

# 3.3.3 Final Evaluation of Alternatives

## A. OPTION 1A

### CODE UPGRADES

- a. Prospective Site Analysis
- b. Construction Impact
- c. Structural Systems
- d. Site Utilities
- e. Building Systems

## B. OPTION 2A

### RENOVATION ONLY

- a. Prospective Site Analysis
- b. Construction Impact
- c. Concept Drawings
- d. Structural Systems
- e. Site Utilities
- f. Building Systems

## C. OPTION 3A

### RENOVATION ADDITION

- a. Prospective Site Analysis
- b. Construction Impact
- c. Concept Drawings
- d. Structural Systems
- e. Site Utilities
- f. Building Systems

## D. OPTION 4A

### NEW CONSTRUCTION

- a. Prospective Site Analysis
- b. Construction Impact
- c. Concept Drawings
- d. Structural Systems
- e. Site Utilities
- f. Building Systems

## E. OPTION 4B

### NEW CONSTRUCTION

- a. Prospective Site Analysis
- b. Construction Impact
- c. Concept Drawings
- d. Structural Systems
- e. Site Utilities
- f. Building Systems

## F. COST ESTIMATES

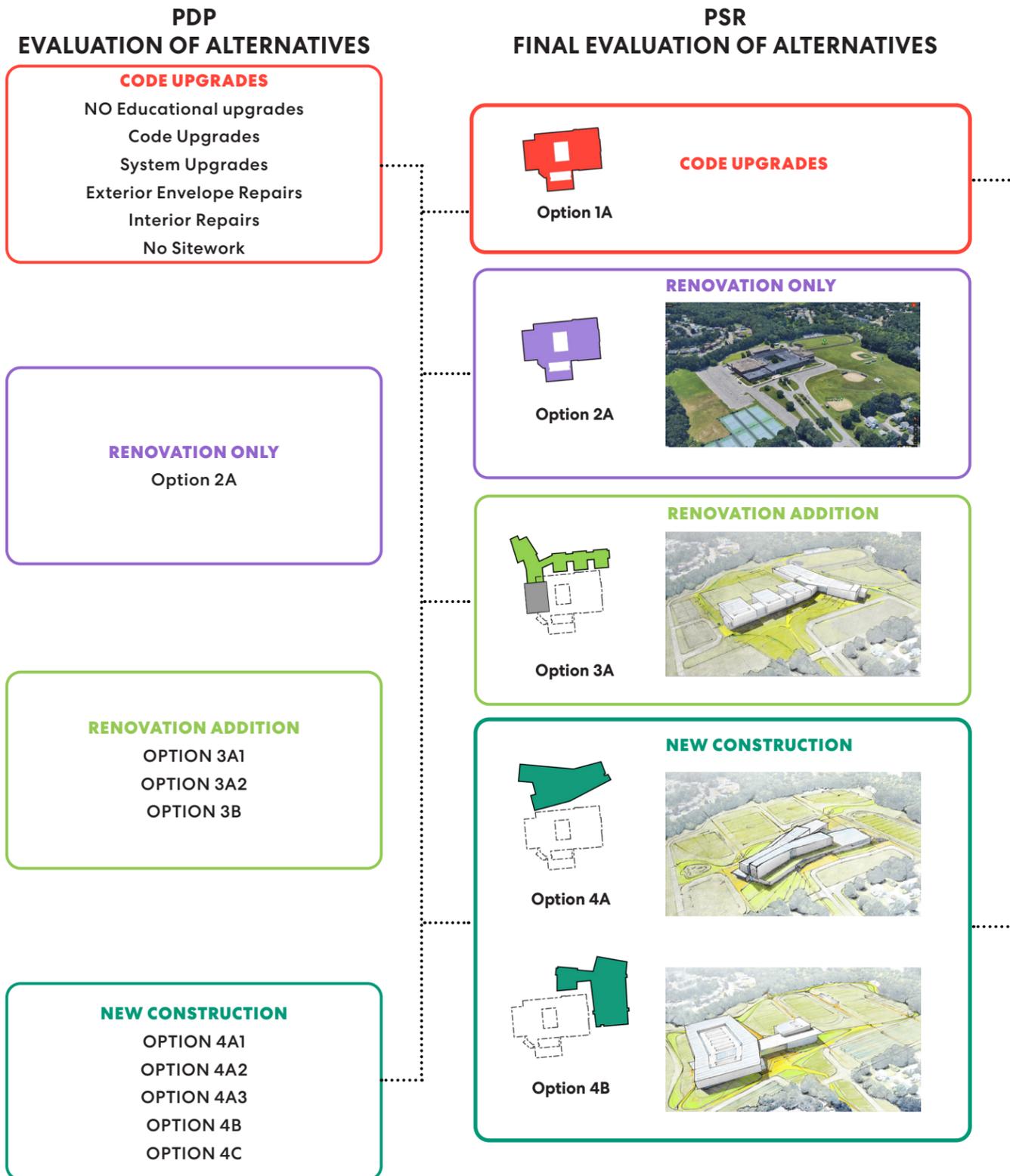
## G. PERMITTING REQUIREMENTS

## H. DESIGN & CONSTRUCTION SCHEDULE

## I. PRELIMINARY DESIGN PRICING

## J. QUALITATIVE MATRIX

MATRIX OF ALTERNATIVES



MATRIX OF ALTERNATIVES

The Stoneham School Building Committee (SSBC) ensured a thorough community engagement process throughout both the PDP and PSR, in a consistent effort to ensure that every voice was heard. On September 28, 2020 the SSBC discussed the pros and cons of the 10 options developed during PDP, and narrowed the list of Alternatives down to 5 options which were further explored in the PSR phase.

The five final options consisted of the following:

1. OPTION 1A: Code Upgrade
2. OPTION 2A: Renovation Only
3. OPTION 3A: Renovation Addition
4. OPTION 4A: New Construction
5. OPTION 4B: New Construction

The decisions that lead to the determination of the final options have been reviewed in Section 3.3.1 Introduction.

The SSBC, Design Team, and the Stoneham Community collaborated through an in-depth evaluation of each final option. The analysis and presentation of each option included: site diagrams, an updated site plan with strategies on pedestrian and vehicular circulation, parking, entry, athletic program organization, phasing plans, floor plans, and sections as needed, with pros and cons for consideration.

Zero Net Energy research, energy modeling, and recommended approaches were also advanced during PSR and was reviewed during the 12.7.2020 SSBC meeting (see 3.3.4 for further information).

After all options were presented and iterated upon based on SSBC & Community feedback, the Committee had further discussions on the New Construction options before taking a final vote where Option 4B was selected.

**PSR PREFERRED SOLUTION**

**NEW CONSTRUCTION**

**Option 4B**

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**OPTION 1A: CODE UPGRADES / SUMMARY**

GSF: 208,113 SF

<b>Estimated Construction Cost:</b>	<b>\$92,664,325</b>
<b>Estimated Soft Cost (17%):</b>	<b>\$22,859,474</b>
<b>Estimated Project Cost*:</b>	<b>\$115,500,000</b>
<b>Approximate Cost to Stoneham:</b>	<b>\$62,900,000</b>



*\*Project cost - all costs should be considered preliminary based on order of magnitude*

The Code Upgrade option retains the existing Stoneham High School building in its current configuration. The facility was originally built in 1968 as a Junior High School and a small addition was added to the facility in 1981 and reopened as a High School. The existing systems have not been upgraded and/or replaced since the building was constructed 58 years ago and added to 39 years ago. The current square footage of the existing Stoneham High School is 208,113 gross square feet, which is close to the proposed educational program for the new facility. However, most of the buildings infrastructure and systems contain original equipment and has reached the end of its useful life. In addition, the Stoneham High School does not have the physical spaces to support the needs of a 2st century educational facility.

Massachusetts Amendments to the International Building Code 2015 (IBC 2015) and reference code "International Existing Building Code 2015" (IEBC 2015) is required. The intent of the IEBC (and the related Massachusetts Amendments to IEBC) is to provide alternative approaches to alterations, repairs, additions and/or a change of occupancy or use without requiring full compliance with the code requirements for new construction.

The Evaluation of Existing Conditions report is location in Section 3.1.4. This section includes more detailed lists of the building, systems, and site deficiencies requiring upgrades and/or replacement to meet code requirements for the Code upgrade only, with no educational-related modifications. MSBA would support a code upgrade option if it fulfilled the significant components identified in the SOI and if it was reported to support delivery of the district's educational program, which it does not.

The construction phasing of the Code Repairs Option would require significant moving of students around the existing facility or off site to complete the extensive-phased upgrades and renovations at the Stoneham High School Facility.

The required upgrades in the Code Option include, but are not limited to, interior finishes, replacement of windows, envelope repair, replacement of all MEP systems, life safety, and accessibility upgrades. It should be noted that if any repairs, renovations, additions, or change of occupancy are made to the existing structures, compliance with 780 CMR, Chapter 34 "Existing Building Code" (Massachusetts Amendments to The International Existing Building Code 2015) of the

**CONSIDERATIONS**

- The school will meet the building code and ADA
- The school will have new HVAC, Plumbing and Electrical systems
- Hazardous materials will be abated
- The base repair renovations will not meet any capacity requirements.
- The base repair renovations will be a costly option with no educational upgrades.
- A lengthy disruption to the students for only systems upgrades.
- Accessible swing space serving the students needed for construction

**OPTION 1A: CODE UPGRADES**



**A. PROSPECTIVE SITE ANALYSIS**

The Code Upgrades option addresses the deteriorated physical conditions and code non-compliance. Site repairs are limited to repairing deficient areas and extending the life cycle of the site materials without any changes to the site layout. Areas on non-code compliance will be addressed to meet current minimum code. Scope of repairs includes but is not limited to pulverizing, blending and repaving all vehicular asphalt paving, replacement of all curbing, manhole rim resetting, parking/traffic striping, walkway pavement replacement in kind (asphalt and concrete). Code compliance includes the addition of accessible walks to all exterior doors and to each athletic field, adding pedestrian guardrails and handrails where required and installation of accessible ramps and curb cuts.

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OPTION 1A: CODE UPGRADES



B. CONSTRUCTION IMPACT

Option 1A would require major renovations within the existing occupied school and would be undertaken in 3 or 4 phases.

Modular classrooms (estimated 28) would also be required on site to provide necessary swing space during renovations. The anticipated construction schedule is 48 months.

Work under this would be very disruptive to students and staff. Students would be forced to move three to four times to accommodate the multiple construction phases. Disruption from noise, dust, odors and construction traffic could be anticipated.

The detailed plan for phasing and swing space would be determined during schematic design to best coordinate with the educational programs to minimize the impact on students and staff.

DESIGN AND CONSTRUCTION SCHEDULE

Anticipated MSBA Approval of PSR	January 13th, 2021 (MSBA Board Meeting)
Anticipated MSBA Approval of SD	August 25th, 2021 (MSBA Board Meeting)
Special Town Meeting/Ballot Vote	November 2021
Design Development Complete	November 2021 - April 2022
Construction Documents Complete	May 2022 – November 2022
Bid and Award	November 2022 - January 2023
Construction (multiple phases)	June 2022 – June 2026 (48 months)

OPTION 1A: CODE UPGRADES



C. STRUCTURAL SYSTEMS

STRUCTURAL SYSTEMS – OPTION 1A (Code Upgrades Only)

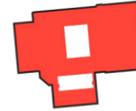
This option considers Upgrades related to Energy Codes, Fire Safety and Accessibility only. Classrooms are anticipated to remain in place without any program changes. One elevator may be added as part of the accessibility upgrade program. The Option 1A renovates less than 50% of the overall existing area and is considered Alteration Level 2 as defined by the International Existing Building Code. Repairs are anticipated as noted below.

Each building structure/component is discussed separately.

1. 1968 Original Building

- a. Expansion joints within classroom wing, unit B, are deliberate but do not appear to be executed correctly across the trades. This would require further investigation. We recommend carrying \$50,000 for addressing structural aspect of this at each of the four expansion joints.
- b. There were several incidences of past water intrusion observed through walls, floor and ceiling of the mechanical rooms. The source of the moisture should be identified and addressed. At minimum we recommend sealing these cracks by injection grouting or other suitable means.
- c. There are instances of exposed rebar in the concrete roof structure above the classrooms. Most of these spalls appear to have been caused during construction and are not structurally significant. These interior spalls may remain unaddressed unless they are active or cause aesthetic issues.
- d. Consistent horizontal cracks were observed at the same vertical height above grade on a series of exterior columns. They appear at locations likely to have been construction joints during original casting in place. We recommend routing, patching and sealing these joints to protect reinforcement bars from elements.
- e. Instances of diagonal cracks along the exterior brick veneer were observed. We recommend repointing of bricks at these locations.
- f. The steel lintels supporting masonry openings appear to be generally in good condition with no substantial rusting. However, based on our experience with buildings of this vintage we recommend carrying an allowance for cleaning and re-painting of lintels.
- g. Cast in place concrete overhang/sunshades run along the length of the building. Horizontal delamination is observed in some of the overhangs leaving the reinforcement steel susceptible to damage from standing environmental water. We recommend this be repaired in order to slow down the process of deterioration. Carry 20% of overhangs to be repaired by chipping out any loose concrete, cleaning the rebar and repair with new concrete applied from top. About 10% of these overhangs may require replacement.
- h. Spalling on exterior faces of concrete columns observed at multiple locations. We recommend patching of the spalled concrete. Estimate 5% of the exposed column surface areas to be patched.
- i. The retaining wall at the loading dock displays a prominent vertical crack that appears to run through the thickness of the wall. This crack has most likely developed due to displacement incompatibility caused by pressure differential. This crack does not pose structural concern and may be repaired to protect the rebar from the elements. Clean cut to create a joint, project the exposed bars from elements and re-grout the joint. One location.
- j. Allow for elevator pit addition, floor penetrations and steel framing to support the floor penetrations for the elevator.
- k. Carry adequate cutting and patching of slab on grade for the foundation work as well as trenching for utilities under the building.

OPTION 1A: CODE UPGRADES



C. STRUCTURAL SYSTEMS

- I. Seismic upgrade is not required under this design option. We recommend the voluntary upgrade described in Option 2A.
- 2. 1981 Expansion Classroom Wing
  - a. Considerable water damage at ceiling level is observed in numerous classrooms of the new wing. School staff indicated that most leaks are addressed and that historically there have been more occurrences of leaking than normal with a building of this age. Carry roof deck repair for about 2% of the deck area of this wing.
  - b. The roof deck of the addition has a continuous separation where the corridor from the original building turns in to the corridor of the addition. The joint does not appear to be executed properly, potentially leading to failure of roofing elements causing leaks. We recommend this joint be appropriately addressed as part of roof repair/replacement project. Cut the deck to install 1" clear joint along the full length of the 1981 expansion.
- 3. Gymnasium
  - a. North columns appear to have been cracked near the top at the connection with the precast tee flanges. It is likely that the connection between the roof frame and the columns were not properly executed causing distress under environmental effects. We recommend that the column tops be repaired and the connection detail be corrected.
  - b. Carry allowance for structural slab repair for potentially spalling concrete due to sustained dampness in the locker area. Assume 15% of the area of the locker room ceilings and storage ceilings. Chip loose concrete, clean rebar with wire brush/sand blasting, provide protective coating and apply repair concrete using techniques such as microcrete or shotcrete.
  - c. Exterior framed stairs serving the gym suffer from concrete spalling at multiple locations. We recommend that the rust be thoroughly cleaned off of the reinforcement bars and the spalling concrete be patched and repaired.
  - d. Spalling, cracked concrete and exposed rebar were observed at multiple spots along the exterior frames (mainly columns) supporting the gym. Some attempts of prior patchwork have also come undone. We recommend that the rust be thoroughly cleaned off of the reinforcement bars and the spalling concrete be patched and repaired.
  - e. Seismic upgrade is not required under this design option. We recommend the voluntary upgrade described in Option 2A.
- 4. Auditorium
  - a. A notable, near vertical crack in the masonry was observed on the stage left wall of the stage house. The crack does not appear to be moving anymore. We recommend grouting and sealing this crack.
  - b. Seismic upgrade of the Auditorium is not required under this design option. We recommend the voluntary upgrade described in Option 2A.

OPTION 1A: CODE UPGRADES



D. SITE UTILITIES

OPTION 1A – CODE UPGRADE / SITE UTILITIES

Site Utilities

Stormwater

No work on the existing stormwater system would be performed under the code upgrade option.

Sanitary Sewer

Work on the sanitary sewer system would be limited to the installation of a new external grease-trap for the sanitary flows from the cafeteria. The new grease trap would be a 6,000-gallon precast concrete below-grade structure with a new 6-inch sanitary service from the kitchen/cafeteria and a new 6-inch connection to the on-site sanitary sewer system. A 4-inch PVC vent would be required from the new grease-trap back into the building.

Water

A new fire service connecting to the existing site water main would be constructed for the code upgrade option. The service would be a 6-inch, cement-lined, ductile iron pipe. In addition, a new site fire hydrant would have to be installed within 100 feet of the new fire department connection.

Natural Gas

No work on the existing natural gas system would be performed under the code upgrade option.

Permitting

Under the code upgrade option, no site permitting would be required. Any exterior work would be done near the existing building and would be outside of any wetland jurisdictional area.

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OPTION 1A: CODE UPGRADES

E. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



OPTION 1A – CODE UPGRADE / FIRE PROTECTION & PLUMBING

**Fire Protection**

To comply with current codes, this building will require a complete sprinkler system installation per the Massachusetts State Building Code, Chapter 34. The Fire Protection system would be designed to meet the requirements of NFPA 13 “Installation of Sprinkler Systems” and Chapter 9 of the Massachusetts State Building Code, 780 CMR, “Fire Protection Systems”.

A new dedicated 6" sprinkler service, connected to the town water system in the street, should be brought into the building. The exact entrance location will need to be coordinated with the Architect. As the sprinkler service enters the building a Massachusetts approved double check valve backflow preventer assembly, complete with OS&Y valves on the inlet and outlet, will be required.

The building will be protected by three types of sprinkler systems and each will protect the following areas:

- Wet sprinkler system – base building system
- Dry sprinkler system – to protect areas subject to freezing, i.e. loading docks and outdoor walkways covered by building overhangs, etc.
- Pre-action sprinkler system – to protect the MDF room

The alarm check valves for the wet and dry sprinkler systems will be installed on separate risers after the double check valve assembly in the water service entrance room. The alarm check valves will be complete with standard trim packages including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches. The dry alarm valve will be supplied with an air compressor and associated appurtenances.

The main feeds out to the system from the alarm check valve will extend out to the building through the first-floor ceiling space. The piping will then extend to all areas of the building so that each section of the building and each floor can be divided into separate zones.

Due to the building being only two stories high, the Massachusetts State Building Code does not require a standpipe system to be installed. However, regulations governing Auditoriums and Stages will require standpipes at each side of the backstage areas.

The sprinkler system risers will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control assembly off of the sprinkler riser that feeds each floor will contain a flow switch and tamper switch. An inspector’s test connection will be installed on the floor control valve station. If the stage is greater than 1,000 square feet, then fire department valves will be required on each side of the stage.

In ceiling types of gypsum or acoustical tile, sprinkler heads will be glass bulb, quick response, chrome plated, semi-recessed type. In areas where ceilings are not present, brass upright sprinklers will be installed. Where upright sprinklers are subject to potential damage, such as

OPTION 1A: CODE UPGRADES

E. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



in storage rooms or gymnasiums, protective cages will be installed. In areas where it is not possible to run piping above the ceiling, the use of sidewall sprinkler heads would be recommended.

The MDF room will be protected by a pre-action sprinkler system. A pre-action alarm valve with all required appurtenances will need to be located next to, or near, the MDF room. Piping from this valve will extend into the room and connect to sprinkler heads. The piping system will be filled with compressed air. Once a sprinkler head activates, the air will discharge and open the pre-action alarm valve to allow water into the system and through the open sprinkler head.

Sprinkler piping for the system will be as follows:

- Piping 2" and smaller shall be schedule 40 black steel with cast iron fittings with threaded joints.
- Piping 2 ½" and larger shall be Schedule 10 black steel with malleable iron fittings with rolled grooved joints.
- Dry sprinkler systems will be supplied with Schedule 10 galvanized piping throughout.

All tamper and flow switches installed on the sprinkler system will be connected to the buildings fire alarm system. Each tamper and flow switch will be a dedicated point on the fire alarm system.

The exterior fire department connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. Final location of this connection will be coordinated with the Stoneham Fire Department. An additional fire hydrant may need to be added on the site to be within the required distance of this connection.

The hydraulic requirements for the building will be as follows:

- Light Hazard - All offices, corridors and the auditorium hydraulically calculated to deliver 0.1 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard - All storage rooms and mechanical rooms hydraulically calculated to deliver 0.15 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard Group II - The stage area hydraulically calculated to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

**Plumbing**

Plumbing Fixtures

All water closets, urinals and lavatories in the existing building are old and not current water conserving type. Removal of all fixtures is required as the existing fixtures have reached the end of their serviceable life. Water closets should be replaced with new dual flush valve fixtures. A full flush will discharge at a rate of 1.6 gallons per flush (gpf). When only flushing liquid waste and paper, the reduced flush rate will be 1.1 gpf. Urinals should be replaced with 0.25 gpf fixtures. Lavatories should be replaced and new low-flow type faucets (0.5 gpm or less) added with temperature limit stops which will deliver water with a maximum temperature of 110°F. ADA requirements for fixture spacing, mounting heights and protection of any exposed piping will also need to be met during a renovation to the bathrooms.

The state plumbing code dictates the number of plumbing fixtures required in a building. Minimum plumbing fixture requirements will be determined once the total occupancy numbers for the building have been established based on the final plan layout.

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E. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



Domestic Cold Water Systems

The 4" water line that enters the building is the original service to the building and appears to be adequate to meet the current building domestic water and non-potable water requirements. The replacement of the existing water meter is recommended at this time.

Domestic Hot Water System

The existing boiler and storage tank providing hot water to most of the school, as well as the storage type heater serving the kitchen, have passed their useful life expectancy. It is recommended to install new gas-fired storage type water heaters in the same locations as the existing. It is also recommended that redundant water heaters be included in the new system design. This would allow the system to continue to deliver hot water if one of the water heaters were to need service. The water heaters would be sized to serve all fixtures within the building. A new gas-fired heater should also be provided to serve the needs of the renovated kitchen equipment.

Sanitary and Vent System

The sanitary system in the existing building appears to be in fair condition but replacement may be required as a consequence of a possible fixture count change and probable relocation of fixtures in the renovation plan. Any new piping would connect to the existing waste and vent piping at a convenient point to be determined by further investigation.

Storm Drainage

The existing building roof drainage appears to be in good condition and no replacement is required. The roof itself appears to be in good condition and leaks around the roof drains themselves have not been reported.

Backwater valves should be installed on all interior storm system piping originating from roof drains on lower roof sections as per the state plumbing code.

Natural Gas System

Currently the existing gas service is more than adequate to meet the school's demand requirements and should remain. Gas piping should be reconfigured to serve all mechanical equipment that will require gas. Any new gas-fired kitchen equipment should also be connected to this service. It is recommended that gas sub-metering be used to separately meter gas consumption for the mechanical equipment and kitchen uses.

Insulation

The insulation that currently exists should be tested to determine the extent of any hazardous materials. The insulation should be removed and replaced with new fiberglass insulation with an all service jacket. Piping to remain, which is not currently insulated, should have new insulation installed. All new domestic water and horizontal storm water piping will be insulated.

Insulation will also need to be provided on waste piping and water piping below handicapped accessible lavatories and sinks.

Hose Bibbs and Wall Hydrants

During any renovation done to the building, the existing hose bibbs in the toilet rooms should be removed and new wall mounted hose bibbs with an integral vacuum breaker and

OPTION 1A: CODE UPGRADES

E. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



removable tee handle installed. New wall hydrants will be provided on the exterior of the building and their locations coordinated with the architect.

Cross Connection Control

As stated previously, the existing hose bibbs and wall hydrants do not have backflow prevention devices. Backflow devices will be integral to all new hose bibbs and wall hydrants installed during the renovation.

All service sink faucets installed during a renovation will also have integral vacuum breakers.

A new reduced pressure backflow preventer assembly should also be installed on the existing 4" domestic water service to further protect the town's domestic water system.

Boys and Girls Locker Room/Shower Areas

All locker room/shower areas should be completely renovated. Floor drains within any new shower stalls should be arranged so that the water from one shower does not enter into the adjacent shower area. New shower valves should be installed with code compliant shower heads. Master mixing valves should be installed at each shower location. Valves shall be provided with limiting stops set to a maximum water temperature delivery of 112°F.

All plumbing fixtures will be replaced as discussed in the "Plumbing Fixture" section of this report.

Kitchen

If kitchen renovations include the addition of new or replaced gas-fired equipment, this equipment can be connected to the new gas service located outside the building as noted above.

Any new gas equipment would be fed by gas piping connecting to a master shut-off valve that would be interconnected with the kitchen hood and exhaust system. Gas would only operate as long as the kitchen hood exhaust system is operating.

Additional floor sinks and/or floor drains would be added to any new equipment design to ensure proper drainage throughout the kitchen.

A new three-compartment sink with new grease trap should be included per state code requirements.

A new dishwasher with accompanying grease trap should also be provided per state code requirements.

A new exterior grease trap, located underground, outside of the kitchen portion of the building will also need to be considered as part of any new design or renovation to the kitchen. Venting of this exterior grease trap should enter back into the school building and exit to the atmosphere above the roof.

Science Classrooms

If the existing science classrooms are to be renovated in their current locations, all existing lab sinks, and faucets should be replaced with new fixtures. Faucets should be low-flow type fixtures with a maximum delivery rate of 0.5 gpm.

OPTION 1A: CODE UPGRADES

E. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



The existing lab waste chip tank system should be removed in its entirety and replaced with a new polypropylene acid resistant piping system that empties into a central acid neutralization tank and system. This system would balance the pH of the lab waste and then safely discharge it into the regular sanitary waste system before it connects back to the town's sanitary waste system.

The existing hot and cold water systems serving the science wing should also be removed in their entirety. New protected hot and cold water systems should be created to serve the renovated science wing by installing reduced pressure backflow preventers on the hot and cold water piping designated to serve this area.

The existing main gas piping system serving the science wing could possibly be re-used. This piping should be reconnected to the new gas service in a convenient location. Gas piping to each science classroom should feed an emergency shut-off valve located in a valve box on the wall near the classroom exit door. Piping from this valve would then feed any gas turrets within that classroom only.

All existing emergency showers in the science wing and connections to the cold water system should be removed. A new tempered water system should be created to serve the science wing. A new gas-fired water heater should be installed somewhere within the science wing and be dedicated to the new tempered water system. Water should be stored at 140°F and a master mixing valve should be mounted nearby and set to deliver tempered water to this wing at approximately 70°F-90°F per state plumbing code requirements.

Pipe Materials

Below grade sanitary and storm drainage piping will be service weight bell and spigot cast iron with neoprene gasketed joints.

Above grade sanitary and storm piping will be service weight hubless cast iron with Massachusetts approved stainless steel and neoprene no-hub connector assemblies.

All lab waste piping will be Schedule 40 polypropylene with electrical heat fusion joints. Mechanical joints may be utilized for lab waste piping within laboratory furniture.

All water supply and return piping shall be Type "L" copper.

All water supply and return piping insulation shall be in accordance with the Energy Code.

All gas piping will be threaded black steel piping up to 2 1/2" size. Piping 3" and larger shall be welded.

OPTION 1A: CODE UPGRADES

E. BUILDING SYSTEMS / HVAC & ELECTRICAL



I. PROJECT OVERVIEW

A. The existing Stoneham High School is approximately 221,000 sf on two levels. The Design Alternatives include Renovation (Option 2A), Renovation and Addition (Option 3A) and New Construction (Options 4A and 4B). All of the alternatives are approximately 207,000 sf. The anticipated program elements include:

1. Education classroom spaces (approx. 56,000 sf)
2. Gymnasium and support spaces (approx. 28,000 sf)
3. Kitchen and Cafeteria Space (approx. 7,500 sf)
4. Vocational / Technical Spaces (approx. 11,000 sf)
5. Media (Auditorium and Support) Spaces (approx. 15,000 sf)
6. Arts Classrooms (approx. 6,000 sf)
7. Entry and Administrative areas (approx. 23,000 sf)
8. Mechanical/Electrical and Misc Spaces, Circulation, etc (approx. 60,000 sf)

B. The purpose of this narrative is to describe the intended HVAC and Electrical systems required to achieve the goal of a Net Zero Energy facility. Therefore, for all of the design alternative options, we shall assume the removal of the existing systems and providing new systems as described in the sections below.

II. HVAC AND ELECTRICAL SYSTEMS OVERVIEW AND SCOPE OF WORK

A. HEATING, VENTILATING, AND AIR CONDITIONING

1. The heating, air conditioning and ventilation systems shall be high-efficiency systems that will contribute towards the goal of achieving a Net Zero Energy facility.

2. Existing Systems:

a. The existing rooftop unit, exhaust fans, air cooled split type units, unit ventilators, heating and ventilating ceiling mounted air handling units and heating units, along with all associated ductwork, piping, controls, existing boilers, etc will be removed.

3. New Systems:

Option 1: Geothermal Heating/Cooling System

a. Ground Loop Geo-Exchange System:

1) A vertical borehole well field consisting of (225) 6-inch diameter boreholes spaced 20 feet apart shall be provided. Each borehole shall be 400 to 500 feet deep. Actual depth to be determined based on thermal conductivity testing performed on a test well. The number of boreholes may be increased or decreased based on thermal testing results and/or determination of the final heating and cooling loads.

2) Provide a 1-1/4 inch supply and return pipe within each borehole with a U-bend at the bottom. Piping shall be high density polyethylene (HDPE) with DR9 wall thickness. Polyethylene pipe and fittings shall be heat fused by butt, socket, sidewall, or electrofusion in accordance with pipe manufacturer's procedures. Underground supply and return piping from boreholes shall collect to four buried circuit vaults constructed of HDPE or concrete. Supply and return circuit piping in each vault shall combine to 8 inch main header piping which shall be routed into the building.

3) Steel sleeve casings shall be provided for the upper section of each borehole down to bedrock. Each borehole shall be filled with a bentonite based thermally enhanced grout mixture.

b. Central Heating and Cooling System:

1) Central geothermal heating and cooling shall be provided by two high efficiency 275 ton (approx. nominal capacity) heat recovery chiller-heaters or modular chiller-heaters connected to the ground loop system. If two larger chillers are utilized in lieu of a modular chiller solution, an additional 60 ton modular chiller shall be provided to address low load conditions.

The ground loop circulation system shall be filled with 30% propylene glycol solution and shall be served via a primary and secondary pumping scheme.

a) Chiller-heater condenser water shall be constant flow primary with zero pressure bypass connections to the ground loop distribution and the building heating distribution. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a

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vertical inline pump and shall have a 10 horsepower motor.

b) Secondary condenser/heating pumps shall be variable flow with variable frequency drives. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 15 horsepower motor.

3) Chilled water distribution from chiller evaporators to building distribution shall be variable primary flow pumps. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 25 horsepower motor.

4) The building circulation loop shall consist of a four-pipe distribution. The main distribution to heating/cooling terminal units in the building shall be four-pipe. Rooftop air handling units, heat recovery air handling units, and central air handling units shall also be four-pipe configuration.

5) The building loop piping system shall contain a 30% propylene glycol solution for freeze protection and corrosion protection.

6) The building terminal heating units will be designed to utilize low temperature heating supply water (130°F maximum). Heating terminal units such as fin tube radiation and heating coils may require larger surface areas due to the low water temperature. In areas with high heating loads, two-row fin-tube and heating coils may be required.

**c. Classrooms – Sensible Fan Powered Terminal Unit System:**

1) The system serving heating, cooling and ventilation for typical exterior classrooms shall utilize four-pipe, ducted, ceiling mounted sensible fan powered terminal units.

2) The primary supply air serving each classroom shall be provided via the fan powered terminal unit with a hot water coil and a sensible cooling coil. Each classroom shall have a terminal unit.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling

and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

**d. Classroom and Interior Ventilation Systems:**

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. The units will be provided with a hot water pre-heat coil and a chilled water cooling coil. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

3) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

4) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

5) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

**e. Miscellaneous Areas:**

1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

- a) Gymnasium – 25,000 cfm RTU
- b) Cafeteria – 8,000 cfm
- c) Auditorium – 10,000 cfm
- d) Administration – 20,000 cfm

2) Rooftop air conditioning units (RTU) will include supply

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fan, return fan, hot water heating coil, chilled water cooling coil, filters, variable frequency drives and total energy recovery.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils for zone temperature control.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**Option 2: Variable Refrigerant Flow (VRF) Heating/Cooling System**

**a. Central Heating and Cooling System:**

1) Heating and cooling shall be accomplished via multiple air cooled heat recovery, simultaneous heating and cooling, VRF systems, totaling 550 tons.

2) The systems shall be capable of operation down to negative 25F, minimum, ambient temperature.

3) The air cooled condensing units shall be located on the roof.

4) Refrigerant piping (liquid and suction) shall be run from the condensing units to branch controller modules located throughout the building. Branch refrigerant piping (liquid and suction) shall be run independently from each branch

controller module to each VRF fan coil unit.

**b. Classrooms:**

1) Space heating and cooling shall be accomplished via VRF fan coil units. The VRF may be ceiling mounted (ducted or ductless) or console type based on the space application.

2) Ventilation air serving each classroom shall be provided with a variable air volume terminal unit with a hot water reheat coil.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

**c. Classroom and Interior Ventilation Systems:**

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. Each unit will be provided with a dedicated heat pump type VRF condensing unit. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

2) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

3) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

4) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

**d. Miscellaneous Areas:**

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1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

- a) Gymnasium – 25,000 cfm RTU
- b) Cafeteria – 8,000 cfm
- c) Auditorium – 10,000 cfm
- d) Administration – 10,000 cfm

2) Rooftop air conditioning units (RTU) will include supply fan, return fan, filters, variable frequency drives and total energy recovery. Each unit will be provided with a dedicated heat pump type VRF condensing unit.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils to provide ventilation air. The Administration area shall also have VRF terminal units connected to the main VRF system.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

4. Building Management System (BMS):

- a. Provide direct digital control (DDC) BMS with local and

unitary controls and web interface for remote access, alarms, and monitoring of all HVAC equipment in the building.

b. BMS system shall be interfaced to the building electrical and gas sub-meters. Daily, weekly, and annual energy use shall be reported for each meter.

5. BTU Metering:

- a. Provide BTU metering of chilled water, hot water and ground loop circulation systems.

III. ELECTRICAL

A. Demolition / Existing Electric Services:

1. All existing services shall be disconnected and removed from the building. Coordinate with the respective utility company and include all work required for the removal of all existing utility services that become abandoned including power, telephone, cable TV, and fire alarm services.

2. Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of demolition of the existing buildings include disconnecting all services and making safe the existing structure for complete demolition.

3. Include maintaining the operation of existing site equipment required during construction.

B. New Main Electric Service:

1. A new primary service will be provided from utility company primary services via an underground ductbank and manhole system to a new utility company pad mounted transformer.

2. Secondary service from the new pad mounted transformer will be underground to a new 5000 Amp main switchboard at 480/277V, 3-phase, 4-wire. Switchboard will be located in a new main electric room.

C. New Normal Distribution System:

- 1. Main switchboard will be provided with surge protection

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E. BUILDING SYSTEMS / HVAC & ELECTRICAL

(SPD) and ground fault protection on main and feeder devices.

2. Surge protection will be provided in all 120/208V panelboards.

D. New Emergency Distribution System:

1. A 2 MW diesel emergency generator will power emergency egress lighting and exit lighting in corridors, assembly areas, and stairwells. Miscellaneous systems to include the following:

- a. IT head-end equipment (located in the MDF Room).
- b. Cooling equipment for school IT equipment.
- c. Security system.
- d. Fire alarm system.
- e. Circulator pumps and controls.

2. Separate automatic transfer switches shall be provided for emergency and non-emergency loads.

3. In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.

- a. Additional lighting in Gymnasium, Cafeteria and associated toilets and corridors.
- b. HVAC (heating, cooling and ventilation) equipment associated with the Gymnasium, Cafeteria and associated toilets and corridors.
- c. Receptacles in Gymnasium and Cafeteria.

4. Generator will be mounted at grade at the exterior of the building in a self-contained sound attenuated enclosure with an integral base mounted fuel tank. Generator will be mounted on an elevated concrete platform for survivability.

5. Emergency panels will be located in new two-hour rated electric closets.

6. Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.

7. Emergency feeders run outside two-hour electric rooms and shafts and not in or under floor slab will utilize MI Cables.

8. A portable generator connection will be provided to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.

E. Sustainable Design Intent:

1. Sustainable Design Intent compliance will include:

a. Advanced measurement and verification of air conditioning, fans, lighting, and receptacle power via electronic sub-meters equal to E-Mon, D-Mon Class 2000 3-phase kWh and demand meters. Measurement and verification metering will be monitored by the Building Management System (BMS).

b. Plug and process load reductions through the use of vacancy/occupancy sensor controls for local convenience outlets in classrooms, offices, library and resource rooms. Open areas such as Media Center, Auditorium and Kitchen will be equipped with relay panels controlled via the lighting control system, to reduce loads on a time schedule basis.

c. Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting.

d. Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.

e. Empty conduits and space provisions will be provided for photovoltaic (PV) installations. Include conduits and space provisions for inverters at a minimum of two locations in the upper floor electric closets.

F. Lighting:

1. New luminaires will be provided throughout all renovated areas as well as new construction. Luminaires will be dimmable LED. All luminaires will be suitable for respective utility rebate incentives.

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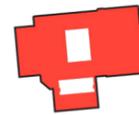
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2. Exterior building mounted around the entire building including all canopies, all entry drives, parking areas, and all walkways will be full cutoff LED type. All exterior lighting will be controlled via the building low voltage lighting control system.

G. Lighting Controls:

1. A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.
2. Manual low voltage override switches to override the time of day lighting control schedules shall be provided. Override switches will permit extension of lighting control program as well as ON-OFF override for exiting the facility.
3. Lighting program for time of day schedules shall permit all lighting, including exterior to be turned off during non-occupied hours, reducing sky glow and light trespass. Activation of either fire alarm or intrusion detection system shall override the lighting program.
4. Vacancy and occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces. In addition, all spaces will be provided with local low voltage dimmable switching.
5. Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight utilizing daylight sensors in each space.

H. Circuitry and Devices:

1. Safety type duplex receptacles will be provided throughout the building in quantities to suit space programming.
2. Plug load reduction will be achieved by vacancy/ occupancy sensors in classrooms, offices, and staff spaces, and circuits routed via relay panels, controlled via lighting control system time schedule for open areas.
3. Provide circuitry for HVAC and Plumbing systems.

I. Fire Alarm:

1. Existing automatic, fully supervised, analog addressable, voice evacuation system will be retained and utilized where

- applicable.
- a. Manual pull stations (with tamperproof covers if applicable), at points of egress, and other locations as required to meet code.
  - b. Audible/visual units in corridors, classrooms, and throughout the building to meet code.
  - c. Visual only units in conference rooms, meeting rooms and small toilets.
  - d. Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms.
  - e. Smoke duct detectors in HVAC units over 2,000 CFM, and within five feet of smoke dampers including connections to all smoke/fire dampers.
  - f. Connections to all Fire Protection devices.
  - g. Connections to audio/visual systems, sound systems, and dimmed lighting controls.
  - h. Remote annunciator at main entrance and secondary entrances as directed by the Boston Fire Department.
  - i. 24 VDC magnetic hold open devices at smoke doors.
  - j. Master box and exterior beacon (quantity of beacons per Boston Fire Department.
  - k. Wiring will be fire alarm MC cable.

J. Technology Systems – refer to the Technology Section.

K. Integrated Intrusion, Access Control, CCTV, and Alarm System:

1. Intrusion alarm system will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade. Motion sensors will be provided in corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs.
2. CCTV coverage will be provided at main and secondary entries as well as all other perimeter entries to be used by students and staff on a daily basis and for off hours

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community programs, including Gymnasium and Cafeteria entries.

3. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.
4. Access control via card access system will be provided at all exterior doors.
5. CCTV system will be an extension of the existing system that is networked with the other schools in Stoneham. System will be web based to allow viewing by the Stoneham Police Department.

L. Miscellaneous:

1. Provide conduit and electrical circuitry for tel/data, security and AV requirements.

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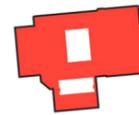
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E. BUILDING SYSTEMS / INFORMATION TECHNOLOGY

OPTION 1A – CODE UPGRADE / INFORMATION TECHNOLOGY

**Structured Cabling System:**

The existing structured cabling system, which consists of a combination of older cabling standards, will be removed and replaced with a new system. The new structured cabling system will consist of a hybrid delivery system comprised of hard-wired data cabling to support fixed workstations where required and high bandwidth, full coverage wireless connectivity. The data cabling channel performance will exhibit Category 6A performance capabilities. The data channel will be comprised of the passive components including cabling, connectors, patch panel port, and patch cords, providing up to a total of four (4) connections between network electronics. The Category 6A channel will be component compliant, capable of supporting 10 Gigabit per second networking. Category 6A data cabling will be provided to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other related equipment. This cabling will support computer network requirements, wireless connectivity, telephone system (VoIP) and IP-based security needs. WLAN cabling will be terminated above the ceiling in typical ACT areas. All data jacks will be color coded. Multiple lengths and colors of patch cables will be provided for closet connectivity.

Educational spaces will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

Admin Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. Nurse's Suite will also be wired for fax.

**Space Requirements:**

The existing technology support spaces will be re-configured to accommodate and support the various technology systems and associated networking hardware. These spaces are MDF/Head End Room, and IDF/Tech Closets.

The MDF will be the central location of all head end equipment including but not limited to servers, storage, switch electronics, security equipment, video equipment, telephone system, public address system and security system. It will be a dedicated space with proper ventilation, environmental treatment and emergency power.

The IDF locations will serve as intermediate closets for local cabling and equipment. The IDFs will be dedicated spaces with proper ventilation, environmental treatment and emergency power. Each closet will connect to the MDF with backbone cabling. IDFs will be located to keep all cable distances within specification limits. The Central Office area will be segmented with its own IDF.

The existing spaces will come offline in accordance with project phasing requirements. The MDF will be built-out in the first phase of construction and connected to new IDFs as they come online.

**Backbone Cabling:**

12-Strands of OM4 Multimode and OS2 Singlemode fiber will be provided between the Head End Room (MDF) and the Tel/Data closets (IDF). This cabling will support all network requirements; wireless connectivity, and VoIP system needs. Multimode fiber will be laser-enhanced and guaranteed for transmission distances in 10 Gigabit Ethernet of up to 500 Meters. All single-mode fiber optic cables will be OS2, tight buffered, high flexibility. All fiber

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E. BUILDING SYSTEMS / INFORMATION TECHNOLOGY

optic cables will be installed in innerduct. Outbuildings requiring connectivity will be treated as IDFs.

Equipment racks will be installed in the MDF and IDFs for patch panels and network hardware. Two-post and four-post racks will be provided. Racks will be 19" EIA floor mount racks with wide floor mounting flanges, vertical cables guides and horizontal cable managers. Power for rack equipment will be installed in cable tray above the racks. Power will consist of both 20A and 30A twist-lock receptacles.

The district fiber must be protected during all phases of construction and relocated to the new MDF location. The existing MDF and the existing district fiber must remain functional until cutover occurs. The existing district fiber must be protected during site work.

**Data Communication Systems:**

The existing networking hardware will be replaced with up-to-date technology. New networking hardware will be provided for the MDF and IDFs consisting of network switch electronics for the data and voice communication systems, distributed communication system, audio-video communication system, security system, wireless LAN and other Owner equipment. Components will consist of PoE+ hardware and power supplies, 10/100/1000 to all endpoints, fiber transceivers, patch cables and UPS equipment. The switches will be fully configured according to network requirements and VLANs will be created according to best practice and equipment requirements. Inter-closet connectivity will be 25Gb or greater via fiber.

**Audio/Visual Communication Systems**

Digital signage will be provided in gathering areas and large group instruction spaces. The system will consist of LED displays, media players, and a server or cloud based digital signage solution.

Classrooms and general instruction spaces will be equipped with a local audio system consisting of ceiling speaker, amplification, wireless microphones and auxiliary inputs. There will be an input available for FM assistive listening systems the Owner may have.

**Distributed Communication System:**

The existing intercom system will be replaced. The new distributed communication system will consist of a fully operational IP platform public address system for district and school internal communications system incorporating school-wide notifications and general announcements. It will provide complete internal communications using state of the art IP technology with two-way loudspeaker internal communication, bell event notification, emergency announcements that will override any pre-programmed zones assuring that all emergency/lockdown announcements are heard at all locations, and atomic time synchronization. The system will connect directly to the high school's LAN and have the future capability of expanding to connect to other intercom systems in the school district over the WAN for district-wide, emergency, and live voice announcements (additional hardware required at the other school facilities for this feature). Configuration of zoning, bell schedules, calendars, and emergency sequences will be accomplished using a browser-based interface.

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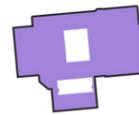
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OPTION 2A: RENOVATION ONLY / SUMMARY

GSF: 208,113 SF  
**Estimated Construction Cost: \$135,140,192**  
**Estimated Soft Cost (20%): \$33,259,808**  
**Estimated Project Cost\*: \$168,400,000**  
**Approximate Cost to Stoneham: \$110,100,000**



\*Project cost - all costs should be considered preliminary based on order of magnitude

**Relationship of Site Organization to Surrounding Context:**

The Stoneham High School site has a number of unique spatial and environmental characteristics. Sitting on the threshold between Stoneham's suburban fabric and the regional resource of the Middlesex Fells, the high school project has the unique opportunity to define the civic interface between these distinct parts of the town. This edge between the environmental preserve (whose immediate character is one of wooded wetlands) and that of local neighborhoods gives the site distinctly different edge conditions that transition from wetland to rock ledge outcropping to tightly spaced single-family homes and apartments. The School's new educational and athletic spaces have the opportunity to improve connectivity and better define the relationship between the school's context and the academic campus.

**Phasing / Existing Utilities**

The existing high school building sits at the center of the site near its highest topographic point. Renovating this structure poses distinct phasing challenges that require new site configurations to consider, potential construction logistics, existing utility lines, temporary access configurations, temporary parking as well as the potential relocation of an existing culverted stream on site.

**Site Scope and Disturbance**

The renovation of the existing building would require a complex phased renovation that requires site area to be converted to temporary classroom space and temporary parking in order to enable construction and site logistics

**Traffic Mitigation / Site Circulation**

The existing site circulation will be upgraded to a two-way vehicular drive with a separate multi-modal path. Parking will extend deeper into the site in order to gain better PreK drop-off access at the back of the building.

**Program Organization**

This scheme organizes the academic neighborhoods around the North, West, and South sides of the existing courtyard. The high school's main entry shifts to align with the East side of the courtyard, which becomes the new dining area, creating a view corridor through the active center of the building upon arrival. Media is stacked above dining on Level 2, completing an open and vibrant multi-level gathering hub. The larger program elements of the Gymnasium, Auditorium, and Kitchen maintain their current locations. The PreK program is independent in the southern wing. However, given the limitations of the existing footprint, not all vocational programs can have close classroom adjacencies and the District Offices do not fit.

**Civic Presence**

The existing school building sits in view of the site's main entry drive at the top of an extended entry drive giving the building a prominent civic presence. The existing entry lacks welcoming outdoor space and is presented through a large parking lot, making vehicles the primary focus of site arrival.

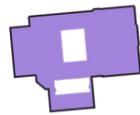
**Learning Environment / Landscape Relationship**

Direct, immediate access to the outdoors is of particular importance as we consider the effects of indoor air quality on classroom learning and infection control. The existing facility's relationship to parking and limited direct access to outdoor learning spaces make efficient use of exterior educational environments less than ideal.

**Daylighting / Solar Orientation**

The school district's admirable goal of executing a zero net energy building requires that the site planning options begin to consider daylighting strategies and envelope efficiency even at this early phase. The renovation of existing space, even with program reorganized, remains compromised as major changes in window shape and orientation are fixed without major structural changes.

OPTION 2A: RENOVATION ONLY / SUMMARY



CONSIDERATIONS

- Variations from Approved Educational Program:
  - District Offices do not fit
  - Larger average classroom size
  - Reduction in MEP spaces
- On-site temporary classrooms required during phased construction
- Minimized change to field layout
- Upgrade existing fields to regulation size fields; Stadium & (2) Soccer/LAX to be turf
- Reorient baseball field
- Pedestrian/bike path from Franklin Street crosses vehicular path
- Improvements to traffic flow

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A. PROSPECTIVE SITE ANALYSIS

Site / Landscape Scope Narrative

This narrative provides an analysis of the options including natural site limitations, building footprint(s), athletic fields, parking areas and drives, bus and parent drop-off areas, site access and surrounding site features. This narrative excludes temporary site facilities, phasing implications, site drainage, utilities and permitting requirements addressed separately.

Paving and Curbing

All building/site options include new asphalt pavement and granite curbing for driveways and parking areas (350 spaces). Fire lanes shall be asphalt paving without curbing. Walkways around the building and site will be accessible.

Athletic Facilities

Since the existing fields are undersized, fields will be reconstructed to meet regulation size in all options. Scope includes replacing the two natural grass soccer/lacrosse fields and the natural grass field inside the track with synthetic turf including a concrete curb edger, shock pad and polyethylene fiber with sand and plant-based infill. The track will have new paving and ½” urethane resilient surface for track and field events (high jump, long and triple jump lanes & pits with covers, pole vault, discus and shot put). The stadium will also include new home and visitor bleachers. All options will include an athletic building for concessions and restrooms. Locker rooms and team rooms are planned in a building below the home bleachers.

Baseball/field hockey and softball fields will be natural grass with seeded, irrigated lawn. Softball and baseball will include classic skinned infield, plates, and bases, aluminum team benches on concrete pads, dugout shelters, backstops and fences with safety caps. Tennis courts will include new paving, color surfacing, nets, fences and gates.

Site Lighting

All options will meet LEED requirements and IESNA standards with site lighting provided at parking, driveways and walkways. LED sports lighting will be provided at the stadium and one of the synthetic turf soccer/lacrosse fields.

Site Amenities

All options will include site furnishings, signage, electrical charging stations and the potential for photovoltaics over parking. Site furnishings will include benches, bicycle racks, vehicular bollards, tables, trash receptacles. Site signage will include traffic/regulatory, wayfinding and monumental school identity signage. Existing memorials will be salvaged and reset. The main entrance will include planter curbs, bollards and seat walls for pedestrian safety. Outdoor classrooms will include supporting amenities such as raised garden beds, storage/tool sheds, water source, fencing, tables and benches. There will be a separate play area for Pre-K with play equipment and poured in place rubber surfacing with a perimeter fence.

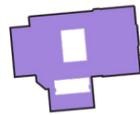
Fences and Gates

All options will include black vinyl coated chain link fencing and gates at the reconstructed softball and baseball/field hockey fields (6-foot high and 24-foot backstop), 6-foot high at reconstructed track, 10’ high at tennis courts. Sports netting will be included as needed. The service drive will include a vehicular barrier gate. There will be an 8’ high perforated or louvered powder coated metal screen fence and gates at service area.

Planting

Planting shall include 3.5-4” caliper trees for shade and ornamental character at parking, driveways, walks plazas and courtyards, approximate spacing 40’ O.C. Limited ornamental landscaping at plazas and outdoor learning, and seeded lawn and landscape restoration areas. Green infrastructure for stormwater management will include vegetated swales, rain gardens and bioretention areas.

OPTION 2A: RENOVATION ONLY



B. CONSTRUCTION IMPACT

The existing Stoneham High School has a gross square footage of 208,113 which falls within a gross square foot range of the proposed educational program of 204,107 GSF. However, due to the existing configuration and location of the major program spaces, the condition and age of the existing building systems (ranging from 39 to 58 years), requirements for seismic upgrades, the overall condition of the exterior shell and interior surfaces, the need for extensive ADA compliance, and the necessity to support 21 century learning through space size, configuration, adjacency and location, a gut renovation would be required at a significant cost to the Town of Stoneham. Option 2A would require major renovations within the existing occupied school and would be undertaken in 3 or 4 phases.

Modular classrooms (estimated 28) would also be required on site to provide necessary swing space during renovations. The anticipated construction schedule is 48 months.

DESIGN AND CONSTRUCTION SCHEDULE

Anticipated MSBA Approval of PSR	January 13th, 2021 (MSBA Board Meeting)
Anticipated MSBA Approval of SD	August 25th, 2021 (MSBA Board Meeting)
Special Town Meeting/Ballot Vote	November 2021
Design Development Complete	November 2021 - April 2022
Construction Documents Complete	May 2022 – November 2022
Bid and Award	November 2022 - January 2023
Construction (multiple phases)	June 2022 – June 2026 (48 months)

Work under these conditions would be very disruptive to students and staff. Students would be forced to move three to four times to accommodate the multiple construction phases. Disruption from noise, dust, odors and construction traffic could be anticipated.

The detailed plan for phasing and swing space would be determined during schematic design to best coordinate with the educational programs to minimize the impact on students and staff.

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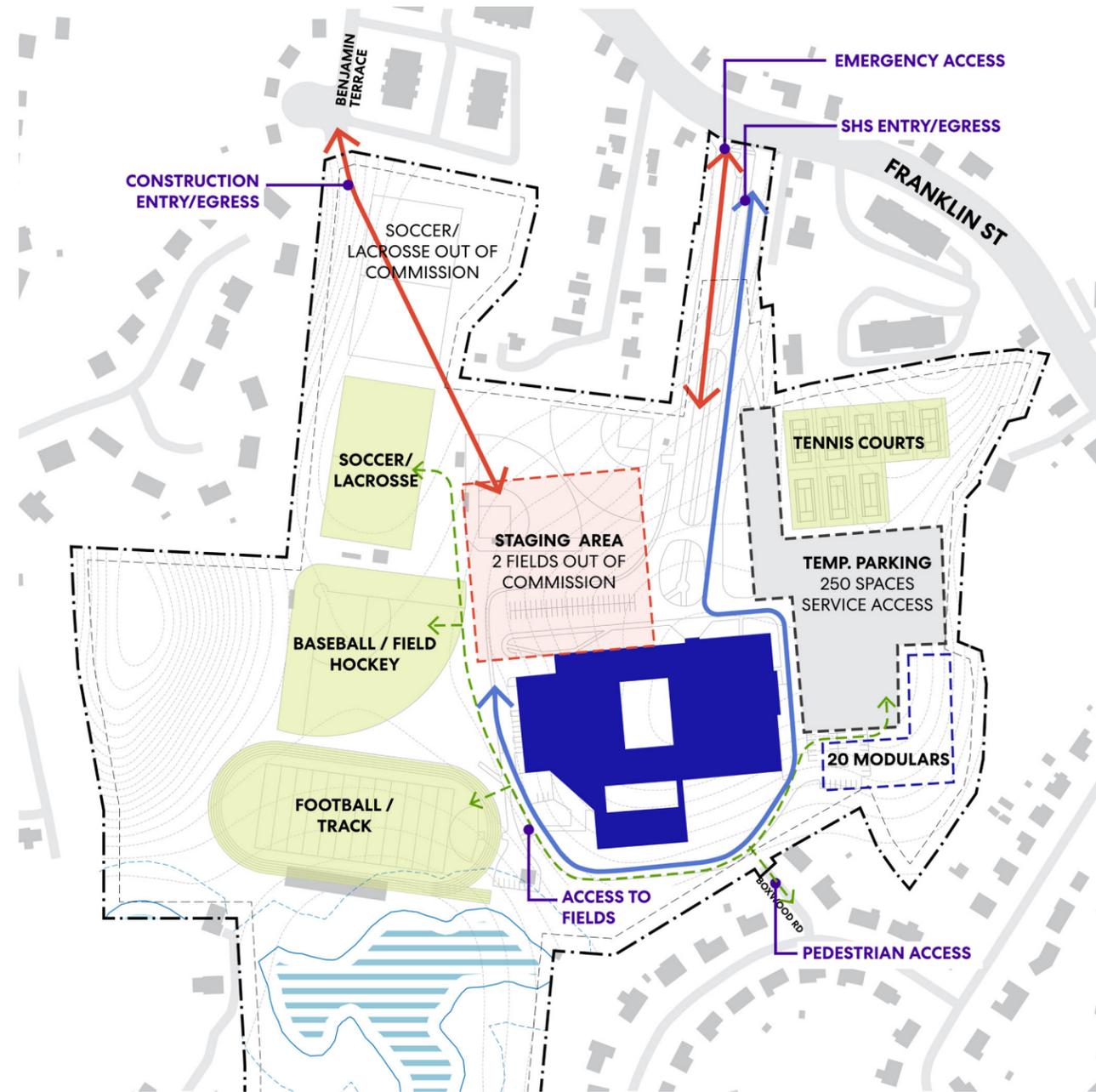
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OPTION 2A: RENOVATION ONLY

OPTION 2A: RENOVATION ONLY

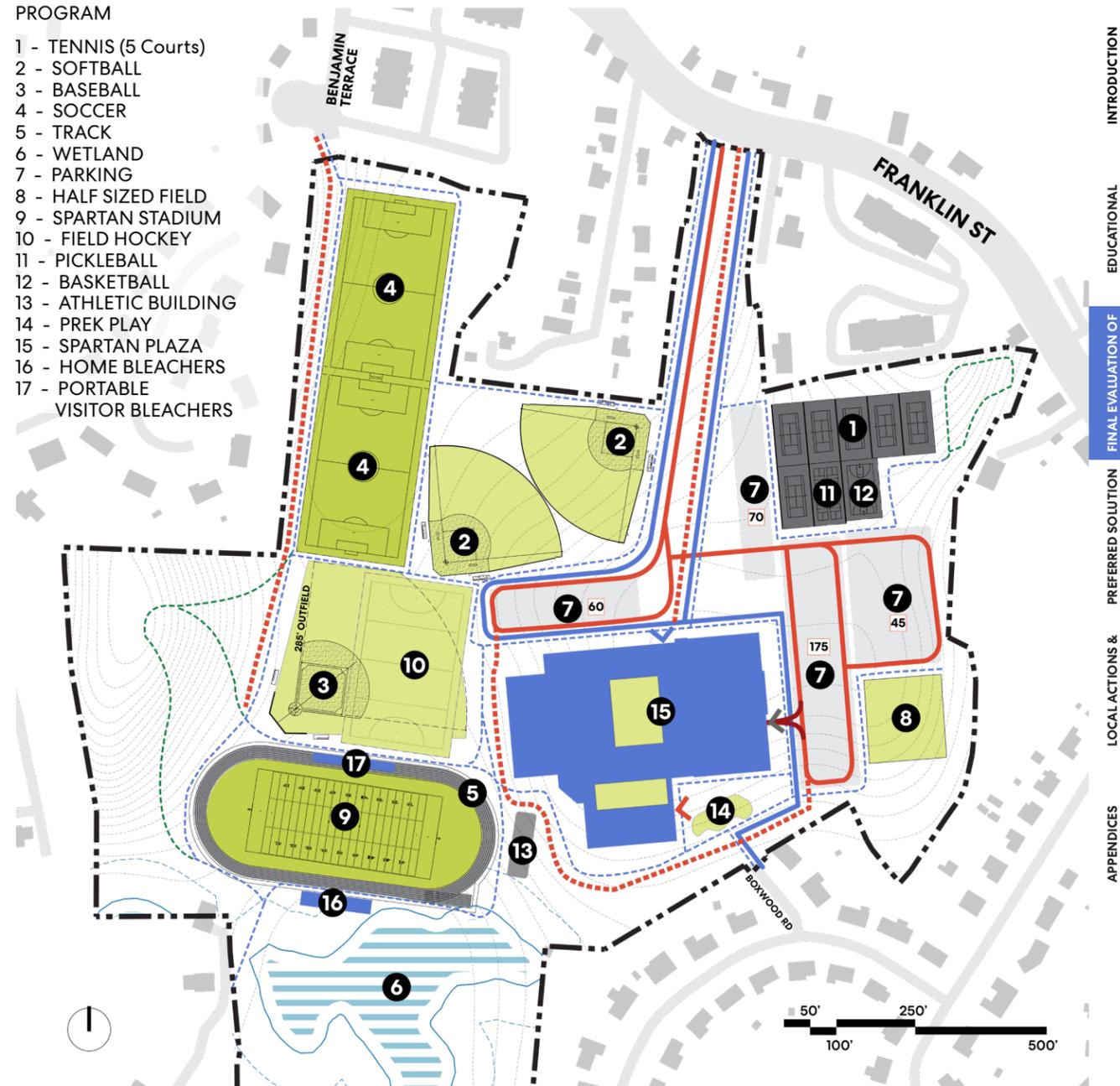
C. CONCEPT DRAWING / CONSTRUCTION PHASING PLAN

C. CONCEPT DRAWING / SITE PLAN



PROGRAM

- 1 - TENNIS (5 Courts)
- 2 - SOFTBALL
- 3 - BASEBALL
- 4 - SOCCER
- 5 - TRACK
- 6 - WETLAND
- 7 - PARKING
- 8 - HALF SIZED FIELD
- 9 - SPARTAN STADIUM
- 10 - FIELD HOCKEY
- 11 - PICKLEBALL
- 12 - BASKETBALL
- 13 - ATHLETIC BUILDING
- 14 - PREK PLAY
- 15 - SPARTAN PLAZA
- 16 - HOME BLEACHERS
- 17 - PORTABLE VISITOR BLEACHERS



- VEHICULAR DRIVE
- BIKE LANE
- HS MAIN ENTRY
- GRASS
- LIMITED ACCESS: EMERGENCY, MAINTENANCE, BICYCLES
- ADA PEDESTRIAN PATH
- PRE-K MAIN ENTRY
- SYNTHETIC TURF
- SERVICE DRIVE
- HIKING TRAIL (NOT ADA ACCESSIBLE)
- LOADING

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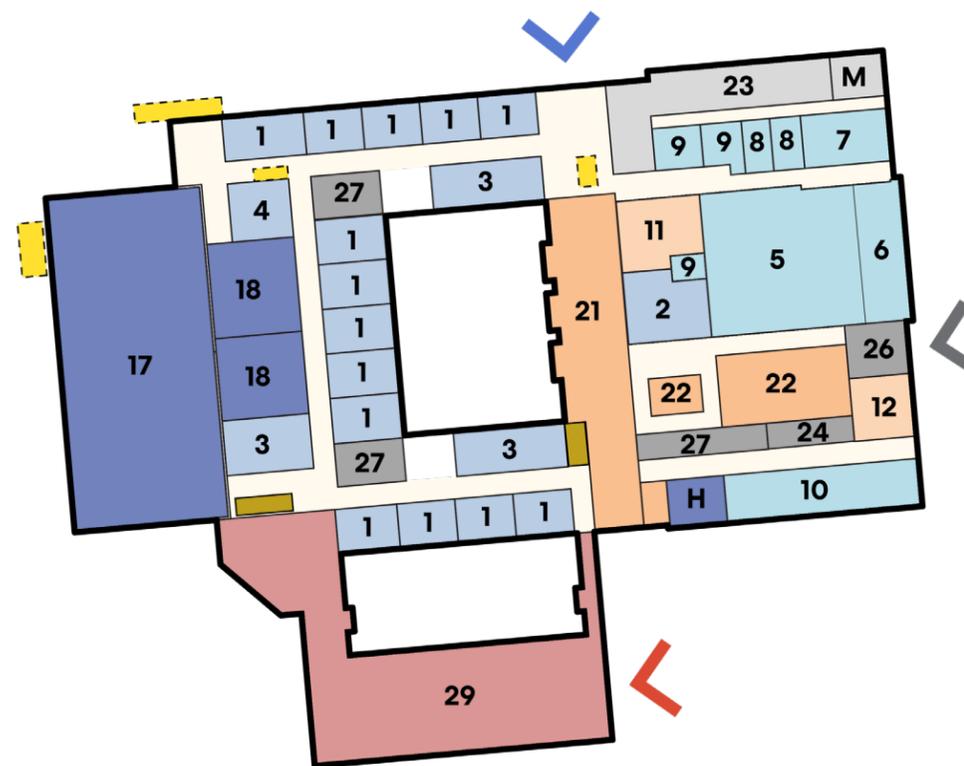
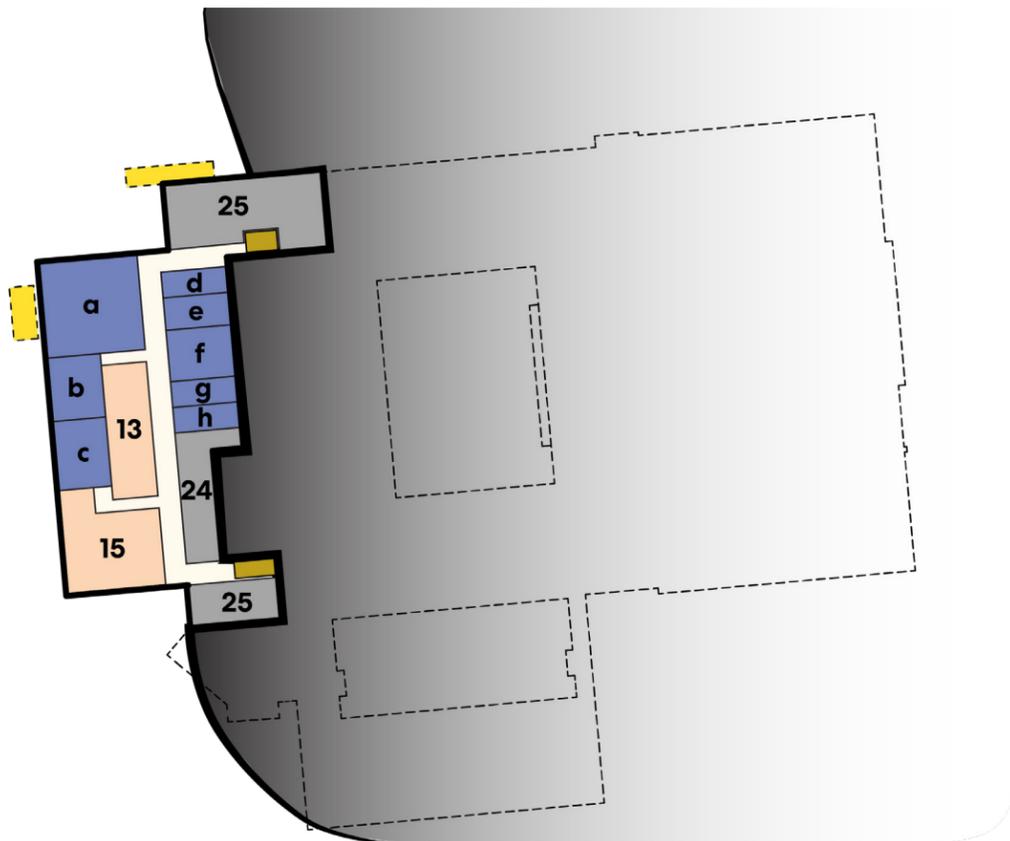
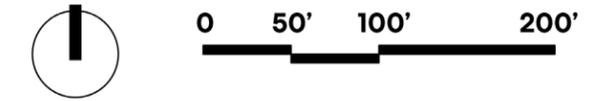
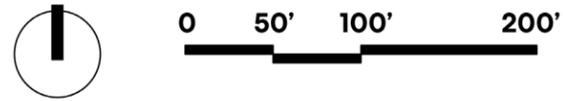
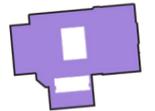
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OPTION 2A: RENOVATION ONLY

OPTION 2A: RENOVATION ONLY

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 00

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 01



- CORE ACADEMIC**  
1/ CLASSROOM  
2/ SPED  
3/ SCIENCE  
4/ TEACHER PLANNING
- ART & MUSIC**  
5/ AUDITORIUM  
6/ STAGE  
7/ BAND  
8/ PRACTICE  
9/ THEATER  
10/ ART CLASSROOM
- VOC & TECH**  
11/ PERFORMANCE  
12/ CULINARY  
13/ VIDEO PRODUCTION  
14/ BIOMEDICAL  
15/ ENGINEERING  
16/ MAKER SPACE
- HEALTH & PE**  
17/ GYMNASIUM  
18/ PE & LOCKERS  
19/ ATHLETICS  
a - ALT PE  
b - ATHL. OFFICES  
c - TRAINER  
d - PE STORAGE  
e - COACH SHOWERS  
f - EQUIPMENT ROOM  
g - GYMNASISTICS STOR.  
h - ATHLETICS STOR.  
SB/STADIUM  
BLEACHERS  
AF/ATHLETIC FIELDS
- BREAK OUT SPACE**
- MEDIA CENTER**  
20a/ OPEN MEDIA  
20b/ CLOSED MEDIA
- 23/ ADMIN**
- OTHER**  
28/ DISTRICT OFFICE  
29/ PRE-K
- DINING**  
21/ CAFETERIA  
22/ KITCHEN
- SUPPORT**  
24/ CUSTODIAL  
25/ MECHANICAL  
26/ LOADING  
27/ RESTROOMS
- CIRCULATION**
- OPEN STAIR**
- CLOSED EGRESS STAIR**
- SP/ SPARTAN PLAZA**

- CORE ACADEMIC**  
1/ CLASSROOM  
2/ SPED  
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- CIRCULATION**
- OPEN STAIR**
- CLOSED EGRESS STAIR**
- SP/ SPARTAN PLAZA**

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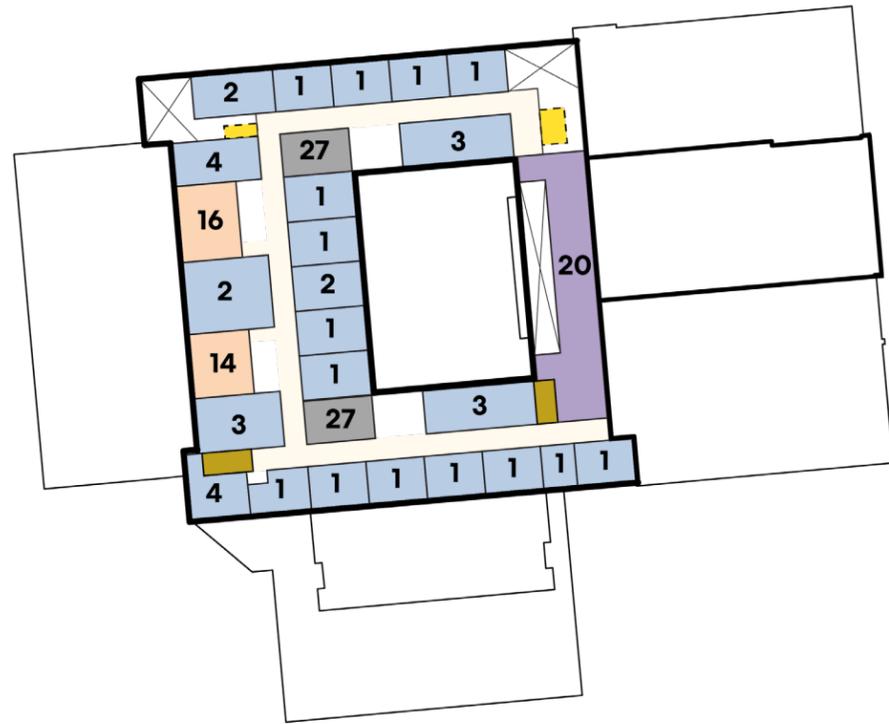
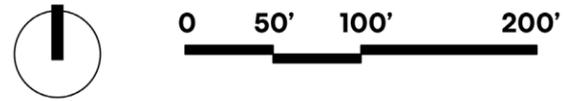
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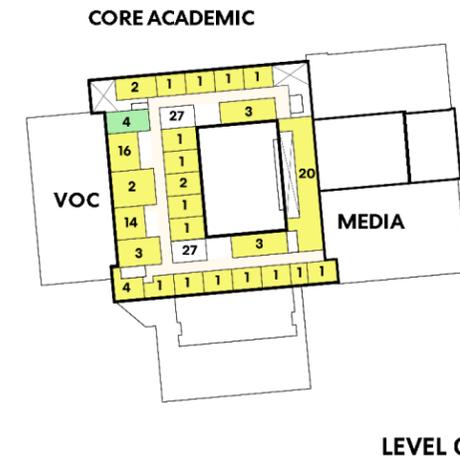
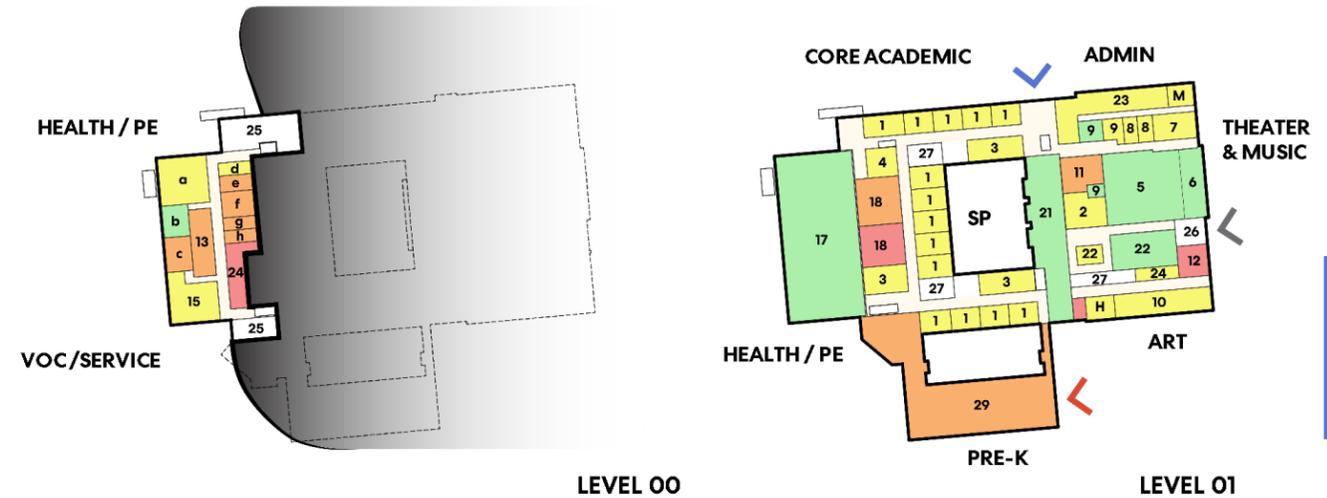
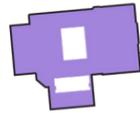
C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 02



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OPTION 2A: RENOVATION ONLY

C. CONCEPT DRAWING / MSBA SPACE SUMMARY DEVIATION ANALYSIS



- Greater than MSBA Guideline
- Meets MSBA Guideline
- Less than MSBA Guideline
- Proposed variation from MSBA Guideline

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D. STRUCTURAL SYSTEMS



**STRUCTURAL SYSTEMS – OPTION 2A (Renovation Only)**

All existing structures are proposed to be renovated and repaired under design option 2A. A new running track is proposed to be suspended within the existing Gym. The renovation exceeds the 50% of the overall existing area and is considered Alteration Level 3 as defined by the International Existing Building Code. We anticipate the Auditorium stage area to be improved potentially in line with current stage standards.

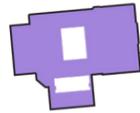
Each building structure/component is discussed separately.

1. 1968 Original Building

- a. Expansion joints within classroom wing, unit B, are deliberate but do not appear to be executed correctly across the trades. This would require further investigation. We recommend carrying \$50,000 for addressing structural aspect of this at each of the four expansion joints.
- b. There were several incidences of past water intrusion observed through walls, floor and ceiling of the mechanical rooms. The source of the moisture should be identified and addressed. At minimum we recommend sealing these cracks by injection grouting or other suitable means.
- c. There are instances of exposed rebar in the concrete roof structure above the classrooms. Most of these spalls appear to have been caused during construction and are not structurally significant. These interior spalls may remain unaddressed unless they are active or cause aesthetic issues.
- d. Consistent horizontal cracks were observed at the same vertical height above grade on a series of exterior columns. They appear at locations likely to have been construction joints during original casting in place. We recommend routing, patching and sealing these joints to protect reinforcement bars from elements.
- e. Instances of diagonal cracks along the exterior brick veneer were observed. We recommend repointing of bricks at these locations.
- f. The steel lintels supporting masonry openings appear to be generally in good condition with no substantial rusting. However, based on our experience with buildings of this vintage we recommend carrying an allowance for cleaning and re-painting of lintels.
- g. Cast in place concrete overhang/sunshades run along the length of the building. Horizontal delamination is observed in some of the overhangs leaving the reinforcement steel susceptible to damage from standing environmental water. We recommend this be repaired in order to slow down the process of deterioration. Carry 20% of overhangs to be repaired by chipping out any loose concrete, cleaning the rebar and repair with new concrete applied from top. About 10% of these overhangs may require replacement.
- h. Spalling on exterior faces of concrete columns observed at multiple locations. We recommend patching of the spalled concrete. Estimate 5% of the exposed column surface areas to be patched.
- i. The retaining wall at the loading dock displays a prominent vertical crack that appears to run through the thickness of the wall. This crack has most likely developed due to displacement incompatibility caused by pressure differential. This crack does not pose structural concern and may be repaired to protect the rebar from the elements. Clean cut to create a joint, project the exposed bars from elements and re-grout the joint. One location.
- j. Provide seismic anchoring at the top of all masonry, exterior and partition walls. Allow for steel angles at 4'-0" spacing anchoring the top of the wall with concrete framing using adhesive steel anchors. Galvanized steel for exterior walls.

OPTION 2A: RENOVATION ONLY

D. STRUCTURAL SYSTEMS



- k. Allow for steel bracing connected to existing concrete framing along perimeter of the building. Total of 16-foot bays spread across the building. Assume 60 tons of steel bracing and connections to concrete.
- l. Allow for foundation addition to the existing foundations at 32 column locations that connect to the new bracing system. Carry adequate cutting and patching of slab on grade for the foundation work as well as trenching for utilities under the building.
- m. About 80 feet wide floor opening is proposed west of the Media Center. Estimate steel framing weighing 80 lbs per linear feet along the perimeter of the openings. Additionally steel HSS posts with 4'x4' footing will be required at 16 feet spacing to support the discontinuous edge between the gridlines. Estimate 10 such posts.
- n. Areas for the new Biomedical Lab and the Makerspace Lab were originally classrooms. These spaces will need to be reinforced to achieve the additional live load rating for Laboratory spaces.

2. 1981 Expansion Classroom Wing

- a. Considerable water damage at ceiling level is observed in numerous classrooms of the new wing. School staff indicated that most leaks are addressed and that historically there have been more occurrences of leaking than normal with a building of this age. Carry roof deck repair for about 2% of the deck area of this wing.
- b. The roof deck of the addition has a continuous separation where the corridor from the original building turns in to the corridor of the addition. The joint does not appear to be executed properly, potentially leading to failure of roofing elements causing leaks. We recommend this joint be appropriately addressed as part of roof repair/replacement project. Cut the deck to install 1" clear joint along the full length of the 1981 expansion.

3. Gymnasium

- a. North columns appear to have been cracked near the top at the connection with the precast tee flanges. It is likely that the connection between the roof frame and the columns were not properly executed causing distress under environmental effects. We recommend that the column tops be repaired and the connection detail be corrected.
- b. Carry allowance for structural slab repair for potentially spalling concrete due to sustained dampness in the locker area. Assume 15% of the area of the locker room ceilings and storage ceilings. Chip loose concrete, clean rebar with wire brush/sand blasting, provide protective coating and apply repair concrete using techniques such as microcrete or shotcrete.
- c. Exterior framed stairs serving the gym suffer from concrete spalling at multiple locations. We recommend that the rust be thoroughly cleaned off of the reinforcement bars and the spalling concrete be patched and repaired.
- d. Spalling, cracked concrete and exposed rebar were observed at multiple spots along the exterior frames (mainly columns) supporting the gym. Some attempts of prior patchwork have also come undone. We recommend that the rust be thoroughly cleaned off of the reinforcement bars and the spalling concrete be patched and repaired.
- e. Provide seismic anchoring at the top of all masonry wall. Exterior and partition walls. Allow for steel angles at 4'-0" spacing anchoring the top of the wall with concrete framing using adhesive steel anchors. Galvanized steel for exterior walls.

OPTION 2A: RENOVATION ONLY



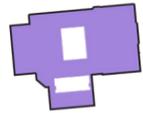
D. STRUCTURAL SYSTEMS

- f. Allow for steel bracing connected to existing concrete framing along perimeter of the Gym building. Two 16-foot bays along each of the four sides. Assume 30 tons of steel bracing and connections to concrete.
- g. The Gym roof diaphragm may need additional reinforcing to comply with the Code requirements. Allow for a ¼" thick steel plate at each flange and connection clips at the precast T girders. Also, carry another 10 tons of steel to create a roof diaphragm collector and its connection to the new lateral system.
- h. A new track is proposed to be suspended from the existing roof structure. Connect the track support hanger to the girder web using through bolting. Carry allowance for scanning each girder web at the connection point and connection hardware at every 16 feet along the length of the track. Additional 8 tons of steel for the support of track along the North and South legs of the track.

4. Auditorium

- a. A notable, near vertical crack in the masonry was observed on the stage left wall of the stage house. The crack does not appear to be moving anymore. We recommend grouting and sealing this crack.
- b. Elements such as house fly, traps and pit were not observed. Upgrading the auditorium to modern standards may require structural modifications to accommodate many of these elements. We anticipate that the existing roof over the stage to be demolished and rebuilt with steel framing supported by new foundation elements and roof deck. Allow for 32lb/sf of steel framing for the new structure including the beams and columns plus ancillary Auditorium stage framing such as fly gallery grating, well beams, header beams, lock rail and related rigging support framing, lighting grid etc.
- c. Some of the observations and recommendations for common elements such as lintels, masonry anchors are not repeated here for brevity.
- d. We recommend upgrading the lateral load resting system of this building which is currently supported by unreinforced load bearing masonry construction. A shotcrete overlay on top of the masonry would be the most practical approach in this area. Use 4" thick reinforced shotcrete for estimation purpose. Carry shotcrete in eight bays of 16 feet wide each for the full height of the walls. This will require increasing the pad size of footings at the end of the shotcrete shear walls. Assume eight footings to be increased to 12'x12'x3' concrete footings with 60lbs/cu.yd steel reinforcement.

OPTION 2A: RENOVATION ONLY



E. SITE UTILITIES

OPTION 2A – RENOVATION ONLY / SITE UTILITIES

Site Utilities

Stormwater

Currently the stormwater management at the existing Stoneham High School site does not address either stormwater quality, rate or volume. To bring the site stormwater system up to current standards, stormwater quality would have to be addressed. Stormwater rate and volume would only have to be addressed if the site saw an increase in impervious area.

Stormwater quality on the site would be addressed by replacing the existing catch basins with new catchbasins with deep-sumps and hoods or tees. In addition, areas that see vehicular traffic would see enhanced treatment by routing the stormwater from those areas through a large water quality inlet similar to a Stormceptor 3600STC. Both the new catchbasins and water quality inlet would work to remove both total suspended solids and floatables from the stormwater stream.

Portions of the existing stormwater system to remain in place would be video inspected and replaced and/or repaired as necessary. A more detailed inspection of the 36-inch drain line traversing the site, including inspection by remote vehicle, test pits and possible sampling of pipe materials would be warranted.

Sanitary Sewer

The existing site sanitary sewer system would be video inspected and replaced and/or repaired, as necessary. Repairs to the sanitary sewer system could include either replacing or sealing existing sewer manholes to limit groundwater intrusion, root removal of the existing pipe network, re-lining of the existing pipe network, or spot repairs of broken pipe.

A new external grease trap will be required for the sanitary flows from the kitchen and cafeteria. The new grease trap would be a 6,000-gallon precast concrete below-grade structure with a new 6-inch sanitary service from the kitchen/cafeteria and a new 6-inch connection to the on-site sanitary sewer system. A 4-inch PVC vent would be required from the new grease-trap back into the building.

Water

A new fire service would be required for the building. The new fire service would be connected to the existing fire main that loops around the building. The fire hydrants on site would be inspected and operated to make sure they are functional. Damaged hydrants would be replaced.

Natural Gas

The existing natural gas service would remain as currently constituted.

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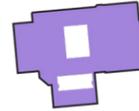
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OPTION 2A: RENOVATION ONLY

E. SITE UTILITIES



Permitting

Wetlands Protection Act (310 CMR 10.00) and Town of Stoneham Wetland Protection By-Law

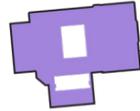
There are wetland resource areas subject to protection under the Wetlands Protection Act and Town of Stoneham Wetland By-law at the north end of the site (stream and bank) and south end of the site (bordering vegetated wetlands). Work within 100 feet of these resource areas will require the approval of the Town of Stoneham Conservation Commission. Any work associated with the existing football field/track or on the 36-inch drain line would trigger the filing of a Notice of Intent.

Other Permitting

Review of MassGIS permitting layers indicate that the site is not within a Priority Habitat of Rare Species or Estimated Habitats of Rare Wildlife or within any Surface Water Supply Protection Zone or within any Flood Hazard area.

OPTION 2A: RENOVATION ONLY

F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



OPTION 2A – RENOVATION ONLY / FIRE PROTECTION & PLUMBING

Fire Protection

To comply with current codes, this building will require a complete sprinkler system installation per the Massachusetts State Building Code, Chapter 34. The Fire Protection system would be designed to meet the requirements of NFPA 13 “Installation of Sprinkler Systems” and Chapter 9 of the Massachusetts State Building Code, 780 CMR, “Fire Protection Systems”.

A new dedicated 6" sprinkler service, connected to the town water system in the street, should be brought into the building. The exact entrance location will need to be coordinated with the Architect. As the sprinkler service enters the building a Massachusetts approved double check valve backflow preventer assembly, complete with OS&Y valves on the inlet and outlet, will be required.

The building will be protected by three types of sprinkler systems and each will protect the following areas:

- Wet sprinkler system – base building system
- Dry sprinkler system – to protect areas subject to freezing, i.e. loading docks and outdoor walkways covered by building overhangs, etc.
- Pre-action sprinkler system – to protect the MDF room

The alarm check valves for the wet and dry sprinkler systems will be installed on separate risers after the double check valve assembly in the water service entrance room. The alarm check valves will be complete with standard trim packages including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches. The dry alarm valve will be supplied with an air compressor and associated appurtenances.

The main feeds out to the system from the alarm check valve will extend out to the building through the first-floor ceiling space. The piping will then extend to all areas of the building so that each section of the building and each floor can be divided into separate zones.

Due to the building being only three stories the Massachusetts State Building Code does not require a standpipe system throughout the School. However, regulations governing Auditoriums and Stages will require standpipes at each side of the backstage areas.

The sprinkler system risers will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control assembly off of the standpipe which feeds each floor will contain a flow switch and tamper switch. An inspector’s test connection will be installed on the floor control valve station. If the stage is greater than 1,000 square feet, then fire department valves will be required on each side of the stage.

Sprinkler heads throughout the facility where gypsum or suspended ceilings are installed will be glass bulb, quick response, chrome plated semi-recessed type. In areas where no ceilings are installed brass upright sprinklers will be installed. Where upright sprinklers are subject to

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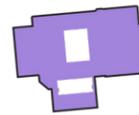
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F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION

potential damage, such as in storage rooms, protective cages will be installed. In areas where it is not possible to run piping above the ceiling, the use of sidewall sprinkler heads would be recommended.

The MDF room will be protected by a pre-action sprinkler system. A pre-action alarm valve with all required appurtenances will need to be located next to or near the MDF room. Piping from this valve will extend into the room and connect to sprinkler heads. The piping system will be filled with compressed air. Once a sprinkler head activates, the air will discharge and open the pre-action alarm valve to allow water into the system and through the open sprinkler head.

Sprinkler piping for the system will be as follows:

- Piping 2" and smaller shall be schedule 40 black steel with cast iron fittings with threaded joints.
- Piping 2 ½" and larger shall be Schedule 10 black steel with malleable iron fittings with rolled grooved joints.
- Dry sprinkler systems will be supplied with Schedule 10 galvanized piping throughout.

All tamper and flow switches installed on the sprinkler system will be connected to the buildings fire alarm system. Each tamper and flow switch will be a dedicated point on the fire alarm system.

The exterior fire department connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. Final location of this connection will be coordinated with the Stoneham Fire Department. An additional fire hydrant may need to be added on the site to be within the required distance of this connection.

The hydraulic requirements for the building will be as follows:

- Light Hazard - All offices, corridors and the auditorium hydraulically calculated to deliver 0.1 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard - All storage rooms and mechanical rooms hydraulically calculated to deliver 0.15 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard Group II - The stage area hydraulically calculated to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

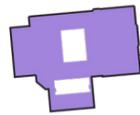
**Plumbing**

Plumbing Fixtures

All water closets, urinals and lavatories in the existing building are old and not current water conserving type. Removal of all fixtures is required as the existing fixtures have reached the end of their serviceable life. Water closets should be replaced with new dual flush valve fixtures. A full flush will discharge at a rate of 1.6 gallons per flush (gpf). When only flushing liquid waste and paper, the reduced flush rate will be 1.1 gpf. Urinals should be replaced with 0.25 gpf fixtures. Lavatories should be replaced and new low-flow type faucets (0.5 gpm or less) added with temperature limit stops which will deliver water with a maximum temperature of 110°F. ADA requirements for fixture spacing, mounting heights and protection of any exposed piping will also need to be met during a renovation to the bathrooms.

The state plumbing code dictates the number of plumbing fixtures required in a building. Minimum plumbing fixture requirements will be determined once the total occupancy numbers for the building have been established based on the final plan layout.

OPTION 2A: RENOVATION ONLY



F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION

Domestic Cold Water Systems

The 4" water line that enters the building is the original service to the building and appears to be adequate to meet the current building domestic water and non-potable water requirements. The replacement of the existing water meter is recommended at this time.

Domestic Hot Water System

The existing boiler and storage tank providing hot water to most of the school, as well as the storage type heater serving the kitchen, have passed their useful life expectancy. It is recommended to install new gas-fired storage type water heaters in the same locations as the existing. It is also recommended that redundant water heaters be included in the new system design. This would allow the system to continue to deliver hot water if one of the water heaters were to need service. The water heaters would be sized to serve all fixtures within the building. A new gas-fired heater should also be provided to serve the needs of the renovated kitchen equipment.

Sanitary and Vent System

The sanitary system in the existing building appears to be in good condition but replacement may be required as a consequence of a possible fixture count change and probable relocation of fixtures in the renovation plan. Any new piping would connect to the existing waste and vent piping at a convenient point to be determined by further investigation.

Storm Drainage

The existing building roof drainage appears to be in good condition and no replacement is required. The roof itself appears to be in good condition and leaks around the roof drains themselves have not been reported.

Backwater valves should be installed on all interior storm system piping originating from roof drains on lower roof sections as per the state plumbing code.

Natural Gas System

Currently the existing gas service is more than adequate to meet the school's demand requirements and should remain. Gas piping should be reconfigured to serve all mechanical equipment that will require gas. Any new gas-fired kitchen equipment should also be connected to this service. It is recommended that gas sub-metering be used to separately meter gas consumption for the mechanical equipment and kitchen uses.

Insulation

The insulation that currently exists should be tested to determine the extent of any hazardous materials. The insulation should be removed and replaced with new fiberglass insulation with an all service jacket. Piping to remain, which is not currently insulated, should have new insulation installed. All new domestic water and horizontal storm water piping will be insulated.

Insulation will also need to be provided on waste piping and water piping below handicapped lavatories and sinks.

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Hose Bibbs and Wall Hydrants

During any renovation done to the building, the existing hose bibbs in the toilet rooms should be removed and new wall mounted hose bibbs with an integral vacuum breaker and removable tee handle installed. New wall hydrants will be provided on the exterior of the building and their locations coordinated with the architect.

Cross Connection Control

As stated previously, the existing hose bibbs and wall hydrants do not have backflow prevention devices. Backflow devices will be integral to all new hose bibbs and wall hydrants installed during the renovation.

All service sink faucets installed during a renovation will also have integral vacuum breakers.

A new reduced pressure backflow preventer assembly should also be installed on the existing 4" domestic water service (or on a new service if this is the preferred option) to further protect the town's domestic water system.

Boys and Girls Locker Room/Shower Areas

All locker room/shower areas should be completely renovated. Floor drains within any new shower stalls should be arranged so that the water from one shower does not enter into the adjacent shower area. New shower valves should be installed with code compliant shower heads. Master mixing valves should be installed at each shower location. Valves shall be provided with limiting stops set to a maximum water temperature delivery of 112°F.

All plumbing fixtures will be replaced as discussed in the "Plumbing Fixture" section of this report.

Kitchen

If kitchen renovations include the addition of new or replaced gas-fired equipment, this equipment can be connected to the new gas service located outside the building as noted above.

Any new gas equipment would be fed by gas piping connecting to a master shut-off valve that would be interconnected with the kitchen hood and exhaust system. Gas would only operate as long as the kitchen hood exhaust system is operating.

Additional floor sinks and/or floor drains would be added to any new equipment design to ensure proper drainage throughout the kitchen.

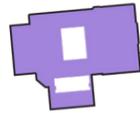
A new three-compartment sink with new grease trap should be included per state code requirements.

A new dishwasher with accompanying grease trap should also be provided per state code requirements.

A new exterior grease trap, located underground, outside of the kitchen portion of the building will also need to be considered as part of any new design or renovation to the kitchen. Venting of this exterior grease trap should enter back into the school building and exit to the atmosphere above the roof.

OPTION 2A: RENOVATION ONLY

F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



Science Classrooms

If the existing science classrooms are to be renovated in their current locations, all existing lab sinks, and faucets should be replaced with new fixtures. Faucets should be low-flow type fixtures with a maximum delivery rate of 0.5 gpm.

The lab waste system should be removed in its entirety and replaced with a new polypropylene acid resistant piping system that empties into a central acid neutralization tank and system. This system would balance the pH of the lab waste and then safely discharge it into the regular sanitary waste system before it connects back to the town's sanitary waste system.

The existing hot and cold water systems serving the science wing should also be removed in their entirety. New protected hot and cold water systems should be created to serve the renovated science wing by installing reduced pressure backflow preventers on the hot and cold water piping designated to serve this area.

The existing main gas piping system serving the science wing could possibly be re-used. This piping should be reconnected to the new gas service in a convenient location. Gas piping to each science classroom should feed an emergency shut-off valve located in a valve box on the wall near the classroom exit door. Piping from this valve would then feed any gas turrets within that classroom only.

All existing emergency showers in the science wing and connections to the cold water system should be removed. A new tempered water system should be created to serve the science wing. A new gas-fired water heater should be installed somewhere within the science wing and be dedicated to the new tempered water system. Water should be stored at 140°F and a master mixing valve should be mounted nearby and set to deliver tempered water to this wing at approximately 70°F-90°F per state plumbing code requirements.

Pipe Materials

Below grade sanitary and storm drainage piping will be service weight bell and spigot cast iron with neoprene gasketed joints. Above grade sanitary and storm piping will be service weight hubless cast iron with Massachusetts approved stainless steel and neoprene no-hub connector assemblies.

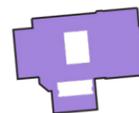
All lab waste piping will be Schedule 40 polypropylene with electrical heat fusion joints. Mechanical joints may be utilized for lab waste piping within laboratory furniture.

All water supply and return piping shall be Type "L" copper.

All water supply and return piping insulation shall be in accordance with the Energy Code.

All gas piping will be threaded black steel piping up to 2 ½" size. Piping 3" and larger shall be welded.

OPTION 2A: RENOVATION ONLY



F. BUILDING SYSTEMS / HVAC & ELECTRICAL

I. PROJECT OVERVIEW

A. The existing Stoneham High School is approximately 221,000 sf on two levels. The Design Alternatives include Renovation (Option 2A), Renovation and Addition (Option 3A) and New Construction (Options 4A and 4B). All of the alternatives are approximately 207,000 sf. The anticipated program elements include:

1. Education classroom spaces (approx. 56,000 sf)
2. Gymnasium and support spaces (approx. 28,000 sf)
3. Kitchen and Cafeteria Space (approx. 7,500 sf)
4. Vocational / Technical Spaces (approx. 11,000 sf)
5. Media (Auditorium and Support) Spaces (approx. 15,000 sf)
6. Arts Classrooms (approx. 6,000 sf)
7. Entry and Administrative areas (approx. 23,000 sf)
8. Mechanical/Electrical and Misc Spaces, Circulation, etc (approx. 60,000 sf)

B. The purpose of this narrative is to describe the intended HVAC and Electrical systems required to achieve the goal of a Net Zero Energy facility. Therefore, for all of the design alternative options, we shall assume the removal of the existing systems and providing new systems as described in the sections below.

II. HVAC AND ELECTRICAL SYSTEMS OVERVIEW AND SCOPE OF WORK

A. HEATING, VENTILATING, AND AIR CONDITIONING

1. The heating, air conditioning and ventilation systems shall be high-efficiency systems that will contribute towards the goal of achieving a Net Zero Energy facility.

2. Existing Systems:

a. The existing rooftop unit, exhaust fans, air cooled split type units, unit ventilators, heating and ventilating ceiling mounted air handling units and heating units, along with all associated ductwork, piping, controls, existing boilers, etc will be removed.

3. New Systems:

Option 1: Geothermal Heating/Cooling System

a. Ground Loop Geo-Exchange System:

1) A vertical borehole well field consisting of (225) 6-inch diameter boreholes spaced 20 feet apart shall be provided. Each borehole shall be 400 to 500 feet deep. Actual depth to be determined based on thermal conductivity testing performed on a test well. The number of boreholes may be increased or decreased based on thermal testing results and/or determination of the final heating and cooling loads.

2) Provide a 1-1/4 inch supply and return pipe within each borehole with a U-bend at the bottom. Piping shall be high density polyethylene (HDPE) with DR9 wall thickness. Polyethylene pipe and fittings shall be heat fused by butt, socket, sidewall, or electrofusion in accordance with pipe manufacturer's procedures. Underground supply and return piping from boreholes shall collect to four buried circuit vaults constructed of HDPE or concrete. Supply and return circuit piping in each vault shall combine to 8 inch main header piping which shall be routed into the building.

3) Steel sleeve casings shall be provided for the upper section of each borehole down to bedrock. Each borehole shall be filled with a bentonite based thermally enhanced grout mixture.

b. Central Heating and Cooling System:

1) Central geothermal heating and cooling shall be provided by two high efficiency 275 ton (approx. nominal capacity) heat recovery chiller-heaters or modular chiller-heaters connected to the ground loop system. If two larger chillers are utilized in lieu of a modular chiller solution, an additional 60 ton modular chiller shall be provided to address low load conditions.

The ground loop circulation system shall be filled with 30% propylene glycol solution and shall be served via a primary and secondary pumping scheme.

a) Chiller-heater condenser water shall be constant flow primary with zero pressure bypass connections to the ground loop distribution and the building heating distribution. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a

OPTION 2A: RENOVATION ONLY



F. BUILDING SYSTEMS / HVAC & ELECTRICAL

vertical inline pump and shall have a 10 horsepower motor.

b) Secondary condenser/heating pumps shall be variable flow with variable frequency drives. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 15 horsepower motor.

3) Chilled water distribution from chiller evaporators to building distribution shall be variable primary flow pumps. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 25 horsepower motor.

4) The building circulation loop shall consist of a four-pipe distribution. The main distribution to heating/cooling terminal units in the building shall be four-pipe. Rooftop air handling units, heat recovery air handling units, and central air handling units shall also be four-pipe configuration.

5) The building loop piping system shall contain a 30% propylene glycol solution for freeze protection and corrosion protection.

6) The building terminal heating units will be designed to utilize low temperature heating supply water (130°F maximum). Heating terminal units such as fin tube radiation and heating coils may require larger surface areas due to the low water temperature. In areas with high heating loads, two-row fin-tube and heating coils may be required.

c. Classrooms – Sensible Fan Powered Terminal Unit System:

1) The system serving heating, cooling and ventilation for typical exterior classrooms shall utilize four-pipe, ducted, ceiling mounted sensible fan powered terminal units.

2) The primary supply air serving each classroom shall be provided via the fan powered terminal unit with a hot water coil and a sensible cooling coil. Each classroom shall have a terminal unit.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling

and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

d. Classroom and Interior Ventilation Systems:

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. The units will be provided with a hot water pre-heat coil and a chilled water cooling coil. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

3) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

4) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

5) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

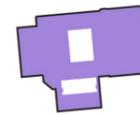
e. Miscellaneous Areas:

1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

- a) Gymnasium – 25,000 cfm RTU
- b) Cafeteria – 8,000 cfm
- c) Auditorium – 10,000 cfm
- d) Administration – 20,000 cfm

2) Rooftop air conditioning units (RTU) will include supply

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fan, return fan, hot water heating coil, chilled water cooling coil, filters, variable frequency drives and total energy recovery.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils for zone temperature control.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**Option 2: Variable Refrigerant Flow (VRF) Heating/Cooling System**

**a. Central Heating and Cooling System:**

1) Heating and cooling shall be accomplished via multiple air cooled heat recovery, simultaneous heating and cooling, VRF systems, totaling 550 tons.

2) The systems shall be capable of operation down to negative 25F, minimum, ambient temperature.

3) The air cooled condensing units shall be located on the roof.

4) Refrigerant piping (liquid and suction) shall be run from the condensing units to branch controller modules located throughout the building. Branch refrigerant piping (liquid and suction) shall be run independently from each branch

controller module to each VRF fan coil unit.

**b. Classrooms:**

1) Space heating and cooling shall be accomplished via VRF fan coil units. The VRF may be ceiling mounted (ducted or ductless) or console type based on the space application.

2) Ventilation air serving each classroom shall be provided with a variable air volume terminal unit with a hot water reheat coil.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

**c. Classroom and Interior Ventilation Systems:**

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. Each unit will be provided with a dedicated heat pump type VRF condensing unit. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

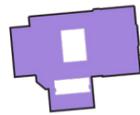
2) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

3) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

4) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

**d. Miscellaneous Areas:**

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F. BUILDING SYSTEMS / HVAC & ELECTRICAL

1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

a) Gymnasium – 25,000 cfm RTU

b) Cafeteria – 8,000 cfm

c) Auditorium – 10,000 cfm

d) Administration – 10,000 cfm

2) Rooftop air conditioning units (RTU) will include supply fan, return fan, filters, variable frequency drives and total energy recovery. Each unit will be provided with a dedicated heat pump type VRF condensing unit.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils to provide ventilation air. The Administration area shall also have VRF terminal units connected to the main VRF system.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**4. Building Management System (BMS):**

a. Provide direct digital control (DDC) BMS with local and

unitary controls and web interface for remote access, alarms, and monitoring of all HVAC equipment in the building.

b. BMS system shall be interfaced to the building electrical and gas sub-meters. Daily, weekly, and annual energy use shall be reported for each meter.

**5. BTU Metering:**

a. Provide BTU metering of chilled water, hot water and ground loop circulation systems.

**III. ELECTRICAL**

**A. Demolition / Existing Electric Services:**

1. All existing services shall be disconnected and removed from the building. Coordinate with the respective utility company and include all work required for the removal of all existing utility services that become abandoned including power, telephone, cable TV, and fire alarm services.

2. Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of demolition of the existing buildings include disconnecting all services and making safe the existing structure for complete demolition.

3. Include maintaining the operation of existing site equipment required during construction.

**B. New Main Electric Service:**

1. A new primary service will be provided from utility company primary services via an underground ductbank and manhole system to a new utility company pad mounted transformer.

2. Secondary service from the new pad mounted transformer will be underground to a new 5000 Amp main switchboard at 480/277V, 3-phase, 4-wire. Switchboard will be located in a new main electric room.

**C. New Normal Distribution System:**

1. Main switchboard will be provided with surge protection

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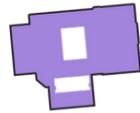


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- (SPD) and ground fault protection on main and feeder devices.
2. Surge protection will be provided in all 120/208V panelboards.
- D. New Emergency Distribution System:**
1. A 2 MW diesel emergency generator will power emergency egress lighting and exit lighting in corridors, assembly areas, and stairwells. Miscellaneous systems to include the following:
- a. IT head-end equipment (located in the MDF Room).
  - b. Cooling equipment for school IT equipment.
  - c. Security system.
  - d. Fire alarm system.
  - e. Circulator pumps and controls.
2. Separate automatic transfer switches shall be provided for emergency and non-emergency loads.
3. In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.
- a. Additional lighting in Gymnasium, Cafeteria and associated toilets and corridors.
  - b. HVAC (heating, cooling and ventilation) equipment associated with the Gymnasium, Cafeteria and associated toilets and corridors.
  - c. Receptacles in Gymnasium and Cafeteria.
4. Generator will be mounted at grade at the exterior of the building in a self-contained sound attenuated enclosure with an integral base mounted fuel tank. Generator will be mounted on an elevated concrete platform for survivability.
5. Emergency panels will be located in new two-hour rated electric closets.
6. Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.

7. Emergency feeders run outside two-hour electric rooms and shafts and not in or under floor slab will utilize MI Cables.
8. A portable generator connection will be provided to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.
- E. Sustainable Design Intent:**
1. Sustainable Design Intent compliance will include:
- a. Advanced measurement and verification of air conditioning, fans, lighting, and receptacle power via electronic sub-meters equal to E-Mon, D-Mon Class 2000 3-phase kWh and demand meters. Measurement and verification metering will be monitored by the Building Management System (BMS).
  - b. Plug and process load reductions through the use of vacancy/occupancy sensor controls for local convenience outlets in classrooms, offices, library and resource rooms. Open areas such as Media Center, Auditorium and Kitchen will be equipped with relay panels controlled via the lighting control system, to reduce loads on a time schedule basis.
  - c. Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting.
  - d. Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.
  - e. Empty conduits and space provisions will be provided for photovoltaic (PV) installations. Include conduits and space provisions for inverters at a minimum of two locations in the upper floor electric closets.
- F. Lighting:**
1. New luminaires will be provided throughout all renovated areas as well as new construction. Luminaires will be dimmable LED. All luminaires will be suitable for respective utility rebate incentives.

OPTION 2A: RENOVATION ONLY



F. BUILDING SYSTEMS / HVAC & ELECTRICAL

2. Exterior building mounted around the entire building including all canopies, all entry drives, parking areas, and all walkways will be full cutoff LED type. All exterior lighting will be controlled via the building low voltage lighting control system.
- G. Lighting Controls:**
1. A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.
2. Manual low voltage override switches to override the time of day lighting control schedules shall be provided. Override switches will permit extension of lighting control program as well as ON-OFF override for exiting the facility.
3. Lighting program for time of day schedules shall permit all lighting, including exterior to be turned off during non-occupied hours, reducing sky glow and light trespass. Activation of either fire alarm or intrusion detection system shall override the lighting program.
4. Vacancy and occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces. In addition, all spaces will be provided with local low voltage dimmable switching.
5. Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight utilizing daylight sensors in each space.
- H. Circuitry and Devices:**
1. Safety type duplex receptacles will be provided throughout the building in quantities to suit space programming.
2. Plug load reduction will be achieved by vacancy/occupancy sensors in classrooms, offices, and staff spaces, and circuits routed via relay panels, controlled via lighting control system time schedule for open areas.
3. Provide circuitry for HVAC and Plumbing systems.
- I. Fire Alarm:**
1. Existing automatic, fully supervised, analog addressable, voice evacuation system will be retained and utilized where

- applicable.
- a. Manual pull stations (with tamperproof covers if applicable), at points of egress, and other locations as required to meet code.
  - b. Audible/visual units in corridors, classrooms, and throughout the building to meet code.
  - c. Visual only units in conference rooms, meeting rooms and small toilets.
  - d. Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms.
  - e. Smoke duct detectors in HVAC units over 2,000 CFM, and within five feet of smoke dampers including connections to all smoke/fire dampers.
  - f. Connections to all Fire Protection devices.
  - g. Connections to audio/visual systems, sound systems, and dimmed lighting controls.
  - h. Remote annunciator at main entrance and secondary entrances as directed by the Boston Fire Department.
  - i. 24 VDC magnetic hold open devices at smoke doors.
  - j. Master box and exterior beacon (quantity of beacons per Boston Fire Department).
  - k. Wiring will be fire alarm MC cable.
- J. Technology Systems – refer to the Technology Section.**
- K. Integrated Intrusion, Access Control, CCTV, and Alarm System:**
1. Intrusion alarm system will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade. Motion sensors will be provided in corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs.
2. CCTV coverage will be provided at main and secondary entries as well as all other perimeter entries to be used by students and staff on a daily basis and for off hours

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F. BUILDING SYSTEMS / HVAC & ELECTRICAL



community programs, including Gymnasium and Cafeteria entries.

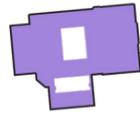
- 3. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.
- 4. Access control via card access system will be provided at all exterior doors.
- 5. CCTV system will be an extension of the existing system that is networked with the other schools in Stoneham. System will be web based to allow viewing by the Stoneham Police Department.

L. Miscellaneous:

- 1. Provide conduit and electrical circuitry for tel/data, security and AV requirements.

OPTION 2A: RENOVATION ONLY

F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY



OPTION 2A – RENOVATION ONLY / INFORMATION TECHNOLOGY

**Structured Cabling System:**

The existing structured cabling system, which consists of a combination of older cabling standards, will be removed and replaced with a new system. The new structured cabling system will consist of a hybrid delivery system comprised of hard-wired data cabling to support fixed workstations where required and high bandwidth, full coverage wireless connectivity. The data cabling channel performance will exhibit Category 6A performance capabilities. The data channel will be comprised of the passive components including cabling, connectors, patch panel port, and patch cords, providing up to a total of four (4) connections between network electronics. The Category 6A channel will be component compliant, capable of supporting 10 Gigabit per second networking. Category 6A data cabling will be provided to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other related equipment. This cabling will support computer network requirements, wireless connectivity, telephone system (VoIP) and IP-based security needs. WLAN cabling will be terminated above the ceiling in typical ACT areas. All data jacks will be color coded. Multiple lengths and colors of patch cables will be provided for closet connectivity.

General classrooms including Science, Health, ESL, SPED Resource, RISE, STRIDE, Speech/Language, OT/PT, and Culinary will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

Collaborative Spaces and Small Group Seminar Rooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher use where required.

Teacher Planning Spaces will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, workgroup printers/multifunction copiers and connections for staff use where required.

Art Classrooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, 3D printers, and connections for teacher and student use where required.

Band and Music Areas will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, workgroup printers/multifunction copiers and connections for teacher use where required.

Engineering Labs (Maker, Engineering, Robotics, Scene Shop, CAD, Project Lead the Way Spaces) will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, 3D printers and other peripherals, and connections for teacher and student use where required. Fixed computer workstations in these spaces will be hardwired

Gymnasium, PE Alternatives Spaces and Team Rooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff use where required. Team Rooms will be equipped with

Media Center including the Cyber Café and Student Help Desk will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

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F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY

Auditorium will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

Café/Student Lounge will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

Admin Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. Nurse's Suite will also be wired for fax.

District Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. This area will be segmented with its own IDF, regardless of distance requirements.

Pre-K Classrooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

**Space Requirements:**

The existing technology support spaces will be replaced with new spaces. These new spaces will accommodate and support the various technology systems and associated networking hardware. These spaces are the Service Entrance/Demarc, MDF/Head End Room, and IDF/Tech Closets.

The Service Entrance will be the termination point for all incoming services such as TELCO, Internet, CATV and district fiber. Services will be extended from the demarc to the MDF via various backbone cables (fiber, multi-pair copper).

The MDF will be the central location of all head end equipment including but not limited to servers, storage, switch electronics, security equipment, video equipment, telephone system, public address system and security system. It will be a dedicated space with proper ventilation, environmental treatment and emergency power.

The IDF locations will serve as intermediate closets for local cabling and equipment. The IDFs will be dedicated spaces with proper ventilation, environmental treatment and emergency power. Each closet will connect to the MDF with backbone cabling. IDFs will be located to keep all cable distances within specification limits. The Central Office area will be segmented with its own IDF.

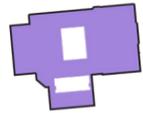
The existing spaces will come offline in accordance with project phasing requirements. The new MDF will be built-out in the first phase of construction and connected to the existing MDF via fiber and the new IDFs as they come online.

**Backbone Cabling:**

12-Strands of OM4 Multimode and OS2 Singlemode fiber will be provided between the Head End Room (MDF) and the Tel/Data closets (IDF). This cabling will support all network requirements; wireless connectivity, and VoIP system needs. Multimode fiber will be laser-enhanced and guaranteed for transmission distances in 10 Gigabit Ethernet of up to 500 Meters. All single-mode fiber optic cables will be OS2, tight buffered, high flexibility. All fiber optic cables will be installed in innerduct. Outbuildings requiring connectivity will be treated as IDFs.

Equipment racks will be installed in the MDF and IDFs for patch panels and network hardware. Two-post and four-post racks will be provided. Racks will be 19" EIA floor mount racks with wide floor mounting flanges, vertical cables guides and horizontal cable managers. Power for rack equipment will be installed in cable tray above the racks. Power will consist of both 20A and 30A twist-lock receptacles.

OPTION 2A: RENOVATION ONLY



F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY

The district fiber must be extended to the new demarc and MDF. The existing MDF and the existing district fiber must remain functional until cutover occurs. The existing district fiber must be protected during site work.

**Data Communication Systems:**

The existing networking hardware will be replaced with up to date technology. New networking hardware will be provided for the MDF and IDFs consisting of network switch electronics for the data and voice communication systems, distributed communication system, audio-video communication system, security system, wireless LAN and other Owner equipment. Components will consist of PoE+ hardware and power supplies, 10/100/1000 to all endpoints, fiber transceivers, patch cables and UPS equipment. The switches will be fully configured according to network requirements and VLANs will be created according to best practice and equipment requirements. Inter-closet connectivity will be 25Gb or greater via fiber.

**Audio/Visual Communication Systems:**

Digital signage will be provided in gathering areas and large group instruction spaces. The system will consist of LED displays, media players, and a server or cloud based digital signage solution.

Classrooms and general instruction spaces will be equipped with a local audio system consisting of ceiling speaker, amplification, wireless microphones and auxiliary inputs. There will be an input available for FM assistive listening systems the Owner may have.

**Distributed Communication System:**

The existing intercom system will be replaced. The new distributed communication system will consist of a fully operational IP platform public address system for district and school internal communications system incorporating school-wide notifications and general announcements. It will provide complete internal communications using state of the art IP technology with two-way loudspeaker internal communication, bell event notification, emergency announcements that will override any pre-programmed zones assuring that all emergency/lockdown announcements are heard at all locations, and atomic time synchronization. The system will connect directly to the high school's LAN and have the future capability of expanding to connect to other intercom systems in the school district over the WAN for district-wide, emergency, and live voice announcements (additional hardware required at the other school facilities for this feature). Configuration of zoning, bell schedules, calendars, and emergency sequences will be accomplished using a browser-based interface.

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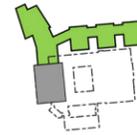
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OPTION 3A: RENOVATION ADDITION / SUMMARY



GSF: 207,827 SF  
**Estimated Construction Cost:** \$145,405,962  
**Estimated Soft Cost (20%):** \$36,494,038  
**Estimated Project Cost\*:** \$181,900,000  
**Approximate Cost to Stoneham:** \$128,700,000

\*Project cost - all costs should be considered preliminary based on order of magnitude

**Relationship of Site Organization to Surrounding Context:**

Option 3A2 sets up a clear front and back to the site creating a distinction between the two, the north being focused on vehicular arrival and the south focusing on an academic and athletic landscape. The gymnasium and its associated spaces are to be renovated in place. On the south and west side of the new facility playing fields, outdoor dining, outdoor civic pre function and outdoor learning environments connect strongly to the wooded edge of the Middlesex Fells Reservation. The path between these the north and south sides of the building passes through the building energizing the heart of the school.

**Phasing / Existing Utilities**

This option requires two major building phases and a site phase allowing students to stay largely in the existing building during construction. The existing gymnasium will remain, be renovated and integrated with the new structure. Site construction access is possible from the north west corner at Benjamin Terrace and existing utilities to the current school building must be rerouted in an enabling phase.

**Site Scope and Disturbance**

Less of the site is disturbed in this scheme compared to Reno Only option 2A, as fields to the west remain in the same general place minimizing regrading of the site. The existing culverted stream can remain in its current configuration.

**Traffic Mitigation / Site Circulation**

Optimal site circulation is achieved by bringing the drop-off loop along the north edge of the site lengthening the queuing line. However, pedestrian circulation will likely need to cross vehicular traffic from Franklin street on the site.

**Energy Strategy**

By stretching parking east to west and stepping the building to the northern edge, the site strategy sets up the potential for on-site power generation to equal the building's energy demands.

**Program Organization**

In this scheme the renovation of the existing gym and the spaces below it demand that the most public programs are located directly adject to the reused space. A multi-level commons that acts as a pre function space for major school events connects the upper and lower portions of the site. On the upper floors of the building, academic pods are clustered together around two story maker spaces that facilitate vertical circulation and interconnectivity.

**Civic Presence**

This option presents a strong civic presence to Franklin Street by placing the new portion of the building in front of the existing facility. The main civic entry is shifted to the west making it less prominent and the constraints of existing fields make parking and drop off more compressed than other options.

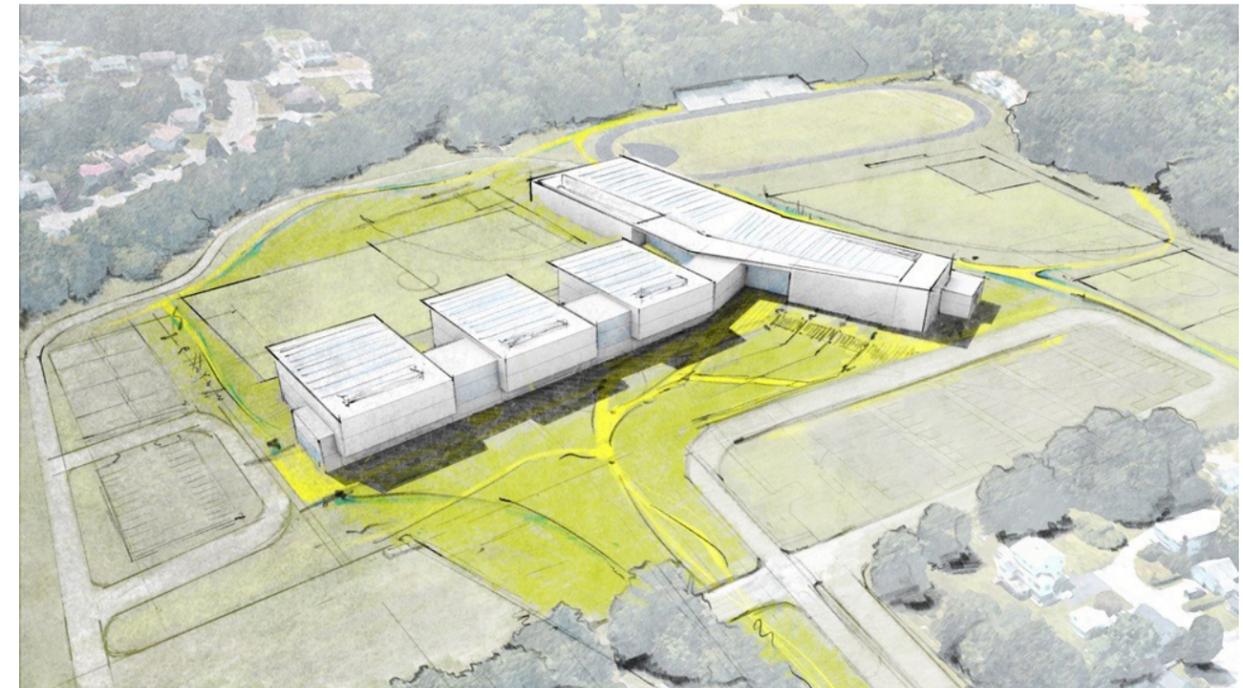
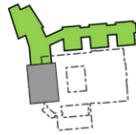
**Learning Environment / Landscape Relationship**

The opportunity to directly connect classroom clusters to outdoor learning environments on the south side is maximized by stretching the building east-west along the fields. These spaces face south and thus can extend their calendar further into the school year.

**Daylighting / Solar Orientation**

The mass of the building is oriented east-west allowing for optimal daylighting for classrooms and minimal negative afternoon heat gain. North facing classrooms receive even diffused light while south facing glare can be controlled through simple horizontal sun shades.

OPTION 3A: RENOVATION ADDITION / SUMMARY



CONSIDERATIONS

- Visibility of new building from Franklin St
- Minimized change to existing athletic fields
- Gateway to major athletics
- Central turf field as commons
- Optimized building orientation for daylighting/ZNE
- Pedestrian/bike path from Franklin Street crossing vehicular path
- Existing fields upgraded to regulation size
- Utilities relocation required to keep existing in operation during construction

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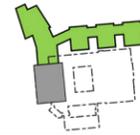
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A. PROSPECTIVE SITE ANALYSIS

Site / Landscape Scope Narrative

This narrative provides an analysis of the options including natural site limitations, building footprint(s), athletic fields, parking areas and drives, bus and parent drop-off areas, site access and surrounding site features. This narrative excludes temporary site facilities, phasing implications, site drainage, utilities and permitting requirements addressed separately.

Paving and Curbing

All building/site options include new asphalt pavement and granite curbing for driveways and parking areas (350 spaces). Fire lanes shall be asphalt paving without curbing. Walkways around the building and site will be accessible.

Athletic Facilities

Since the existing fields are undersized, fields will be reconstructed to meet regulation size in all options. The soccer/lacrosse fields and track will all remain in the existing locations, with upgrades. Scope includes replacing the two natural grass soccer/lacrosse fields and the natural grass field inside the track with synthetic turf including a concrete curb edger, shock pad and polyethylene fiber with sand and plant-based infill. The track will have new paving and ½" urethane resilient surface for track and field events (high jump, long and triple jump lanes & pits with covers, pole vault, discus and shot put). The stadium will also include new home and visitor bleachers. All options will include an athletic building for concessions and restrooms. Locker rooms and team rooms are planned in a building below the home bleachers.

Baseball will be re-oriented for optimal solar orientation but will have a shortened left field due to spatial constraints. Tennis will be located over the existing practice field location. Softball and a full-sized natural grass practice field overlapping the softball outfield will be located south of the building addition.

Site Lighting

All options will meet LEED requirements and IESNA standards with site lighting provided at parking, driveways and walkways. LED sports lighting will be provided at the stadium and one of the synthetic turf soccer/lacrosse fields.

Site Amenities

All options will include site furnishings, signage, electrical charging stations and the potential for photovoltaics over parking. Site furnishings will include benches, bicycle racks, vehicular bollards, tables, trash receptacles. Site signage will include traffic/regulatory, wayfinding and monumental school identity signage. Existing memorials will be salvaged and reset. The main entrance will include planter curbs, bollards and seat walls for pedestrian safety. Outdoor classrooms will include supporting amenities such as raised garden beds, storage/tool sheds, water source, fencing, tables and benches. There will be a separate play area for Pre-K with play equipment and poured in place rubber surfacing with a perimeter fence.

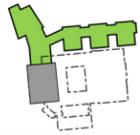
Fences and Gates

All options will include black vinyl coated chain link fencing and gates at the reconstructed softball and baseball/field hockey fields (6-foot high and 24-foot backstop), 6-foot high at reconstructed track, 10' high at tennis courts. Sports netting will be included as needed. The service drive will include a vehicular barrier gate. There will be an 8' high perforated or louvered powder coated metal screen fence and gates at service area.

Planting

Planting shall include 3.5-4" caliper trees for shade and ornamental character at parking, driveways, walks plazas and courtyards, approximate spacing 40' O.C. Limited ornamental landscaping at plazas and outdoor learning, and seeded lawn and landscape restoration areas. Green infrastructure for stormwater management will include vegetated swales, rain gardens and bioretention areas.

OPTION 3A: RENOVATION ADDITION



B. CONSTRUCTION IMPACT

Option 3A would require minor renovations within the existing occupied school, predominantly in the existing-to-remain Gymnasium, and would be undertaken in 2 or 3 phases. Modular classrooms are not anticipated to be required on site during renovations. Scheduling work over summer or holiday breaks may alleviate some of the disruption but would need to be carefully managed. The anticipated construction schedule is 36 months.

Work under this would be less disruptive to students and staff. Students would be forced to move only once to accommodate the construction phases. Disruption from noise, dust, odors and construction traffic could be anticipated.

The detailed plan for phasing and swing space would be determined during schematic design to best coordinate with the educational programs to minimize the impact on students and staff.

DESIGN AND CONSTRUCTION SCHEDULE

Anticipated MSBA Approval of PSR	January 13th, 2021 (MSBA Board Meeting)
Anticipated MSBA Approval of SD	August 25th, 2021 (MSBA Board Meeting)
Special Town Meeting/Ballot Vote	November 2021
Design Development Complete	November 2021 - April 2022
Construction Documents Complete	May 2022 - November 2022
Bid and Award	November 2022 - January 2023
Construction (multiple phases)	June 2022 - June 2025 (36 months)

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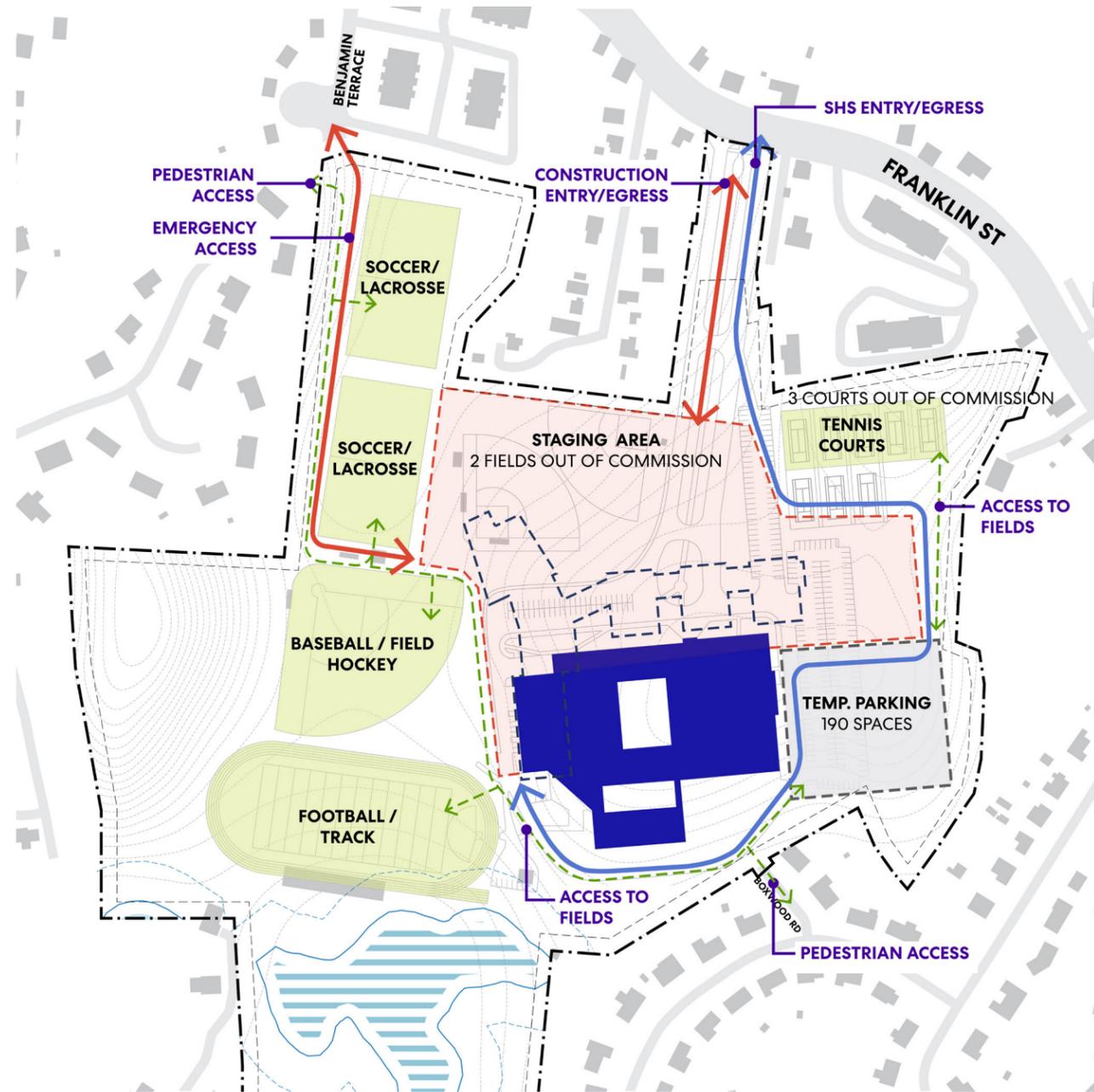
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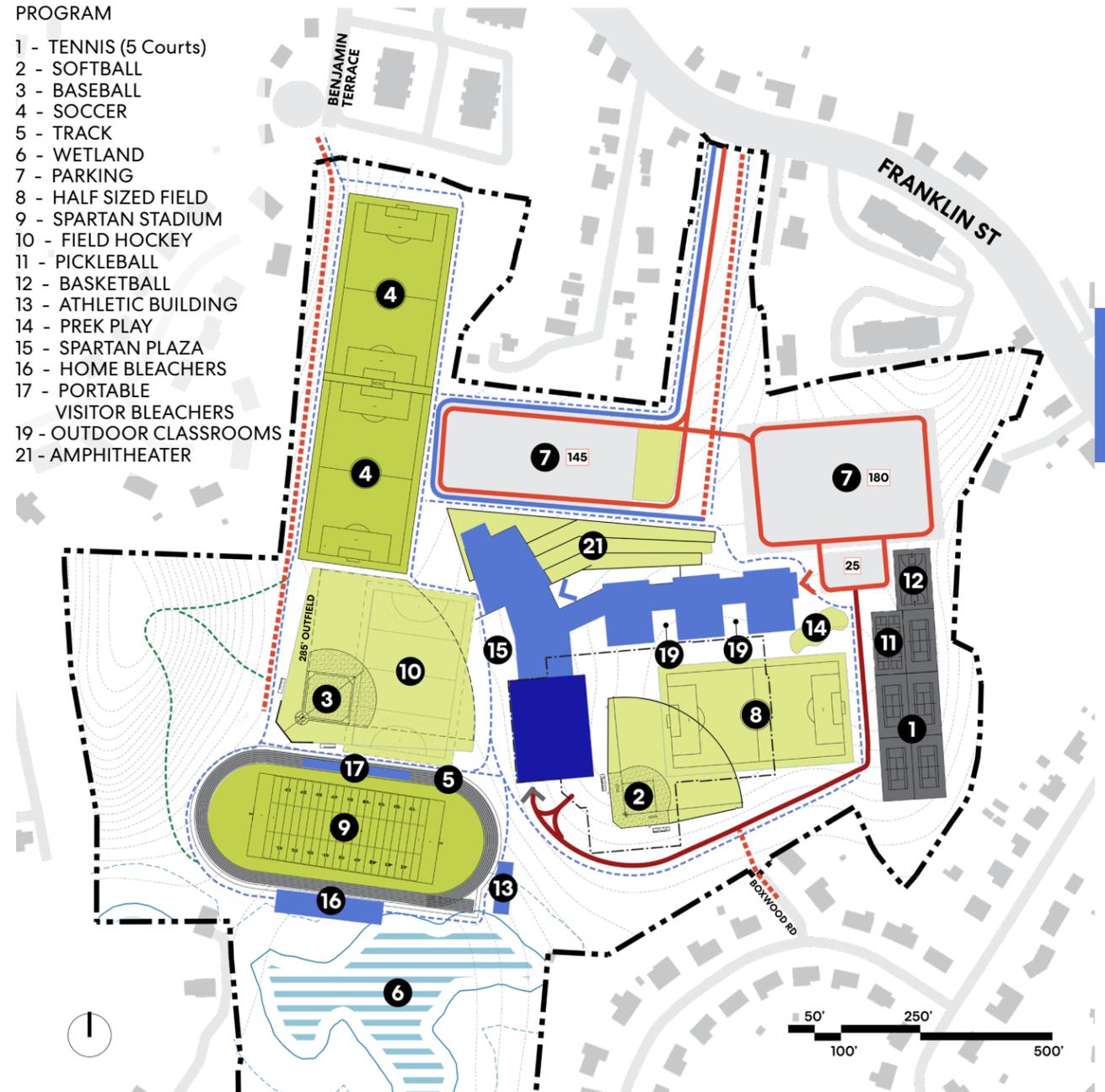
C. CONCEPT DRAWING / CONSTRUCTION PHASING PLAN

C. CONCEPT DRAWING / SITE PLAN



PROGRAM

- 1 - TENNIS (5 Courts)
- 2 - SOFTBALL
- 3 - BASEBALL
- 4 - SOCCER
- 5 - TRACK
- 6 - WETLAND
- 7 - PARKING
- 8 - HALF SIZED FIELD
- 9 - SPARTAN STADIUM
- 10 - FIELD HOCKEY
- 11 - PICKLEBALL
- 12 - BASKETBALL
- 13 - ATHLETIC BUILDING
- 14 - PREK PLAY
- 15 - SPARTAN PLAZA
- 16 - HOME BLEACHERS
- 17 - PORTABLE
- 18 - VISITOR BLEACHERS
- 19 - OUTDOOR CLASSROOMS
- 20 - AMPHITHEATER



- VEHICULAR DRIVE
- BIKE LANE
- HS MAIN ENTRY
- GRASS
- LIMITED ACCESS: EMERGENCY, MAINTENANCE, BICYCLES
- ADA PEDESTRIAN PATH
- PRE-K MAIN ENTRY
- SYNTHETIC TURF
- SERVICE DRIVE
- HIKING TRAIL (NOT ADA ACCESSIBLE)
- LOADING

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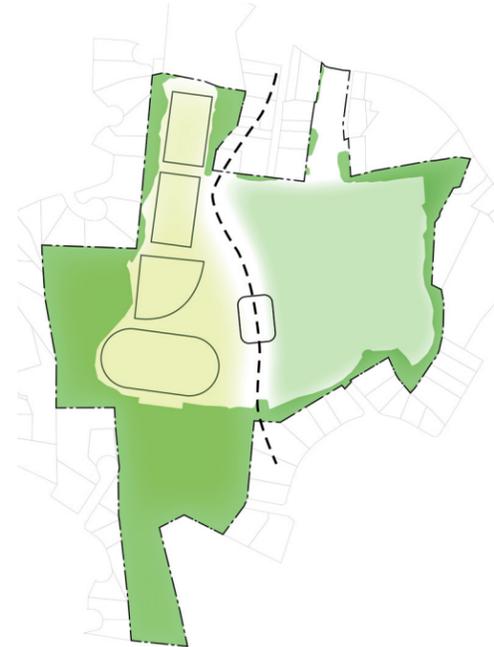
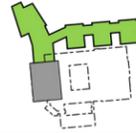
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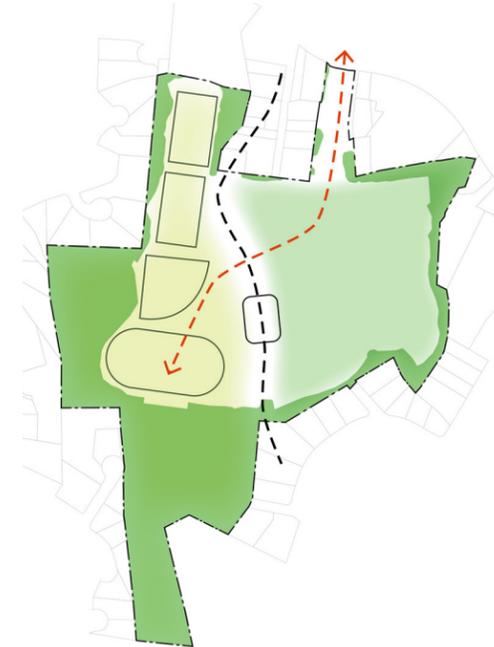
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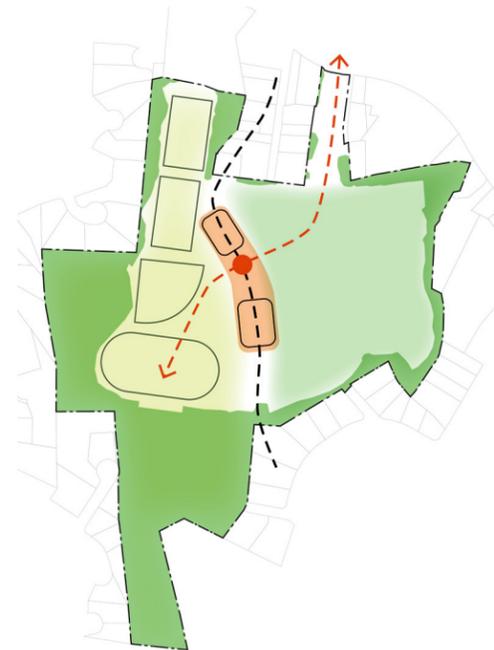
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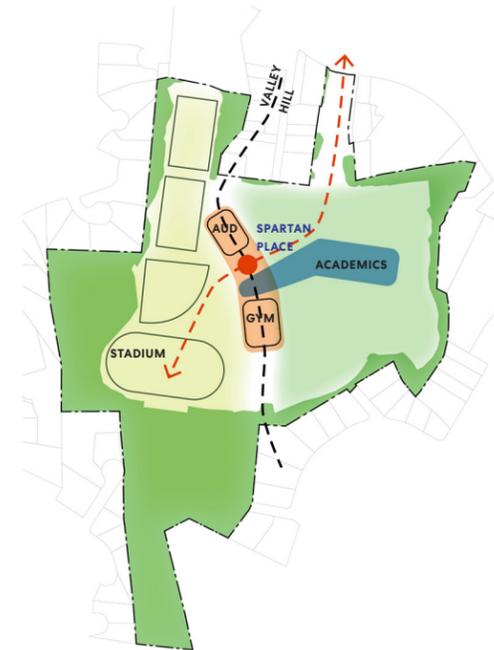
WEST ATHLETIC FIELDS & EXISTING GYM REMAIN



ENTRY & STADIUM ARRIVAL SEQUENCE IMPLY A REORIENTATION AT THE SITE CENTER



CIVIC PROGRAMS OCCUPY THE SITE CENTER



THE HEART OF THE SCHOOL IS LOCATED AT THE INTERSECTION OF CIVIC AND ACADEMIC LIFE

OPTION 3A: RENOVATION ADDITION

C. CONCEPT DRAWING / MASSING SKETCH

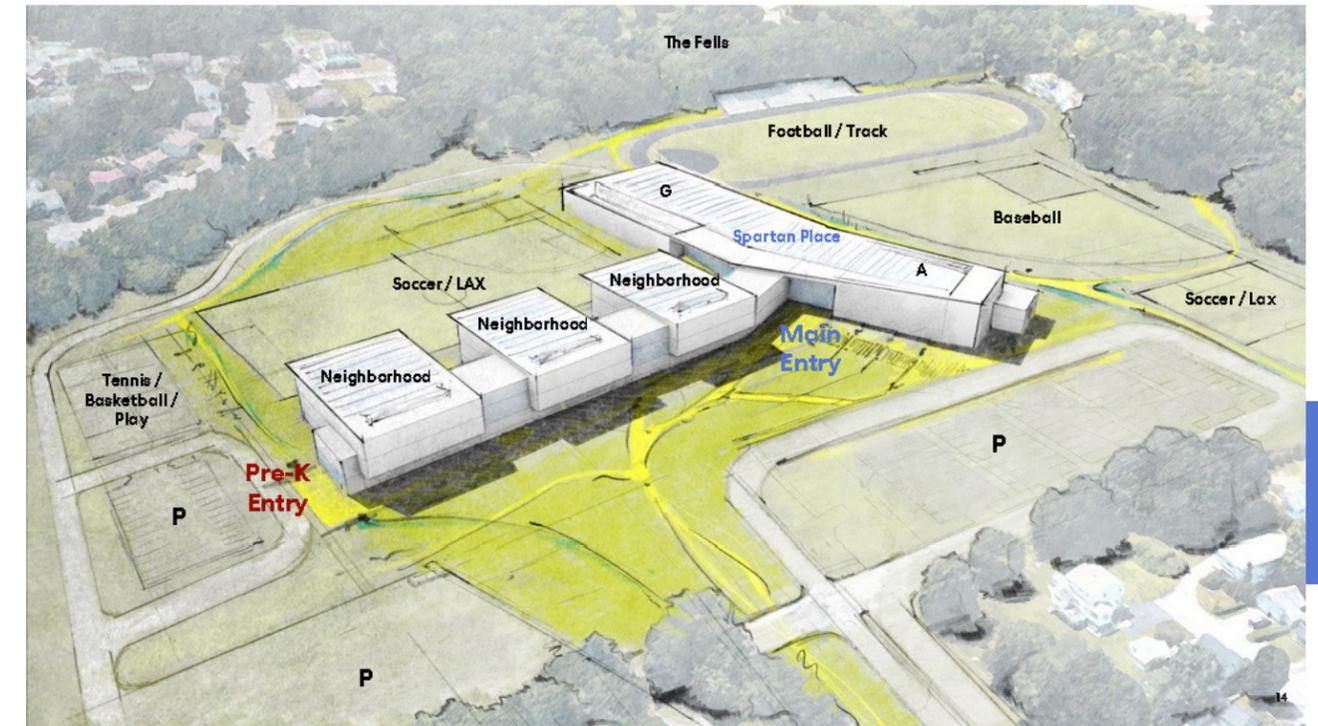
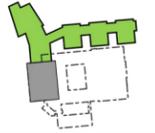


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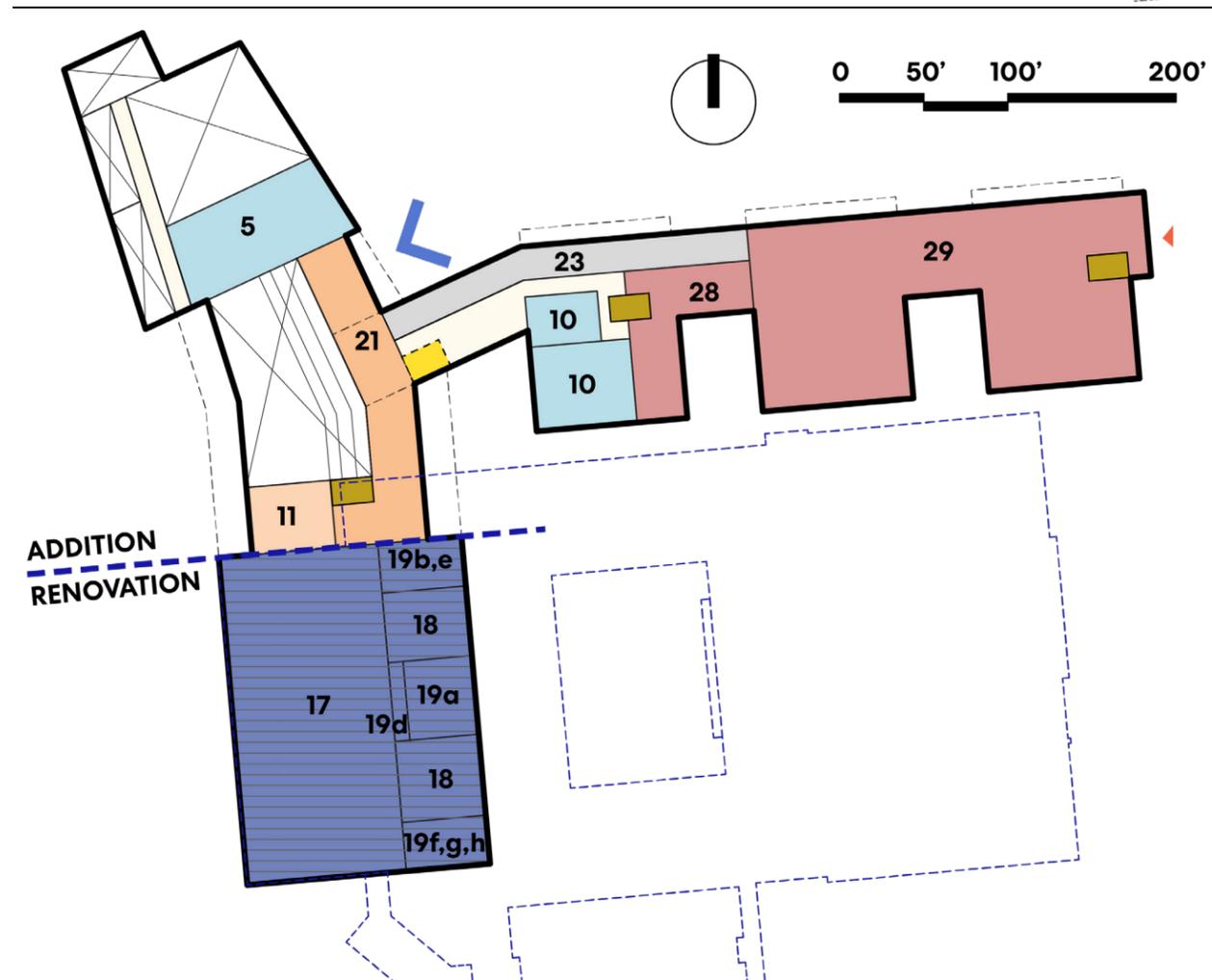
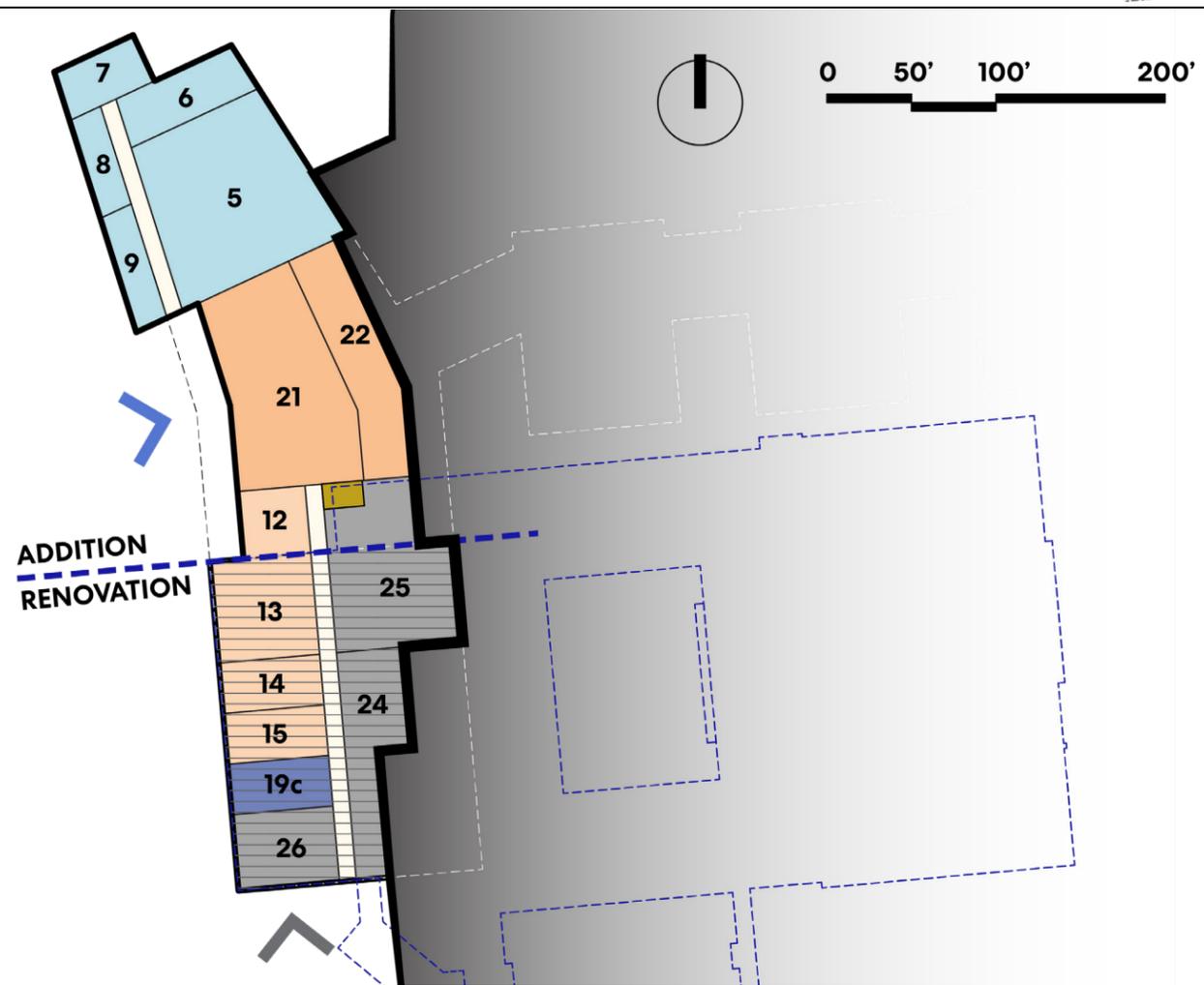
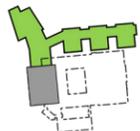
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OPTION 3A: RENOVATION ADDITION

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 00

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 01



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| <ul style="list-style-type: none"> <li>SP/ SPARTAN PLAZA</li> </ul>  |  |  |  |

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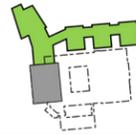
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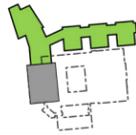
C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 02



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- SP/ SPARTAN PLAZA

OPTION 3A: RENOVATION ADDITION

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 03



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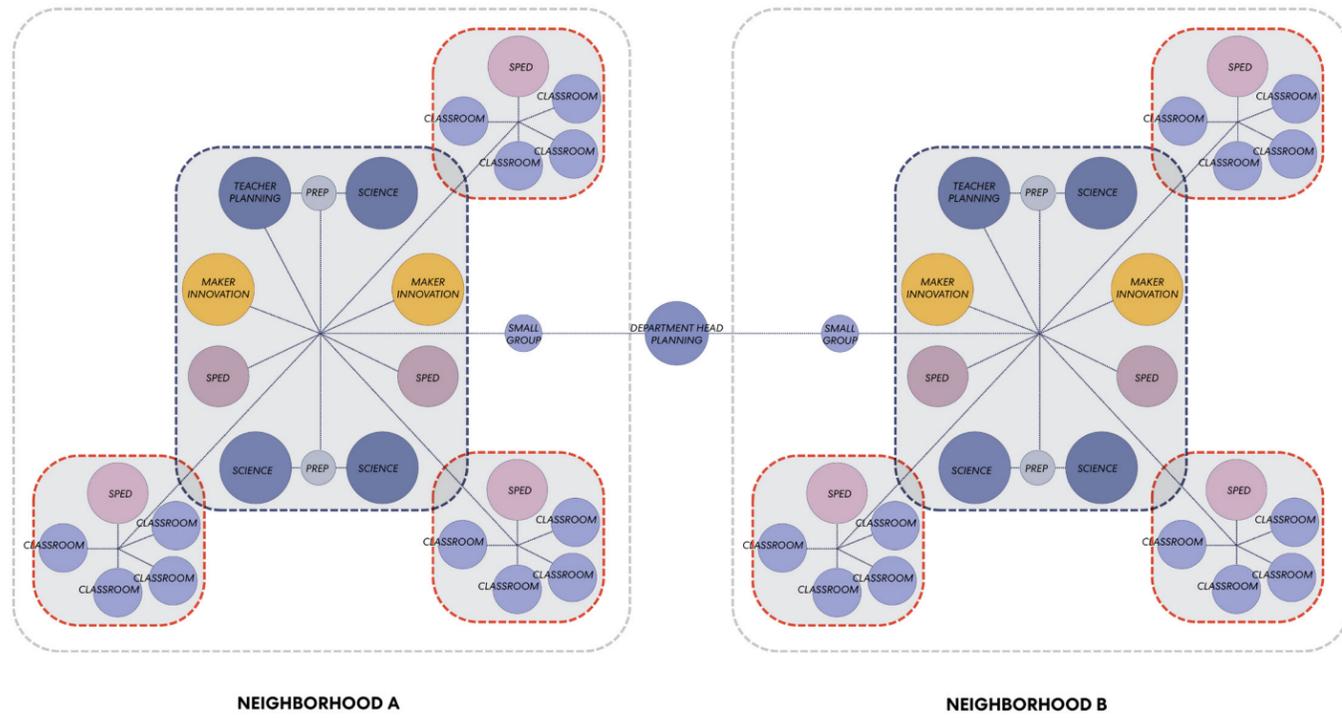
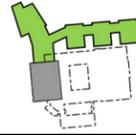
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OPTION 3A: RENOVATION ADDITION

C. CONCEPT DRAWING / ACADEMIC NEIGHBORHOOD STRUCTURE



OPTION 3A: RENOVATION ADDITION

C. CONCEPT DRAWING / ACADEMIC NEIGHBORHOOD STRUCTURE

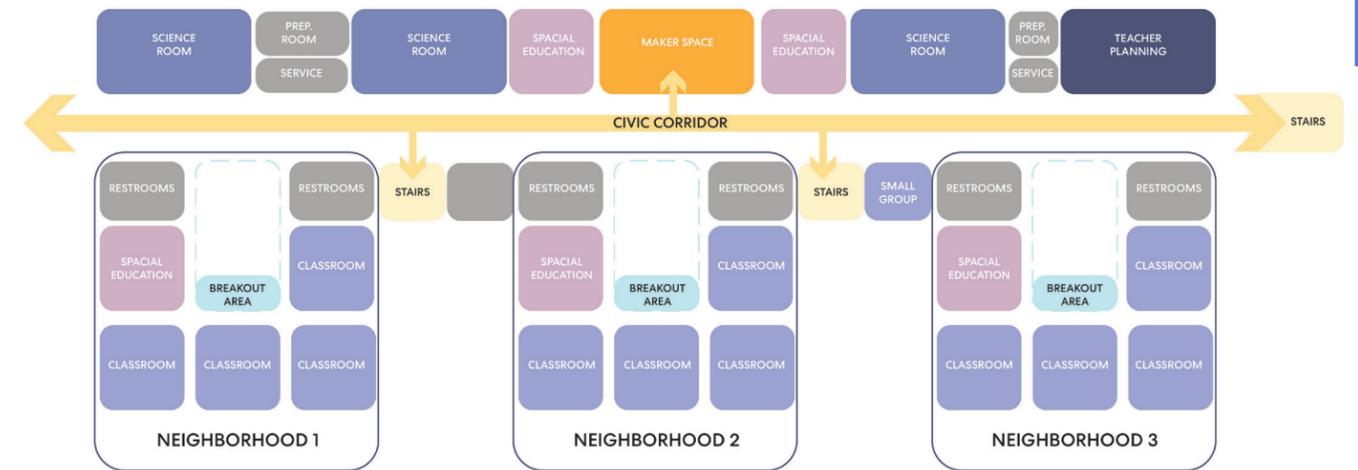


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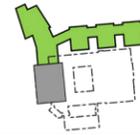
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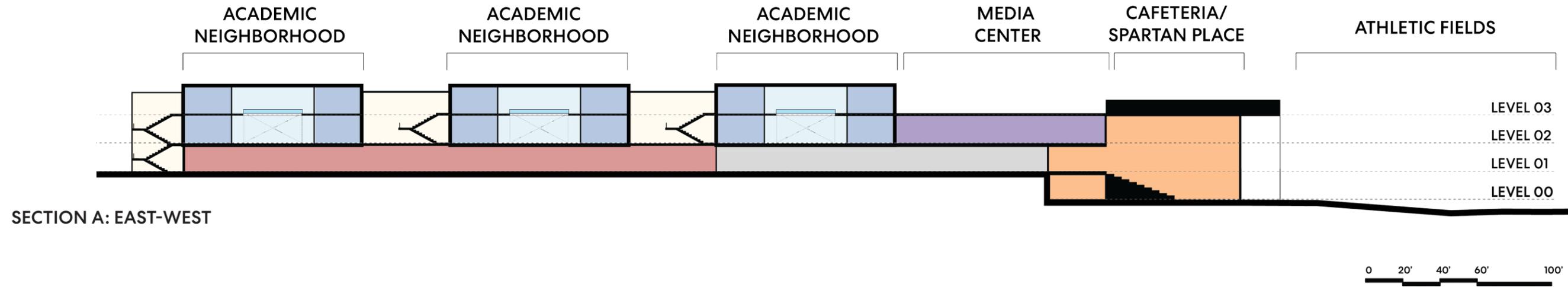
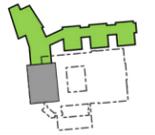
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C. CONCEPT DRAWING / BUILDING SECTIONS

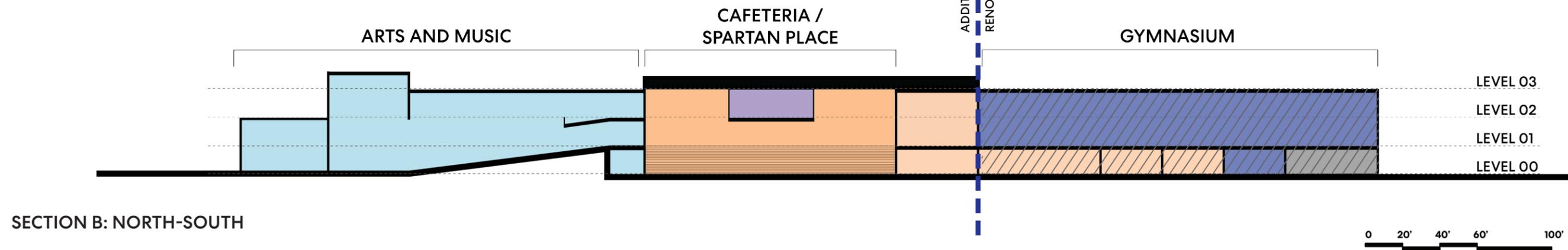


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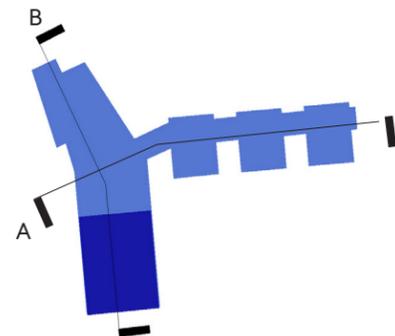
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SECTION A: EAST-WEST



SECTION B: NORTH-SOUTH



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| <span style="display:inline-block; width:15px; height:15px; background-color:orange; border:1px solid black;"></span> VOC & TECH          | <span style="display:inline-block; width:15px; height:15px; background-color:yellow; border:1px solid black;"></span> CIRCULATION      |

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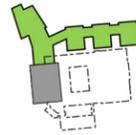
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D. STRUCTURAL SYSTEMS

STRUCTURAL SYSTEMS – OPTION 3A (Renovation Addition)

This option demolishes most of the existing structure but preserves the Gymnasium portion of the existing. A new running track is proposed to be suspended within the existing Gymnasium. Other programs are accommodated by a new addition to the north and the east of the existing Gymnasium.

3A RENOVATION FOUNDATIONS:

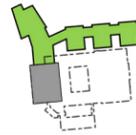
The Gymnasium is proposed to be retained and renovated. Allow for foundation addition to the existing foundations at 16 column locations that connect to the new bracing system. Carry adequate cutting and patching of slab on grade for the foundation work as well as trenching for utilities under the Gym building.

3A RENOVATION SUPERSTRUCTURE:

The Gym is structurally integral with the framing that is proposed to be demolished under this design option. Anticipated structural repair and alternation scope is noted below:

- a. North columns appear to have been cracked near the top at the connection with the precast tee flanges. It is likely that the connection between the roof frame and the columns were not properly executed causing distress under environmental effects. We recommend that the column tops be repaired and the connection detail be corrected.
- b. Carry allowance for structural slab repair for potentially spalling concrete due to sustained dampness in the locker area. Assume 15% of the area of the locker room ceilings and storage ceilings. Chip loose concrete, clean rebar with wire brush/sand blasting, provide protective coating and apply repair concrete using techniques such as microcrete or shotcrete.
- c. Exterior framed stairs serving the gym suffer from concrete spalling at multiple locations. We recommend that the rust be thoroughly cleaned off of the reinforcement bars and the spalling concrete be patched and repaired.
- d. Spalling, cracked concrete and exposed rebar were observed at multiple spots along the exterior frames (mainly columns) supporting the gym. Some attempts of prior patchwork have also have come undone. We recommend that the rust be thoroughly cleaned off of the reinforcement bars and the spalling concrete be patched and repaired.
- e. Provide seismic anchoring at the top of all masonry wall. Exterior and partition walls. Allow for steel angles at 4'-0" spacing anchoring the top of the wall with concrete framing using adhesive steel anchors. Galvanized steel for exterior walls.
- f. Allow for steel bracing connected to existing concrete framing along perimeter of the Gym building. Two 16-foot bays along each of the four sides. Assume 30 tons of steel bracing and connections to concrete.
- g. The Gym roof diaphragm may need additional reinforcing to comply with the Code requirements. Allow for a ¼" thick steel plate at each flange connection clips at the precast T girders. Also, carry another 10 tons of steel to create a roof diaphragm collector and its connection to the new lateral system.
- h. A new track is proposed to be suspended from the existing roof structure. Connect the track support hanger to the girder web using through bolting. Carry allowance for scanning each girder web at the connection point and connection hardware at every 16 feet along the length of the track. Additional 8 tons of steel for the support of track along the North and South legs of the track.

OPTION 3A: RENOVATION ADDITION



D. STRUCTURAL SYSTEMS

3A ADDITION FOUNDATIONS:

Geotech report has recommended conventional footings supported on a minimum of 6 inches of structural fill placed directly over the natural sand after removing top soils and fills. An allowable bearing capacity of 4,000 pounds per square feet has been provided by the Geotech report.

Typical Interior Column Footings of 8' x 8' x 25", and Exterior Column Footings of 7' x 7' x 22" with 60lbs/cu.yd. steel reinforcement. The proposed footing sizes are based on a typical bay spacing of 25 feet in each direction. Individual footings may vary depending on specific column spacing in each area.

2'-0" x 2'-0" Grade Beams below slab-on-grade at locations of the braced frames. Consider 1 bay (or 25 linear feet) of grade beam at every 25' x 100' area. 100 feet long grade beams at 30 feet on center under auditorium floor. 330lbs/cu.yd. steel reinforcement.

Perimeter Frost Walls – 14" thick, 4'-0" below finished grade with 2'-6" x 1'-3" footing. Reinforced with 115 lbs/cu.yd. 2'-0" x 2'-0" concrete piers under all perimeter columns with 300 lbs/cu.yd. steel reinforcement.

First floor slab-on-grade, 5" thick concrete with WWF6x6-W2.9xW2.9 supported on minimum of 12 inch structural fill, insulation and vapor barrier. No under slab drains anticipated. Contraction joints at 15 feet max. Slabs that are polished, exposed concrete and carry directly adhered finish should include vapor reducing admixtures such as Barrier One.

Elevator pit with 12" thick reinforced concrete wall and 24" thick base, reinforced with 120 lbs/cu.yd. steel reinforcement. Under stage pit, if needed, may be similarly estimated with 8" thick pit slab.

Retaining walls east of Level 00 – 14" thick concrete reinforced with 180 lb/cu.yd. of steel reinforcement.

The project site has sloping topography and known potential for ledge. The amount of earthwork will depend on the final finish level of the first floor elevation. We recommend an allowance be carried for appropriate cut and fill earthwork including potential ledge cutting. Also, the utilities running under the building footprint may require trenching through ledge.

Ground water levels are found to be ranging between 3.5 feet and 9 feet below existing grade, and hence moderate level of groundwater management is anticipated to be required. Permanent perimeter wall drains are recommended.

3A ADDITION SUPERSTRUCTURE:

A conventionally framed structural steel system is proposed for this project. Composite beams supporting composite floor slabs consisting of lightweight concrete on steel deck. The floor slab construction will consist of 3.25" light weight concrete on a 3", 18 gage composite galvanized steel deck. The roof housing mechanical units will consist of 3", 20 gage galvanized steel decking with concrete topping or other suitable means for acoustical considerations.

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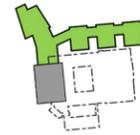
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OPTION 3A: RENOVATION ADDITION



D. STRUCTURAL SYSTEMS

Assuming a typical floor bay of 25' x 25', the floors will be supported by steel wide flange (typically 16 inch deep) beams, 21 inch deep girders and steel columns. Actual spans may vary depending on further coordination with other disciplines. The columns will typically be placed along exterior walls and along the corridor walls. Assume square and rectangular HSS columns for compact shapes. The beams are typically spaced at 8 to 10 feet on center. Standard double angle or shear plate bolted connections are anticipated between steel members.

The framing supporting the Auditorium roofs are anticipated to span close to 100 feet. Deep steel trusses or open web long span girder are typically used systems for such spans. The long span members in turn are supported by girders supported by perimeter columns. The steel columns along these two special elements may also be utilized to support the tall curtain wall or other building envelope system. At least one level of wind girts should be estimated for supporting the building envelope in these and other tall spaces.

Open web bar joists may be considered as an alternative to the traditional wide flange steel framing. This change may result in savings of about 1.0 lbs per sf of steel tonnage but will require deeper joist depths. This option can be considered in the next phase of design upon further coordination. Open web steel joists can be spaced at 30" or so on center to keep the joist depths within reasonable range.

The lateral force resisting system to resist wind and seismic forces will be composed of braced frames in both orthogonal directions. These will be strategically located at partition walls, exterior walls, or exposed to coordinate with project aesthetics. The braced frame diagonals are anticipated to be steel tube sections spanning diagonally within the plane of a column bay. Brace end connections will consist of gusset plates and a combination of welded and bolted anchorage to the plates.

Façade support is generally expected to consist of slab-supported perimeter walls constructed with light gage steel studs. Glazing elevations are expected to require perimeter bent plate slab edge construction for appropriate mullion anchorage.

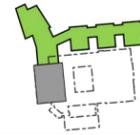
Structural Steel Estimates

Typical floor and roof framing	6.5 psf
Auditorium Floor framing	12 psf
Auditorium Roof Framing	21 psf
Stage Roof and fly tower Framing	28 psf
Suspended Tracks	10 psf
Columns (HSS)	2 psf
Bracing (HSS)	1 psf
Miscellaneous	2 psf

3A ADDITIONAL CONSIDERATIONS:

- Expansion/Separation Joints:** The addition should be structurally independent of the existing Gymnasium. Also, due to the layout of the floor plates and the diaphragms another expansion joint should be introduced between the Cafeteria and the Media Center. This offers a very cost effective opportunity to separate the very active programs from the quieter core educational programs.
- Alternative materials:** Spartan Place and the Auditorium are visually connected to the Gymnasium. Precast concrete construction for the Auditorium and Spartan Place may be considered for framing as an aesthetic consideration.
- Auditorium:** The Auditorium has unique components such as over-house catwalk, fly gallery grating, well beams, header beams, lock rail and related rigging support framing, lighting grid etc. Carry an allowance for these items.

OPTION 3A: RENOVATION ADDITION



D. STRUCTURAL SYSTEMS

- Other scope not specifically identified:** Allowances should be considered for items such as screening around roof top units, structured canopies, monumental stairs, support for sculpture/art commissions, and thermal breaks within steel construction that penetrates the envelop.

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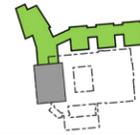
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E. SITE UTILITIES

OPTION 3A – RENOVATION ADDITION / SITE UTILITIES

Site Utilities

Stormwater

Storm drainage for the site will need to comply with Massachusetts Stormwater Management standards. Massachusetts Stormwater Management standards require that the rate of stormwater flows from the site not be increased over current conditions. They also require that the quality and quantity of stormwater be addressed by treating the stormwater to remove possible contaminants and that a portion of the stormwater be directed to the groundwater. Areas that see vehicular traffic are required to have their stormwater quality addressed through enhanced means such directing it through a water quality inlet prior to discharge. Runoff from roofs and landscaped areas are considered clean and additional treatment prior to recharge or discharge is not required.

The increased rate of runoff from the site will need to be addressed by detaining or infiltrating stormwater on-site. Detention/retention ponds, constructed wetlands, underground infiltration systems, porous pavement and rainwater recycling are all examples of some best-management practices (BMP's) used to address stormwater rate and volume. With limited available site area, sub-surface infiltration/detention systems would be the preferred option.

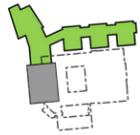
The stormwater improvements required to meet current stormwater standards would include the construction of an all-new stormwater management system for the site. Stormwater from the site would be collected in new deep-sump manholes with hoods or tees. Runoff from areas seeing vehicular traffic would be routed through a water quality inlet similar to a Stormceptor Model 3600STC. Prior to discharge from the site the runoff would be routed through a new subsurface infiltration/detention system. The size of the systems would be dependent on the amount of additional impervious area added to the site.

Sanitary Sewer

The existing sanitary sewer system on site will remain where it does not conflict with the new construction. The portions of the existing system to remain should be cleaned, video inspected and repaired as needed. As currently proposed the existing sewer line serving the site could remain to approximately the end of the existing entrance drive. New sanitary sewers would need to be constructed to serve the new addition which would then connect to the existing system to remain.

A new external grease trap will be required for the sanitary flows from the kitchen and cafeteria. The new grease trap would be a 6,000-gallon precast concrete below-grade structure with a new 6-inch sanitary service from the kitchen/cafeteria and a new 6-inch connection to the on-site sanitary sewer system. A 4-inch PVC vent would be required from the new grease-trap back into the building and a new sanitary sewer line would need to be installed from the external grease.

OPTION 3A: RENOVATION ADDITION



E. SITE UTILITIES

Water

The portions of the existing on-site water system that are not in conflict with the new construction would remain. The water line serving the site under the entrance drive could remain up to approximately the end of the entrance drive. A new water loop consisting of 8-inch ductile iron, cement-lined water main would be constructed around the building with connections to the existing-to-remain water line under the entrance drive and to the town system in Boxwood Road. The two connections to the town system will provide a measure of resiliency and will also improve available flow. New fire and domestic water services would be provided to the building from the new loop around the building. In addition, all new site fire hydrants would be provided throughout the site.

Natural Gas

The existing gas service located under the entrance drive would remain where it does not conflict with the new construction. A new service to the building, sized by the project's MEP Engineer and the gas utility would be provided to the new building from the portion of the existing service to remain.

Permitting

Wetlands Protection Act (310 CMR 10.00) and Town of Stoneham Wetland Protection By-Law

There are wetland resource areas subject to protection under the Wetlands Protection Act and Town of Stoneham Wetland By-law at the north end of the site (stream and bank) and south end of the site (bordering vegetated wetlands). Work within 100 feet of these resource areas will require the approval of the Town of Stoneham Conservation Commission. Any work associated with the existing football field/track or on the 36-inch drain line would trigger the filing of a Notice of Intent.

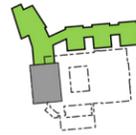
Other Permitting

Review of MassGIS permitting layers indicate that the site is not within a Priority Habitat of Rare Species or Estimated Habitats of Rare Wildlife or within any Surface Water Supply Protection Zone or within any Flood Hazard area.

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F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



OPTION 3A – RENOVATION-ADDITION/ FIRE PROTECTION & PLUMBING

**Fire Protection**

To comply with current codes, this building will require a complete sprinkler system installation per the Massachusetts State Building Code, Chapter 34. The Fire Protection system would be designed to meet the requirements of NFPA 13 “Installation of Sprinkler Systems” and Chapter 9 of the Massachusetts State Building Code, 780 CMR, “Fire Protection Systems”.

A new dedicated 6" sprinkler service, connected to the town water system in the street, should be brought into the building. The exact entrance location will need to be coordinated with the Architect. As the sprinkler service enters the building a Massachusetts approved double check valve backflow preventer assembly, complete with OS&Y valves on the inlet and outlet, will be required.

The building will be protected by three types of sprinkler systems and each will protect the following areas:

- Wet sprinkler system – base building system
- Dry sprinkler system – to protect areas subject to freezing, i.e. loading docks and outdoor walkways covered by building overhangs, etc.
- Pre-action sprinkler system – to protect the MDF room

The alarm check valves for the wet and dry sprinkler systems will be installed on separate risers after the double check valve assembly in the water service entrance room. The alarm check valves will be complete with standard trim packages including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches. The dry alarm valve will be supplied with an air compressor and associated appurtenances.

The main feeds out to the system from the alarm check valve will extend out to the building through the first-floor ceiling space. The piping will then extend to all areas of the building so that each section of the building and each floor can be divided into separate zones.

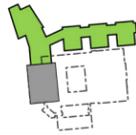
Due to the building being only three stories the Massachusetts State Building Code does not require a standpipe system throughout the School. However, regulations governing Auditoriums and Stages will require standpipes at each side of the backstage areas.

The sprinkler system risers will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control assembly off of the standpipe which feeds each floor will contain a flow switch and tamper switch. An inspector’s test connection will be installed on the floor control valve station. If the stage is greater than 1,000 square feet, then fire department valves will be required on each side of the stage.

Sprinkler heads throughout the facility where gypsum or suspended ceilings are installed will be glass bulb, quick response, chrome plated semi-recessed type. In areas where no ceilings are installed brass upright sprinklers will be installed. Where upright sprinklers are subject to

OPTION 3A: RENOVATION ADDITION

F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



potential damage, such as in storage rooms, protective cages will be installed. In areas where it is not possible to run piping above the ceiling, the use of sidewall sprinkler heads would be recommended.

The MDF room will be protected by a pre-action sprinkler system. A pre-action alarm valve with all required appurtenances will need to be located next to or near the MDF room. Piping from this valve will extend into the room and connect to sprinkler heads. The piping system will be filled with compressed air. Once a sprinkler head activates, the air will discharge and open the pre-action alarm valve to allow water into the system and through the open sprinkler head.

Sprinkler piping for the system will be as follows:

- Piping 2" and smaller shall be schedule 40 black steel with cast iron fittings with threaded joints.
- Piping 2 ½" and larger shall be Schedule 10 black steel with malleable iron fittings with rolled grooved joints.
- Dry sprinkler systems will be supplied with Schedule 10 galvanized piping throughout.

All tamper and flow switches installed on the sprinkler system will be connected to the buildings fire alarm system. Each tamper and flow switch will be a dedicated point on the fire alarm system.

The exterior fire department connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. Final location of this connection will be coordinated with the Stoneham Fire Department. An additional fire hydrant may need to be added on the site to be within the required distance of this connection.

The hydraulic requirements for the building will be as follows:

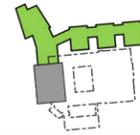
- Light Hazard - All offices, corridors and the auditorium hydraulically calculated to deliver 0.1 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard - All storage rooms and mechanical rooms hydraulically calculated to deliver 0.15 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard Group II - The stage area hydraulically calculated to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

**Plumbing**

A renovation and addition to the school would require that all existing systems be modified to comply with current codes. The following recommendations to the plumbing systems should also be considered.

- All existing plumbing systems, or portions thereof, that were capable of remaining and being maintained should also be removed or modified to meet the requirements of any planned renovations.
- All existing plumbing systems to be removed as part of the select building demolition should be removed back to the nearest point of connection of their respective system.
- New above ground sanitary waste piping should be installed throughout remaining portions of the existing building to replace the existing older system that is currently in place.

OPTION 3A: RENOVATION ADDITION



F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION

- New above ground domestic hot and cold water piping should be installed throughout remaining portions of the existing building to replace the existing older systems that are currently in place.
- Install new waste outlets as required to accept HVAC condensate and sprinkler waste discharge.

Plumbing Fixtures

All water closets, urinals and lavatories in the existing building are old and not current water conserving type. Removal of all fixtures is required as the existing fixtures have reached the end of their serviceable life. Water closets should be replaced with new dual flush valve fixtures. A full flush will discharge at a rate of 1.6 gallons per flush (gpf). When only flushing liquid waste and paper, the reduced flush rate will be 1.1 gpf. Urinals should be replaced with 0.25 gpf fixtures. Lavatories should be replaced and new low-flow type faucets (0.5 gpm or less) added with temperature limit stops which will deliver water with a maximum temperature of 110°F. ADA requirements for fixture spacing, mounting heights and protection of any exposed piping will also need to be met during a renovation to the bathrooms.

The state plumbing code dictates the number of plumbing fixtures required in a building. Minimum plumbing fixture requirements will be determined once the total occupancy numbers for the building have been established based on the final plan layout.

Domestic Cold-Water System

The existing 4" domestic water service will be removed as part of the building demolition, after the new addition is built. This service appears to be adequate to meet the current building water requirements. A new 4" domestic water service will be brought into the new addition in a new mechanical room. A new water meter and backflow preventer assembly will be provided on the new service. Cold water piping will distribute to all fixtures requiring cold water. The existing plumbing fixtures in the remaining portion of the existing building will have to be re-piped to the new water service after completion of the new addition and before the demolition of the rest of the building.

Domestic Hot Water System

The existing boiler and storage tank providing hot water to most of the school, as well as the storage type heater serving the kitchen, will remain in service until the existing building is demolished. In the new addition, it is recommended to install new gas-fired storage type water heaters to serve the entire school. It is also recommended that redundant water heaters be included in the new system design. This would allow the system to continue to deliver hot water if one of the water heaters were to need service. The water heaters would be sized to serve all fixtures within the building. A new gas-fired heater should also be provided to serve the needs of the renovated kitchen equipment.

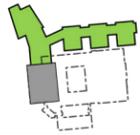
Sanitary Waste and Vent System

The sanitary system in the existing building appears to be in fair condition and will remain. A new sanitary system will be installed in the new addition to serve all plumbing fixtures. Sanitary piping within the field house will remain and be reconnected to the site sanitary system as required. All other sanitary piping in the existing building will be removed during demolition.

Storm Drainage

The existing building roof drainage appears to be in good condition and no replacement is required. The roof itself appears to be in good condition and leaks around the roof drains themselves have not been reported.

OPTION 3A: RENOVATION ADDITION



F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION

New roof drains and storm water piping system will need to be added to the new addition. Discharge of the storm water will be coordinated with the civil engineer.

Backwater valves should be installed on all interior storm system piping originating from roof drains on lower roof sections as per the state plumbing code.

Natural Gas System

Currently the existing gas service is more than adequate to meet the school's demand requirements and should remain. Gas piping should be reconfigured to serve all mechanical equipment that will require gas. Any new gas-fired kitchen equipment should also be connected to this service. It is recommended that gas sub-metering be used to separately meter gas consumption for the mechanical equipment and kitchen uses.

Insulation

The pipe insulation that currently exists should be tested to determine the extent of any hazardous materials. The insulation should be removed and replaced with new fiberglass insulation with an all service jacket. Domestic water and horizontal storm drainage piping that is not currently insulated should have new insulation installed. New domestic water piping and horizontal storm drainage piping installed throughout the new building addition will be insulated.

Insulation will also need to be provided on waste piping and water piping below handicapped lavatories and sinks.

Hose Bibbs and Wall Hydrants

During any renovation done to the building, the existing hose bibbs in the toilet rooms should be removed and new wall mounted hose bibbs with an integral vacuum breaker and removable tee handle installed. In the new addition, hose bibbs will be provided in all bathrooms and mechanical spaces. New wall hydrants will be provided on the exterior of the building and their locations coordinated with the architect.

Cross Connection Control

The existing hose bibbs and wall hydrants do not have backflow prevention devices. Backflow devices should be integral to all new hose bibbs and wall hydrants installed during the renovation.

All service sink faucets installed during a renovation and in the new addition, will also be supplied with integral vacuum breakers.

A new reduced pressure backflow preventer assembly should also be installed on the existing 4" domestic water service (or on a new service if this is the preferred option) to further protect the town's domestic water system.

Boys and Girls Locker Room/Shower Areas

All locker room/shower areas will be removed as part of the demolition. Floor drains within any new shower stalls should be arranged so that the water from one shower does not enter the adjacent shower area. New shower valves should be installed with code compliant shower heads. Master mixing valves should be installed at each shower location. Valves shall be provided with limiting stops set to a maximum water temperature delivery of 112°F.

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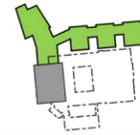
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F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION

All plumbing fixtures will be replaced as discussed in the "Plumbing Fixture" section of this report.

Kitchen

The new cafeteria kitchen will include the addition of new gas-fired equipment. This equipment can be connected to the new gas service located outside the building as noted above. Any new gas equipment would be fed by gas piping connecting to a master shut-off valve that would be interconnected with the kitchen hood and exhaust system. Gas would only operate when the kitchen hood exhaust system is operating.

Additional floor sinks and/or floor drains would be added to any new equipment design to ensure proper drainage throughout the kitchen.

A new three-compartment sink with new grease trap should be included per state code requirements.

A new dishwasher with accompanying grease trap may also be provided per state code requirements.

A new exterior grease trap, located underground, outside of the kitchen portion of the building will also need to be considered as part of any new kitchen design. Venting of this exterior grease trap should enter back into the school building and exit to the atmosphere above the roof.

Science Wing

New science classrooms will include new sinks and faucets. Faucets should be low-flow type fixtures with a maximum delivery rate of 0.5 gpm.

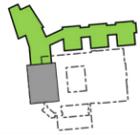
All new science classroom sinks will connect to a new polypropylene acid resistant piping system that empties into a central acid neutralization tank and system. This system would balance the pH of the lab waste and then safely discharge it into the regular sanitary waste system before it connects back to the town's sanitary waste system.

New protected hot and cold-water systems should be created to serve the new science classrooms by installing reduced pressure backflow preventers on the hot and cold-water piping designated to serve this area.

Gas piping to each science classroom should first feed an emergency shut-off valve located in a valve box on the wall near the classroom exit door. Piping from this valve would then feed any gas turrets within that classroom only.

New emergency showers and eyewashes will be installed in each science classroom. A new tempered water system should be created to serve these fixtures. A new gas-fired water heater should be installed somewhere within the science wing and be dedicated to the new tempered water system. Water should be stored at 140°F and a master mixing valve should be mounted nearby and set to deliver tempered water to this wing at approximately 70°F-90°F per state plumbing code requirements. A tempered water return system will also be required to keep this system from becoming stagnant per state plumbing code requirements as well.

OPTION 3A: RENOVATION ADDITION



F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION

Pipe Materials

Below grade sanitary and storm drainage piping will be service weight bell and spigot cast iron with neoprene gasketed joints. Above grade sanitary and storm piping will be service weight hubless cast iron with Massachusetts approved stainless steel and neoprene no-hub connector assemblies.

All lab waste piping will be Schedule 40 polypropylene with electrical heat fusion joints. Mechanical joints may be utilized for lab waste piping within laboratory furniture.

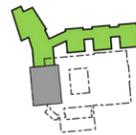
All water supply and return piping shall be Type "L" copper.

All water supply and return piping insulation shall be in accordance with the Energy Code.

All gas piping will be threaded black steel piping up to 2 1/2" size. Piping 3" and larger shall be welded.

OPTION 3A: RENOVATION ADDITION

F. BUILDING SYSTEMS / HVAC & ELECTRICAL



I. PROJECT OVERVIEW

A. The existing Stoneham High School is approximately 221,000 sf on two levels. The Design Alternatives include Renovation (Option 2A), Renovation and Addition (Option 3A) and New Construction (Options 4A and 4B). All of the alternatives are approximately 207,000 sf. The anticipated program elements include:

1. Education classroom spaces (approx. 56,000 sf)
2. Gymnasium and support spaces (approx. 28,000 sf)
3. Kitchen and Cafeteria Space (approx. 7,500 sf)
4. Vocational / Technical Spaces (approx. 11,000 sf)
5. Media (Auditorium and Support) Spaces (approx. 15,000 sf)
6. Arts Classrooms (approx. 6,000 sf)
7. Entry and Administrative areas (approx. 23,000 sf)
8. Mechanical/Electrical and Misc Spaces, Circulation, etc (approx. 60,000 sf)

B. The purpose of this narrative is to describe the intended HVAC and Electrical systems required to achieve the goal of a Net Zero Energy facility. Therefore, for all of the design alternative options, we shall assume the removal of the existing systems and providing new systems as described in the sections below.

II. HVAC AND ELECTRICAL SYSTEMS OVERVIEW AND SCOPE OF WORK

A. HEATING, VENTILATING, AND AIR CONDITIONING

1. The heating, air conditioning and ventilation systems shall be high-efficiency systems that will contribute towards the goal of achieving a Net Zero Energy facility.

2. Existing Systems:

a. The existing rooftop unit, exhaust fans, air cooled split type units, unit ventilators, heating and ventilating ceiling mounted air handling units and heating units, along with all associated ductwork, piping, controls, existing boilers, etc will be removed.

3. New Systems:

Option 1: Geothermal Heating/Cooling System

a. Ground Loop Geo-Exchange System:

1) A vertical borehole well field consisting of (225) 6-inch diameter boreholes spaced 20 feet apart shall be provided. Each borehole shall be 400 to 500 feet deep. Actual depth to be determined based on thermal conductivity testing performed on a test well. The number of boreholes may be increased or decreased based on thermal testing results and/or determination of the final heating and cooling loads.

2) Provide a 1-1/4 inch supply and return pipe within each borehole with a U-bend at the bottom. Piping shall be high density polyethylene (HDPE) with DR9 wall thickness. Polyethylene pipe and fittings shall be heat fused by butt, socket, sidewall, or electrofusion in accordance with pipe manufacturer's procedures. Underground supply and return piping from boreholes shall collect to four buried circuit vaults constructed of HDPE or concrete. Supply and return circuit piping in each vault shall combine to 8 inch main header piping which shall be routed into the building.

3) Steel sleeve casings shall be provided for the upper section of each borehole down to bedrock. Each borehole shall be filled with a bentonite based thermally enhanced grout mixture.

b. Central Heating and Cooling System:

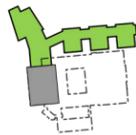
1) Central geothermal heating and cooling shall be provided by two high efficiency 275 ton (approx. nominal capacity) heat recovery chiller-heaters or modular chiller-heaters connected to the ground loop system. If two larger chillers are utilized in lieu of a modular chiller solution, an additional 60 ton modular chiller shall be provided to address low load conditions.

The ground loop circulation system shall be filled with 30% propylene glycol solution and shall be served via a primary and secondary pumping scheme.

a) Chiller-heater condenser water shall be constant flow primary with zero pressure bypass connections to the ground loop distribution and the building heating distribution. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a

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vertical inline pump and shall have a 10 horsepower motor.

b) Secondary condenser/heating pumps shall be variable flow with variable frequency drives. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 15 horsepower motor.

3) Chilled water distribution from chiller evaporators to building distribution shall be variable primary flow pumps. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 25 horsepower motor.

4) The building circulation loop shall consist of a four-pipe distribution. The main distribution to heating/cooling terminal units in the building shall be four-pipe. Rooftop air handling units, heat recovery air handling units, and central air handling units shall also be four-pipe configuration.

5) The building loop piping system shall contain a 30% propylene glycol solution for freeze protection and corrosion protection.

6) The building terminal heating units will be designed to utilize low temperature heating supply water (130°F maximum). Heating terminal units such as fin tube radiation and heating coils may require larger surface areas due to the low water temperature. In areas with high heating loads, two-row fin-tube and heating coils may be required.

c. Classrooms – Sensible Fan Powered Terminal Unit System:

1) The system serving heating, cooling and ventilation for typical exterior classrooms shall utilize four-pipe, ducted, ceiling mounted sensible fan powered terminal units.

2) The primary supply air serving each classroom shall be provided via the fan powered terminal unit with a hot water coil and a sensible cooling coil. Each classroom shall have a terminal unit.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling

and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

d. Classroom and Interior Ventilation Systems:

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. The units will be provided with a hot water pre-heat coil and a chilled water cooling coil. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

3) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

4) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

5) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

e. Miscellaneous Areas:

1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

- a) Gymnasium – 25,000 cfm RTU
- b) Cafeteria – 8,000 cfm
- c) Auditorium – 10,000 cfm
- d) Administration – 20,000 cfm

2) Rooftop air conditioning units (RTU) will include supply

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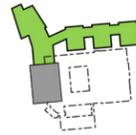
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fan, return fan, hot water heating coil, chilled water cooling coil, filters, variable frequency drives and total energy recovery.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils for zone temperature control.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**Option 2: Variable Refrigerant Flow (VRF) Heating/Cooling System**

**a. Central Heating and Cooling System:**

1) Heating and cooling shall be accomplished via multiple air cooled heat recovery, simultaneous heating and cooling, VRF systems, totaling 550 tons.

2) The systems shall be capable of operation down to negative 25F, minimum, ambient temperature.

3) The air cooled condensing units shall be located on the roof.

4) Refrigerant piping (liquid and suction) shall be run from the condensing units to branch controller modules located throughout the building. Branch refrigerant piping (liquid and suction) shall be run independently from each branch

controller module to each VRF fan coil unit.

**b. Classrooms:**

1) Space heating and cooling shall be accomplished via VRF fan coil units. The VRF may be ceiling mounted (ducted or ductless) or console type based on the space application.

2) Ventilation air serving each classroom shall be provided with a variable air volume terminal unit with a hot water reheat coil.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

**c. Classroom and Interior Ventilation Systems:**

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. Each unit will be provided with a dedicated heat pump type VRF condensing unit. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

2) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

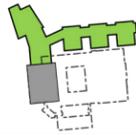
3) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

4) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

**d. Miscellaneous Areas:**

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1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

a) Gymnasium – 25,000 cfm RTU

b) Cafeteria – 8,000 cfm

c) Auditorium – 10,000 cfm

d) Administration – 10,000 cfm

2) Rooftop air conditioning units (RTU) will include supply fan, return fan, filters, variable frequency drives and total energy recovery. Each unit will be provided with a dedicated heat pump type VRF condensing unit.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils to provide ventilation air. The Administration area shall also have VRF terminal units connected to the main VRF system.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**4. Building Management System (BMS):**

a. Provide direct digital control (DDC) BMS with local and

unitary controls and web interface for remote access, alarms, and monitoring of all HVAC equipment in the building.

b. BMS system shall be interfaced to the building electrical and gas sub-meters. Daily, weekly, and annual energy use shall be reported for each meter.

**5. BTU Metering:**

a. Provide BTU metering of chilled water, hot water and ground loop circulation systems.

**III. ELECTRICAL**

**A. Demolition / Existing Electric Services:**

1. All existing services shall be disconnected and removed from the building. Coordinate with the respective utility company and include all work required for the removal of all existing utility services that become abandoned including power, telephone, cable TV, and fire alarm services.

2. Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of demolition of the existing buildings include disconnecting all services and making safe the existing structure for complete demolition.

3. Include maintaining the operation of existing site equipment required during construction.

**B. New Main Electric Service:**

1. A new primary service will be provided from utility company primary services via an underground ductbank and manhole system to a new utility company pad mounted transformer.

2. Secondary service from the new pad mounted transformer will be underground to a new 5000 Amp main switchboard at 480/277V, 3-phase, 4-wire. Switchboard will be located in a new main electric room.

**C. New Normal Distribution System:**

1. Main switchboard will be provided with surge protection

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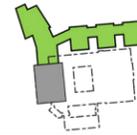
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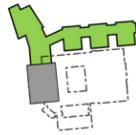


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- (SPD) and ground fault protection on main and feeder devices.
- Surge protection will be provided in all 120/208V panelboards.
- D. New Emergency Distribution System:**
- A 2 MW diesel emergency generator will power emergency egress lighting and exit lighting in corridors, assembly areas, and stairwells. Miscellaneous systems to include the following:
    - IT head-end equipment (located in the MDF Room).
    - Cooling equipment for school IT equipment.
    - Security system.
    - Fire alarm system.
    - Circulator pumps and controls.
  - Separate automatic transfer switches shall be provided for emergency and non-emergency loads.
  - In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.
    - Additional lighting in Gymnasium, Cafeteria and associated toilets and corridors.
    - HVAC (heating, cooling and ventilation) equipment associated with the Gymnasium, Cafeteria and associated toilets and corridors.
    - Receptacles in Gymnasium and Cafeteria.
  - Generator will be mounted at grade at the exterior of the building in a self-contained sound attenuated enclosure with an integral base mounted fuel tank. Generator will be mounted on an elevated concrete platform for survivability.
  - Emergency panels will be located in new two-hour rated electric closets.
  - Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.

- Emergency feeders run outside two-hour electric rooms and shafts and not in or under floor slab will utilize MI Cables.
  - A portable generator connection will be provided to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.
- E. Sustainable Design Intent:**
- Sustainable Design Intent compliance will include:
    - Advanced measurement and verification of air conditioning, fans, lighting, and receptacle power via electronic sub-meters equal to E-Mon, D-Mon Class 2000 3-phase kWh and demand meters. Measurement and verification metering will be monitored by the Building Management System (BMS).
    - Plug and process load reductions through the use of vacancy/occupancy sensor controls for local convenience outlets in classrooms, offices, library and resource rooms. Open areas such as Media Center, Auditorium and Kitchen will be equipped with relay panels controlled via the lighting control system, to reduce loads on a time schedule basis.
    - Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting.
    - Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.
    - Empty conduits and space provisions will be provided for photovoltaic (PV) installations. Include conduits and space provisions for inverters at a minimum of two locations in the upper floor electric closets.
- F. Lighting:**
- New luminaires will be provided throughout all renovated areas as well as new construction. Luminaires will be dimmable LED. All luminaires will be suitable for respective utility rebate incentives.

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- Exterior building mounted around the entire building including all canopies, all entry drives, parking areas, and all walkways will be full cutoff LED type. All exterior lighting will be controlled via the building low voltage lighting control system.
- G. Lighting Controls:**
- A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.
  - Manual low voltage override switches to override the time of day lighting control schedules shall be provided. Override switches will permit extension of lighting control program as well as ON-OFF override for exiting the facility.
  - Lighting program for time of day schedules shall permit all lighting, including exterior to be turned off during non-occupied hours, reducing sky glow and light trespass. Activation of either fire alarm or intrusion detection system shall override the lighting program.
  - Vacancy and occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces. In addition, all spaces will be provided with local low voltage dimmable switching.
  - Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight utilizing daylight sensors in each space.
- H. Circuitry and Devices:**
- Safety type duplex receptacles will be provided throughout the building in quantities to suit space programming.
  - Plug load reduction will be achieved by vacancy/occupancy sensors in classrooms, offices, and staff spaces, and circuits routed via relay panels, controlled via lighting control system time schedule for open areas.
  - Provide circuitry for HVAC and Plumbing systems.
- I. Fire Alarm:**
- Existing automatic, fully supervised, analog addressable, voice evacuation system will be retained and utilized where

- applicable.
- Manual pull stations (with tamperproof covers if applicable), at points of egress, and other locations as required to meet code.
  - Audible/visual units in corridors, classrooms, and throughout the building to meet code.
  - Visual only units in conference rooms, meeting rooms and small toilets.
  - Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms.
  - Smoke duct detectors in HVAC units over 2,000 CFM, and within five feet of smoke dampers including connections to all smoke/fire dampers.
  - Connections to all Fire Protection devices.
  - Connections to audio/visual systems, sound systems, and dimmed lighting controls.
  - Remote annunciator at main entrance and secondary entrances as directed by the Boston Fire Department.
  - 24 VDC magnetic hold open devices at smoke doors.
  - Master box and exterior beacon (quantity of beacons per Boston Fire Department).
  - Wiring will be fire alarm MC cable.
- J. Technology Systems – refer to the Technology Section.**
- K. Integrated Intrusion, Access Control, CCTV, and Alarm System:**
- Intrusion alarm system will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade. Motion sensors will be provided in corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs.
  - CCTV coverage will be provided at main and secondary entries as well as all other perimeter entries to be used by students and staff on a daily basis and for off hours

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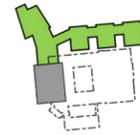
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community programs, including Gymnasium and Cafeteria entries.

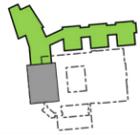
- 3. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.
- 4. Access control via card access system will be provided at all exterior doors.
- 5. CCTV system will be an extension of the existing system that is networked with the other schools in Stoneham. System will be web based to allow viewing by the Stoneham Police Department.

L. Miscellaneous:

- 1. Provide conduit and electrical circuitry for tel/data, security and AV requirements.

OPTION 3A: RENOVATION ADDITION

F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY



OPTION 3A – RENOVATION-ADDITION/INFORMATIONTECHNOLOGY

**Structured Cabling System:**

The existing structured cabling system, which consists of a combination of older cabling standards, will be removed and replaced with a new system. The new structured cabling system will consist of a hybrid delivery system comprised of hard-wired data cabling to support fixed workstations where required and high bandwidth, full coverage wireless connectivity. The data cabling channel performance will exhibit Category 6A performance capabilities. The data channel will be comprised of the passive components including cabling, connectors, patch panel port, and patch cords, providing up to a total of four (4) connections between network electronics. The Category 6A channel will be component compliant, capable of supporting 10 Gigabit per second networking. Category 6A data cabling will be provided to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other related equipment. This cabling will support computer network requirements, wireless connectivity, telephone system (VoIP) and IP-based security needs. WLAN cabling will be terminated above the ceiling in typical ACT areas. All data jacks will be color coded. Multiple lengths and colors of patch cables will be provided for closet connectivity.

General classrooms including Science, Health, ESL, SPED Resource, RISE, STRIDE, Speech/Language, OT/PT, and Culinary will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

Collaborative Spaces and Small Group Seminar Rooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher use where required.

Teacher Planning Spaces will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, workgroup printers/multifunction copiers and connections for staff use where required.

Art Classrooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, 3D printers, and connections for teacher and student use where required.

Band and Music Areas will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, workgroup printers/multifunction copiers and connections for teacher use where required.

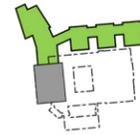
Engineering Labs (Maker, Engineering, Robotics, Scene Shop, CAD, Project Lead the Way Spaces) will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, 3D printers and other peripherals, and connections for teacher and student use where required. Fixed computer workstations in these spaces will be hardwired.

Gymnasium, PE Alternatives Spaces and Team Rooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff use where required. Team Rooms will be equipped with

Media Center including the Cyber Café and Student Help Desk will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

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F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY

Auditorium will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

Café/Student Lounge will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

Admin Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. Nurse's Suite will also be wired for fax.

District Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. This area will be segmented with its own IDF, regardless of distance requirements.

Pre-K Classrooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

**Space Requirements:**

The existing technology support spaces will be replaced with new spaces. These new spaces will accommodate and support the various technology systems and associated networking hardware. These spaces are the Service Entrance/Demarc, MDF/Head End Room, and IDF/Tech Closets.

The Service Entrance will be the termination point for all incoming services such as TELCO, Internet, CATV and district fiber. Services will be extended from the demarc to the MDF via various backbone cables (fiber, multi-pair copper).

The MDF will be the central location of all head end equipment including but not limited to servers, storage, switch electronics, security equipment, video equipment, telephone system, public address system and security system. It will be a dedicated space with proper ventilation, environmental treatment and emergency power.

The IDF locations will serve as intermediate closets for local cabling and equipment. The IDFs will be dedicated spaces with proper ventilation, environmental treatment and emergency power. Each closet will connect to the MDF with backbone cabling. IDFs will be located to keep all cable distances within specification limits. The Central Office area will be segmented with its own IDF.

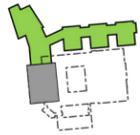
The existing spaces will come offline in accordance with project phasing requirements. The new MDF will be built-out in the first phase of construction and connected to the existing MDF via fiber and the new IDFs as they come online.

**Backbone Cabling:**

12-Strands of OM4 Multimode and OS2 Singlemode fiber will be provided between the Head End Room (MDF) and the Tel/Data closets (IDF). This cabling will support all network requirements; wireless connectivity, and VoIP system needs. Multimode fiber will be laser-enhanced and guaranteed for transmission distances in 10 Gigabit Ethernet of up to 500 Meters. All single-mode fiber optic cables will be OS2, tight buffered, high flexibility. All fiber optic cables will be installed in innerduct. Outbuildings requiring connectivity will be treated as IDFs.

Equipment racks will be installed in the MDF and IDFs for patch panels and network hardware. Two-post and four-post racks will be provided. Racks will be 19" EIA floor mount racks with wide floor mounting flanges, vertical cables guides and horizontal cable managers. Power for rack equipment will be installed in cable tray above the racks. Power will consist of both 20A and 30A twist-lock receptacles.

OPTION 3A: RENOVATION ADDITION



F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY

The district fiber must be extended to the new demarc and MDF. The existing MDF and the existing district fiber must remain functional until cutover occurs. The existing district fiber must be protected during site work.

**Data Communication Systems:**

The existing networking hardware will be replaced with up to date technology. New networking hardware will be provided for the MDF and IDFs consisting of network switch electronics for the data and voice communication systems, distributed communication system, audio-video communication system, security system, wireless LAN and other Owner equipment. Components will consist of PoE+ hardware and power supplies, 10/100/1000 to all endpoints, fiber transceivers, patch cables and UPS equipment. The switches will be fully configured according to network requirements and VLANs will be created according to best practice and equipment requirements. Inter-closet connectivity will be 25Gb or greater via fiber.

**Audio/Visual Communication Systems:**

Digital signage will be provided in gathering areas and large group instruction spaces. The system will consist of LED displays, media players, and a server or cloud based digital signage solution.

Classrooms and general instruction spaces will be equipped with a local audio system consisting of ceiling speaker, amplification, wireless microphones and auxiliary inputs. There will be an input available for FM assistive listening systems the Owner may have.

**Distributed Communication System:**

The existing intercom system will be replaced. The new distributed communication system will consist of a fully operational IP platform public address system for district and school internal communications system incorporating school-wide notifications and general announcements. It will provide complete internal communications using state of the art IP technology with two-way loudspeaker internal communication, bell event notification, emergency announcements that will override any pre-programmed zones assuring that all emergency/lockdown announcements are heard at all locations, and atomic time synchronization. The system will connect directly to the high school's LAN and have the future capability of expanding to connect to other intercom systems in the school district over the WAN for district-wide, emergency, and live voice announcements (additional hardware required at the other school facilities for this feature). Configuration of zoning, bell schedules, calendars, and emergency sequences will be accomplished using a browser-based interface.

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OPTION 4A: NEW CONSTRUCTION / SUMMARY

GSF: 207,827 SF  
 Estimated Construction Cost: \$141,652,635  
 Estimated Soft Cost (20%): \$35,747,365  
 Estimated Project Cost\*: \$177,400,000  
 Approximate Cost to Stoneham: \$126,400,000



\*Project cost - all costs should be considered preliminary based on order of magnitude

Relationship of Site Organization to Surrounding Context:

Option 4A sets up a front and back to the site, creating a clear distinction between the two. This option also links the stadium and its required facilities directly to the new building's athletics program. On the south side of the new facility playing fields, outdoor dining, outdoor civic pre function and outdoor learning environments connect strongly to the wooded edge of the Middlesex Fells Reservation and are linked together by an east-west landscape path.

Phasing / Existing Utilities

This option requires one major building phase and a site phase, allowing students to stay fully in the existing building during construction. Site construction access is possible from the north west corner at Benjamin Terrace and existing utilities to the current school building must be rerouted in an enabling phase. However, because the building both stretches east-west and is centrally located in scheme 4A, more of the site is affected during construction than in scheme 4B.

Site Scope and Disturbance

A large area of the site is disturbed during construction including playing fields to the east and west of the building as well as the site of the new portion of the building. The 36" existing culverted stream will not need to be relocated with this building position, but may need to be bridged over where it passes near the home bleachers & athletic building.

Traffic Mitigation / Site Circulation

Optimal site circulation is achieved by bringing the drop-off deep into the site which lengthens the queuing line. Pedestrian circulation will likely only need to cross vehicular access to the staff parking and Pre-K drop off area, zones which will be used at different times than high school start and finish times. Building loading will occur on the south side and has a lengthy drive lane that will require retaining walls and potential blasting of ledge. Emergency vehicles will also access the site from the Benjamin Terrace pedestrian entry.

Program Organization

This scheme forms a strong base to the building where public programs such as fitness, art, district offices, media and the theater can be used to extend the public use of the facility. The gym and dining occur on the lowest floor of the building's base and make use of the site's slope to gain access and provide pre function to outdoor athletic events. The upper floors are occupied by 6 classroom clusters that link centrally to shared amenities and vertical circulation.

Civic Presence

This option presents a strong civic presence to Franklin Street by placing the new building in front of the existing facility. The building's entry and primary interior space are positioned in view of the entry drive, while arts and athletics interior events can efficiently share a pre function lobby.

Learning Environment / Landscape Relationship

The opportunity to efficiently connect classroom clusters to outdoor learning environments is maximized by a central stair that brings students down to the building's southern landscape edge. These spaces face south and thus can extend their use further into the school year.

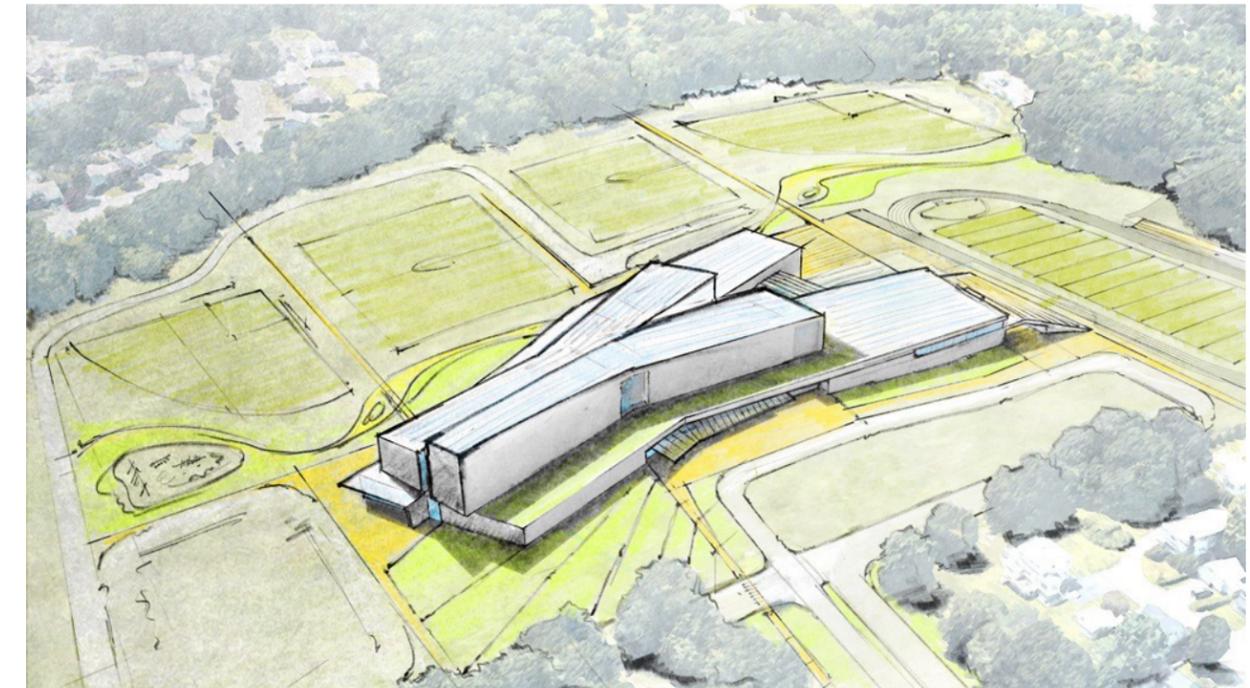
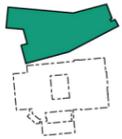
Energy Strategy

By stretching parking east to west and stepping the building to the northern edge, the site strategy sets up the potential for on-site power generation to equal the building's energy demands.

Daylighting / Solar Orientation

The mass of the building is oriented east-west allowing for optimal daylighting for classrooms and minimal negative afternoon heat gain, which is reflected in the early energy modeling analysis. North facing classrooms receive even diffused light while south phasing glare can be controlled through simple horizontal sun shades.

OPTION 4A: NEW CONSTRUCTION / SUMMARY



CONSIDERATIONS

- Visibility of new building from Franklin St
- Optimized orientation of the stadium
- Connection of building athletic facilities to stadium
- Gateway to major athletics
- Soccer/ LAX fields as geoexchange fields
- Spartan Place ia central to site and building, connecting to southern-facing Spartan Plaza
- Optimized building orientation for daylighting/ZNE
- Utilities relocation required to keep existing building in operation during construction
- Green space South of building as Landscape buffer between building and fields
- Challenges to accommodate grade change with most fields on the South of site (potential retaining walls)
- Lot geometry adds inefficiency to PV and parking

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OPTION 4A: NEW CONSTRUCTION



A. PROSPECTIVE SITE ANALYSIS

Site / Landscape Scope Narrative

This narrative provides an analysis of the options including natural site limitations, building footprint(s), athletic fields, parking areas and drives, bus and parent drop-off areas, site access and surrounding site features. This narrative excludes temporary site facilities, phasing implications, site drainage, utilities and permitting requirements addressed separately.

Paving and Curbing

All building/site options include new asphalt pavement and granite curbing for driveways and parking areas (350 spaces). Fire lanes shall be asphalt paving without curbing. Walkways around the building and site will be accessible.

Athletic Facilities

The fields will be constructed to meet regulation size in all options. The soccer/lacrosse fields and track will all remain in the existing locations, with upgrades. Scope includes replacing the two natural grass soccer/lacrosse fields and the natural grass field inside the track with synthetic turf & new resilient track surface. The stadium will also include new home and visitor bleachers. All options will include an athletic building for concessions and restrooms. Locker rooms and team rooms are planned in a building below the home bleachers.

The baseball/field hockey will be relocated over the existing track, adjacent to the exposed ledge and wetlands, allowing for a full-sized outfield and optimal solar orientation. The track/stadium complex will be reoriented N/S for optimal solar orientation and moved directly adjacent to the Gym & Spartan Plaza. The softball field will overlap with the 160x160' practice field, east of the baseball field. The two soccer/lacrosse fields will be located south of the new construction in the location of the existing building.

Site Lighting

All options will meet LEED requirements and IESNA standards with site lighting provided at parking, driveways and walkways. LED sports lighting will be provided at the stadium and one of the synthetic turf soccer/lacrosse fields.

Site Amenities

All options will include site furnishings, signage, electrical charging stations and the potential for photovoltaics over parking. Site furnishings will include benches, bicycle racks, vehicular bollards, tables, trash receptacles. Site signage will include traffic/regulatory, wayfinding and monumental school identity signage. Existing memorials will be salvaged and reset. The main entrance will include planter curbs, bollards and seat walls for pedestrian safety. Outdoor classrooms will include supporting amenities such as raised garden beds, storage/tool sheds, water source, fencing, tables and benches. There will be a separate play area for Pre-K with play equipment and poured in place rubber surfacing with a perimeter fence. In this scheme, Pre-K drop-off and play are located at the east end of the building, with outdoor classrooms located along the south.

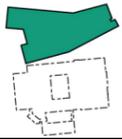
Fences and Gates

All options will include black vinyl coated chain link fencing and gates at the reconstructed softball and baseball/field hockey fields (6-foot high and 24-foot backstop), 6-foot high at reconstructed track, 10' high at tennis courts. Sports netting will be included as needed. The service drive will include a vehicular barrier gate. There will be an 8' high perforated or louvered powder coated metal screen fence and gates at service area.

Planting

Planting shall include 3.5-4" caliper trees for shade and ornamental character at parking, driveways, walks plazas and courtyards, approximate spacing 40' O.C. Limited ornamental landscaping at plazas and outdoor learning, and seeded lawn and landscape restoration areas. Green infrastructure for stormwater management will include vegetated swales, rain gardens and bioretention areas.

OPTION 4A: NEW CONSTRUCTION



B. CONSTRUCTION IMPACT

Scheme 4A's centrally located building affects the most site program during construction of all the options. Building in front of the existing building while maintaining access & site circulation will require a wider construction staging zone than in scheme 4B. Modular classrooms are not anticipated to be required on site during renovations. Scheduling work over summer or holiday breaks may alleviate some of the disruption but would need to be carefully managed. The anticipated construction schedule is 33 months.

Work under this would be less disruptive to students and staff than a renovation option. Students would be forced to move only once to accommodate the construction phases. Disruption from noise, dust, odors and construction traffic could be anticipated.

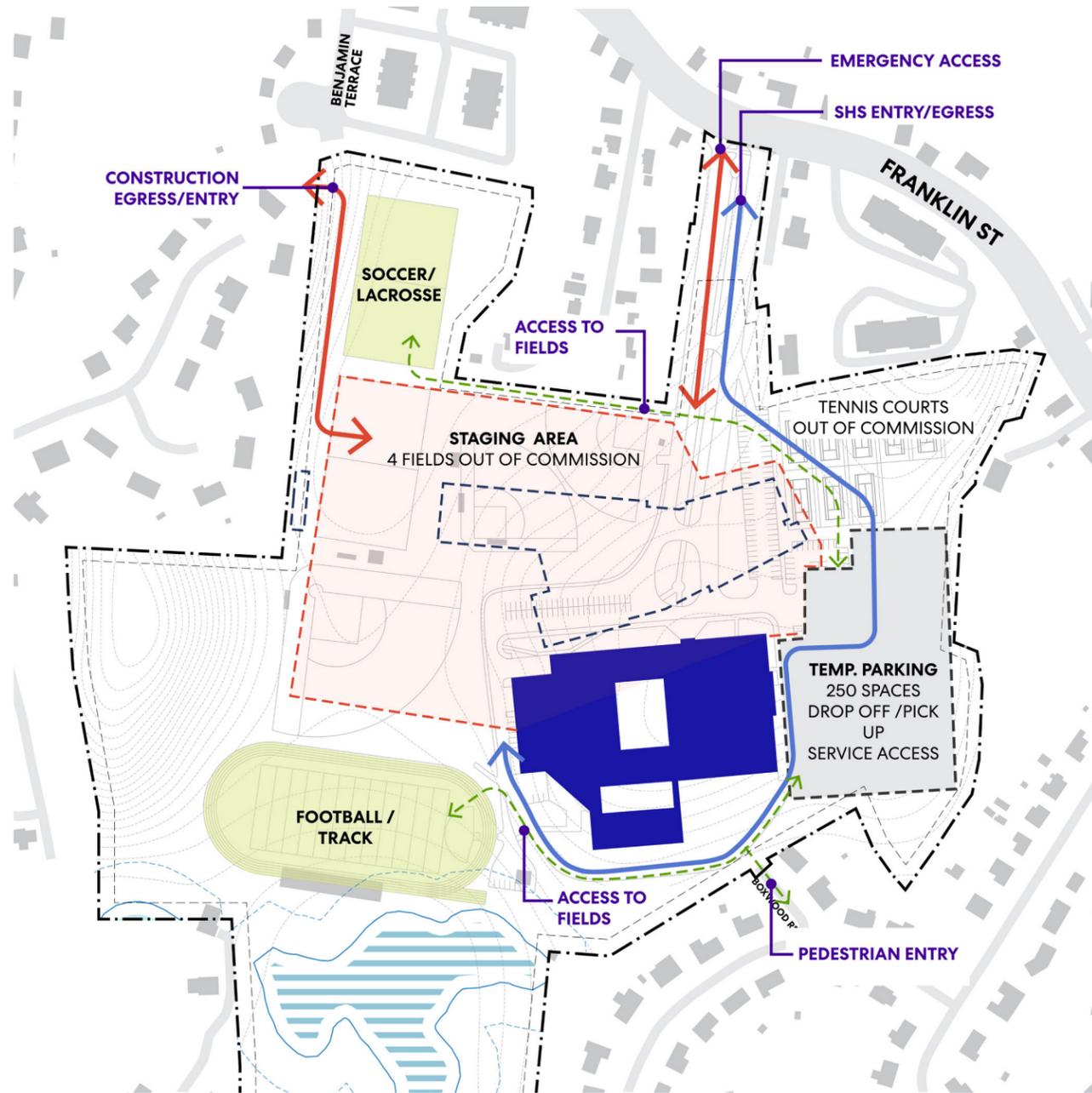
The detailed plan for phasing and swing space would be determined during schematic design to best coordinate with the educational programs to minimize the impact on students and staff.

DESIGN AND CONSTRUCTION SCHEDULE

Anticipated MSBA Approval of PSR	January 13th, 2021 (MSBA Board Meeting)
Anticipated MSBA Approval of SD	August 25th, 2021 (MSBA Board Meeting)
Special Town Meeting/Ballot Vote	November 2021
Design Development Complete	November 2021 - April 2022
Construction Documents Complete	May 2022 - November 2022
Bid and Award	November 2022 - January 2023
Construction (2 phases: Building then Site)	June 2022 - April 2025 (33 months)

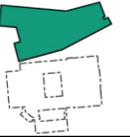
OPTION 4A: NEW CONSTRUCTION

C. CONCEPT DRAWING / CONSTRUCTION PHASING PLAN



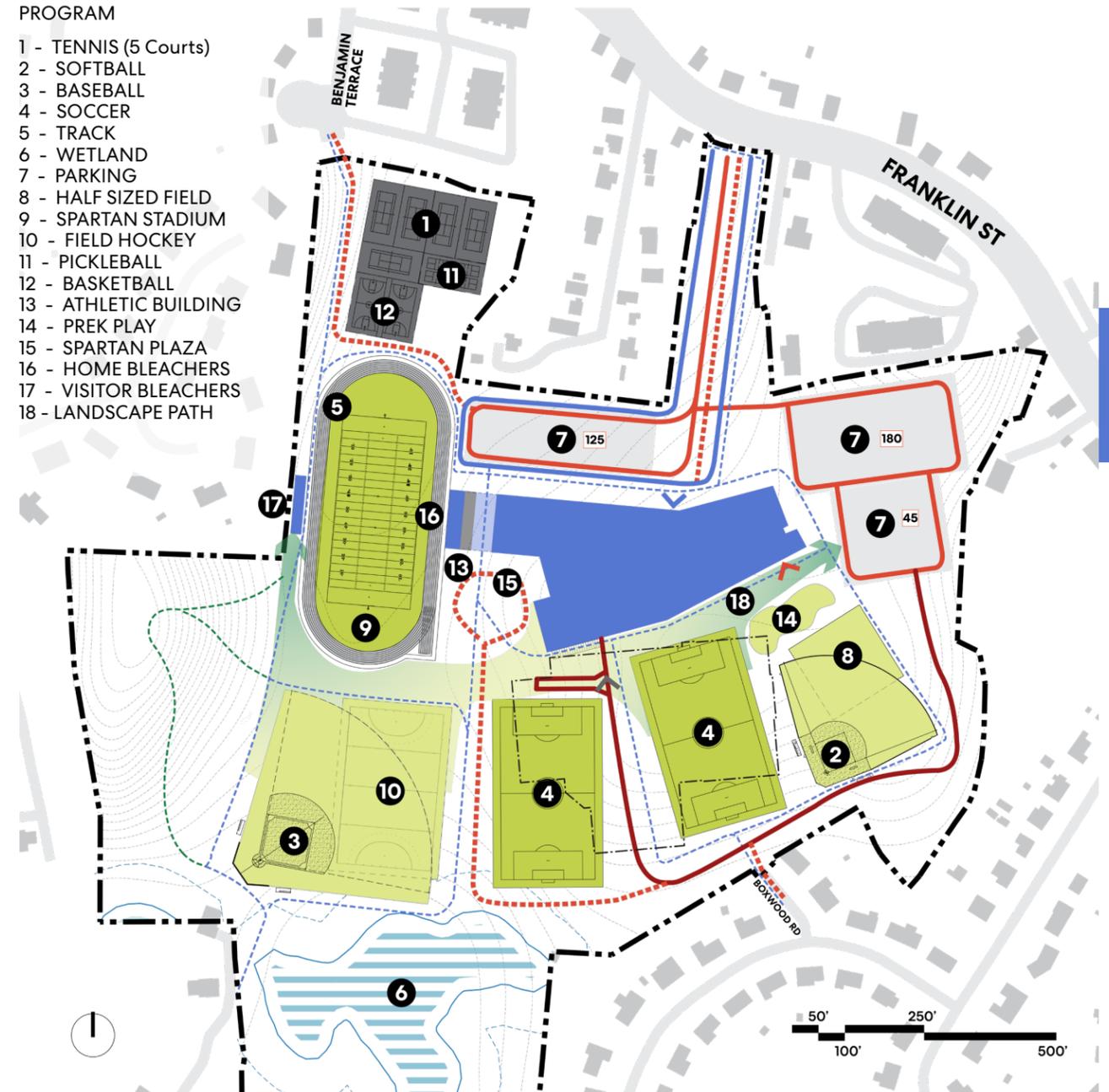
OPTION 4A: NEW CONSTRUCTION

C. CONCEPT DRAWING / SITE PLAN



PROGRAM

- 1 - TENNIS (5 Courts)
- 2 - SOFTBALL
- 3 - BASEBALL
- 4 - SOCCER
- 5 - TRACK
- 6 - WETLAND
- 7 - PARKING
- 8 - HALF SIZED FIELD
- 9 - SPARTAN STADIUM
- 10 - FIELD HOCKEY
- 11 - PICKLEBALL
- 12 - BASKETBALL
- 13 - ATHLETIC BUILDING
- 14 - PREK PLAY
- 15 - SPARTAN PLAZA
- 16 - HOME BLEACHERS
- 17 - VISITOR BLEACHERS
- 18 - LANDSCAPE PATH



- VEHICULAR DRIVE
- BIKE LANE
- HS MAIN ENTRY
- GRASS
- LIMITED ACCESS: EMERGENCY, MAINTENANCE, BICYCLES
- ADA PEDESTRIAN PATH
- PRE-K MAIN ENTRY
- SYNTHETIC TURF
- SERVICE DRIVE
- HIKING TRAIL (NOT ADA ACCESSIBLE)
- LOADING

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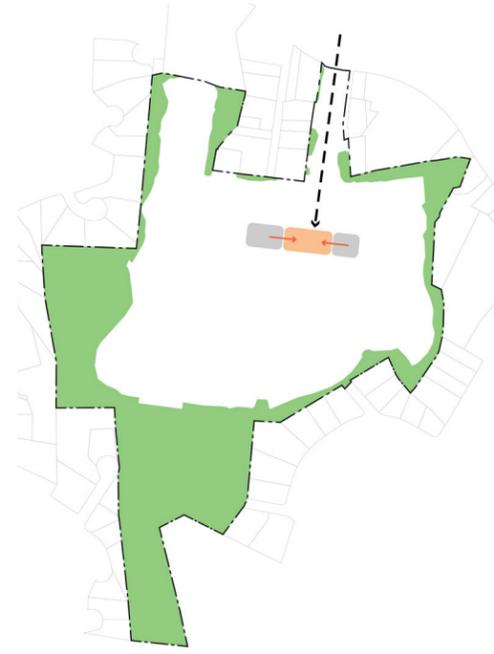
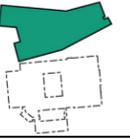
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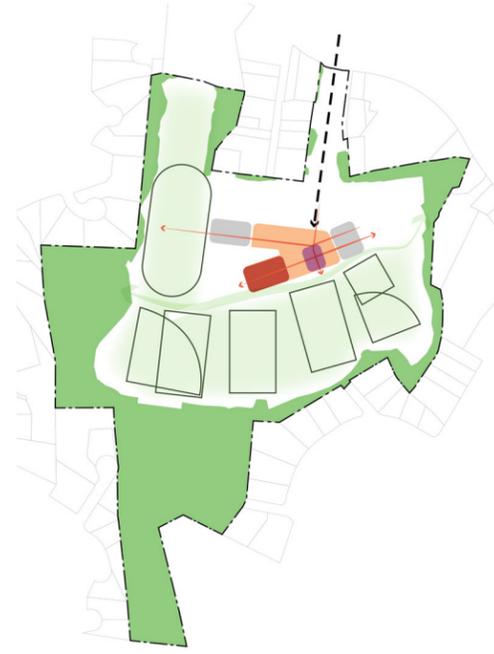
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C. CONCEPT DRAWING / SITE STRATEGY

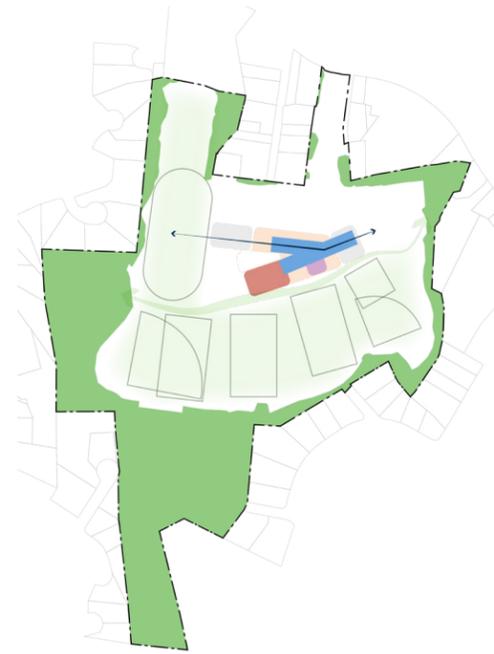
C. CONCEPT DRAWING / MASSING SKETCH



ARRIVE AT SPARTAN PLACE



EXPAND SPARTAN PLACE TO CONNECT TO AUDITORIUM & STADIUM, WITH ART & MEDIA IN THE CENTER



ACADEMIC NEIGHBORHOODS ON UPPER FLOORS



THE HEART OF THE SCHOOL IS LOCATED AT THE INTERSECTION OF CIVIC AND ACADEMIC LIFE

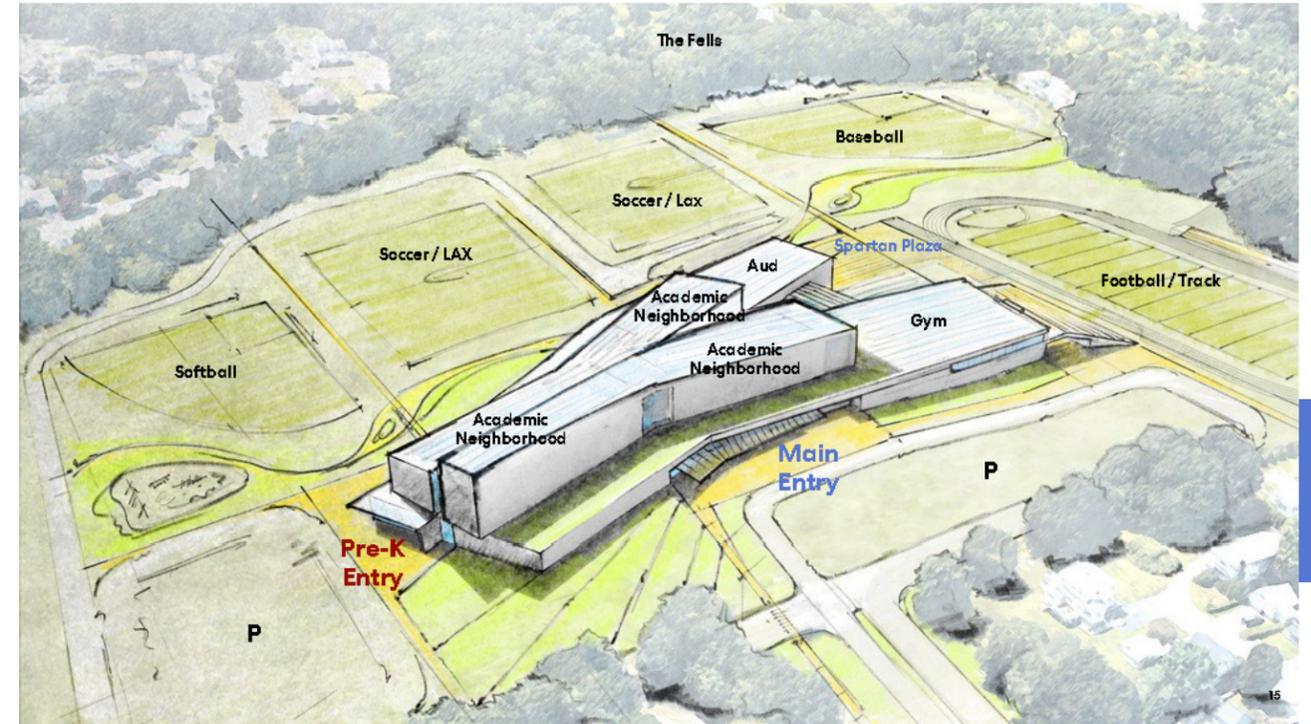


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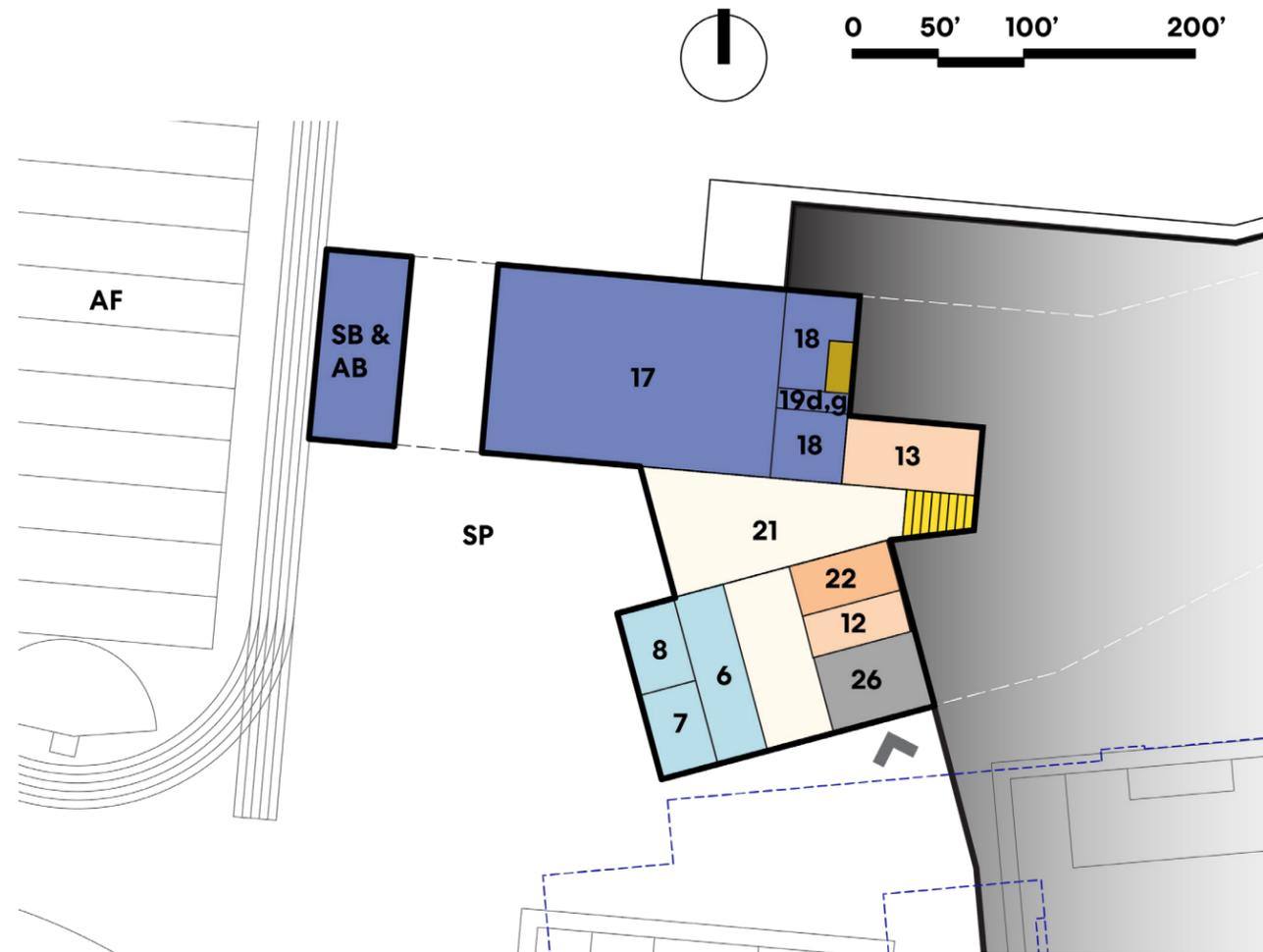
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OPTION 4A: NEW CONSTRUCTION

OPTION 4A: NEW CONSTRUCTION

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 00

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 01



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| <ul style="list-style-type: none"> <li><span style="color: #4F81BD;">■</span> <b>CORE ACADEMIC</b></li> <li>1/ CLASSROOM</li> <li>2/ SPED</li> <li>3/ SCIENCE</li> <li>4/ TEACHER PLANNING</li> <li><span style="color: #ADD8E6;">■</span> <b>BREAK OUT SPACE</b></li> <li><span style="color: #800080;">■</span> <b>MEDIA CENTER</b></li> <li>20a/ OPEN MEDIA</li> <li>20b/ CLOSED MEDIA</li> <li><span style="color: #FFA07A;">■</span> <b>DINING</b></li> <li>21/ CAFETERIA</li> <li>22/ KITCHEN</li> <li><b>SP/ SPARTAN PLAZA</b></li> </ul> | <ul style="list-style-type: none"> <li><span style="color: #ADD8E6;">■</span> <b>ART &amp; MUSIC</b></li> <li>5/ AUDITORIUM</li> <li>6/ STAGE</li> <li>7/ BAND</li> <li>8/ PRACTICE</li> <li>9/ THEATER</li> <li>10/ ART CLASSROOM</li> <li><span style="color: #D3D3D3;">■</span> <b>23/ ADMIN</b></li> <li><span style="color: #808080;">■</span> <b>SUPPORT</b></li> <li>24/ CUSTODIAL</li> <li>25/ MECHANICAL</li> <li>26/ LOADING</li> <li>27/ RESTROOMS</li> <li><span style="color: #FFFACD;">■</span> <b>CIRCULATION</b></li> <li><span style="color: #FFD700;">■</span> <b>OPEN STAIR</b></li> <li><span style="color: #808000;">■</span> <b>CLOSED EGRESS STAIR</b></li> </ul> | <ul style="list-style-type: none"> <li><span style="color: #FFDAB9;">■</span> <b>VOC &amp; TECH</b></li> <li>11/ PERFORMANCE</li> <li>12/ CULINARY</li> <li>13/ VIDEO PRODUCTION</li> <li>14/ BIOMEDICAL</li> <li>15/ ENGINEERING</li> <li>16/ MAKER SPACE</li> <li><span style="color: #D2691E;">■</span> <b>OTHER</b></li> <li>28/ DISTRICT OFFICE</li> <li>29/ PRE-K</li> <li><span style="color: #FFFACD;">■</span> <b>CIRCULATION</b></li> <li><span style="color: #FFD700;">■</span> <b>OPEN STAIR</b></li> <li><span style="color: #808000;">■</span> <b>CLOSED EGRESS STAIR</b></li> </ul> | <ul style="list-style-type: none"> <li><span style="color: #4F81BD;">■</span> <b>HEALTH &amp; PE</b></li> <li>17/ GYMNASIUM</li> <li>18/ PE &amp; LOCKERS</li> <li>19/ ATHLETICS</li> <li>a - ALT PE</li> <li>b - ATHL. OFFICES</li> <li>c - TRAINER</li> <li>d - PE STORAGE</li> <li>e - COACH SHOWERS</li> <li>f - EQUIPMENT ROOM</li> <li>g - GYMNASISTICS STOR.</li> <li>h - ATHLETICS STOR.</li> <li>SB/STADIUM</li> <li>BLEACHERS</li> <li>AF/ATHLETIC FIELDS</li> </ul> |
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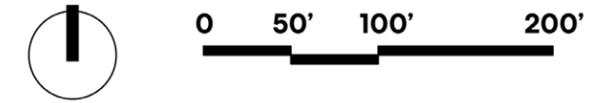
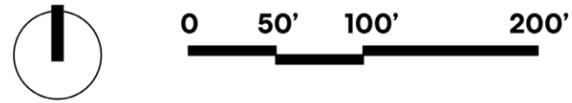
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OPTION 4A: NEW CONSTRUCTION

OPTION 4A: NEW CONSTRUCTION

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 02

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 03



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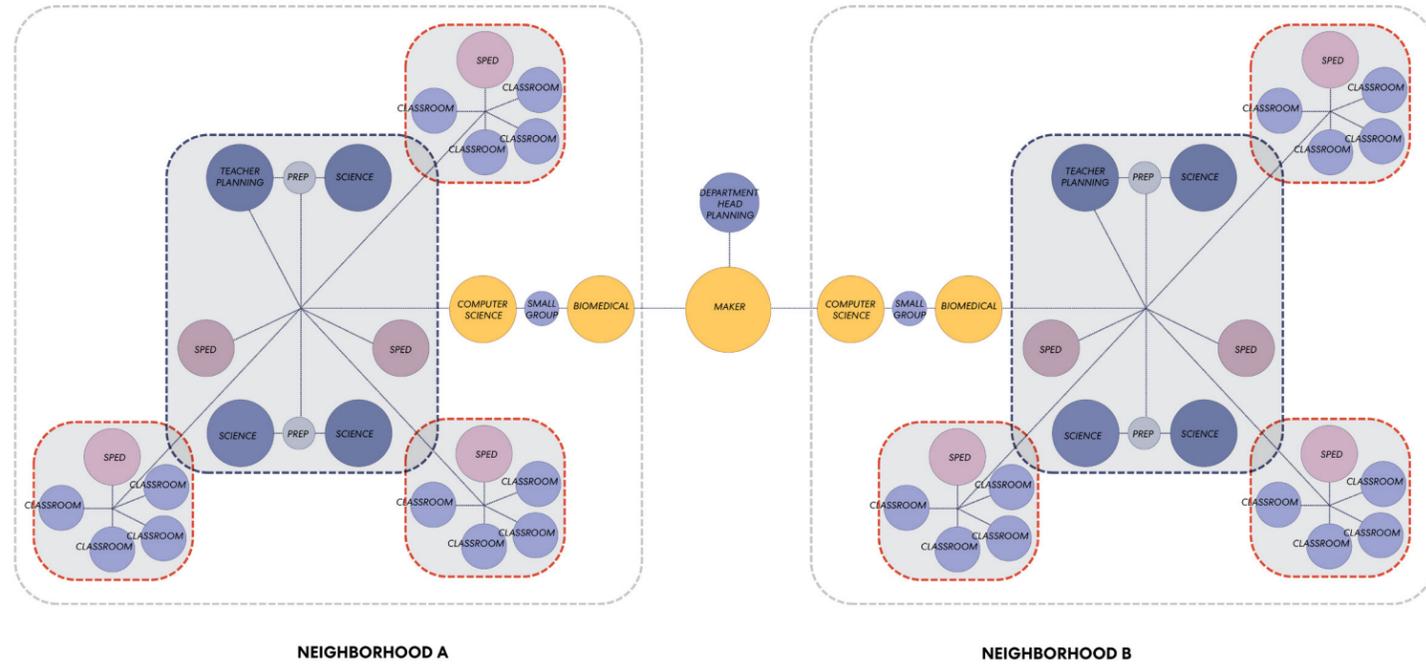
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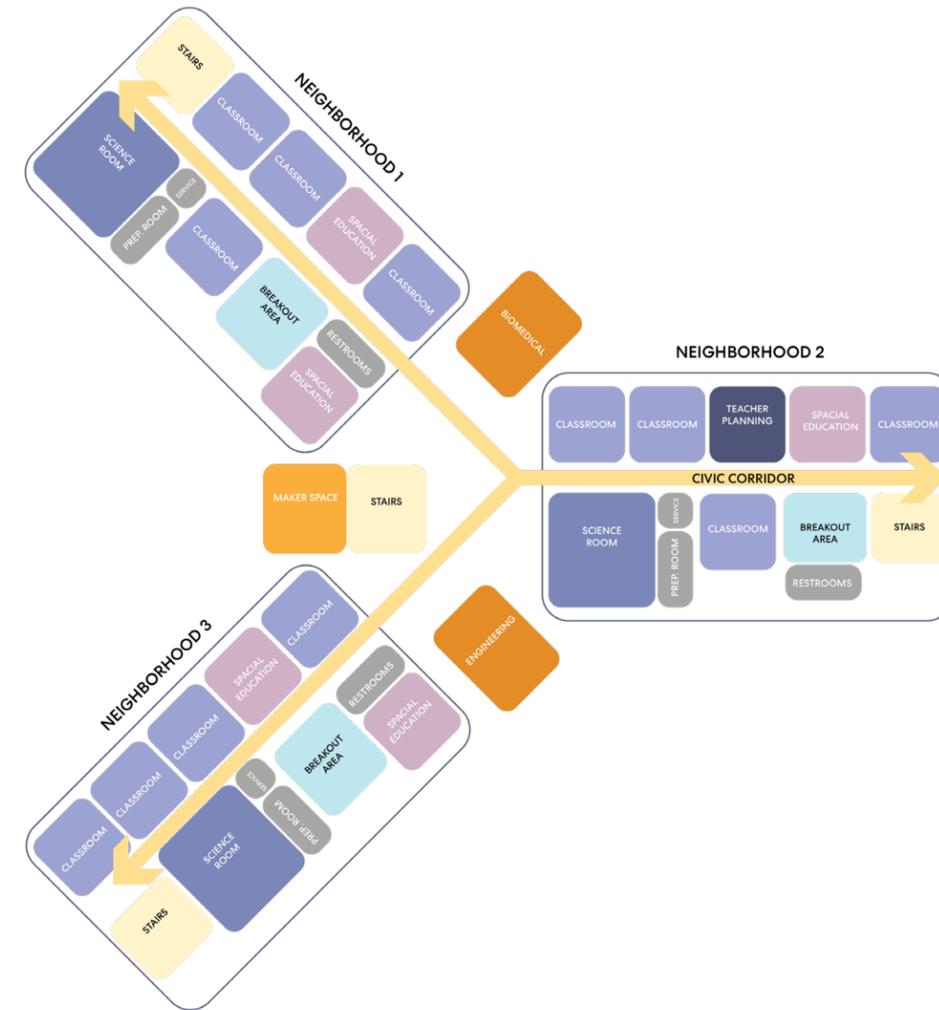
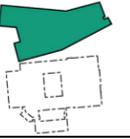
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C. CONCEPT DRAWING / ACADEMIC NEIGHBORHOOD STRUCTURE



OPTION 4A: NEW CONSTRUCTION

C. CONCEPT DRAWING / ACADEMIC NEIGHBORHOOD STRUCTURE



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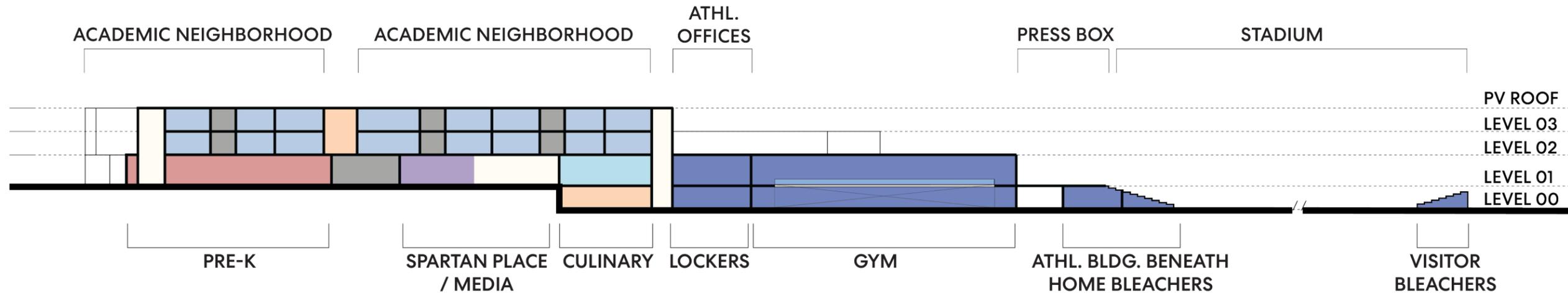
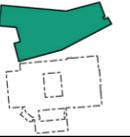
OPTION 4A: NEW CONSTRUCTION

C. CONCEPT DRAWING / BUILDING SECTIONS

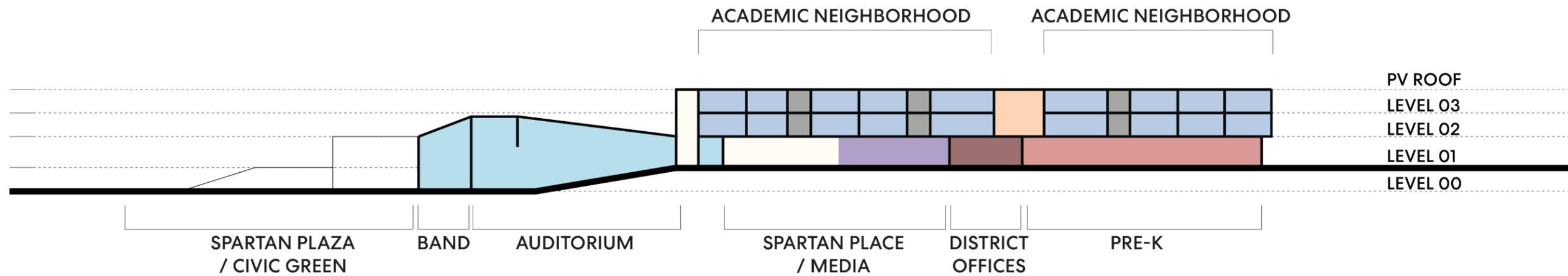


OPTION 4A: NEW CONSTRUCTION

C. CONCEPT DRAWING / BUILDING SECTIONS



SECTION A: EAST-WEST



SECTION B: NORTH-SOUTH

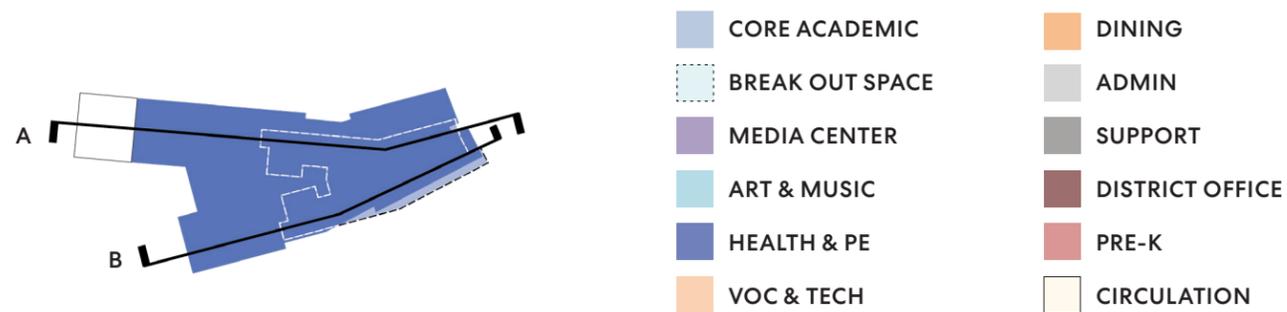


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OPTION 4A: NEW CONSTRUCTION

D. STRUCTURAL SYSTEMS



GENERAL

Stoneham High School is a sprawling campus built on what was originally a gently sloping, thirty-five acre site that has surrounding wetlands. The original building is that of one and two stories built of cast-in-place concrete and precast concrete. Foundations are conventional standard spread footings. At the time of the school's conversion from Junior High to High School in 1981, a one-story steel framed addition was added to the south of the original building and the gym was expanded to the south using concrete elements. Foundations for the addition are also spread footings. Generally the building appears to be in fair structural condition without signs of significant distress.

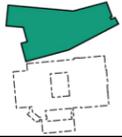
Four design options are studied:

- a. Option 1A – Code Upgrades Only
- b. Option 2A – Renovation Only
- c. Option 3A – Renovation Addition
- d. Option 4A – New Construction
- e. Option 4B1 – New Construction Embedded Gymnasium
- f. Option 4B2 – New Construction Embedded Auditorium

Each design option is discussed separately and order of magnitude structural scope items are presented in the flowing pages. The purpose of this narrative is to inform the reader about structural implication of each design option based on our understanding of the existing conditions and the design options presented. This narrative should be used by a professional cost estimator to prepare a cost estimate in line with MSBA requirements.

OPTION 4A: NEW CONSTRUCTION

D. STRUCTURAL SYSTEMS



STRUCTURAL SYSTEMS – OPTION 4A (New Construction)

This option builds a new High School Building to the north of existing and demolishes the entirety of the existing structure.

4A FOUNDATIONS:

Geotech report has recommended conventional footings supported on a minimum of 6 inches of structural fill placed directly over the natural sand after removing top soils and fills. An allowable bearing capacity of 4,000 pounds per square feet has been provided by the Geotech report.

Typical Interior Column Footings of 9.5' x 9.5' x 27", and Exterior Column Footings of 7.5' x 7.5' x 22" with 60lbs/cu.yd. steel reinforcement. The proposed footing sizes are based on a typical bay spacing of 30 feet in each direction. Individual footings may vary depending on specific column spacing in each area.

2'-0" x 2'-0" Grade Beams below slab-on-grade at locations of the braced frames. Consider 1 bay (or 30 linear feet) of grade beam at every 30' x 90' area. 100 feet long grade beams at 30 feet on center under gym floor. 330lbs/cu.yd. steel reinforcement.

Perimeter Frost Walls – 14" thick, 4'-0" below finished grade with 2'-6" x 1'-3" footing. Reinforced with 115 lbs/cu.yd. 2'-0' x 2'-0" concrete piers under all perimeter columns with 300 lbs/cu.yd. steel reinforcement.

First floor slab-on-grade, 5" thick concrete with WWF6x6-W2.9xW2.9 supported on minimum of 12 inch structural fill, insulation and vapor barrier. No under slab drains anticipated. Contraction joints at 15 feet max. Slabs that are polished, exposed concrete and carry directly adhered finish should include vapor reducing admixtures such as Barrier One.

Elevator pit with 12" thick reinforced concrete wall and 24" thick base, reinforced with 120 lbs/cu.yd. steel reinforcement. Under stage pit, if needed, may be similarly estimated with 8" thick pit slab.

Retaining walls east of Level 00 – 14" thick concrete reinforced with 180 lb/cu.yd. of steel reinforcement.

The project site has sloping topography and known potential for ledge. The amount of earthwork will depend on the final finish level of the first floor elevation. We recommend an allowance be carried for appropriate cut and fill earthwork including potential ledge cutting. Also, the utilities running under the building footprint may require trenching through ledge.

Ground water levels are found to be ranging between 3.5 feet and 9 feet below existing grade, and hence moderate level of groundwater management is anticipated to be required. Permanent perimeter wall drains are recommended.

4A SUPERSTRUCTURE:

A conventionally framed structural steel system is proposed for this project. Composite beams supporting composite floor slabs consisting of lightweight concrete on steel deck. The floor

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OPTION 4A: NEW CONSTRUCTION



D. STRUCTURAL SYSTEMS

slab construction will consist of 3.25" light weight concrete on a 3", 18 gage composite galvanized steel deck. The roof housing mechanical units will consist of 3", 20 gage galvanized steel decking with concrete topping or other suitable means for acoustical considerations.

Assuming a typical floor bay of 30' x 30', the floors will be supported by steel wide flange (typically 18 inch deep) beams, 21 inch deep girders and steel columns. Actual spans may vary depending on further coordination with other disciplines. The columns will typically be placed along exterior walls and along the corridor walls. Assume square and rectangular HSS columns for compact shapes. The beams are typically spaced at 10 feet on center. Standard double angle or shear plate bolted connections are anticipated between steel members.

The framing supporting the gymnasium and the Auditorium roofs are anticipated to span close to 100 feet. Deep steel trusses or open web long span girder are typically used systems for such spans. The long span members in turn are supported by girders supported by perimeter columns. The steel columns along these two special elements may also be utilized to support the tall curtain wall or other building envelope system. At least one level of wind girts should be estimated for supporting the building envelope in these and other tall spaces.

Open web bar joists may be considered as an alternative to the traditional wide flange steel framing. This change may result in savings of about 1.0 lbs per sf of steel tonnage but will require deeper joist depths. This option can be considered in the next phase of design upon further coordination. Open web steel joists can be spaced at 30" or so on center to keep the joist depths within reasonable range.

The lateral force resisting system to resist wind and seismic forces will be composed of braced frames in both orthogonal directions. These will be strategically located at partition walls, exterior walls, or exposed to coordinate with project aesthetics. The braced frame diagonals are anticipated to be steel tube sections spanning diagonally within the plane of a column bay. Brace end connections will consist of gusset plates and a combination of welded and bolted anchorage to the plates.

Façade support is generally expected to consist of slab-supported perimeter walls constructed with light gage steel studs. Glazing elevations are expected to require perimeter bent plate slab edge construction for appropriate mullion anchorage.

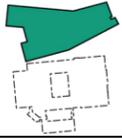
Structural Steel Estimates

Typical floor and roof framing	7.5 psf
Auditorium Floor framing	12 psf
Gym and Auditorium Roof Framing	21 psf
Stage Roof and fly tower Framing	28 psf
Suspended Tracks	10 psf
Columns (HSS)	2 psf
Bracing (HSS)	1 psf
Miscellaneous	2 psf

4A ADDITIONAL CONSIDERATIONS:

1. Expansion/Separation Joints: This design option appears to create almost independent wings for the Health and Auditorium/Arts programs. As such it may be advantageous to consider expansion joints just east of each of the wings. This offers a very cost effective opportunity to separate the very active programs from the quieter core educational programs.

OPTION 4A: NEW CONSTRUCTION



D. STRUCTURAL SYSTEMS

2. Alternative materials: As much of the structural framing in the Gymnasium and the Cafeteria will potentially be exposed to view, mass timber or similar alternatives to steel may be considered for framing.
3. Auditorium: The Auditorium has unique components such as over the house catwalk, fly gallery grating, well beams, header beams, lock rail and related rigging support framing, lighting grid etc. Carry an allowance for these items.
4. Other scope not specifically identified: Allowances should be considered for items such as screening around roof top units, structured canopies, monumental stairs, support for sculpture/art commissions, and thermal breaks within steel construction that penetrates the envelop.

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OPTION 4A: NEW CONSTRUCTION



E. SITE UTILITIES

OPTION 4A-NEW CONSTRUCTION / SITE UTILITIES

Site Utilities

Stormwater

Storm drainage for the site will need to comply with Massachusetts Stormwater Management standards. Massachusetts Stormwater Management standards require that the rate of stormwater flows from the site not be increased over current conditions. They also require that the quality and quantity of stormwater be addressed by treating the stormwater to remove possible contaminants and that a portion of the stormwater be directed to the groundwater. Areas that see vehicular traffic are required to have their stormwater quality addressed through enhanced means such directing it through water quality inlets prior to discharge. Runoff from roofs and landscaped areas are considered clean and additional treatment prior to recharge or discharge is not required.

The increased rate of runoff from the site will need to be addressed by detaining or infiltrating stormwater on-site. Detention/retention ponds, constructed wetlands, underground infiltration systems, porous pavement and rainwater recycling are all examples of some best-management practices (BMP's) used to address stormwater rate and volume. With limited available site area, sub-surface infiltration/detention systems would be the preferred option.

The stormwater improvements required to meet current stormwater standards would include the construction of an all-new stormwater management system for the site. Stormwater from the site would be collected in new deep-sump manholes with hoods or tees. Runoff from areas seeing vehicular traffic would be routed through a water quality inlet similar to a Stormceptor Model 3600STC. Prior to discharge from the site the runoff would be routed through new subsurface infiltration/detention systems. The size of the system would be dependent on the amount of additional impervious area added to the site.

Sanitary Sewer

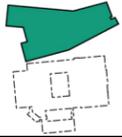
The existing sanitary sewer system on site will remain where it does not conflict with the new construction. The portions of the existing system to remain should be cleaned, video inspected and repaired as needed. New sanitary sewers would need to be constructed to serve the new addition which would then connect to the existing system to remain.

A new external grease trap will be required for the sanitary flows from the kitchen and cafeteria. The new grease trap would be a 6,000-gallon precast concrete below-grade structure with a new 6-inch sanitary service from the kitchen/cafeteria and a new 6-inch connection to the on-site sanitary sewer system. A 4-inch PVC vent would be required from the new grease-trap back into the building and a new sanitary sewer line would need to be installed from the external grease.

Water

The portions of the existing on-site water system that are not in conflict with the new construction would remain. The water line serving the site under the entrance drive could

OPTION 4A: NEW CONSTRUCTION



E. SITE UTILITIES

remain up to approximately the end of the entrance drive. A new water loop consisting of 8-inch ductile iron, cement-lined water main would be constructed around the building with connections to the existing-to-remain water line under the entrance drive and to the town system in Boxwood Road. The two connections to the town system will provide a measure of resiliency and will also improve available flow. New fire and domestic water services would be provided to the building from the new loop around the building. In addition, all new site fire hydrants would be provided throughout the site.

Natural Gas

The existing gas service located under the entrance drive would remain where it does not conflict with the new construction. A new service to the building, sized by the project's MEP Engineer and the gas utility would be provided to the new building from the portion of the existing service to remain.

**Permitting**

Wetlands Protection Act (310 CMR 10.00) and Town of Stoneham Wetland Protection By-Law

There are wetland resource areas subject to protection under the Wetlands Protection Act and Town of Stoneham Wetland By-law at the north end of the site (stream and bank) and south end of the site (bordering vegetated wetlands). A Notice of Intent would need to be filed, reviewed and approved by the Town of Stoneham Conservation Commission since work is proposed within 100 feet of the wetland resource areas.

Other Permitting

Review of MassGIS permitting layers indicate that the site is not within a Priority Habitat of Rare Species or Estimated Habitats of Rare Wildlife or within any Surface Water Supply Protection Zone or within any Flood Hazard area.

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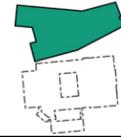
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F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



OPTION 4A – NEW CONSTRUCTION/ FIRE PROTECTION & PLUMBING

**Fire Protection**

To comply with current codes, this building will require a complete sprinkler system installation per the Massachusetts State Building Code, Chapter 34. The Fire Protection system would be designed to meet the requirements of NFPA 13 “Installation of Sprinkler Systems” and Chapter 9 of the Massachusetts State Building Code, 780 CMR, “Fire Protection Systems”.

A new dedicated 6" sprinkler service, connected to the town water system in the street, should be brought into the building. The exact entrance location will need to be coordinated with the Architect. As the sprinkler service enters the building a Massachusetts approved double check valve backflow preventer assembly, complete with OS&Y valves on the inlet and outlet, will be required.

The building will be protected by three types of sprinkler systems and each will protect the following areas:

- Wet sprinkler system – base building system
- Dry sprinkler system – to protect areas subject to freezing, i.e. loading docks and outdoor walkways covered by building overhangs, etc.
- Pre-action sprinkler system – to protect the MDF room

The alarm check valves for the wet and dry sprinkler systems will be installed on separate risers after the double check valve assembly in the water service entrance room. The alarm check valves will be complete with standard trim packages including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches. The dry alarm valve will be supplied with an air compressor and associated appurtenances.

The main feeds out to the system from the alarm check valve will extend out to the building through the first-floor ceiling space. The piping will then extend to all areas of the building so that each section of the building and each floor can be divided into separate zones.

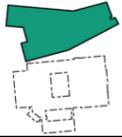
Due to the building being only three stories the Massachusetts State Building Code does not require a standpipe system throughout the School. However, regulations governing Auditoriums and Stages will require standpipes at each side of the backstage areas.

The sprinkler system risers will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control assembly off of the standpipe which feeds each floor will contain a flow switch and tamper switch. An inspector’s test connection will be installed on the floor control valve station. If the stage is greater than 1,000 square feet, then fire department valves will be required on each side of the stage.

Sprinkler heads throughout the facility where gypsum or suspended ceilings are installed will be glass bulb, quick response, chrome plated semi-recessed type. In areas where no ceilings are installed brass upright sprinklers will be installed. Where upright sprinklers are subject to

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potential damage, such as in storage rooms, protective cages will be installed. In areas where it is not possible to run piping above the ceiling, the use of sidewall sprinkler heads would be recommended.

The MDF room will be protected by a pre-action sprinkler system. A pre-action alarm valve with all required appurtenances will need to be located next to or near the MDF room. Piping from this valve will extend into the room and connect to sprinkler heads. The piping system will be filled with compressed air. Once a sprinkler head activates, the air will discharge and open the pre-action alarm valve to allow water into the system and through the open sprinkler head.

Sprinkler piping for the system will be as follows:

- Piping 2" and smaller shall be schedule 40 black steel with cast iron fittings with threaded joints.
- Piping 2 ½" and larger shall be Schedule 10 black steel with malleable iron fittings with rolled grooved joints.
- Dry sprinkler systems will be supplied with Schedule 10 galvanized piping throughout.

All tamper and flow switches installed on the sprinkler system will be connected to the buildings fire alarm system. Each tamper and flow switch will be a dedicated point on the fire alarm system.

The exterior fire department connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. Final location of this connection will be coordinated with the Stoneham Fire Department. An additional fire hydrant may need to be added on the site to be within the required distance of this connection.

The hydraulic requirements for the building will be as follows:

- Light Hazard - All offices, corridors and the auditorium hydraulically calculated to deliver 0.1 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard - All storage rooms and mechanical rooms hydraulically calculated to deliver 0.15 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard Group II - The stage area hydraulically calculated to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

**Plumbing**

Plumbing Fixtures

Plumbing fixtures will be new high efficiency, water conserving type, and wall-hung for optimum sanitary purposes. Automatic hard-wired flushometer valves and lavatory faucets are to be provided.

Fixture flow rates should be provided as follows:

- Water closets (dual flush type) at 1.6 gpf or 1.1 gpf
- Urinals - 0.25 gpf
- Lavatories - 0.5 gpm or less
- Showers – 1.5 gpm

The state plumbing code dictates the number of plumbing fixtures required in a building. Minimum plumbing fixture requirements will be determined once the total occupancy numbers for the building have been established based on the final plan layout.

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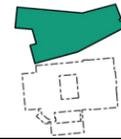
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Domestic Cold Water

Domestic cold water connecting to all fixtures as required. Domestic cold-water service piping shall extend 10'-0" beyond the building exterior for connection to the site water distribution piping system. This system will include a new water meter and backflow preventer assembly.

Domestic Hot Water

Domestic hot water will be produced and stored in high-efficiency, condensing type, gas-fired domestic water storage heaters with a single code-compliant insulated tank sized to meet the highest hourly demand. There will be two insulated distribution and recirculation loops for domestic hot water: one for the kitchen (140°F) and one for the main building loop (125°F). All lavatories qualifying as "public" lavatories will be provided with individual mixing valves below the fixture to reduce hot water discharge temperatures to 110°F maximum per code. Mixing valves for hand sinks in the kitchen shall reduce discharge temperature to 120°F maximum.

Sanitary Waste & Vent System

Sanitary waste and vent connecting to all fixtures as required. Sanitary waste service piping shall extend 10'-0" beyond the building exterior for connection to the site sanitary piping system.

Storm Drainage

Roof drainage will be a combination of roof drains with internal roof drain piping serving flat roofs, and gutters and downspouts serving sloped roof portions of the building. Internal roof drain piping will convey storm water to underground piping and exit the building through foundation walls to connection with site storm drainage piping. Storm water service piping shall extend 10'-0" beyond the building exterior for connection to the site drainage piping system. Horizontal roof leaders above grade within the building shall be insulated.

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

Natural Gas System

Natural gas service provided by the local gas company serving the town. The gas company shall provide the underground service, gas meter and gas regulator. Contractor's work will begin on the discharge side of the gas meter and extend to all equipment requiring natural gas.

Hose Bibbs and Wall Hydrants

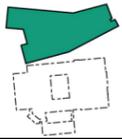
Freeze proof wall hydrants shall be provided around the perimeter of the building.

Hose bibbs will be provided in all bathrooms with more than one flushing fixture and all mechanical spaces and will be provided with cross connection protection.

Kitchen

The cafeteria kitchen is to be provided with all plumbing connections noted on the food service drawings. Piping from the local grease interceptors and from kitchen floor drains subject to the introduction of fats, oil or grease will be by a dedicated grease waste piping system leading to the exterior grease trap. There will be three local grease interceptors: one for the three-compartment pot sink, one for the ware-washing/garbage disposer and one

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dedicated to automatic dishwasher drainage. The grease waste discharge from these interceptors will be piped to an exterior grease trap.

Grease waste piping system from the new kitchen to an exterior grease trap located outside of the building. Grease trap vent piping shall enter the new building underground and exit through the roof of the building per state code requirements.

Science Classrooms

Science classroom waste and vent connecting to all fixtures as required. Science classroom waste piping shall discharge into a central acid neutralization system located on the lowest level of the building. System shall monitor and adjust the pH level of the waste and then discharge this waste to the sanitary waste piping system outside the building, as part of the underground system.

Non-potable (protected) hot and cold water systems shall be created to serve the new science classrooms by installing reduced pressure backflow preventers on the hot and cold water piping designated to serve this area.

New emergency showers and eyewashes should be installed in each science classroom. A new tempered water system should be created to serve these fixtures. A new gas-fired water heater should be installed somewhere within the science wing and be dedicated to the new tempered water system. Water should be stored at 140°F and a master mixing valve should be mounted nearby and set to deliver tempered water to this wing at approximately 70°F-90°F per state plumbing code requirements. A tempered water return system will also be required to keep this system from becoming stagnant per state plumbing code requirements as well.

A dedicated gas piping main will serve the new science classrooms of the building. Each classroom will be equipped with an emergency gas shut-off valve located in a valve box near the exit door of the classroom. Gas will distribute from this location to bench or countertop gas turrets as required. Each science classroom will also be supplied with one emergency shower/eyewash unit as required by code. These units will be supplied with tempered water as required by code. Floor drains with trap primer connections will be provided under each shower/eyewash unit to protect against water damage when in use or due to accidental discharge.

Pipe Materials

Below grade sanitary and storm drainage piping will be service weight bell and spigot cast iron with neoprene gasketed joints. Above grade sanitary and storm piping will be service weight hubless cast iron with Massachusetts approved stainless steel and neoprene no-hub connector assemblies.

All lab waste piping will be Schedule 40 polypropylene with electrical heat fusion joints. Mechanical joints may be utilized for lab waste piping within laboratory furniture.

All water supply and return piping shall be Type "L" copper.  
All water supply and return piping insulation shall be in accordance with the Energy Code.

All gas piping will be threaded black steel piping up to 2 1/2" size. Piping 3" and larger shall be welded.

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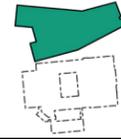
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F. BUILDING SYSTEMS / HVAC & ELECTRICAL

I. PROJECT OVERVIEW

A. The existing Stoneham High School is approximately 221,000 sf on two levels. The Design Alternatives include Renovation (Option 2A), Renovation and Addition (Option 3A) and New Construction (Options 4A and 4B). All of the alternatives are approximately 207,000 sf. The anticipated program elements include:

1. Education classroom spaces (approx. 56,000 sf)
2. Gymnasium and support spaces (approx. 28,000 sf)
3. Kitchen and Cafeteria Space (approx. 7,500 sf)
4. Vocational / Technical Spaces (approx. 11,000 sf)
5. Media (Auditorium and Support) Spaces (approx. 15,000 sf)
6. Arts Classrooms (approx. 6,000 sf)
7. Entry and Administrative areas (approx. 23,000 sf)
8. Mechanical/Electrical and Misc Spaces, Circulation, etc (approx. 60,000 sf)

B. The purpose of this narrative is to describe the intended HVAC and Electrical systems required to achieve the goal of a Net Zero Energy facility. Therefore, for all of the design alternative options, we shall assume the removal of the existing systems and providing new systems as described in the sections below.

II. HVAC AND ELECTRICAL SYSTEMS OVERVIEW AND SCOPE OF WORK

A. HEATING, VENTILATING, AND AIR CONDITIONING

1. The heating, air conditioning and ventilation systems shall be high-efficiency systems that will contribute towards the goal of achieving a Net Zero Energy facility.

2. Existing Systems:

a. The existing rooftop unit, exhaust fans, air cooled split type units, unit ventilators, heating and ventilating ceiling mounted air handling units and heating units, along with all associated ductwork, piping, controls, existing boilers, etc will be removed.

3. New Systems:

Option 1: Geothermal Heating/Cooling System

a. Ground Loop Geo-Exchange System:

- 1) A vertical borehole well field consisting of (225) 6-inch diameter boreholes spaced 20 feet apart shall be provided. Each borehole shall be 400 to 500 feet deep. Actual depth to be determined based on thermal conductivity testing performed on a test well. The number of boreholes may be increased or decreased based on thermal testing results and/or determination of the final heating and cooling loads.
- 2) Provide a 1-1/4 inch supply and return pipe within each borehole with a U-bend at the bottom. Piping shall be high density polyethylene (HDPE) with DR9 wall thickness. Polyethylene pipe and fittings shall be heat fused by butt, socket, sidewall, or electrofusion in accordance with pipe manufacturer's procedures. Underground supply and return piping from boreholes shall collect to four buried circuit vaults constructed of HDPE or concrete. Supply and return circuit piping in each vault shall combine to 8 inch main header piping which shall be routed into the building.
- 3) Steel sleeve casings shall be provided for the upper section of each borehole down to bedrock. Each borehole shall be filled with a bentonite based thermally enhanced grout mixture.

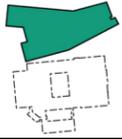
b. Central Heating and Cooling System:

1) Central geothermal heating and cooling shall be provided by two high efficiency 275 ton (approx. nominal capacity) heat recovery chiller-heaters or modular chiller-heaters connected to the ground loop system. If two larger chillers are utilized in lieu of a modular chiller solution, an additional 60 ton modular chiller shall be provided to address low load conditions.

The ground loop circulation system shall be filled with 30% propylene glycol solution and shall be served via a primary and secondary pumping scheme.

- a) Chiller-heater condenser water shall be constant flow primary with zero pressure bypass connections to the ground loop distribution and the building heating distribution. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a

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vertical inline pump and shall have a 10 horsepower motor.

- b) Secondary condenser/heating pumps shall be variable flow with variable frequency drives. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 15 horsepower motor.
- 3) Chilled water distribution from chiller evaporators to building distribution shall be variable primary flow pumps. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 25 horsepower motor.
- 4) The building circulation loop shall consist of a four-pipe distribution. The main distribution to heating/cooling terminal units in the building shall be four-pipe. Rooftop air handling units, heat recovery air handling units, and central air handling units shall also be four-pipe configuration.
- 5) The building loop piping system shall contain a 30% propylene glycol solution for freeze protection and corrosion protection.
- 6) The building terminal heating units will be designed to utilize low temperature heating supply water (130°F maximum). Heating terminal units such as fin tube radiation and heating coils may require larger surface areas due to the low water temperature. In areas with high heating loads, two-row fin-tube and heating coils may be required.

c. Classrooms – Sensible Fan Powered Terminal Unit System:

- 1) The system serving heating, cooling and ventilation for typical exterior classrooms shall utilize four-pipe, ducted, ceiling mounted sensible fan powered terminal units.
- 2) The primary supply air serving each classroom shall be provided via the fan powered terminal unit with a hot water coil and a sensible cooling coil. Each classroom shall have a terminal unit.
- 3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling

and heating set point temperatures when the room is unoccupied.

- 4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

d. Classroom and Interior Ventilation Systems:

- 1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).
- 2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. The units will be provided with a hot water pre-heat coil and a chilled water cooling coil. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.
- 3) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.
- 4) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.
- 5) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

e. Miscellaneous Areas:

- 1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.
  - a) Gymnasium – 25,000 cfm RTU
  - b) Cafeteria – 8,000 cfm
  - c) Auditorium – 10,000 cfm
  - d) Administration – 20,000 cfm
- 2) Rooftop air conditioning units (RTU) will include supply

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fan, return fan, hot water heating coil, chilled water cooling coil, filters, variable frequency drives and total energy recovery.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils for zone temperature control.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**Option 2: Variable Refrigerant Flow (VRF) Heating/Cooling System**

**a. Central Heating and Cooling System:**

1) Heating and cooling shall be accomplished via multiple air cooled heat recovery, simultaneous heating and cooling, VRF systems, totaling 550 tons.

2) The systems shall be capable of operation down to negative 25F, minimum, ambient temperature.

3) The air cooled condensing units shall be located on the roof.

4) Refrigerant piping (liquid and suction) shall be run from the condensing units to branch controller modules located throughout the building. Branch refrigerant piping (liquid and suction) shall be run independently from each branch

controller module to each VRF fan coil unit.

**b. Classrooms:**

1) Space heating and cooling shall be accomplished via VRF fan coil units. The VRF may be ceiling mounted (ducted or ductless) or console type based on the space application.

2) Ventilation air serving each classroom shall be provided with a variable air volume terminal unit with a hot water reheat coil.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

**c. Classroom and Interior Ventilation Systems:**

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. Each unit will be provided with a dedicated heat pump type VRF condensing unit. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

2) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

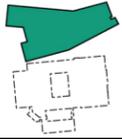
3) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

4) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

**d. Miscellaneous Areas:**

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1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

a) Gymnasium – 25,000 cfm RTU

b) Cafeteria – 8,000 cfm

c) Auditorium – 10,000 cfm

d) Administration – 10,000 cfm

2) Rooftop air conditioning units (RTU) will include supply fan, return fan, filters, variable frequency drives and total energy recovery. Each unit will be provided with a dedicated heat pump type VRF condensing unit.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils to provide ventilation air. The Administration area shall also have VRF terminal units connected to the main VRF system.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**4. Building Management System (BMS):**

a. Provide direct digital control (DDC) BMS with local and

unitary controls and web interface for remote access, alarms, and monitoring of all HVAC equipment in the building.

b. BMS system shall be interfaced to the building electrical and gas sub-meters. Daily, weekly, and annual energy use shall be reported for each meter.

**5. BTU Metering:**

a. Provide BTU metering of chilled water, hot water and ground loop circulation systems.

**III. ELECTRICAL**

**A. Demolition / Existing Electric Services:**

1. All existing services shall be disconnected and removed from the building. Coordinate with the respective utility company and include all work required for the removal of all existing utility services that become abandoned including power, telephone, cable TV, and fire alarm services.

2. Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of demolition of the existing buildings include disconnecting all services and making safe the existing structure for complete demolition.

3. Include maintaining the operation of existing site equipment required during construction.

**B. New Main Electric Service:**

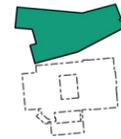
1. A new primary service will be provided from utility company primary services via an underground ductbank and manhole system to a new utility company pad mounted transformer.

2. Secondary service from the new pad mounted transformer will be underground to a new 5000 Amp main switchboard at 480/277V, 3-phase, 4-wire. Switchboard will be located in a new main electric room.

**C. New Normal Distribution System:**

1. Main switchboard will be provided with surge protection

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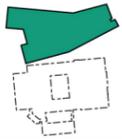


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- (SPD) and ground fault protection on main and feeder devices.
- 2. Surge protection will be provided in all 120/208V panelboards.
- D. New Emergency Distribution System:**
- 1. A 2 MW diesel emergency generator will power emergency egress lighting and exit lighting in corridors, assembly areas, and stairwells. Miscellaneous systems to include the following:
  - a. IT head-end equipment (located in the MDF Room).
  - b. Cooling equipment for school IT equipment.
  - c. Security system.
  - d. Fire alarm system.
  - e. Circulator pumps and controls.
- 2. Separate automatic transfer switches shall be provided for emergency and non-emergency loads.
- 3. In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.
  - a. Additional lighting in Gymnasium, Cafeteria and associated toilets and corridors.
  - b. HVAC (heating, cooling and ventilation) equipment associated with the Gymnasium, Cafeteria and associated toilets and corridors.
  - c. Receptacles in Gymnasium and Cafeteria.
- 4. Generator will be mounted at grade at the exterior of the building in a self-contained sound attenuated enclosure with an integral base mounted fuel tank. Generator will be mounted on an elevated concrete platform for survivability.
- 5. Emergency panels will be located in new two-hour rated electric closets.
- 6. Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.

- 7. Emergency feeders run outside two-hour electric rooms and shafts and not in or under floor slab will utilize MI Cables.
- 8. A portable generator connection will be provided to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.
- E. Sustainable Design Intent:**
- 1. Sustainable Design Intent compliance will include:
  - a. Advanced measurement and verification of air conditioning, fans, lighting, and receptacle power via electronic sub-meters equal to E-Mon, D-Mon Class 2000 3-phase kWh and demand meters. Measurement and verification metering will be monitored by the Building Management System (BMS).
  - b. Plug and process load reductions through the use of vacancy/occupancy sensor controls for local convenience outlets in classrooms, offices, library and resource rooms. Open areas such as Media Center, Auditorium and Kitchen will be equipped with relay panels controlled via the lighting control system, to reduce loads on a time schedule basis.
  - c. Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting.
  - d. Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.
  - e. Empty conduits and space provisions will be provided for photovoltaic (PV) installations. Include conduits and space provisions for inverters at a minimum of two locations in the upper floor electric closets.
- F. Lighting:**
- 1. New luminaires will be provided throughout all renovated areas as well as new construction. Luminaires will be dimmable LED. All luminaires will be suitable for respective utility rebate incentives.

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- 2. Exterior building mounted around the entire building including all canopies, all entry drives, parking areas, and all walkways will be full cutoff LED type. All exterior lighting will be controlled via the building low voltage lighting control system.
- G. Lighting Controls:**
- 1. A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.
- 2. Manual low voltage override switches to override the time of day lighting control schedules shall be provided. Override switches will permit extension of lighting control program as well as ON-OFF override for exiting the facility.
- 3. Lighting program for time of day schedules shall permit all lighting, including exterior to be turned off during non-occupied hours, reducing sky glow and light trespass. Activation of either fire alarm or intrusion detection system shall override the lighting program.
- 4. Vacancy and occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces. In addition, all spaces will be provided with local low voltage dimmable switching.
- 5. Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight utilizing daylight sensors in each space.
- H. Circuitry and Devices:**
- 1. Safety type duplex receptacles will be provided throughout the building in quantities to suit space programming.
- 2. Plug load reduction will be achieved by vacancy/occupancy sensors in classrooms, offices, and staff spaces, and circuits routed via relay panels, controlled via lighting control system time schedule for open areas.
- 3. Provide circuitry for HVAC and Plumbing systems.
- I. Fire Alarm:**
- 1. Existing automatic, fully supervised, analog addressable, voice evacuation system will be retained and utilized where

- applicable.
- a. Manual pull stations (with tamperproof covers if applicable), at points of egress, and other locations as required to meet code.
- b. Audible/visual units in corridors, classrooms, and throughout the building to meet code.
- c. Visual only units in conference rooms, meeting rooms and small toilets.
- d. Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms.
- e. Smoke duct detectors in HVAC units over 2,000 CFM, and within five feet of smoke dampers including connections to all smoke/fire dampers.
- f. Connections to all Fire Protection devices.
- g. Connections to audio/visual systems, sound systems, and dimmed lighting controls.
- h. Remote annunciator at main entrance and secondary entrances as directed by the Boston Fire Department.
- i. 24 VDC magnetic hold open devices at smoke doors.
- j. Master box and exterior beacon (quantity of beacons per Boston Fire Department).
- k. Wiring will be fire alarm MC cable.
- J. Technology Systems – refer to the Technology Section.**
- K. Integrated Intrusion, Access Control, CCTV, and Alarm System:**
- 1. Intrusion alarm system will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade. Motion sensors will be provided in corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs.
- 2. CCTV coverage will be provided at main and secondary entries as well as all other perimeter entries to be used by students and staff on a daily basis and for off hours

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OPTION 4A: NEW CONSTRUCTION



F. BUILDING SYSTEMS / HVAC & ELECTRICAL

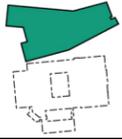
community programs, including Gymnasium and Cafeteria entries.

- 3. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.
- 4. Access control via card access system will be provided at all exterior doors.
- 5. CCTV system will be an extension of the existing system that is networked with the other schools in Stoneham. System will be web based to allow viewing by the Stoneham Police Department.

L. Miscellaneous:

- 1. Provide conduit and electrical circuitry for tel/data, security and AV requirements.

OPTION 4A: NEW CONSTRUCTION



F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY

OPTION 4A – NEW CONSTRUCTION/INFORMATION TECHNOLOGY

**Structured Cabling System:**

The structured cabling system will consist of a hybrid delivery system comprised of hard-wired data cabling to support fixed workstations where required and high bandwidth, full coverage wireless connectivity. The data cabling channel performance will exhibit Category 6A performance capabilities. The data channel will be comprised of the passive components including cabling, connectors, patch panel port, and patch cords, providing up to a total of four (4) connections between network electronics. The Category 6A channel will be component compliant, capable of supporting 10 Gigabit per second networking. Category 6A data cabling will be provided to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other related equipment. This cabling will support computer network requirements, wireless connectivity, telephone system (VoIP) and IP-based security needs. WLAN cabling will be terminated above the ceiling in typical ACT areas. All data jacks will be color coded. Multiple lengths and colors of patch cables will be provided for closet connectivity.

General classrooms including Science, Health, ESL, SPED Resource, RISE, STRIDE, Speech/Language, OT/PT, and Culinary will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

Collaborative Spaces and Small Group Seminar Rooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher use where required.

Teacher Planning Spaces will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, workgroup printers/multifunction copiers and connections for staff use where required.

Art Classrooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, 3D printers, and connections for teacher and student use where required.

Band and Music Areas will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for teacher and student use where required.

Engineering Labs (Maker, Engineering, Robotics, Scene Shop, CAD, Project Lead the Way Spaces) will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, 3D printers and other peripherals, and connections for teacher and student use where required. Fixed computer workstations in these spaces will be hardwired.

Gymnasium, PE Alternatives Spaces and Team Rooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff use where required. Team Rooms will be equipped with

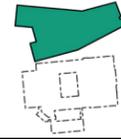
Media Center including the Cyber Café and Student Help Desk will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

Auditorium will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

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OPTION 4A: NEW CONSTRUCTION

F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY



Café/Student Lounge will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

Admin Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. Nurse's Suite will also be wired for fax.

District Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. This area will be segmented with its own IDF, regardless of distance requirements.

Pre-K Classrooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

**Space Requirements:**

There will be several utilitarian spaces provided to accommodate and support the various technology system and associated networking hardware. These spaces are the Service Entrance/Demarc, MDF/Head End Room, and IDF/Tech Closets.

The Service Entrance will be the termination point for all incoming services such as TELCO, Internet, CATV and district fiber. Services will be extended from the demarc to the MDF via various backbone cables (fiber, multi-pair copper).

The MDF will be the central location of all head end equipment including but not limited to servers, storage, switch electronics, security equipment, video equipment, telephone system, public address system and security system. It will be a dedicated space with proper ventilation, environmental treatment and emergency power.

The IDF locations will serve as intermediate closets for local cabling and equipment. The IDFs will be dedicated spaces with proper ventilation, environmental treatment and emergency power. Each closet will connect to the MDF with backbone cabling. IDFs will be located to keep all cable distances within specification limits. The Central Office area will be segmented with its own IDF.

**Backbone Cabling:**

12-Strands of OM4 Multimode and OS2 Singlemode fiber will be provided between the Head End Room (MDF) and the Tel/Data closets (IDF). This cabling will support all network requirements; wireless connectivity, and VoIP system needs. Multimode fiber will be laser-enhanced and guaranteed for transmission distances in 10 Gigabit Ethernet of up to 500 Meters. All single-mode fiber optic cables will be OS2, tight buffered, high flexibility. All fiber optic cables will be installed in innerduct. Outbuildings requiring connectivity will be treated as IDFs.

Equipment racks will be installed in the MDF and IDFs for patch panels and network hardware. Two-post and four-post racks will be provided. Racks will be 19" EIA floor mount racks with wide floor mounting flanges, vertical cables guides and horizontal cable managers. Power for rack equipment will be installed in cable tray above the racks. Power will consist of both 20A and 30A twist-lock receptacles.

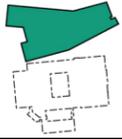
The district fiber must be extended to the new high school. The existing MDF and the existing district fiber must remain functional until cutover occurs. The existing district fiber must be protected during site work.

**Data Communication Systems:**

Networking hardware will be provided for the MDF and IDFs consisting of network switch electronics for the data and voice communication systems, distributed communication system,

OPTION 4A: NEW CONSTRUCTION

F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY



audio-video communication system, security system, wireless LAN and other Owner equipment. Components will consist of PoE+ hardware and power supplies, 10/100/1000 to all endpoints, fiber transceivers, patch cables and UPS equipment. The switches will be fully configured according to network requirements and VLANs will be created according to best practice and equipment requirements. Inter-closet connectivity will be 25Gb or greater via fiber.

**Audio/Visual Communication Systems:**

Digital signage will be provided in gathering areas and large group instruction spaces. The system will consist of LED displays, media players, and a server or cloud based digital signage, solution.

Classrooms and general instruction spaces will be equipped with a local audio system consisting of ceiling speaker, amplification, wireless microphones and auxiliary inputs. There will be an input available for FM assistive listening systems the Owner may have.

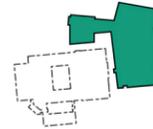
**Distributed Communication System:**

The distributed communication system will consist of a fully operational IP platform public address system for district and school internal communications system incorporating school-wide notifications and general announcements. It will provide complete internal communications using state of the art IP technology with two-way loudspeaker internal communication, bell event notification, emergency announcements that will override any pre-programmed zones assuring that all emergency/lockdown announcements are heard at all locations, and atomic time synchronization. The system will connect directly to the high school's LAN and have the future capability of expanding to connect to other intercom systems in the school district over the WAN for district-wide, emergency, and live voice announcements (additional hardware required at the other school facilities for this feature). Configuration of zoning, bell schedules, calendars, and emergency sequences will be accomplished using a browser-based interface.

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OPTION 4B: NEW CONSTRUCTION / SUMMARY

GSF: 207,827 SF  
 Estimated Construction Cost: \$140,636,495  
 Estimated Soft Cost (20%): \$35,563,505  
 Estimated Project Cost\*: \$176,200,000  
 Approximate Cost to Stoneham: \$125,300,000



\*Project cost - all costs should be considered preliminary based on order of magnitude

**Relationship of Site Organization to Surrounding Context:**  
 Option 4B sets up two strong organizing gestures on the site. The first is a landscape loop that collects the disparate informal paths that access the site from surrounding neighborhoods and brings students and visitors to the various site programs, including the building. The second is the new school which acts as a physical gateway to an academic green at the center of the site. The building sits on the axis of the entry road and puts the most public interior functions of the school within sight of Franklin St. This option sets up the most efficient use of site area and provides long-term site flexibility by collocating the athletic fields on one half of the site.

**Phasing / Existing Utilities**  
 This option requires one major building phase and a site phase, allowing students to stay fully in the existing building during construction. Site construction access would likely need to happen in parallel to the school's single student/service drive, making construction site logistics critical. Existing utilities to the current school building must be rerouted in an enabling phase but to a lesser degree than Option 4A.

**Site Scope and Disturbance**  
 A large area of the site is disturbed during construction, including playing fields to the north and west of the building along with the new building footprint. However, more existing fields are able to be used during construction compared to 4A, because 4B's building is both more compact and located on the east edge rather than the site center. A 36" existing culverted stream will not need to be relocated with this building position.

**Traffic Mitigation / Site Circulation**  
 Optimal site circulation is achieved by bringing the drop-off loop along the north edge of the site, lengthening the queuing line and keeping pedestrian circulation to the main entry separate from vehicular traffic. Building loading is achieved from the site's security drive, which is shorter and less complex in this building strategy than other options.

**Program Organization**  
 In this option, the arts programs sit adjacent to the athletics and academic spaces in separate zones. These zones are all connected by a strong bridge of public spaces that include shared pre function, dining and media spaces. On the east side of the building the academic clusters group themselves around the Gym, using the large space as an efficient light well for interdisciplinary collaboration spaces and maker hubs.

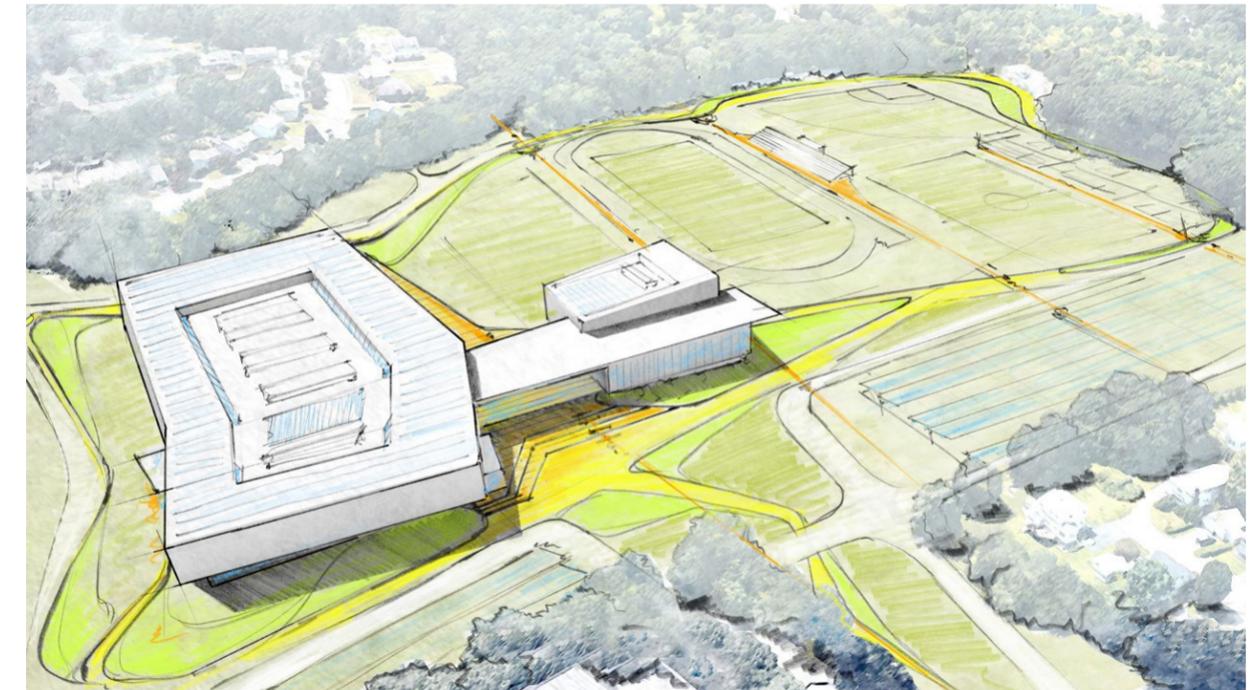
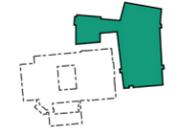
**Civic Presence**  
 This option presents a strong civic presence to Franklin Street by placing the new building in front of the existing facility and aligning the drive aisle with the school's new civic entry. Parking and associated PV canopies are parted by an entry landscape gesture, allowing the entry viewshed to capture the building form.

**Learning Environment / Landscape Relationship**  
 Classroom clusters have a close adjacency to an outdoor learning environment to the west of the building, making morning outdoor connections more viable. Space on the east side of the building mass will be limited due to steep grades and the necessity of access to emergency vehicles. The landscape loop that organizes the site also has potential to give access to outdoor learning environments such as informal terraced landscape theaters and community garden spaces.

**Energy Strategy**  
 By stretching parking orthogonally east-west and creating a simple building roof form with designated mechanical well, this option sets up the potential for on-site power generation to equal the building's energy demands.

**Daylighting / Solar Orientation**  
 The mass of the academic portion of the building is oriented north-south, making daylighting for classrooms and negative heat gain more challenging. Glare control will be necessary in many of the classrooms in the morning and afternoon but can be lessened by fixed vertical shading strategies. through simple horizontal sun shades.

OPTION 4B: NEW CONSTRUCTION / SUMMARY



CONSIDERATIONS

- Visibility of new building across a landscaped entry zone from Franklin St
- Stadium, Auditorium, & Spartan Place are central to the site
- Geoexchange field wraps building on 3 sides
- Spartan Place is central to site and building, connecting to southern-facing Spartan Plaza
- Building encroaches on areas of known ledge
- Sub-optimal orientation for classroom daylighting
- Existing fields upgraded to regulation size
- Utilities relocation required to keep existing building in operation during construction
- Parking geometry is optimized for PV
- Opportunity for separate entrances for all user groups: High School, PreK, and District Offices
- Landscape Loop is a community amenity that connects all site program while managing site water

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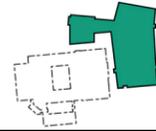
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OPTION 4B: NEW CONSTRUCTION



A. PROSPECTIVE SITE ANALYSIS

Site / Landscape Scope Narrative

This narrative provides an analysis of the options including natural site limitations, building footprint(s), athletic fields, parking areas and drives, bus and parent drop-off areas, site access and surrounding site features. This narrative excludes temporary site facilities, phasing implications, site drainage, utilities and permitting requirements addressed separately.

Paving and Curbing

All building/site options include new asphalt pavement and granite curbing for driveways and parking areas (350 spaces). Fire lanes shall be asphalt paving without curbing. Walkways around the building and site will be accessible.

The site circulation will include upgrades to the main entry on Franklin Place, which will become a two-way drive and a separate dedicated multi-modal path for emergency & maintenance vehicles, bicycles and pedestrians. Parking will be located at the northern edge of the site, visually buffered from the rest of the site by the landscape loop, the true site threshold. Service will be located at the rear of the school.

Athletic Facilities

The fields will be constructed to meet regulation size in all options. The soccer/lacrosse fields and track will all remain in the existing locations, with upgrades. Scope includes replacing the two natural grass soccer/lacrosse fields and the natural grass field inside the track with synthetic turf & new resilient track surface. The stadium will also include new home and visitor bleachers. All options will include an athletic building for concessions and restrooms. Locker rooms and team rooms are planned in a building below the home bleachers.

The baseball/field hockey will be relocated over the existing track, adjacent to the exposed ledge and wetlands, allowing for a full-sized outfield with optimal solar orientation. The track/stadium complex will be reoriented N/S for optimal solar orientation and situated in the center of the site, moving noise & light furthest away from neighbors. The softball field transitions into a civic green & Spartan Plaza closer to the building. Tennis courts, practice field, and community garden are organized around the two soccer/lacrosse fields on the northwestern part of the site.

Site Lighting

All options will meet LEED requirements and IESNA standards with site lighting provided at parking, driveways and walkways. LED sports lighting will be provided at the stadium and one of the synthetic turf soccer/lacrosse fields.

Site Amenities

All options will include site furnishings, signage, electrical charging stations and the potential for photovoltaics over parking. Site furnishings will include benches, bicycle racks, vehicular bollards, tables, trash receptacles. Site signage will include traffic/regulatory, wayfinding and monumental school identity signage. Existing memorials will be salvaged and reset. The main entrance will include planter curbs, bollards and seat walls for pedestrian safety. Outdoor classrooms will include supporting amenities such as raised garden beds, storage/tool sheds, water source, fencing, tables and benches. There will be a separate play area for Pre-K with play equipment and poured in place rubber surfacing with a perimeter fence. In this scheme, Pre-K drop-off and play are located along the quiet eastern side of the building.

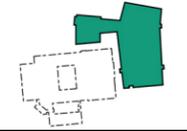
Fences and Gates

All options will include black vinyl coated chain link fencing and gates at the reconstructed softball and baseball/field hockey fields (6-foot high and 24-foot backstop), 6-foot high at reconstructed track, 10' high at tennis courts. Sports netting will be included as needed. The service drive will include a vehicular barrier gate. There will be an 8' high perforated or louvered powder coated metal screen fence and gates at service area.

Planting

Planting shall include 3.5-4" caliper trees for shade and ornamental character at parking, driveways, walks plazas and courtyards, approximate spacing 40' O.C. Limited ornamental landscaping at plazas and outdoor learning, and seeded lawn and landscape restoration areas. Green infrastructure for stormwater management will include vegetated swales, rain gardens and bioretention areas.

OPTION 4B: NEW CONSTRUCTION



B. CONSTRUCTION IMPACT

Scheme 4B's compact footprint on the eastern edge of the site affects less site program during construction than the centrally-located schemes 3A & 4A. Site construction access would likely need to happen in parallel to the school's single student/service drive, making construction site logistics critical. Existing utilities to the current school building must be rerouted in an enabling phase but to a lesser degree than Option 4A. Modular classrooms are not anticipated to be required on site during renovations. Scheduling work over summer or holiday breaks may alleviate some of the disruption but would need to be carefully managed. The anticipated construction schedule is 33 months.

Work under these conditions would be less disruptive to students and staff than a renovation option. Students would be forced to move only once to accommodate the construction phases. Disruption from noise, dust, odors and construction traffic could be anticipated.

The detailed plan for phasing and swing space would be determined during schematic design to best coordinate with the educational programs to minimize the impact on students and staff.

DESIGN AND CONSTRUCTION SCHEDULE

Anticipated MSBA Approval of PSR	January 13th, 2021 (MSBA Board Meeting)
Anticipated MSBA Approval of SD	August 25th, 2021 (MSBA Board Meeting)
Special Town Meeting/Ballot Vote	November 2021
Design Development Complete	November 2021 - April 2022
Construction Documents Complete	May 2022 - November 2022
Bid and Award	November 2022 - January 2023
Construction (2 phases: Building then Site)	June 2022 - April 2025 (33 months)

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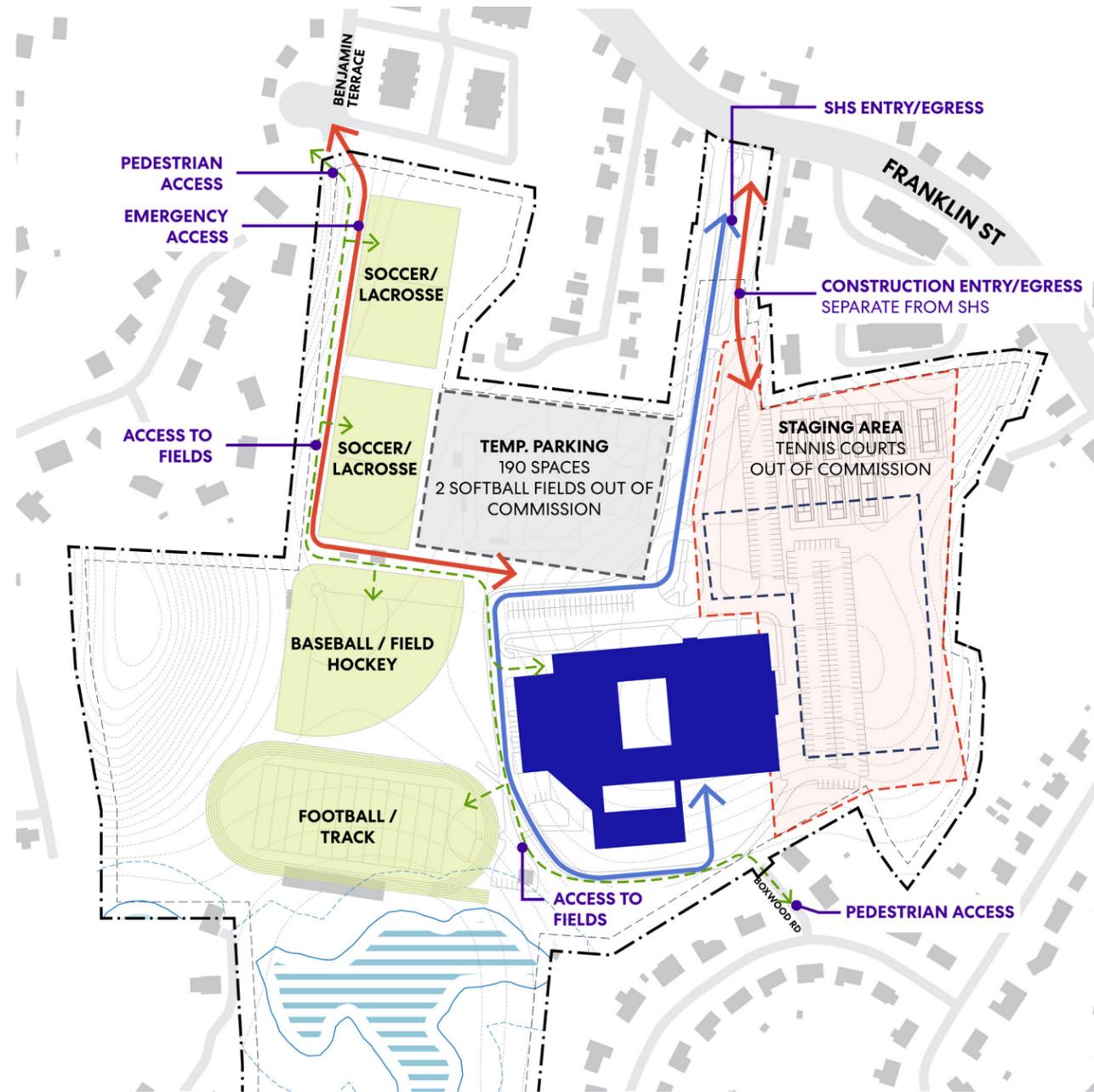
APPENDICES

OPTION 4B: NEW CONSTRUCTION

OPTION 4B: NEW CONSTRUCTION

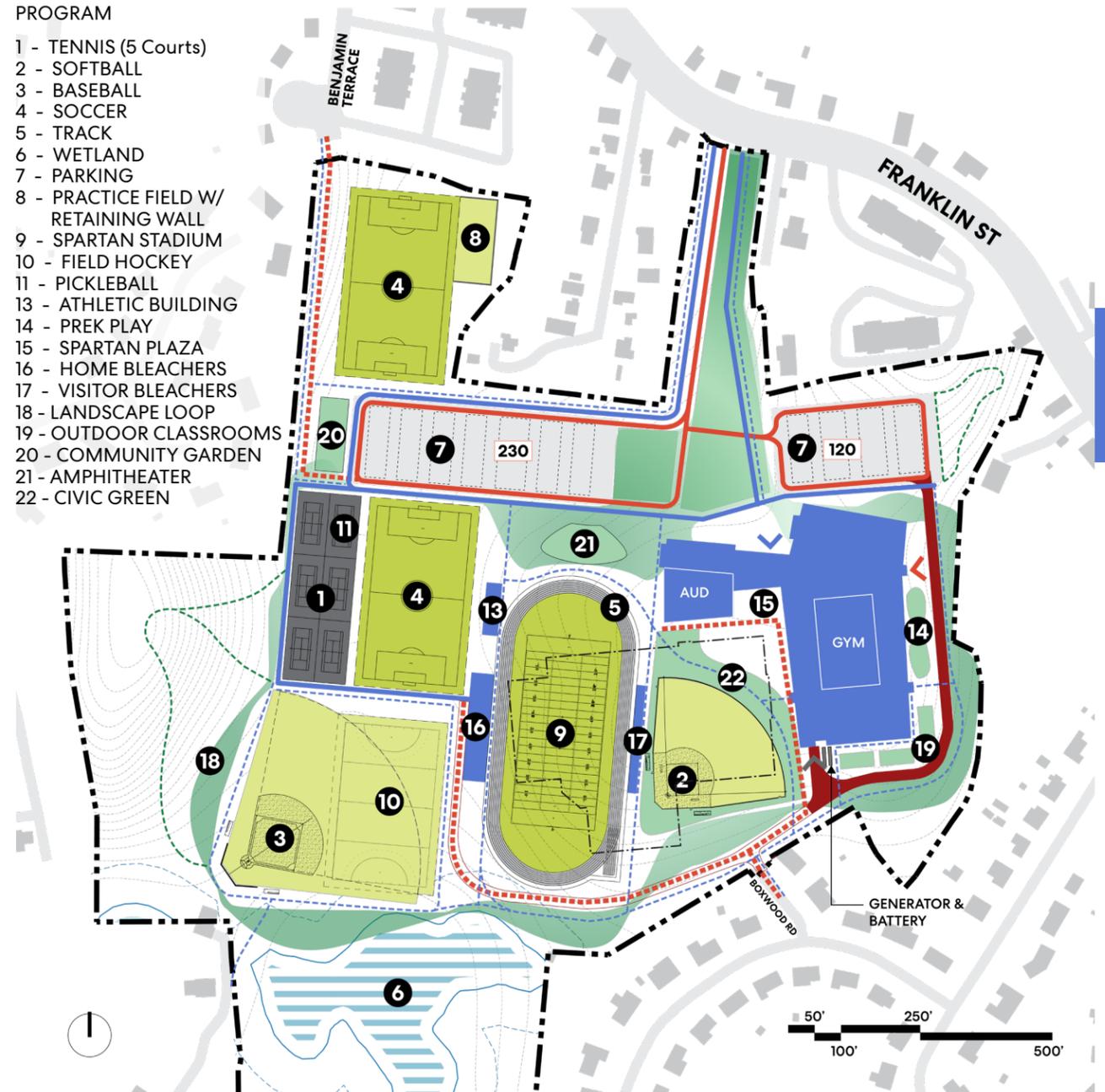
C. CONCEPT DRAWING / CONSTRUCTION PHASING PLAN

C. CONCEPT DRAWING / SITE PLAN



PROGRAM

- 1 - TENNIS (5 Courts)
- 2 - SOFTBALL
- 3 - BASEBALL
- 4 - SOCCER
- 5 - TRACK
- 6 - WETLAND
- 7 - PARKING
- 8 - PRACTICE FIELD W/ RETAINING WALL
- 9 - SPARTAN STADIUM
- 10 - FIELD HOCKEY
- 11 - PICKLEBALL
- 13 - ATHLETIC BUILDING
- 14 - PREK PLAY
- 15 - SPARTAN PLAZA
- 16 - HOME BLEACHERS
- 17 - VISITOR BLEACHERS
- 18 - LANDSCAPE LOOP
- 19 - OUTDOOR CLASSROOMS
- 20 - COMMUNITY GARDEN
- 21 - AMPHITHEATER
- 22 - CIVIC GREEN



- |  |                                     |                    |                          |
|--|-------------------------------------|--------------------|--------------------------|
| — VEHICULAR DRIVE                                  | — BIKE LANE                         | ➤ HS MAIN ENTRY    | ■ GRASS                  |
| ⋯ LIMITED ACCESS: EMERGENCY, MAINTENANCE, BICYCLES | ⋯ ADA PEDESTRIAN PATH               | ➤ PRE-K MAIN ENTRY | ■ SYNTHETIC TURF         |
| — SERVICE DRIVE                                    | ⋯ HIKING TRAIL (NOT ADA ACCESSIBLE) | ➤ LOADING          | ■ EDUCATION / RECREATION |

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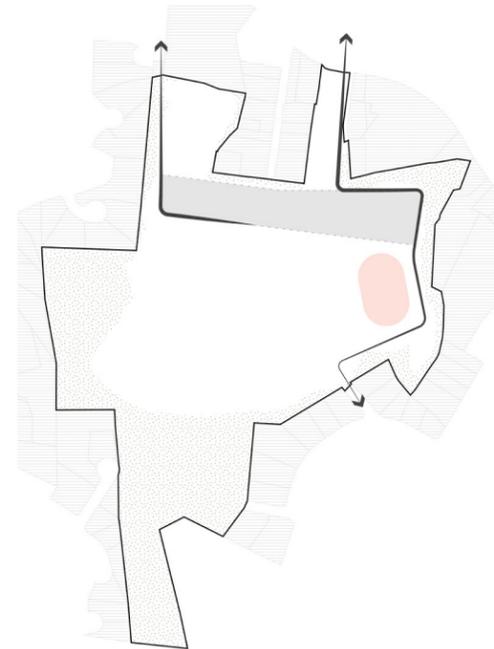
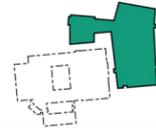
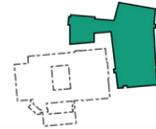
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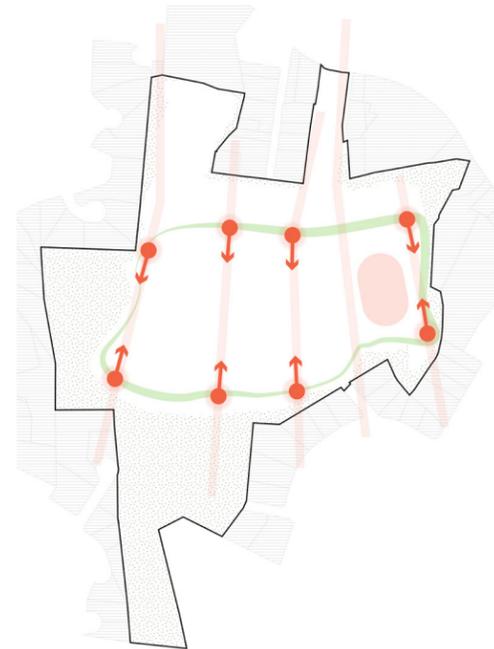
OPTION 4B: NEW CONSTRUCTION

C. CONCEPT DRAWING / SITE STRATEGY

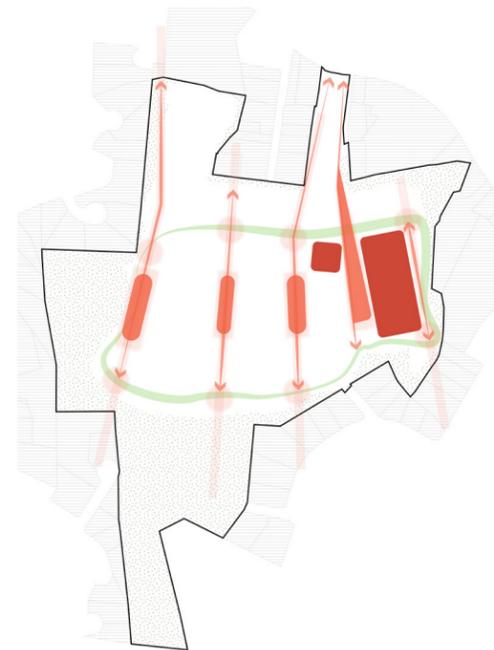
C. CONCEPT DRAWING / MASSING SKETCH



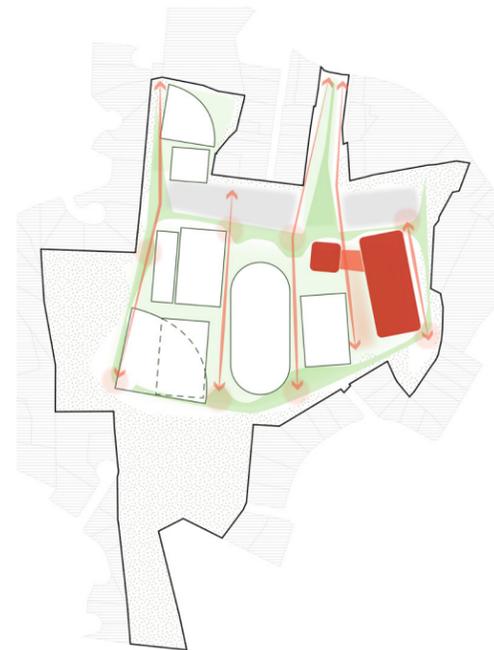
CONSOLIDATE PARKING ALONG NORTH EDGE



PERIMETER LANDSCAPE LOOP CAN SERVE AS BOTH NATURE WALK AND SITE HYDROLOGY SYSTEM



EFFICIENT NORTH-SOUTH PATHS; ENTRY AXIS REORIENTS TO THE BUILDING & SPARTAN PLAZA



ATHLETICS, ART, & ACADEMICS ARE ORGANIZED TOGETHER AS THE SITE FOCUS

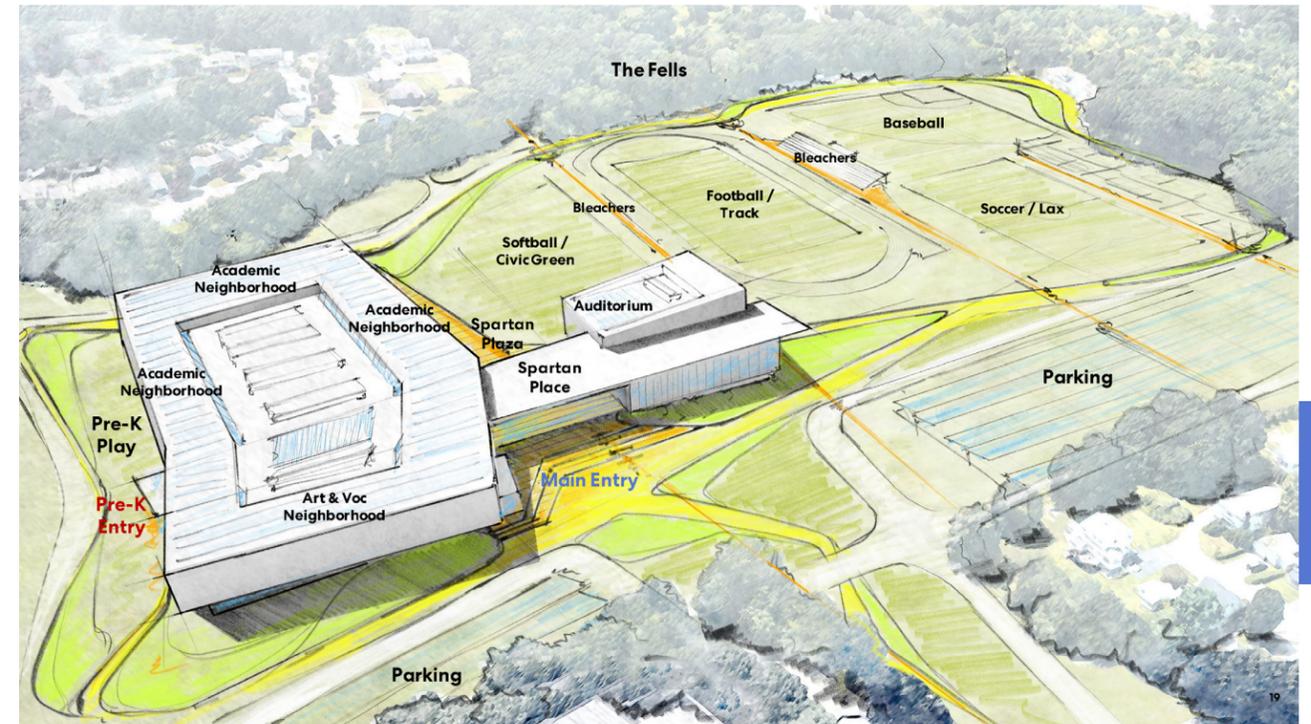
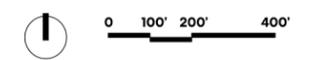


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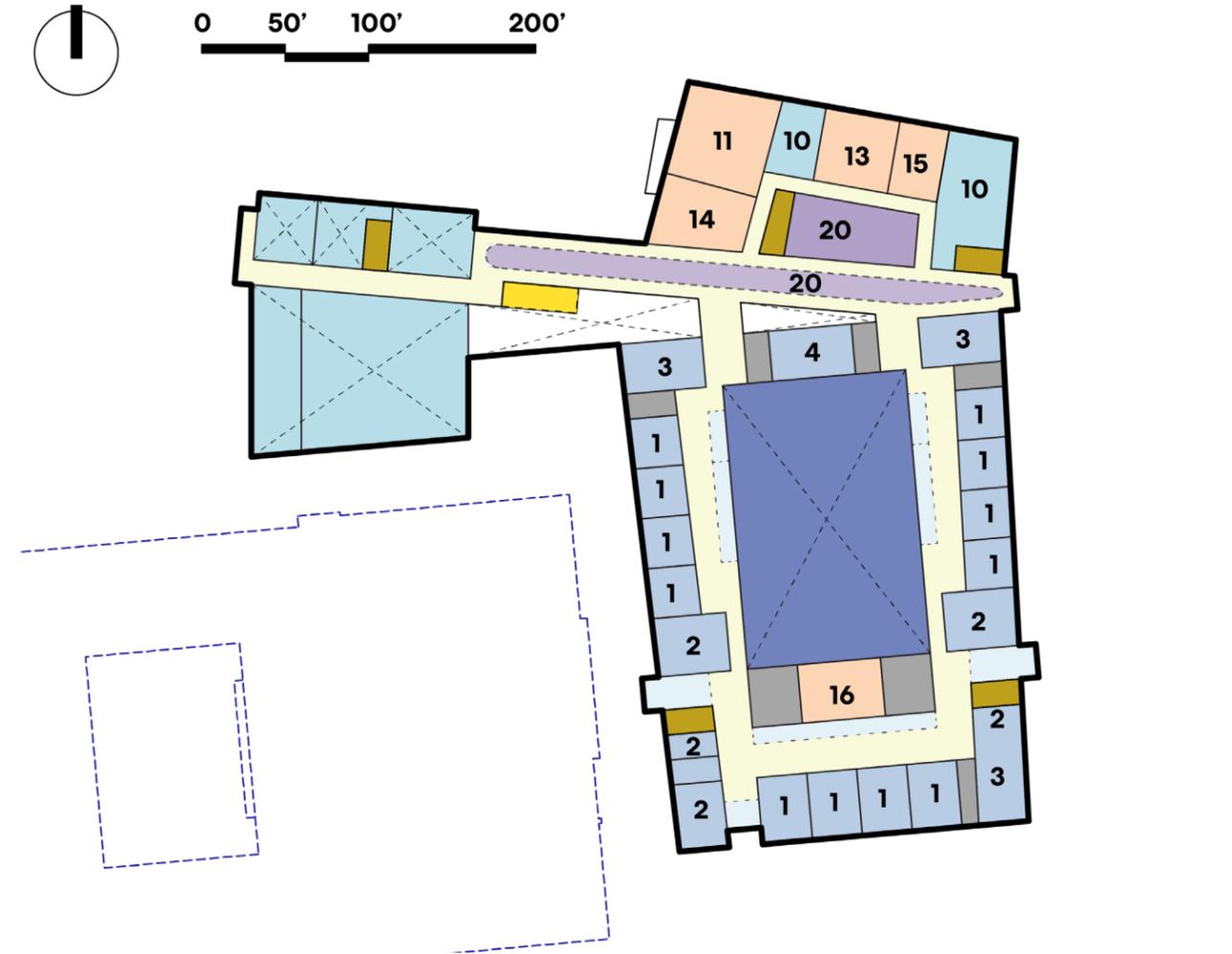


OPTION 4B: NEW CONSTRUCTION

OPTION 4B: NEW CONSTRUCTION

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 01

C. CONCEPT DRAWING / FLOOR PLAN - LEVEL 02



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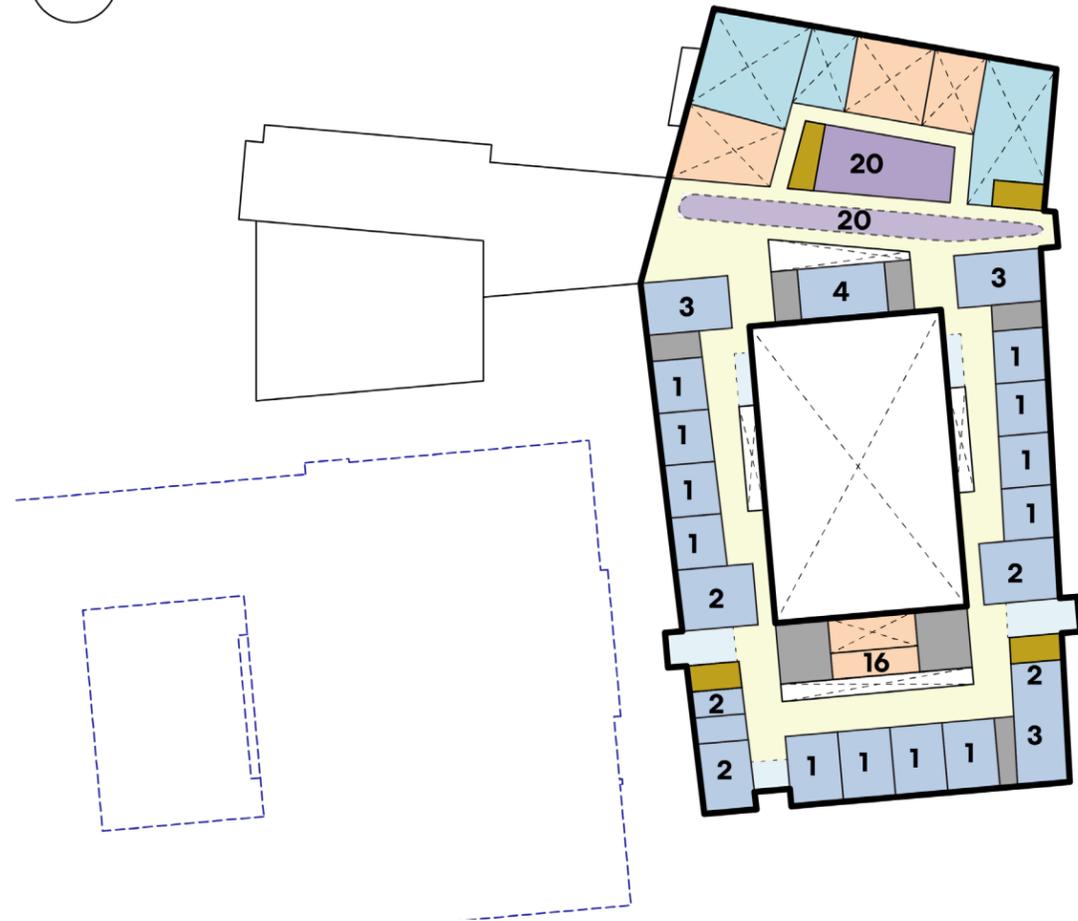
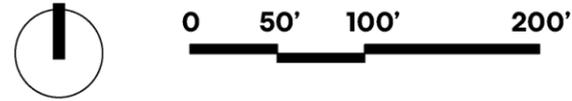
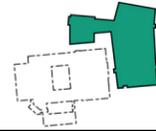
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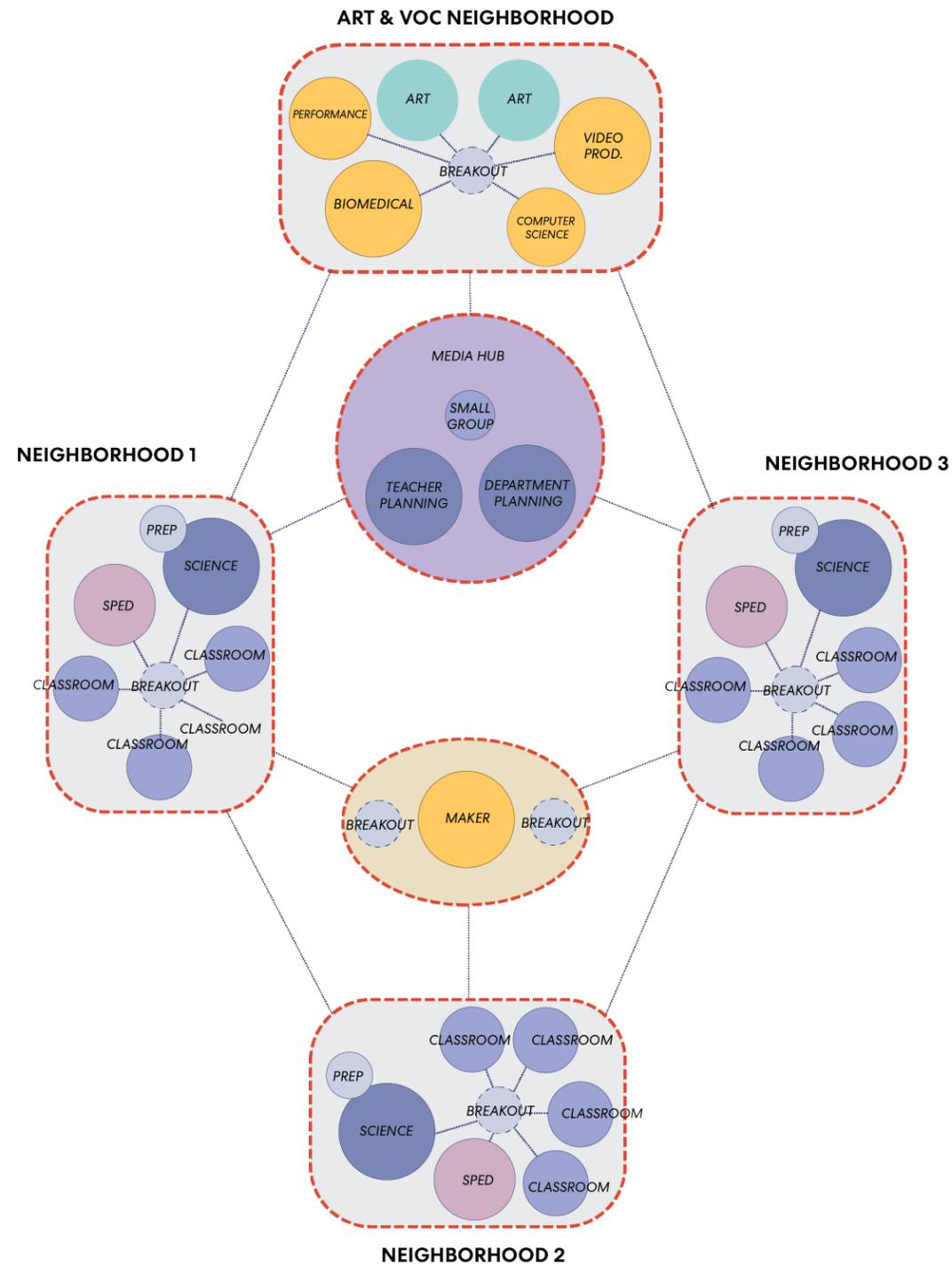
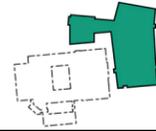
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OPTION 4B: NEW CONSTRUCTION

C. CONCEPT DRAWING / ACADEMIC NEIGHBORHOOD STRUCTURE

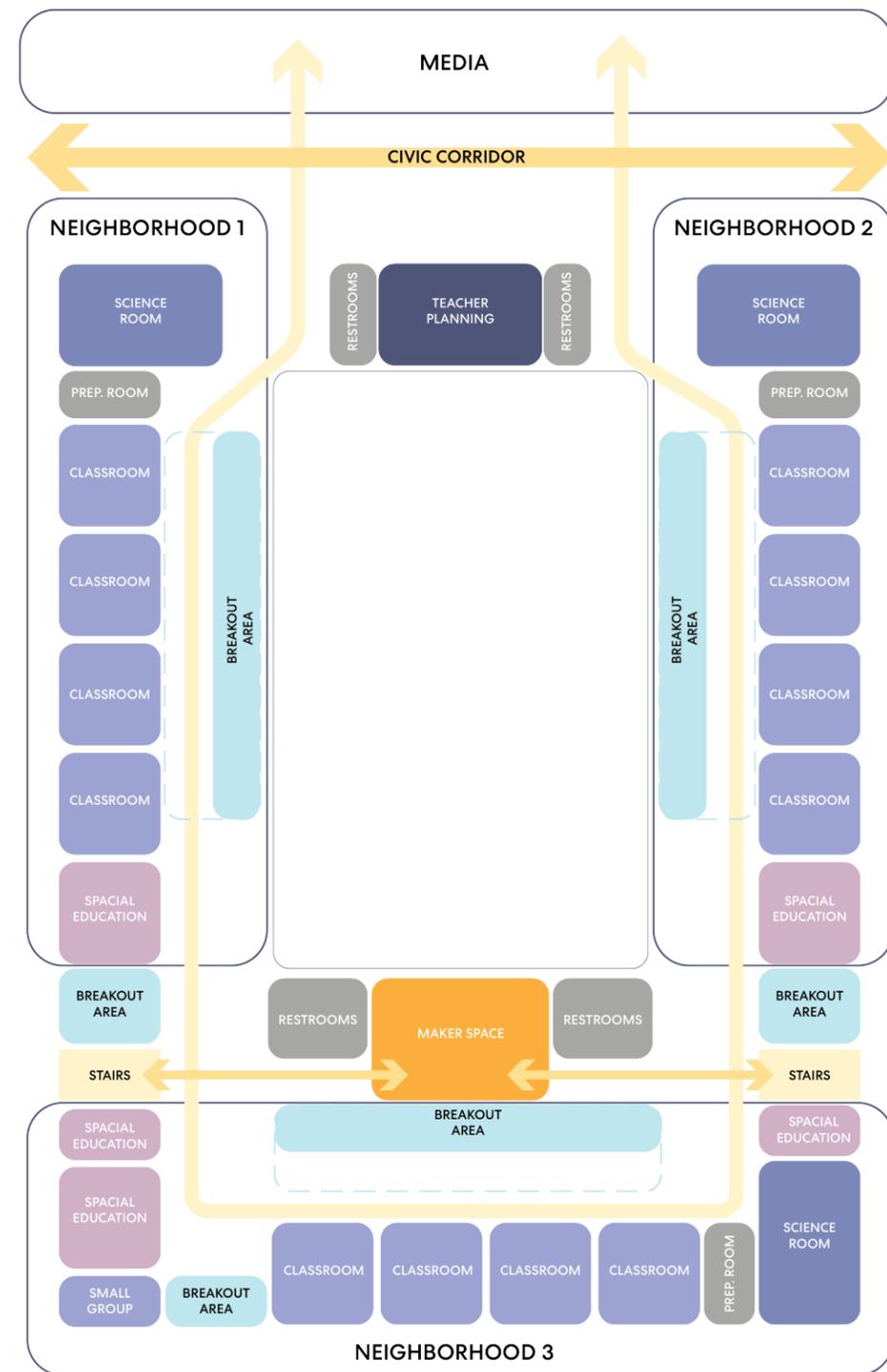
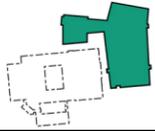
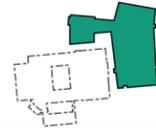


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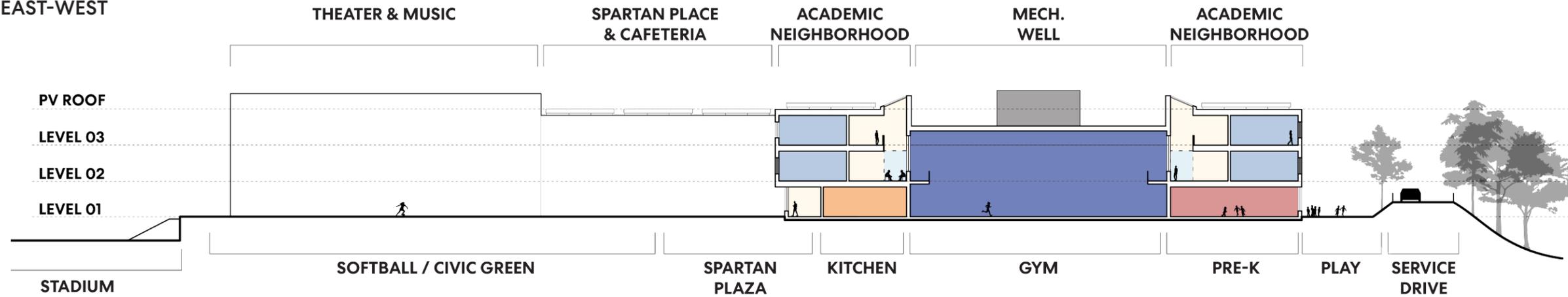
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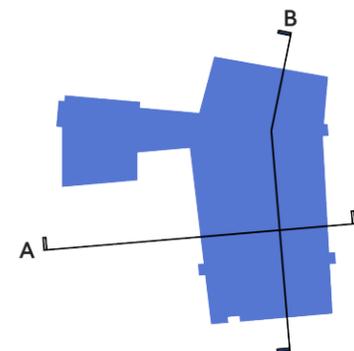
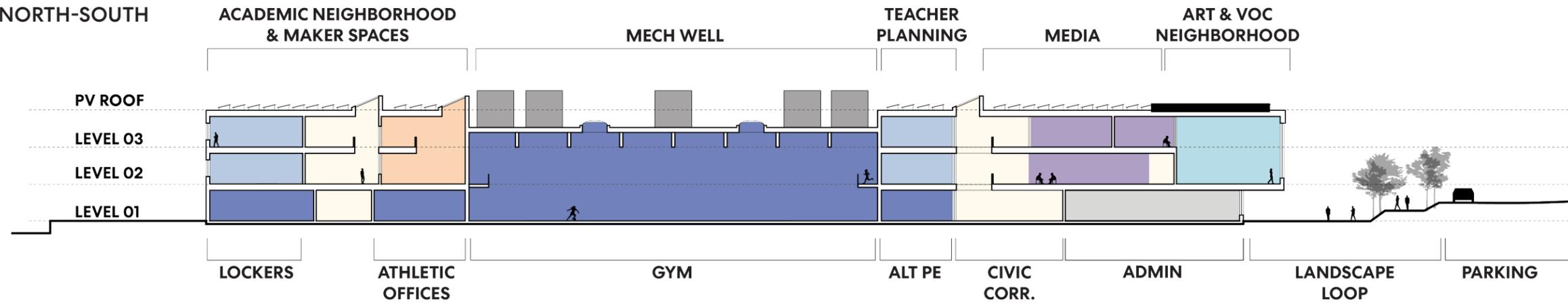
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SECTION A: EAST-WEST



SECTION B: NORTH-SOUTH



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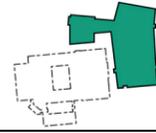
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GENERAL

Stoneham High School is a sprawling campus built on what was originally a gently sloping, thirty-five acre site that has surrounding wetlands. The original building is that of one and two stories built of cast-in-place concrete and precast concrete. Foundations are conventional standard spread footings. At the time of the school's conversion from Junior High to High School in 1981, a one-story steel framed addition was added to the south of the original building and the gym was expanded to the south using concrete elements. Foundations for the addition are also spread footings. Generally the building appears to be in fair structural condition without signs of significant distress.

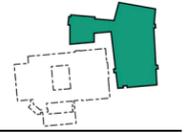
Four design options are studied:

- a. Option 1A – Code Upgrades Only
- b. Option 2A – Renovation Only
- c. Option 3A – Renovation Addition
- d. Option 4A – New Construction
- e. Option 4B1 – New Construction Embedded Gymnasium
- f. Option 4B2 – New Construction Embedded Auditorium

Each design option is discussed separately and order of magnitude structural scope items are presented in the flowing pages. The purpose of this narrative is to inform the reader about structural implication of each design option based on our understanding of the existing conditions and the design options presented. This narrative should be used by a professional cost estimator to prepare a cost estimate in line with MSBA requirements.

OPTION 4B: NEW CONSTRUCTION

D. STRUCTURAL SYSTEMS



STRUCTURAL SYSTEMS – OPTION 4B1 (New Construction Embedded Gymnasium))

This option builds a new High School Building to the east of existing and demolishes the entirety of the existing structure. The Gymnasium is proposed to be embedded within the Core Academic functions.

4B1 FOUNDATIONS:

Geotech report has recommended conventional footings supported on a minimum of 6 inches of structural fill placed directly over the natural sand after removing top soils and fills. An allowable bearing capacity of 4,000 pounds per square feet has been provided by the Geotech report.

Typical Interior Column Footings of 9.5' x 9.5' x 27", and Exterior Column Footings of 7.5' x 7.5' x 22" with 60lbs/cu.yd. steel reinforcement. The proposed footing sizes are based on a typical bay spacing of 30 feet in each direction. Individual footings may vary depending on specific column spacing in each area.

2'-0" x 2'-0" Grade Beams below slab on grade at locations of the braced frames. Consider 1 bay (or 30 linear feet) of grade beam at every 30' x 90' area. Allow for 100 feet long grade beams at 30 feet on center under the auditorium and stage floor. 330lbs/cu.yd. steel reinforcement.

Perimeter Frost Walls – 14" thick, 4'-0" below finished grade with 2'-6" x 1'-3" footing. Reinforced with 115 lbs/cu.yd. 2'-0' x 2'-0" concrete piers under all perimeter columns with 300 lbs/cu.yd. steel reinforcement.

First floor slab-on-grade, 5" thick concrete with WWF6x6-W2.9xW2.9 supported on minimum of 12 inch structural fill, insulation and vapor barrier. No under slab drains anticipated. Contraction joints at 15 feet max. Slabs that are polished, exposed concrete and carry directly adhered finish should include vapor reducing admixtures such as Barrier One.

Elevator pit with 12" thick reinforced concrete wall and 24" thick base, reinforced with 120 lbs/cu.yd. steel reinforcement. Under stage pit, if needed, may be similarly estimated with 8" thick pit slab.

The project site has sloping topography and known potential for ledge. The amount of earthwork will depend on the final finish level of the first floor elevation. We recommend an allowance be carried for appropriate cut and fill earthwork including potential ledge cutting. Also, the utilities running under the building footprint may require trenching through ledge.

Ground water levels are found to be ranging between 3.5 feet and 9 feet below existing grade, and hence moderate level of groundwater management is anticipated to be required. Permanent perimeter wall drains are recommended.

4B1 SUPERSTRUCTURE:

A conventionally framed structural steel system is proposed for this project. Composite beams supporting composite floor slabs consisting of lightweight concrete on steel deck. The floor slab construction will consist of 3.25" light weight concrete on a 3", 18 gage composite

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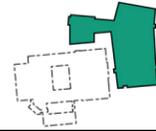
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D. STRUCTURAL SYSTEMS

galvanized steel deck. The roof housing mechanical units will consist of 3", 20 gage galvanized steel decking with concrete topping or other suitable means for acoustical considerations.

Assuming a typical floor bay of 30' x 30', the floors will be supported by steel wide flange (typically 18 inch deep) beams, 21 inch deep girders and steel columns. Actual spans may vary depending on further coordination with other disciplines. The columns will typically be placed along exterior walls and along the corridor walls. Assume square and rectangular HSS columns for compact shapes. The beams are typically spaced at 10 feet on center. Standard double angle or shear plate bolted connections are anticipated between steel members.

The framing supporting the gymnasium and the Auditorium roofs are anticipated to span close to 100 feet. Deep steel trusses or open web long span girder are typically used systems for such spans. The long span members in turn are supported by girders supported by perimeter columns. The location of the Gym lends itself to an economical use of the steel columns and footing elements. Steel columns along the auditorium may also be utilized to support the tall curtain wall or other building envelope system. At least one level of wind girts should be estimated for supporting the building envelope in these and other tall spaces.

Open web bar joists may be considered as an alternative to the traditional wide flange steel framing. This change may result in savings of about 1.0 lbs per sf of steel tonnage but will require deeper joist depths. This option can be considered in the next phase of design upon further coordination. Open web steel joists can be spaced at 30" or so on center to keep the joist depths within reasonable range.

The lateral force resisting system to resist wind and seismic forces will be composed of braced frames in both orthogonal directions. These will be strategically located at partition walls, exterior walls, or exposed to coordinate with project aesthetics. The braced frame diagonals are anticipated to be steel tube sections spanning diagonally within the plane of a column bay. Brace end connections will consist of gusset plates and a combination of welded and bolted anchorage to the plates.

Façade support is generally expected to consist of slab-supported perimeter walls constructed with light gage steel studs. Glazing elevations are expected to require perimeter bent plate slab edge construction for appropriate mullion anchorage.

Structural Steel Estimates

Typical floor and roof framing	7.5 psf
Auditorium Floor framing	12 psf
Gym and Auditorium Roof Framing	21 psf
Stage Roof and fly tower Framing	28 psf
Suspended Tracks	10 psf
Columns (HSS)	1.75 psf
Bracing (HSS)	1 psf
Miscellaneous	2 psf

4B1 ADDITIONAL CONSIDERATIONS:

1. Expansion/Separation Joints: This design option appears to celebrate the Auditorium and the Spartan Plaza. An expansion joint is recommended to the east of the Spartan Place for efficient functionality of the structural systems. This also offers a very cost effective opportunity to separate the very active programs from the more quiet core educational programs.

OPTION 4B: NEW CONSTRUCTION



D. STRUCTURAL SYSTEMS

2. Auditorium: The Auditorium has unique components such as over the house catwalk, fly gallery grating, well beams, header beams, lock rail and related rigging support framing, lighting grid etc. Carry an allowance for these items.
3. Alternative materials: As much of the structural framing in the Gymnasium, the Cafeteria and the Spartan Place will potentially be exposed to view, mass timber or similar alternatives to steel may be considered for framing.
4. Other scope not specifically identified: Allowances should be considered for items such as screening around roof top units, structured canopies, monumental stairs, support for sculpture/art commissions, and thermal breaks within steel construction that penetrates the envelop.

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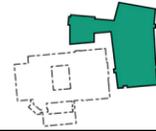
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OPTION 4B: NEW CONSTRUCTION



D. STRUCTURAL SYSTEMS

DESIGN LOADS

Dead Loads:

Weight of Building Components	As Required
Partitions Allowance	20 psf (for live loads < 80 psf)
Ceiling, Lights, HVAC, Fireproofing	10 psf
PV allowance	10 psf

Live Loads:

Offices	50 psf
Classrooms, Labs, activity rooms	60 psf
Gym, Public Spaces and balconies	100 psf
Stairways, Lobbies and corridors	100 psf
Assembly Areas	100 psf
Library stacking area	150 psf
Fixed Seat Auditorium	60 psf
Stage floors	150 psf
Vocational, Tech Ed areas	125 psf
Science Laboratories	100 psf
Kitchen Area	150 psf
First floor outdoor public spaces	250 psf
Mechanical Area	150 psf or weight of mech equipment

Snow Loads:

Ground Snow	40 psf plus drift
Importance Factor, I	1.10

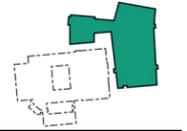
Wind Loads:

Basic wind speed	137 mph
Exposure	C
Wind Pressure per	ASCE7-10
Maximum Overall Drift	N/A

Earthquake Loads:

Risk Category	III
Site Class	D
Importance Factor, I	1.25
Site Coefficient, Fa	-
Site Coefficient, Fv	-
Spectral Acceleration, S <sub>S</sub>	0.229
Spectral Acceleration, S <sub>1</sub>	0.071
Max Spectral Acceleration, S <sub>MS</sub>	-
Design Spectral Acceleration, S <sub>DS</sub>	-
Seismic Design Category	B
Seismic Resisting System	Steel Bracing Not Specially Detailed
Response Modification Factor, R	3
Deflection Amplification Factor, C <sub>d</sub>	3
Seismic Base Shear, V	CSW
Maximum Story Drift	H/500

OPTION 4B: NEW CONSTRUCTION



D. STRUCTURAL SYSTEMS

CONSTRUCTION MATERIALS

Cast-in-Place Concrete (General):	f'c = 4,500 psi
Concrete Slabs on Steel Deck:	f'c = 4,000 psi (Lightweight)
Concrete Equipment Pads:	f'c = 3,000 psi (Lightweight)
Reinforcing Steel:	ASTM A615, Grade 60 (Epoxy Coated foundation and floor)
Structural Steel:	ASTM A992/A572, Grade 50/55
Rectangular or Square HSS (Tubes):	ASTM A500, Grade B (Fy = 46 ksi)
Round HSS (Pipes):	ASTM A500, Grade C (Fy = 46 ksi)
Anchor Bolts:	ASTM A307, ASTM A449
High Strength Bolts:	ASTM A325, ASTM A490
Steel Deck	ASTM A653, galvanized coating class G-60
CMU	f'm = 1,350 psi

OTHER

Contingencies should be carried as appropriate with the nature of work and the phase of design.

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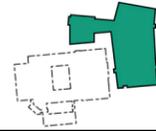
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E. SITE UTILITIES



OPTION 4B-NEW CONSTRUCTION / SITE UTILITIES

Site Utilities

Stormwater

Storm drainage for the site will need to comply with Massachusetts Stormwater Management standards. Massachusetts Stormwater Management standards require that the rate of stormwater flows from the site not be increased over current conditions. They also require that the quality and quantity of stormwater be addressed by treating the stormwater to remove possible contaminants and that a portion of the stormwater be directed to the groundwater. Areas that see vehicular traffic are required to have their stormwater quality addressed through enhanced means such directing it through a water quality inlet prior to discharge. Runoff from roofs and landscaped areas are considered clean and additional treatment prior to recharge or discharge is not required.

The increased rate of runoff from the site will need to be addressed by detaining or infiltrating stormwater on-site. Detention/retention ponds, constructed wetlands, underground infiltration systems, porous pavement and rainwater recycling are all examples of some best-management practices (BMP's) used to address stormwater rate and volume. With limited available site area, sub-surface infiltration/detention systems would be the preferred option.

The stormwater improvements required to meet current stormwater standards would include the construction of an all-new stormwater management system for the site. Stormwater from the site would be collected in new deep-sump manholes with hoods or tees. Runoff from areas seeing vehicular traffic would be routed through a water quality inlet similar to a Stormceptor Model 3600STC. Prior to discharge from the site the runoff would be routed through a new subsurface infiltration/detention system. The size of the system would be dependent on the amount of additional impervious area added to the site.

Sanitary Sewer

The existing sanitary sewer system on site will remain where it does not conflict with the new construction. The portions of the existing system to remain should be cleaned, video inspected and repaired as needed. New sanitary sewers would need to be constructed to serve the new addition which would then connect to the existing system to remain.

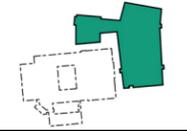
A new external grease trap will be required for the sanitary flows from the kitchen and cafeteria. The new grease trap would be a 6,000-gallon precast concrete below-grade structure with a new 6-inch sanitary service from the kitchen/cafeteria and a new 6-inch connection to the on-site sanitary sewer system. A 4-inch PVC vent would be required from the new grease-trap back into the building.

Water

The portions of the existing on-site water system that are not in conflict would remain. The water line serving the site under the entrance drive could remain up to approximately the end of the entrance drive. A new water loop consisting of 8-inch ductile iron, cement-lined water

OPTION 4B: NEW CONSTRUCTION

E. SITE UTILITIES



main would be constructed around the building with connections to the existing-to-remain water line under the entrance drive and to the town system in Boxwood Road. The two connections to the town system will provide a measure of resiliency and will also improve available flow. New fire and domestic water service would be provided to the building from the new loop around the building. In addition, all new site fire hydrants would be provided throughout the site.

Natural Gas

The existing gas service located under the entrance drive would remain where it does not conflict with the new construction. A new service to the building, sized by the project's MEP Engineer and the gas utility would be provided to the new building from the portion of the existing service to remain.

**Permitting**

Wetlands Protection Act (310 CMR 10.00) and Town of Stoneham Wetland Protection By-Law

There are wetland resource areas subject to protection under the Wetlands Protection Act and Town of Stoneham Wetland By-law at the north end of the site (stream and bank) and south end of the site (bordering vegetated wetlands). A Notice of Intent would need to be filed, reviewed and approved by the Town of Stoneham Conservation Commission since work is proposed within 100 feet of the wetland resource areas.

Other Permitting

Review of MassGIS permitting layers indicate that the site is not within a Priority Habitat of Rare Species or Estimated Habitats of Rare Wildlife or within any Surface Water Supply Protection Zone or within any Flood Hazard area.

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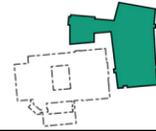
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OPTION 4B: NEW CONSTRUCTION

F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



OPTION 4B – NEW CONSTRUCTION/ FIRE PROTECTION & PLUMBING

**Fire Protection**

To comply with current codes, this building will require a complete sprinkler system installation per the Massachusetts State Building Code, Chapter 34. The Fire Protection system would be designed to meet the requirements of NFPA 13 “Installation of Sprinkler Systems” and Chapter 9 of the Massachusetts State Building Code, 780 CMR, “Fire Protection Systems”.

A new dedicated 6" sprinkler service, connected to the town water system in the street, should be brought into the building. The exact entrance location will need to be coordinated with the Architect. As the sprinkler service enters the building a Massachusetts approved double check valve backflow preventer assembly, complete with OS&Y valves on the inlet and outlet, will be required.

The building will be protected by three types of sprinkler systems and each will protect the following areas:

- Wet sprinkler system – base building system
- Dry sprinkler system – to protect areas subject to freezing, i.e. loading docks and outdoor walkways covered by building overhangs, etc.
- Pre-action sprinkler system – to protect the MDF room

The alarm check valves for the wet and dry sprinkler systems will be installed on separate risers after the double check valve assembly in the water service entrance room. The alarm check valves will be complete with standard trim packages including pressure gauges, retard chamber, 2" main drain, water flow indicator and supervisory switches. The dry alarm valve will be supplied with an air compressor and associated appurtenances.

The main feeds out to the system from the alarm check valve will extend out to the building through the first-floor ceiling space. The piping will then extend to all areas of the building so that each section of the building and each floor can be divided into separate zones.

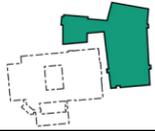
Due to the building being only three stories the Massachusetts State Building Code does not require a standpipe system throughout the School. However, regulations governing Auditoriums and Stages will require standpipes at each side of the backstage areas.

The sprinkler system risers will feed the sprinkler system at each floor level. Each floor will be a separate zone. The floor control assembly off of the standpipe which feeds each floor will contain a flow switch and tamper switch. An inspector’s test connection will be installed on the floor control valve station. If the stage is greater than 1,000 square feet, then fire department valves will be required on each side of the stage.

Sprinkler heads throughout the facility where gypsum or suspended ceilings are installed will be glass bulb, quick response, chrome plated semi-recessed type. In areas where no ceilings are installed brass upright sprinklers will be installed. Where upright sprinklers are subject to

OPTION 4B: NEW CONSTRUCTION

F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



potential damage, such as in storage rooms, protective cages will be installed. In areas where it is not possible to run piping above the ceiling, the use of sidewall sprinkler heads would be recommended.

The MDF room will be protected by a pre-action sprinkler system. A pre-action alarm valve with all required appurtenances will need to be located next to or near the MDF room. Piping from this valve will extend into the room and connect to sprinkler heads. The piping system will be filled with compressed air. Once a sprinkler head activates, the air will discharge and open the pre-action alarm valve to allow water into the system and through the open sprinkler head.

Sprinkler piping for the system will be as follows:

- Piping 2" and smaller shall be schedule 40 black steel with cast iron fittings with threaded joints.
- Piping 2 ½" and larger shall be Schedule 10 black steel with malleable iron fittings with rolled grooved joints.
- Dry sprinkler systems will be supplied with Schedule 10 galvanized piping throughout.

All tamper and flow switches installed on the sprinkler system will be connected to the buildings fire alarm system. Each tamper and flow switch will be a dedicated point on the fire alarm system.

The exterior fire department connection for the sprinkler system will be a flush type mounted on the exterior of the building within 100' of a fire hydrant. Final location of this connection will be coordinated with the Stoneham Fire Department. An additional fire hydrant may need to be added on the site to be within the required distance of this connection.

The hydraulic requirements for the building will be as follows:

- Light Hazard - All offices, corridors and the auditorium hydraulically calculated to deliver 0.1 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard - All storage rooms and mechanical rooms hydraulically calculated to deliver 0.15 gpm per square foot over the most remote 1,500 square feet.
- Ordinary Hazard Group II - The stage area hydraulically calculated to deliver 0.2 gpm per square foot over the most remote 1,500 square feet.

**Plumbing**

Plumbing Fixtures

Plumbing fixtures will be new high efficiency, water conserving type, and wall-hung for optimum sanitary purposes. Automatic hard-wired flushometer valves and lavatory faucets are to be provided.

Fixture flow rates should be provided as follows:

- Water closets (dual flush type) at 1.6 gpf or 1.1 gpf
- Urinals - 0.25 gpf
- Lavatories - 0.5 gpm or less
- Showers – 1.5 gpm

The state plumbing code dictates the number of plumbing fixtures required in a building. Minimum plumbing fixture requirements will be determined once the total occupancy numbers for the building have been established based on the final plan layout.

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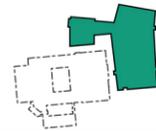
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F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



Domestic Cold Water

Domestic cold water connecting to all fixtures as required. Domestic cold-water service piping shall extend 10'-0" beyond the building exterior for connection to the site water distribution piping system. This system will include a new water meter and backflow preventer assembly.

Domestic Hot Water

Domestic hot water will be produced and stored in high-efficiency, condensing type, gas-fired domestic water storage heaters with a single code-compliant insulated tank sized to meet the highest hourly demand. There will be two insulated distribution and recirculation loops for domestic hot water: one for the kitchen (140°F) and one for the main building loop (125°F). All lavatories qualifying as "public" lavatories will be provided with individual mixing valves below the fixture to reduce hot water discharge temperatures to 110°F maximum per code. Mixing valves for hand sinks in the kitchen shall reduce discharge temperature to 120°F maximum.

Sanitary Waste & Vent System

Sanitary waste and vent connecting to all fixtures as required. Sanitary waste service piping shall extend 10'-0" beyond the building exterior for connection to the site sanitary piping system.

Storm Drainage

Roof drainage will be a combination of roof drains with internal roof drain piping serving flat roofs, and gutters and downspouts serving sloped roof portions of the building. Internal roof drain piping will convey storm water to underground piping and exit the building through foundation walls to connection with site storm drainage piping. Storm water service piping shall extend 10'-0" beyond the building exterior for connection to the site drainage piping system. Horizontal roof leaders above grade within the building shall be insulated.

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

Natural Gas System

Natural gas service provided by the local gas company serving the town. The gas company shall provide the underground service, gas meter and gas regulator. Contractor's work will begin on the discharge side of the gas meter and extend to all equipment requiring natural gas.

Hose Bibbs and Wall Hydrants

Freeze proof wall hydrants shall be provided around the perimeter of the building.

Hose bibbs will be provided in all bathrooms with more than one flushing fixture and all mechanical spaces and will be provided with cross connection protection.

Kitchen

The cafeteria kitchen is to be provided with all plumbing connections noted on the food service drawings. Piping from the local grease interceptors and from kitchen floor drains subject to the introduction of fats, oil or grease will be by a dedicated grease waste piping system leading to the exterior grease trap. There will be three local grease interceptors: one for the three-compartment pot sink, one for the ware-washing/garbage disposer and one

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F. BUILDING SYSTEMS / PLUMBING & FIRE PROTECTION



dedicated to automatic dishwasher drainage. The grease waste discharge from these interceptors will be piped to an exterior grease trap.

Grease waste piping system from the new kitchen to an exterior grease trap located outside of the building. Grease trap vent piping shall enter the new building underground and exit through the roof of the building per state code requirements.

Science Classrooms

Science classroom waste and vent connecting to all fixtures as required. Science classroom waste piping shall discharge into a central acid neutralization system located on the lowest level of the building. System shall monitor and adjust the pH level of the waste and then discharge this waste to the sanitary waste piping system outside the building, as part of the underground system.

Non-potable (protected) hot and cold water systems shall be created to serve the new science classrooms by installing reduced pressure backflow preventers on the hot and cold water piping designated to serve this area.

New emergency showers and eyewashes should be installed in each science classroom. A new tempered water system should be created to serve these fixtures. A new gas-fired water heater should be installed somewhere within the science wing and be dedicated to the new tempered water system. Water should be stored at 140°F and a master mixing valve should be mounted nearby and set to deliver tempered water to this wing at approximately 70°F-90°F per state plumbing code requirements. A tempered water return system will also be required to keep this system from becoming stagnant per state plumbing code requirements as well.

A dedicated gas piping main will serve the new science classrooms of the building. Each classroom will be equipped with an emergency gas shut-off valve located in a valve box near the exit door of the classroom. Gas will distribute from this location to bench or countertop gas turrets as required. Each science classroom will also be supplied with one emergency shower/eyewash unit as required by code. These units will be supplied with tempered water as required by code. Floor drains with trap primer connections will be provided under each shower/eyewash unit to protect against water damage when in use or due to accidental discharge.

Pipe Materials

Below grade sanitary and storm drainage piping will be service weight bell and spigot cast iron with neoprene gasketed joints. Above grade sanitary and storm piping will be service weight hubless cast iron with Massachusetts approved stainless steel and neoprene no-hub connector assemblies.

All lab waste piping will be Schedule 40 polypropylene with electrical heat fusion joints. Mechanical joints may be utilized for lab waste piping within laboratory furniture.

All water supply and return piping shall be Type "L" copper.  
All water supply and return piping insulation shall be in accordance with the Energy Code.

All gas piping will be threaded black steel piping up to 2 1/2" size. Piping 3" and larger shall be welded.

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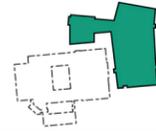
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F. BUILDING SYSTEMS / HVAC & ELECTRICAL



I. PROJECT OVERVIEW

A. The existing Stoneham High School is approximately 221,000 sf on two levels. The Design Alternatives include Renovation (Option 2A), Renovation and Addition (Option 3A) and New Construction (Options 4A and 4B). All of the alternatives are approximately 207,000 sf. The anticipated program elements include:

1. Education classroom spaces (approx. 56,000 sf)
2. Gymnasium and support spaces (approx. 28,000 sf)
3. Kitchen and Cafeteria Space (approx. 7,500 sf)
4. Vocational / Technical Spaces (approx. 11,000 sf)
5. Media (Auditorium and Support) Spaces (approx. 15,000 sf)
6. Arts Classrooms (approx. 6,000 sf)
7. Entry and Administrative areas (approx. 23,000 sf)
8. Mechanical/Electrical and Misc Spaces, Circulation, etc (approx. 60,000 sf)

B. The purpose of this narrative is to describe the intended HVAC and Electrical systems required to achieve the goal of a Net Zero Energy facility. Therefore, for all of the design alternative options, we shall assume the removal of the existing systems and providing new systems as described in the sections below.

II. HVAC AND ELECTRICAL SYSTEMS OVERVIEW AND SCOPE OF WORK

A. HEATING, VENTILATING, AND AIR CONDITIONING

1. The heating, air conditioning and ventilation systems shall be high-efficiency systems that will contribute towards the goal of achieving a Net Zero Energy facility.

2. Existing Systems:

a. The existing rooftop unit, exhaust fans, air cooled split type units, unit ventilators, heating and ventilating ceiling mounted air handling units and heating units, along with all associated ductwork, piping, controls, existing boilers, etc will be removed.

3. New Systems:

Option 1: Geothermal Heating/Cooling System

a. Ground Loop Geo-Exchange System:

1) A vertical borehole well field consisting of (225) 6-inch diameter boreholes spaced 20 feet apart shall be provided. Each borehole shall be 400 to 500 feet deep. Actual depth to be determined based on thermal conductivity testing performed on a test well. The number of boreholes may be increased or decreased based on thermal testing results and/or determination of the final heating and cooling loads.

2) Provide a 1-1/4 inch supply and return pipe within each borehole with a U-bend at the bottom. Piping shall be high density polyethylene (HDPE) with DR9 wall thickness. Polyethylene pipe and fittings shall be heat fused by butt, socket, sidewall, or electrofusion in accordance with pipe manufacturer's procedures. Underground supply and return piping from boreholes shall collect to four buried circuit vaults constructed of HDPE or concrete. Supply and return circuit piping in each vault shall combine to 8 inch main header piping which shall be routed into the building.

3) Steel sleeve casings shall be provided for the upper section of each borehole down to bedrock. Each borehole shall be filled with a bentonite based thermally enhanced grout mixture.

b. Central Heating and Cooling System:

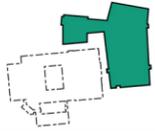
1) Central geothermal heating and cooling shall be provided by two high efficiency 275 ton (approx. nominal capacity) heat recovery chiller-heaters or modular chiller-heaters connected to the ground loop system. If two larger chillers are utilized in lieu of a modular chiller solution, an additional 60 ton modular chiller shall be provided to address low load conditions.

The ground loop circulation system shall be filled with 30% propylene glycol solution and shall be served via a primary and secondary pumping scheme.

a) Chiller-heater condenser water shall be constant flow primary with zero pressure bypass connections to the ground loop distribution and the building heating distribution. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a

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F. BUILDING SYSTEMS / HVAC & ELECTRICAL



vertical inline pump and shall have a 10 horsepower motor.

b) Secondary condenser/heating pumps shall be variable flow with variable frequency drives. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 15 horsepower motor.

3) Chilled water distribution from chiller evaporators to building distribution shall be variable primary flow pumps. There shall be three pumps, each sized at 50% with one as a redundant pump. Each pump shall be a vertical inline pump and shall have a 25 horsepower motor.

4) The building circulation loop shall consist of a four-pipe distribution. The main distribution to heating/cooling terminal units in the building shall be four-pipe. Rooftop air handling units, heat recovery air handling units, and central air handling units shall also be four-pipe configuration.

5) The building loop piping system shall contain a 30% propylene glycol solution for freeze protection and corrosion protection.

6) The building terminal heating units will be designed to utilize low temperature heating supply water (130°F maximum). Heating terminal units such as fin tube radiation and heating coils may require larger surface areas due to the low water temperature. In areas with high heating loads, two-row fin-tube and heating coils may be required.

c. Classrooms – Sensible Fan Powered Terminal Unit System:

1) The system serving heating, cooling and ventilation for typical exterior classrooms shall utilize four-pipe, ducted, ceiling mounted sensible fan powered terminal units.

2) The primary supply air serving each classroom shall be provided via the fan powered terminal unit with a hot water coil and a sensible cooling coil. Each classroom shall have a terminal unit.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling

and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

d. Classroom and Interior Ventilation Systems:

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. The units will be provided with a hot water pre-heat coil and a chilled water cooling coil. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

3) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

4) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

5) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

e. Miscellaneous Areas:

1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

- a) Gymnasium – 25,000 cfm RTU
- b) Cafeteria – 8,000 cfm
- c) Auditorium – 10,000 cfm
- d) Administration – 20,000 cfm

2) Rooftop air conditioning units (RTU) will include supply

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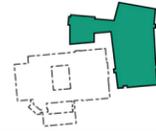
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fan, return fan, hot water heating coil, chilled water cooling coil, filters, variable frequency drives and total energy recovery.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils for zone temperature control.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**Option 2: Variable Refrigerant Flow (VRF) Heating/Cooling System**

**a. Central Heating and Cooling System:**

1) Heating and cooling shall be accomplished via multiple air cooled heat recovery, simultaneous heating and cooling, VRF systems, totaling 550 tons.

2) The systems shall be capable of operation down to negative 25F, minimum, ambient temperature.

3) The air cooled condensing units shall be located on the roof.

4) Refrigerant piping (liquid and suction) shall be run from the condensing units to branch controller modules located throughout the building. Branch refrigerant piping (liquid and suction) shall be run independently from each branch

controller module to each VRF fan coil unit.

**b. Classrooms:**

1) Space heating and cooling shall be accomplished via VRF fan coil units. The VRF may be ceiling mounted (ducted or ductless) or console type based on the space application.

2) Ventilation air serving each classroom shall be provided with a variable air volume terminal unit with a hot water reheat coil.

3) Systems will be interfaced to the local space vacancy sensor to reduce ventilation air and reset the space cooling and heating set point temperatures when the room is unoccupied.

4) A CO2 sensor will be provided in classrooms to provide monitoring and occupied control of ventilation air.

**c. Classroom and Interior Ventilation Systems:**

1) Outside ventilation air for classrooms and interior spaces will be provided by roof mounted dedicated outside air heat recovery units (HRU).

2) The HRU's will be variable air volume and will include supply and exhaust fans with variable frequency drives and total energy recovery wheels. Each unit will be provided with a dedicated heat pump type VRF condensing unit. Each unit shall include 100% recirculation dampers for morning warm-up mode and after-hours night setback heating. There will be three (3) 16,500 cfm HRUs.

2) All unit energy recovery wheels and coils shall be sized for low face velocity to increase unit and system efficiency.

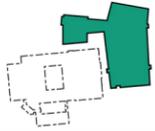
3) Variable supply air will be based on demand from classrooms and interior spaces. Return/exhaust air shall be controlled by air flow measurement and tracking of the supply and exhaust air.

4) Corridors will be provided with ventilation air from the HRU system. Air quantities in excess of basic ventilation requirements will be provided for building exhaust makeup air as required. Corridors will not be fully air conditioned with the exception of areas that have direct solar loads.

**d. Miscellaneous Areas:**

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F. BUILDING SYSTEMS / HVAC & ELECTRICAL



1) The Gymnasium, Cafeteria, Auditorium and Administration areas, will be served by rooftop air conditioning units (RTU). Separate occupancy scheduling for each unit will provide operational flexibility.

a) Gymnasium – 25,000 cfm RTU

b) Cafeteria – 8,000 cfm

c) Auditorium – 10,000 cfm

d) Administration – 10,000 cfm

2) Rooftop air conditioning units (RTU) will include supply fan, return fan, filters, variable frequency drives and total energy recovery. Each unit will be provided with a dedicated heat pump type VRF condensing unit.

3) The unit serving the Administration area will be variable air volume (VAV) with local variable air volume boxes with hot water reheat coils to provide ventilation air. The Administration area shall also have VRF terminal units connected to the main VRF system.

4) The Gymnasium unit, Auditorium unit and Cafeteria unit will be single zone with a variable frequency drive to modulate the supply air during periods of low demand and occupancy.

5) The Gymnasium, Auditorium and Cafeteria systems will be provided with space carbon dioxide (CO2) sensors to provide modulation of outside air based on occupancy demand.

6) The kitchen area shall have kitchen exhaust (black iron) ductwork from each kitchen exhaust hood to a kitchen exhaust fan on the roof. The kitchen area shall also have a dedicated makeup air unit to make up approximately 70% of the air being exhausted. The remaining makeup air will be transferred from the cafeteria space.

7) The Vocational, Arts and Science spaces shall have dedicated exhaust systems where required.

**4. Building Management System (BMS):**

a. Provide direct digital control (DDC) BMS with local and

unitary controls and web interface for remote access, alarms, and monitoring of all HVAC equipment in the building.

b. BMS system shall be interfaced to the building electrical and gas sub-meters. Daily, weekly, and annual energy use shall be reported for each meter.

**5. BTU Metering:**

a. Provide BTU metering of chilled water, hot water and ground loop circulation systems.

**III. ELECTRICAL**

**A. Demolition / Existing Electric Services:**

1. All existing services shall be disconnected and removed from the building. Coordinate with the respective utility company and include all work required for the removal of all existing utility services that become abandoned including power, telephone, cable TV, and fire alarm services.

2. Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of demolition of the existing buildings include disconnecting all services and making safe the existing structure for complete demolition.

3. Include maintaining the operation of existing site equipment required during construction.

**B. New Main Electric Service:**

1. A new primary service will be provided from utility company primary services via an underground ductbank and manhole system to a new utility company pad mounted transformer.

2. Secondary service from the new pad mounted transformer will be underground to a new 5000 Amp main switchboard at 480/277V, 3-phase, 4-wire. Switchboard will be located in a new main electric room.

**C. New Normal Distribution System:**

1. Main switchboard will be provided with surge protection

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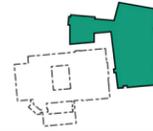
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OPTION 4B: NEW CONSTRUCTION

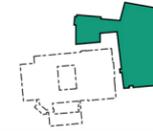


F. BUILDING SYSTEMS / HVAC & ELECTRICAL

- (SPD) and ground fault protection on main and feeder devices.
2. Surge protection will be provided in all 120/208V panelboards.
- D. New Emergency Distribution System:**
1. A 2 MW diesel emergency generator will power emergency egress lighting and exit lighting in corridors, assembly areas, and stairwells. Miscellaneous systems to include the following:
- a. IT head-end equipment (located in the MDF Room).
  - b. Cooling equipment for school IT equipment.
  - c. Security system.
  - d. Fire alarm system.
  - e. Circulator pumps and controls.
2. Separate automatic transfer switches shall be provided for emergency and non-emergency loads.
3. In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.
- a. Additional lighting in Gymnasium, Cafeteria and associated toilets and corridors.
  - b. HVAC (heating, cooling and ventilation) equipment associated with the Gymnasium, Cafeteria and associated toilets and corridors.
  - c. Receptacles in Gymnasium and Cafeteria.
4. Generator will be mounted at grade at the exterior of the building in a self-contained sound attenuated enclosure with an integral base mounted fuel tank. Generator will be mounted on an elevated concrete platform for survivability.
5. Emergency panels will be located in new two-hour rated electric closets.
6. Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.

7. Emergency feeders run outside two-hour electric rooms and shafts and not in or under floor slab will utilize MI Cables.
8. A portable generator connection will be provided to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.
- E. Sustainable Design Intent:**
1. Sustainable Design Intent compliance will include:
- a. Advanced measurement and verification of air conditioning, fans, lighting, and receptacle power via electronic sub-meters equal to E-Mon, D-Mon Class 2000 3-phase kWh and demand meters. Measurement and verification metering will be monitored by the Building Management System (BMS).
  - b. Plug and process load reductions through the use of vacancy/occupancy sensor controls for local convenience outlets in classrooms, offices, library and resource rooms. Open areas such as Media Center, Auditorium and Kitchen will be equipped with relay panels controlled via the lighting control system, to reduce loads on a time schedule basis.
  - c. Advanced lighting controls include a low voltage lighting control system with time schedule control for common areas, vacancy/occupancy sensors, and photocells for daylight harvesting.
  - d. Empty conduit provisions will be provided for future green vehicles charger stations based on two percent of the available parking.
  - e. Empty conduits and space provisions will be provided for photovoltaic (PV) installations. Include conduits and space provisions for inverters at a minimum of two locations in the upper floor electric closets.
- F. Lighting:**
1. New luminaires will be provided throughout all renovated areas as well as new construction. Luminaires will be dimmable LED. All luminaires will be suitable for respective utility rebate incentives.

OPTION 4B: NEW CONSTRUCTION



F. BUILDING SYSTEMS / HVAC & ELECTRICAL

2. Exterior building mounted around the entire building including all canopies, all entry drives, parking areas, and all walkways will be full cutoff LED type. All exterior lighting will be controlled via the building low voltage lighting control system.
- G. Lighting Controls:**
1. A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.
2. Manual low voltage override switches to override the time of day lighting control schedules shall be provided. Override switches will permit extension of lighting control program as well as ON-OFF override for exiting the facility.
3. Lighting program for time of day schedules shall permit all lighting, including exterior to be turned off during non-occupied hours, reducing sky glow and light trespass. Activation of either fire alarm or intrusion detection system shall override the lighting program.
4. Vacancy and occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces. In addition, all spaces will be provided with local low voltage dimmable switching.
5. Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight utilizing daylight sensors in each space.
- H. Circuitry and Devices:**
1. Safety type duplex receptacles will be provided throughout the building in quantities to suit space programming.
2. Plug load reduction will be achieved by vacancy/occupancy sensors in classrooms, offices, and staff spaces, and circuits routed via relay panels, controlled via lighting control system time schedule for open areas.
3. Provide circuitry for HVAC and Plumbing systems.
- I. Fire Alarm:**
1. Existing automatic, fully supervised, analog addressable, voice evacuation system will be retained and utilized where

- applicable.
- a. Manual pull stations (with tamperproof covers if applicable), at points of egress, and other locations as required to meet code.
  - b. Audible/visual units in corridors, classrooms, and throughout the building to meet code.
  - c. Visual only units in conference rooms, meeting rooms and small toilets.
  - d. Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms.
  - e. Smoke duct detectors in HVAC units over 2,000 CFM, and within five feet of smoke dampers including connections to all smoke/fire dampers.
  - f. Connections to all Fire Protection devices.
  - g. Connections to audio/visual systems, sound systems, and dimmed lighting controls.
  - h. Remote annunciator at main entrance and secondary entrances as directed by the Boston Fire Department.
  - i. 24 VDC magnetic hold open devices at smoke doors.
  - j. Master box and exterior beacon (quantity of beacons per Boston Fire Department).
  - k. Wiring will be fire alarm MC cable.
- J. Technology Systems – refer to the Technology Section.**
- K. Integrated Intrusion, Access Control, CCTV, and Alarm System:**
1. Intrusion alarm system will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade. Motion sensors will be provided in corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs.
2. CCTV coverage will be provided at main and secondary entries as well as all other perimeter entries to be used by students and staff on a daily basis and for off hours

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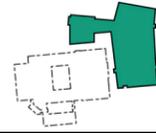
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OPTION 4B: NEW CONSTRUCTION

F. BUILDING SYSTEMS / HVAC & ELECTRICAL



community programs, including Gymnasium and Cafeteria entries.

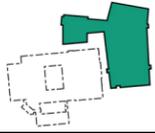
- 3. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.
- 4. Access control via card access system will be provided at all exterior doors.
- 5. CCTV system will be an extension of the existing system that is networked with the other schools in Stoneham. System will be web based to allow viewing by the Stoneham Police Department.

L. Miscellaneous:

- 1. Provide conduit and electrical circuitry for tel/data, security and AV requirements.

OPTION 4B: NEW CONSTRUCTION

F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY



OPTION 4B – NEW CONSTRUCTION/INFORMATIONTECHNOLOGY

Structured Cabling System:

The structured cabling system will consist of a hybrid delivery system comprised of hard-wired data cabling to support fixed workstations where required and high bandwidth, full coverage wireless connectivity. The data cabling channel performance will exhibit Category 6A performance capabilities. The data channel will be comprised of the passive components including cabling, connectors, patch panel port, and patch cords, providing up to a total of four (4) connections between network electronics. The Category 6A channel will be component compliant, capable of supporting 10 Gigabit per second networking. Category 6A data cabling will be provided to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other related equipment. This cabling will support computer network requirements, wireless connectivity, telephone system (VoIP) and IP-based security needs. WLAN cabling will be terminated above the ceiling in typical ACT areas. All data jacks will be color coded. Multiple lengths and colors of patch cables will be provided for closet connectivity.

General classrooms including Science, Health, ESL, SPED Resource, RISE, STRIDE, Speech/Language, OT/PT, and Culinary will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

Collaborative Spaces and Small Group Seminar Rooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher use where required.

Teacher Planning Spaces will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, workgroup printers/multifunction copiers and connections for staff use where required.

Art Classrooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, 3D printers, and connections for teacher and student use where required.

Band and Music Areas will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for teacher and student use where required.

Engineering Labs (Maker, Engineering, Robotics, Scene Shop, CAD, Project Lead the Way Spaces) will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, 3D printers and other peripherals, and connections for teacher and student use where required. Fixed computer workstations in these spaces will be hardwired.

Gymnasium, PE Alternatives Spaces and Team Rooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff use where required. Team Rooms will be equipped with

Media Center including the Cyber Café and Student Help Desk will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

Auditorium will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

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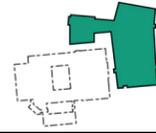
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F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY



Café/Student Lounge will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual systems, and connections for staff and student use where required.

Admin Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. Nurse's Suite will also be wired for fax.

District Offices will be equipped with Cat6A cabling for WLAN and at all workstations for hardwired computer connections and VoIP. This area will be segmented with its own IDF, regardless of distance requirements.

Pre-K Classrooms will be equipped with Cat6A cabling for VoIP, WLAN connectivity, audio-visual display technology, and connections for teacher and student use where required.

**Space Requirements:**

There will be several utilitarian spaces provided to accommodate and support the various technology system and associated networking hardware. These spaces are the Service Entrance/Demarc, MDF/Head End Room, and IDF/Tech Closets.

The Service Entrance will be the termination point for all incoming services such as TELCO, Internet, CATV and district fiber. Services will be extended from the demarc to the MDF via various backbone cables (fiber, multi-pair copper).

The MDF will be the central location of all head end equipment including but not limited to servers, storage, switch electronics, security equipment, video equipment, telephone system, public address system and security system. It will be a dedicated space with proper ventilation, environmental treatment and emergency power.

The IDF locations will serve as intermediate closets for local cabling and equipment. The IDFs will be dedicated spaces with proper ventilation, environmental treatment and emergency power. Each closet will connect to the MDF with backbone cabling. IDFs will be located to keep all cable distances within specification limits. The Central Office area will be segmented with its own IDF.

**Backbone Cabling:**

12-Strands of OM4 Multimode and OS2 Singlemode fiber will be provided between the Head End Room (MDF) and the Tel/Data closets (IDF). This cabling will support all network requirements; wireless connectivity, and VoIP system needs. Multimode fiber will be laser-enhanced and guaranteed for transmission distances in 10 Gigabit Ethernet of up to 500 Meters. All single-mode fiber optic cables will be OS2, tight buffered, high flexibility. All fiber optic cables will be installed in innerduct. Outbuildings requiring connectivity will be treated as IDFs.

Equipment racks will be installed in the MDF and IDFs for patch panels and network hardware. Two-post and four-post racks will be provided. Racks will be 19" EIA floor mount racks with wide floor mounting flanges, vertical cables guides and horizontal cable managers. Power for rack equipment will be installed in cable tray above the racks. Power will consist of both 20A and 30A twist-lock receptacles.

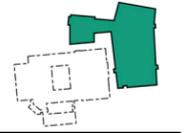
The district fiber must be extended to the new high school. The existing MDF and the existing district fiber must remain functional until cutover occurs. The existing district fiber must be protected during site work.

**Data Communication Systems:**

Networking hardware will be provided for the MDF and IDFs consisting of network switch electronics for the data and voice communication systems, distributed communication system,

OPTION 4B: NEW CONSTRUCTION

F. BUILDING SYSTEMS / INFORMATION TECHNOLOGY



audio-video communication system, security system, wireless LAN and other Owner equipment. Components will consist of PoE+ hardware and power supplies, 10/100/1000 to all endpoints, fiber transceivers, patch cables and UPS equipment. The switches will be fully configured according to network requirements and VLANs will be created according to best practice and equipment requirements. Inter-closet connectivity will be 25Gb or greater via fiber.

**Audio/Visual Communication Systems:**

Digital signage will be provided in gathering areas and large group instruction spaces. The system will consist of LED displays, media players, and a server or cloud based digital signage, solution.

Classrooms and general instruction spaces will be equipped with a local audio system consisting of ceiling speaker, amplification, wireless microphones and auxiliary inputs. There will be an input available for FM assistive listening systems the Owner may have.

**Distributed Communication System:**

The distributed communication system will consist of a fully operational IP platform public address system for district and school internal communications system incorporating school-wide notifications and general announcements. It will provide complete internal communications using state of the art IP technology with two-way loudspeaker internal communication, bell event notification, emergency announcements that will override any pre-programmed zones assuring that all emergency/lockdown announcements are heard at all locations, and atomic time synchronization. The system will connect directly to the high school's LAN and have the future capability of expanding to connect to other intercom systems in the school district over the WAN for district-wide, emergency, and live voice announcements (additional hardware required at the other school facilities for this feature). Configuration of zoning, bell schedules, calendars, and emergency sequences will be accomplished using a browser-based interface.

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F. COST ESTIMATES



PSR Estimate

Stoneham High School  
Design Options

Stoneham, MA

**PM&C LLC**  
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Prepared for:  
**Perkins & Will**  
December 3, 2020

F. COST ESTIMATES

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Gross Floor Area	\$/sf	Estimated Construction Cost
<b>RENOVATION HIGH SCHOOL CODE UPGRADES - OPTION 1A</b>				
	Jan-23			
RENOVATIONS TO EXISTING SCHOOL		208,113	\$239.57	\$49,857,846
REMOVE HAZARDOUS MATERIALS				\$4,025,000
PHASING COSTS				\$1,495,735
SYNTHETIC TWO SOCCER/LACROSS FIELDS				NR
SYNTHETIC FOOTBALL FIELD				NR
SPORTS LIGHTING - Three Fields				NR
STADIUM RENOVATION - New Track + Bleachers				ETR
NEW TRAFFIC SIGNAL WORK (Two Locations)				NR
TICKET BOOTH/PRESS BOX/MENS/STORAGE/WOMENS/CONCESSIONS				NR
SITework - ALLOWANCE				\$2,492,892
<b>SUB-TOTAL</b>		<b>208,113</b>	<b>\$278.08</b>	<b>\$57,871,473</b>
ESCALATION TO MID-POINT - (assumed 3% PA)	6.5%			\$3,761,646
DESIGN AND PRICING CONTINGENCY	15%			\$8,680,721
<b>SUB-TOTAL</b>		<b>208,113</b>	<b>\$337.86</b>	<b>\$70,313,840</b>
GENERAL CONDITIONS		48 MTHS	\$160,000	\$7,680,000
GENERAL REQUIREMENTS	5.00%			\$3,515,692
BONDS	1.00%			\$703,138
INSURANCE	1.40%			\$984,394
PERMIT				Waived
TEMPORARY CLASSROOMS		28 ROOMS	\$200,000	\$5,600,000
CM FEE	2.5%			\$1,757,846
CM/GMP CONTINGENCY	3%			\$2,109,415
<b>TOTAL OF ALL CONSTRUCTION</b>		<b>208,113</b>	<b>\$445.26</b>	<b>\$92,664,325</b>
PV PANELS			ADD	<b>TBD</b>

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F. COST ESTIMATES

	Construction Start	Gross Floor Area	\$/sf	Estimated Construction Cost
<b>FULL RENOVATION OPTION 2A</b>				
	Jan-23			
RENOVATIONS TO EXISTING SCHOOL		208,113	\$312.46	\$65,026,564
REMOVE HAZARDOUS MATERIALS				\$4,025,000
PHASING COSTS				\$1,950,797
SYNTHETIC TWO SOCCER/LACROSS FIELDS				Included with Site
SYNTHETIC FOOTBALL FIELD				Included with Site
SPORTS LIGHTING - Three Fields				\$1,440,000
STADIUM RENOVATION - New Track + Bleachers				Included with Site
NEW TRAFFIC SIGNAL WORK (Two Locations)				\$3,000,000
TICKET BOOTH/PRESS BOX/MENS/STORAGE/WOMENS/CONCESSIONS				NR
SITework				\$13,394,179
<b>SUB-TOTAL</b>		<b>208,113</b>	<b>\$426.87</b>	<b>\$88,836,540</b>
ESCALATION TO MID-POINT - (assumed 3% PA)	6.5%			\$5,774,375
DESIGN AND PRICING CONTINGENCY	15%			\$13,325,481
<b>SUB-TOTAL</b>		<b>208,113</b>	<b>\$518.64</b>	<b>\$107,936,396</b>
GENERAL CONDITIONS		48 MTHS	\$160,000	\$7,680,000
GENERAL REQUIREMENTS	5.00%			\$5,396,820
BONDS	1.00%			\$1,079,364
INSURANCE	1.40%			\$1,511,110
PERMIT				Waived
TEMPORARY CLASSROOMS		28 ROOMS	\$200,000	\$5,600,000
CM FEE	2.5%			\$2,698,410
CM/GMP CONTINGENCY	3%			\$3,238,092
<b>TOTAL OF ALL CONSTRUCTION</b>		<b>208,113</b>	<b>\$649.36</b>	<b>\$135,140,192</b>
PV PANELS			ADD	TBD
HVAC OPTION VRF			DEDUCT	(\$4,302,019)
HVAC OPTION CENTRAL PLANT with VAV			DEDUCT	(\$3,154,814)

F. COST ESTIMATES

	Construction Start	Gross Floor Area	\$/sf	Estimated Construction Cost
<b>RENOVATION + ADDITION OPTION 3A</b>				
	Jan-23			
RENOVATIONS TO EXISTING SCHOOL		48,000	\$306.13	\$14,694,049
ADDITIONS		159,827	\$394.17	\$62,999,040
DEMOLISH EXISTING SCHOOL - PARTIAL (phased)		160,113	\$8.00	\$1,280,904
REMOVE HAZARDOUS MATERIALS				\$3,500,000
PHASING COSTS				\$500,000
SYNTHETIC THREE SOCCER				Included with Site
SYNTHETIC FOOTBALL FIELD				Included with Site
SPORTS LIGHTING - Three Fields				\$1,440,000
STADIUM RENOVATION - New Track + Bleachers				Included with Site
NEW TRAFFIC SIGNAL WORK (Two Locations)				\$3,000,000
TEMPORARY UTILITIES				Included with Site
TICKET BOOTH/PRESS BOX/MENS/STORAGE/WOMENS/CONCESSIONS		5,000	\$410.00	\$2,050,000
SITework				\$16,082,983
<b>SUB-TOTAL</b>		<b>207,827</b>	<b>\$507.86</b>	<b>\$105,546,976</b>
ESCALATION EARLY PACKAGE June 2022 - (assumed 3% PA)	4.8%			\$539,744
ESCALATION BUILDING Jan 2023 - (assumed 3% PA)	6.5%			\$3,364,034
ESCALATION SITE + RENO July 2024 - (assumed 3% PA)	11.0%			\$2,678,928
DESIGN AND PRICING CONTINGENCY	12%			\$12,665,637
<b>SUB-TOTAL</b>		<b>207,827</b>	<b>\$600.48</b>	<b>\$124,795,319</b>
GENERAL CONDITIONS		36 MTHS	\$160,000	\$5,760,000
GENERAL REQUIREMENTS	4.00%			\$4,991,813
BONDS	1.00%			\$1,247,953
INSURANCE	1.40%			\$1,747,134
PERMIT				Waived
CM FEE	2.5%			\$3,119,883
CM/GMP CONTINGENCY	3%			\$3,743,860
<b>TOTAL OF ALL CONSTRUCTION</b>		<b>207,827</b>	<b>\$699.65</b>	<b>\$145,405,962</b>
PV PANELS			ADD	TBD
HVAC OPTION VRF			DEDUCT	(\$4,302,019)
HVAC OPTION CENTRAL PLANT with VAV			DEDUCT	(\$3,154,814)

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F. COST ESTIMATES

	Construction Start	Gross Floor Area	\$/sf	Estimated Construction Cost
<b>NEW HIGH SCHOOL ONLY OPTION 4A</b>				
	Jan-23			
NEW SCHOOL		207,827	\$360.84	\$74,992,175
DEMOLISH EXISTING SCHOOL		208,113	\$6.00	\$1,248,678
REMOVE HAZARDOUS MATERIALS				\$3,500,000
PHASING COSTS				NR
SYNTHETIC TWO SOCCER/LACROSS FIELDS				Included with Site
SYNTHETIC STADIUM FIELD				Included with Site
SPORTS LIGHTING - Three Fields				\$1,440,000
STADIUM RENOVATION - New Track + Bleachers				Included with Site
NEW TRAFFIC SIGNAL WORK (Two Locations)				\$3,000,000
TEMPORARY UTILITIES				Included with Site
TICKET BOOTH/PRESS BOX/MENS/STORAGE/WOMENS/CONCESSIONS		5,000	\$410.00	\$2,050,000
SITework				\$16,062,033
<b>SUB-TOTAL</b>		<b>207,827</b>	<b>\$492.20</b>	<b>\$102,292,886</b>
ESCALATION EARLY PACKAGE June 2022 - (assumed 3% PA)	4.8%			\$693,199
ESCALATION BUILDING Jan 2023 - (assumed 3% PA)	6.5%			\$3,935,785
ESCALATION SITE + RENO July 2024 - (assumed 3% PA)	11.0%			\$2,673,078
DESIGN AND PRICING CONTINGENCY	12%			\$12,275,146
<b>SUB-TOTAL</b>		<b>207,827</b>	<b>\$586.40</b>	<b>\$121,870,094</b>
GENERAL CONDITIONS		33 MTHS	\$160,000	\$5,280,000
GENERAL REQUIREMENTS	4.00%			\$4,874,804
BONDS	1.00%			\$1,218,701
INSURANCE	1.40%			\$1,706,181
PERMIT				Waived
CM FEE	2.5%			\$3,046,752
CM/GMP CONTINGENCY	3%			\$3,656,103
<b>TOTAL OF ALL CONSTRUCTION</b>		<b>207,827</b>	<b>\$681.59</b>	<b>\$141,652,635</b>
PV PANELS			ADD	<b>TBD</b>
HVAC OPTION VRF			DEDUCT	<b>(\$4,302,019)</b>
HVAC OPTION CENTRAL PLANT with VAV			DEDUCT	<b>(\$3,154,814)</b>

F. COST ESTIMATES

	Construction Start	Gross Floor Area	\$/sf	Estimated Construction Cost
<b>NEW HIGH SCHOOL ONLY OPTION 4B</b>				
	Jan-23			
NEW SCHOOL		207,827	\$358.54	\$74,513,582
DEMOLISH EXISTING SCHOOL		208,113	\$6.00	\$1,248,678
REMOVE HAZARDOUS MATERIALS				\$3,500,000
PHASING COSTS				NR
SYNTHETIC TWO SOCCER/LACROSS FIELDS				Included with Site
SYNTHETIC STADIUM FIELD				Included with Site
SPORTS LIGHTING - Three Fields				\$1,440,000
STADIUM RENOVATION - New Track + Bleachers				Included with Site
NEW TRAFFIC SIGNAL WORK (Two Locations)				\$3,000,000
TICKET BOOTH/PRESS BOX/MENS/STORAGE/WOMENS/CONCESSIONS		5,000	\$410.00	\$2,050,000
TEMPORARY UTILITIES				Included with Site
SITework				\$15,932,983
<b>SUB-TOTAL</b>		<b>207,827</b>	<b>\$489.28</b>	<b>\$101,685,243</b>
ESCALATION EARLY PACKAGE June 2022 - (assumed 3% PA)	4.8%			\$570,981
ESCALATION BUILDING Jan 2023 - (assumed 3% PA)	6.5%			\$4,070,180
ESCALATION SITE + RENO July 2024 - (assumed 3% PA)	11.0%			\$2,433,383
DESIGN AND PRICING CONTINGENCY	12%			\$12,202,229
<b>SUB-TOTAL</b>		<b>207,827</b>	<b>\$582.03</b>	<b>\$120,962,016</b>
GENERAL CONDITIONS		33 MTHS	\$160,000	\$5,280,000
GENERAL REQUIREMENTS	4.00%			\$4,838,481
BONDS	1.00%			\$1,209,620
INSURANCE	1.40%			\$1,693,468
PERMIT				Waived
CM FEE	2.5%			\$3,024,050
CM/GMP CONTINGENCY	3%			\$3,628,860
<b>TOTAL OF ALL CONSTRUCTION</b>		<b>207,827</b>	<b>\$676.70</b>	<b>\$140,636,495</b>
PV PANELS			ADD	<b>TBD</b>
HVAC OPTION VRF			DEDUCT	<b>(\$4,302,019)</b>
HVAC OPTION CENTRAL PLANT with VAV			DEDUCT	<b>(\$3,154,814)</b>

F. COST ESTIMATES

The costs presented in this report are ONLY for the comparison between the various options. These costs should not be represented as the final construction costs as the information they are based on is extremely preliminary and final construction costs may vary significantly from the PSR costs once the final design has been completed.

This PSR cost estimate was produced from drawings, narratives and other documentation prepared by Perkins & Will dated December 02, 2020. Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, construction manager's overhead, fee and design contingency. Cost escalation assumes start dates indicated.

Bidding conditions are expected to be public bidding under Chapter 149a of the Massachusetts General Laws to pre-qualified construction managers, and pre-qualified sub-contractors, open specifications for materials and manufactures.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

Items not included in this estimate are:

- Land acquisition, feasibility, and financing costs
- All professional fees and insurance
- Site or existing conditions surveys investigations costs, including to determine subsoil conditions
- All Furnishings, Fixtures and Equipment
- Items identified in the design as Not In Contract (NIC)
- Items identified in the design as by others
- Owner supplied and/or installed items as indicated in the estimate
- Utility company back charges, including work required off-site
- Work to City streets and sidewalks, (except as noted in this estimate)
- Construction contingency (GMP Contingency is included)
- Contaminated soils removal

F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>					
<i>BUILDING SYSTEM</i>	<i>SUB-TOTAL</i>	<i>TOTAL</i>	<i>\$/SF</i>	<i>%</i>	
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>					
<b>A10 FOUNDATIONS</b>					
A1010 Standard Foundations	\$95,000				
A1020 Special Foundations	\$0				
A1030 Lowest Floor Construction	\$478,250	<b>\$573,250</b>	\$2.75	1.1%	
<b>B10 SUPERSTRUCTURE</b>					
B1010 Upper Floor Construction	\$470,247				
B1020 Roof Construction	\$819,275	<b>\$1,289,522</b>	\$6.20	2.6%	
<b>B20 EXTERIOR CLOSURE</b>					
B2010 Exterior Walls	\$899,500				
B2020 Windows/Curtainwall	\$2,139,950				
B2030 Exterior Doors	\$210,552	<b>\$3,250,002</b>	\$15.62	6.5%	
<b>B30 ROOFING</b>					
B3010 Roof Coverings	\$2,721,488				
B3020 Roof Openings	\$27,000	<b>\$2,748,488</b>	\$13.21	5.5%	
<b>C10 INTERIOR CONSTRUCTION</b>					
C1010 Partitions	\$821,100				
C1020 Interior Doors	\$1,248,678				
C1030 Specialties/Millwork	\$1,757,179	<b>\$3,826,957</b>	\$18.39	7.7%	
<b>C20 STAIRCASES</b>					
C2010 Stair Construction	\$180,000				
C2020 Stair Finishes	\$42,000	<b>\$222,000</b>	\$1.07	0.4%	
<b>C30 INTERIOR FINISHES</b>					
C3010 Wall Finishes	\$2,915,469				
C3020 Floor Finishes	\$2,174,283				
C3030 Ceiling Finishes	\$2,128,234	<b>\$7,217,986</b>	\$34.68	14.5%	
<b>D10 CONVEYING SYSTEMS</b>					
D1010 Elevator	\$220,000	<b>\$220,000</b>	\$1.06	0.4%	
<b>D20 PLUMBING</b>					
D20 Plumbing	\$3,347,726	<b>\$3,347,726</b>	\$16.09	6.7%	
<b>D30 HVAC</b>					
D30 HVAC	\$11,446,215	<b>\$11,446,215</b>	\$55.00	23.0%	
<b>D40 FIRE PROTECTION</b>					
D40 Fire Protection	\$1,248,678	<b>\$1,248,678</b>	\$6.00	2.5%	
<b>D50 ELECTRICAL</b>					
D5010 Electrical Systems	\$8,589,892	<b>\$8,589,892</b>	\$41.28	17.2%	

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F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>					
BUILDING SYSTEM		SUB-TOTAL	TOTAL	\$/SF	%
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>					
<b>E10 EQUIPMENT</b>					
E10 Equipment		\$1,453,600	<b>\$1,453,600</b>	\$6.98	2.9%
<b>E20 FURNISHINGS</b>					
E2010 Fixed Furnishings		\$2,588,914			
E2020 Movable Furnishings	NIC		<b>\$2,588,914</b>	\$12.44	5.2%
<b>F10 SPECIAL CONSTRUCTION</b>					
F10 Special Construction		\$0	<b>\$0</b>	\$0.00	0.0%
<b>F20 SELECTIVE BUILDING DEMOLITION</b>					
F2010 Building Elements Demolition		\$1,834,616			
F2020 Hazardous Components Abatement		\$0	<b>\$1,834,616</b>	\$8.82	3.7%
<b>TOTAL DIRECT COST (Trade Costs)</b>			<b>\$49,857,846</b>	\$239.57	100.0%

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>							
<b>GROSS FLOOR AREA CALCULATION</b>							
	LEVEL 2				52,713		
	LEVEL 1				127,252		
	LEVEL 0				28,148		
<b>TOTAL GROSS FLOOR AREA (GFA)</b>					<b>208,113 sf</b>		
<b>A10 FOUNDATIONS</b>							
<b>A1010 STANDARD FOUNDATIONS</b>							
	Repair cracks and resurface exposed concrete foundations	1	ls	25,000	25,000		
	Repair at site retaining wall	1	ls	30,000	30,000		
	Allowance for spalled concrete	500	sf	80.00	40,000		
	SUBTOTAL					95,000	
<b>A1020 SPECIAL FOUNDATIONS</b>	No work in this section						
	SUBTOTAL						
<b>A1030 LOWEST FLOOR CONSTRUCTION</b>							
	Cutting and patching for MEP	1	ls	25,000.00	25,000		
	New slab at bathrms and kitchen	7,030	sf	25.00	175,750		
	Replace loading dock	1	ls	30,000.00	30,000		
	Upgrade auditorium slopes for ADA compliance	7,500	sf	25.00	187,500		
	Equipment pads	1	ls	15,000.00	15,000		
	New elevator pit	1	ls	45,000.00	45,000		
	SUBTOTAL					478,250	
<b>TOTAL - FOUNDATIONS</b>							<b>\$573,250</b>
<b>B10 SUPERSTRUCTURE</b>							
<b>B1010 FLOOR CONSTRUCTION</b>							
	Openings in structure for MEP systems	208,113	gsf	0.50	104,057		
	Structural modifications to facilitate science classroom relocations	1	ls	100,000.00	100,000		
	Infill existing stair openings	1,760	sf	45.00	79,200		
	New stage floor structure	1,914	sf	35.00	66,990		
	New code compliant ramp	2	loc	35,000.00	70,000		
	Fire stopping floors	1	ls	50,000.00	50,000		
	SUBTOTAL					470,247	
<b>B1020 ROOF CONSTRUCTION</b>							
	<u>Roof Structure - Steel:</u>						
	New reinforcing to low roofs for snow loading; 1 bay only against building	11,653	sf	15.00	174,795		
	New structural steel at new stage and fly loft	37.5	tns	6,500.00	243,750		
	New deck at rebuilt stage and fly loft	1,914	sf	18.00	34,452		
	Allowance to reinforce roof diaphragms	52,713	sf	6.00	316,278		
	Support framing for new MEP systems	1	ls	50,000.00	50,000		
	SUBTOTAL					819,275	
<b>TOTAL - SUPERSTRUCTURE</b>							<b>\$1,289,522</b>

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F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>							
<b>B20 EXTERIOR CLOSURE</b>							
<b>B2010 EXTERIOR WALLS</b>							
	Reclad and Insulate exterior walls to meet code	52,450	sf				
	Anchor the top of perimeter masonry partitions to the underside of the floor or structure above	52,450	sf	95.00	NR		
	Mechanical screen; includes backup structure	949	loc	500.00	474,500		
	SUBTOTAL					899,500	
<b>B2020 WINDOWS/CURTAINWALL</b>							
	Replace existing windows; double glazed	13,112	sf	100.00	1,311,200		
	Replace existing curtainwall; double glazed	6,375	sf	130.00	828,750		
	SUBTOTAL					2,139,950	
<b>B2030 EXTERIOR DOORS</b>							
	Replace exterior glazed door, double	15	pr	9,000.00	135,000		
	Replace exterior glazed door, single	2	ea	4,000.00	8,000		
	Replace exterior single door	10	ea	2,100.00	21,000		
	Replace garage doors	4	ea	10,000.00	40,000		
	Backer rod & double sealant	504	lf	10.00	5,040		
	Wood blocking at openings	504	lf	3.00	1,512		
	SUBTOTAL					210,552	
<b>TOTAL - EXTERIOR CLOSURE</b>							<b>\$3,250,002</b>
<b>B30 ROOFING</b>							
<b>B3010 ROOF COVERINGS</b>							
	Replace existing roofing systems	123,704	sf	22.00	2,721,488		
	SUBTOTAL					2,721,488	
<b>B3020 ROOF OPENINGS</b>							
	New stage smoke hatches	3	ea	8,000.00	24,000		
	Replace roof ladders/hatches etc.	1	ls	3,000.00	3,000		
	SUBTOTAL					27,000	
<b>TOTAL - ROOFING</b>							<b>\$2,748,488</b>
<b>C10 INTERIOR CONSTRUCTION</b>							
<b>C1010 PARTITIONS</b>							
	Anchor the top of all masonry partitions to the underside of the floor or structure above	1,970	loc	350.00	689,500		
	New walls for new layouts	208,113	sf	22.00	NR		
	Replace auditorium operable wall	68	lf	1,200.00	81,600		
	Repair/Fill cracks in CMU walls	1	ls	50,000.00	50,000		
	SUBTOTAL					821,100	
<b>C1020 INTERIOR DOORS</b>							
	Replace al interior doors, frames + hardware	208,113	sf	6.00	1,248,678		
	SUBTOTAL					1,248,678	
<b>C1030 SPECIALTIES / MILLWORK</b>							
	Toilet Partitions and accessories	208,113	gsf	1.00	208,113		
	New stage proscenium	1	ls	100,000	100,000		

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>							
	New markerboards/tackboards	208,113	gsf	1.25	260,141		
	Upgrade athletic locker rooms specifically reconfigure showers to provide accessible shower stalls	2	ea	30,000.00	60,000		
	Lockers, full height	710	ea	350.00	248,500		
	New catwalk	1	ls	100,000.00	100,000		
<b>055000 MISCELLANEOUS METALS</b>							
	Miscellaneous metals throughout building	208,113	sf	1.25	260,141		
<b>061000 ROUGH CARPENTRY</b>							
	Rough blocking	208,113	sf	0.50	104,057		
<b>070001 WATERPROOFING, DAMPPROOFING AND CAULKING</b>							
	Miscellaneous sealants throughout building	208,113	sf	1.50	312,170		
<b>101400 SIGNAGE</b>							
	Code compliant signage	208,113	sf	0.50	104,057		
	SUBTOTAL					1,757,179	
<b>TOTAL - INTERIOR CONSTRUCTION</b>							<b>\$3,826,957</b>
<b>C20 STAIRCASES</b>							
<b>C2010 STAIR CONSTRUCTION</b>							
	Upgrade existing stairs for code	2	flt	10,000.00	20,000		
	New stairs	4	flt	40,000.00	160,000		
	SUBTOTAL					180,000	
<b>C2020 STAIR FINISHES</b>							
	New stair finishes; rubber treads/risers/landing and painting	6	flt	7,000.00	42,000		
	SUBTOTAL					42,000	
<b>TOTAL - STAIRCASES</b>							<b>\$222,000</b>
<b>C30 INTERIOR FINISHES</b>							
<b>C3010 WALL FINISHES</b>							
	Painting	208,113	gsf	3.00	624,339		
	Replace wood paneling at auditorium	1	ls	150,000.00	150,000		
	Replace acoustic panels at gym	1	ls	60,000.00	60,000		
	Other finishes	208,113	sf	10.00	2,081,130		
	SUBTOTAL					2,915,469	
<b>C3020 FLOOR FINISHES</b>							
	New linoleum flooring throughout including floor prep	157,294	sf	8.00	1,258,352		
	New shock-absorbing wood gym floor	16,000	sf	20.00	320,000		
	Bathroom renovations	5,000	sf	100.00	500,000		
	New flooring at the stage	1,914	sf	24.00	45,936		
	New carpet	1,111	sy	45.00	49,995		
	SUBTOTAL					2,174,283	
<b>C3030 CEILING FINISHES</b>							

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>							
84	Replace ceiling at auditorium, provide new clouds	1	ls	350,000	350,000		
85	Replace existing ACT/Ceilings/Soffits	157,294	sf	11.00	1,730,234		
85	Paint gym exposed ceiling	16,000	sf	3.00	48,000		
86	SUBTOTAL					2,128,234	
<b>TOTAL - INTERIOR FINISHES</b>							<b>\$7,217,986</b>
<b>D10 CONVEYING SYSTEMS</b>							
89	Remove existing elevator	1	ls	40,000.00	40,000		
90	Remove existing elevator and install new elevator	1	ls	135,000.00	135,000		
90	New lift	1	ls	45,000.00	45,000		
91	SUBTOTAL					220,000	
<b>TOTAL - CONVEYING SYSTEMS</b>							<b>\$220,000</b>
<b>D20 PLUMBING</b>							
<b>D20 PLUMBING, GENERALLY</b>							
<u>Equipment</u>							
95	Gas fired domestic HW heater; 400,000 BTUH	2	ea	28,000.00	56,000		
96	HW storage tank	2	ea	5,000.00	10,000		
96	Plumbing equipment	208,113	sf	4.00	832,452		
<u>Plumbing Fixtures &amp; Specialties</u>							
97	Miscellaneous plumbing fixtures	208,113	sf	1.00	208,113		
<u>Domestic Water Type L Copper Pipe</u>							
98	Domestic water pipe with fittings & hangers	208,113	sf	2.50	520,283		
99	Domestic water pipe insulation	208,113	sf	1.50	312,170		
<u>Sanitary Waste And Vent Pipe w/ Hangers</u>							
100	Sanitary waste pipe with fittings & hangers	208,113	sf	2.50	520,283		
100	Kitchen waste pipe with fittings & hangers	208,113	sf	0.30	62,434		
<u>Acid Waste And Vent Pipe w/ Hangers</u>							
101	Acid waste & vent pipe with fittings & hangers	208,113	sf	0.75	156,085		
<u>Storm Drainage, Hubless Cast Iron Pipe</u>							
102	Storm water pipe with fittings & hangers	208,113	sf	1.50	312,170		
103	Pipe insulation on horizontal runs	208,113	sf	0.20	41,623		
<u>Gas And Fuel Distribution Pipe</u>							
104	Gas pipe with fittings & hangers	208,113	sf	1.00	208,113		
<u>Miscellaneous</u>							
105	Coordination & BIM	1	ls	50,000.00	50,000		
105	Coring, sleeves & firestopping	1	ls	7,000.00	7,000		
106	Commissioning support	1	ls	20,000.00	20,000		
106	Testing and sterilization	1	ls	6,000.00	6,000		
107	Fees & permits	1	ls	25,000.00	25,000		
107	SUBTOTAL					3,347,726	
<b>TOTAL - PLUMBING</b>							<b>\$3,347,726</b>
<b>D30 HVAC</b>							
<b>D30 HVAC, GENERALLY</b>							
<u>HVAC Equipment</u>							
111	New HVAC system; VRF	208,113	gsf	55.00	11,446,215		

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>							
112	SUBTOTAL					11,446,215	
<b>TOTAL - HVAC</b>							<b>\$11,446,215</b>
<b>D40 FIRE PROTECTION</b>							
<b>D40 FIRE PROTECTION, GENERALLY</b>							
116	New sprinkler system	208,113	gsf	6.00	1,248,678		
117	SUBTOTAL					1,248,678	
<b>TOTAL - FIRE PROTECTION</b>							<b>\$1,248,678</b>
<b>D50 ELECTRICAL</b>							
<b>D5010 SERVICE &amp; DISTRIBUTION</b>							
<b>Gear &amp; Distribution</b>							
121	Normal power distribution switchgear & feeders	208,113	sf	5.00	1,040,565		
<u>Emergency power</u>							
122	Emergency power distribution switchgear & feeders	208,113	sf	3.00	624,339		
<u>Equipment Wiring</u>							
123	Equipment wiring	208,113	sf	2.50	520,283		
124	SUBTOTAL					2,185,187	
<b>D5020 LIGHTING &amp; POWER</b>							
<u>Lighting &amp; Branch Power</u>							
125	Lighting fixtures with installation labor	208,113	sf	6.00	1,248,678		
<u>Lighting control system</u>							
126	Lighting controls including interface with DDC	208,113	sf	1.75	364,198		
<u>Branch devices</u>							
127	Branch devices	208,113	sf	0.50	104,057		
<u>Lighting and branch circuitry</u>							
128	Lighting & branch circuitry	208,113	sf	5.00	1,040,565		
129	SUBTOTAL					2,757,498	
<b>D5030 COMMUNICATION &amp; SECURITY SYSTEMS</b>							
<u>Fire Alarm</u>							
131	Fire alarm system	208,113	sf	3.50	728,396		
<u>Bi-Directional System</u>							
132	BDA system	208,113	sf	0.50	104,057		
<u>Security System</u>							
133	Security System	208,113	sf	2.50	520,283		
<u>Telephone/Data/CATV</u>							
134	Network switches, PBX, IP, VP, CCTV (By owner)					By Owner	
135	Telecommunications rough in	208,113	sf	1.50	312,170		
135	Telecommunications devices and cabling	208,113	sf	2.00	416,226		
<u>Public Address/Clock System</u>							
136	PA/Master Clock system	208,113	sf	1.25	260,141		
<u>Audio Visual (rough-in and power only)</u>							
137	AV equipment					By Owner	
138	Rough-In conduit and backboxes only	208,113	sf	1.00	208,113		
<u>Auditorium</u>							
139	Rigging system equipment & installation					See equipment	
139	Power to rigging equipment	1	ls	12,000.00	12,000		
140	Stage dimming system with performance fixture package, allow	1	ls	275,000.00	275,000		
140	Installation, rough-in & 120V power to dimming equipment	1	ls	70,000.00	70,000		

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F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>							
141	Performance audio visual equipment, installation & LV cabling, allow	1	ls	150,000.00	150,000		
141	Performance audio visual rough-in and power	1	ls	60,000.00	60,000		
142	Gymnasium Sound system	1	ls	50,000.00	50,000		
143	Scoreboard/ shot clocks with feed and connection	1	ea	15,000.00	15,000		
143	Misc. gym equipment feed and connections	1	ls	15,000.00	15,000		
144	SUBTOTAL					3,196,386	
<b>D5040 OTHER ELECTRICAL SYSTEMS</b>							
<b>Miscellaneous</b>							
146	Demolition & make safe	1	ls	30,000.00	30,000		
146	Temp power and lights	208,113	sf	1.00	208,113		
147	Seismic restraints	1	ls	15,000.00	15,000		
147	Lightning Protection System, UL Master label	208,113	sf	0.45	93,651		
148	Fees & Permits	208,113	sf	0.50	104,057		
148	SUBTOTAL					450,821	
<b>TOTAL - ELECTRICAL</b>							<b>\$8,589,892</b>
<b>E10 EQUIPMENT</b>							
<b>E10 EQUIPMENT, GENERALLY</b>							
152	Gym wall pads	1	ls	20,000.00	20,000		
153	Basketball backstops; swing up; electric operated	12	loc	10,500.00	126,000		
153	Gymnasium dividing net; electrically operated	3	ea	30,000.00	90,000		
154	Volleyball net and standards	1	ls	5,000.00	5,000		
154	Telescoping bleachers	900	seats	240.00	216,000		
155	Theatrical Equipment Stage curtains, rigging and controls	1	ls	350,000.00	350,000		
155	Theatrical AV allowance	1	ls	200,000.00	200,000		
156	Kitchen equipment	2,030	sf	220.00	446,600		
156	SUBTOTAL					1,453,600	
<b>TOTAL - EQUIPMENT</b>							<b>\$1,453,600</b>
<b>E20 FURNISHINGS</b>							
<b>E2010 FIXED FURNISHINGS</b>							
160	Window shades	13,112	sf	7.00	91,784		
161	Entrance mats	1	ls	20,000.00	20,000		
161	Replace auditorium seats	1,100	seat	360.00	396,000		
<b>123553 CASEWORK</b>							
163	Sinks, counters and casework allowance	208,113	sf	10.00	2,081,130		
163	SUBTOTAL					2,588,914	
<b>E2020 MOVABLE FURNISHINGS</b>							
All movable furnishings to be provided and installed by owner							
165	SUBTOTAL					NIC	
<b>TOTAL - FURNISHINGS</b>							<b>\$2,588,914</b>

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL CODE UPGRADES OPTION 1</b>							
<b>F10 SPECIAL CONSTRUCTION</b>							
<b>F10 SPECIAL CONSTRUCTION SUBTOTAL</b>							
<b>TOTAL - SPECIAL CONSTRUCTION</b>							
<b>F20 SELECTIVE BUILDING DEMOLITION</b>							
<b>F2010 BUILDING ELEMENTS DEMOLITION</b>							
167	Remove exterior glazing	13,112	sf	7.00	91,784		
168	Remove exterior brick façade	52,450	sf	10.00	524,500		
169	Remove roofing	123,704	sf	2.00	In HazMat		
170	Demolish existing stage	1,914	sf	15.00	28,710		
171	Shoring	1	ls	25,000.00	25,000		
172	Remove existing stairs	4	flts	5,000.00	20,000		
173	Interior demolition	208,113	gsf	4.00	832,452		
174	Temporary enclosures/protection	208,113	sf	1.50	312,170		
175	SUBTOTAL					1,834,616	
<b>F2020 HAZARDOUS COMPONENTS ABATEMENT</b>							
See summary							
SUBTOTAL							
<b>TOTAL - SELECTIVE BUILDING DEMOLITION</b>							<b>\$1,834,616</b>

F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>				
BUILDING SYSTEM	SUB-TOTAL	TOTAL	\$/SF	%
<b>FULL RENOVATION - OPTION 2A</b>				
<b>A10 FOUNDATIONS</b>				
A1010 Standard Foundations	\$95,000			
A1020 Special Foundations	\$0			
A1030 Lowest Floor Construction	\$478,250	<b>\$573,250</b>	\$2.75	0.9%
<b>B10 SUPERSTRUCTURE</b>				
B1010 Upper Floor Construction	\$1,220,247			
B1020 Roof Construction	\$684,821	<b>\$1,905,068</b>	\$9.15	2.9%
<b>B20 EXTERIOR CLOSURE</b>				
B2010 Exterior Walls	\$6,459,200			
B2020 Windows/Curtainwall	\$2,659,000			
B2030 Exterior Doors	\$210,552	<b>\$9,328,752</b>	\$44.83	14.3%
<b>B30 ROOFING</b>				
B3010 Roof Coverings	\$2,968,896			
B3020 Roof Openings	\$27,000	<b>\$2,995,896</b>	\$14.40	4.6%
<b>C10 INTERIOR CONSTRUCTION</b>				
C1010 Partitions	\$5,399,586			
C1020 Interior Doors	\$1,248,678			
C1030 Specialties/Millwork	\$1,757,179	<b>\$8,405,443</b>	\$40.39	12.9%
<b>C20 STAIRCASES</b>				
C2010 Stair Construction	\$180,000			
C2020 Stair Finishes	\$42,000	<b>\$222,000</b>	\$1.07	0.3%
<b>C30 INTERIOR FINISHES</b>				
C3010 Wall Finishes	\$2,915,469			
C3020 Floor Finishes	\$2,174,283			
C3030 Ceiling Finishes	\$2,128,234	<b>\$7,217,986</b>	\$34.68	11.1%
<b>D10 CONVEYING SYSTEMS</b>				
D1010 Elevator	\$220,000	<b>\$220,000</b>	\$1.06	0.3%
<b>D20 PLUMBING</b>				
D20 Plumbing	\$3,329,808	<b>\$3,329,808</b>	\$16.00	5.1%
<b>D30 HVAC</b>				
D30 HVAC	\$14,567,910	<b>\$14,567,910</b>	\$70.00	22.4%
<b>D40 FIRE PROTECTION</b>				
D40 Fire Protection	\$1,248,678	<b>\$1,248,678</b>	\$6.00	1.9%
<b>D50 ELECTRICAL</b>				
D5010 Electrical Systems	\$8,718,417	<b>\$8,718,417</b>	\$41.89	13.4%

F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>				
BUILDING SYSTEM	SUB-TOTAL	TOTAL	\$/SF	%
<b>FULL RENOVATION - OPTION 2A</b>				
<b>E10 EQUIPMENT</b>				
E10 Equipment	\$1,453,600	<b>\$1,453,600</b>	\$6.98	2.2%
<b>E20 FURNISHINGS</b>				
E2010 Fixed Furnishings	\$2,588,914			
E2020 Movable Furnishings NIC		<b>\$2,588,914</b>	\$12.44	4.0%
<b>F10 SPECIAL CONSTRUCTION</b>				
F10 Special Construction	\$0	<b>\$0</b>	\$0.00	0.0%
<b>F20 SELECTIVE BUILDING DEMOLITION</b>				
F2010 Building Elements Demolition	\$2,250,842			
F2020 Hazardous Components Abatement	\$0	<b>\$2,250,842</b>	\$10.82	3.5%
<b>TOTAL DIRECT COST (Trade Costs)</b>		<b>\$65,026,564</b>	<b>\$312.46</b>	<b>100.0%</b>

F. COST ESTIMATES

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>FULL RENOVATION - OPTION 2A</b>							
<b>GROSS FLOOR AREA CALCULATION</b>							
	LEVEL 00				30,304		
	LEVEL 01				123,704		
	LEVEL 02				54,105		
<b>TOTAL GROSS FLOOR AREA (GFA)</b>					<b>208,113 sf</b>		
<b>A10 FOUNDATIONS</b>							
<b>A1010 STANDARD FOUNDATIONS</b>							
	Repair cracks and resurface exposed concrete foundations	1	ls	25,000	25,000		
	Repair at site retaining wall	1	ls	30,000	30,000		
	Allowance for spalled concrete	500	sf	80.00	40,000		
	SUBTOTAL					95,000	
<b>A1020 SPECIAL FOUNDATIONS</b>							
	No work in this section						
	SUBTOTAL						
<b>A1030 LOWEST FLOOR CONSTRUCTION</b>							
	Cutting and patching for MEP	1	ls	25,000.00	25,000		
	New slab at bathrooms and kitchen	7,030	sf	25.00	175,750		
	Replace loading dock	1	ls	30,000.00	30,000		
	Upgrade auditorium slopes for ADA compliance	7,500	sf	25.00	187,500		
	Equipment pads	1	ls	15,000.00	15,000		
	New elevator pit	1	ls	45,000.00	45,000		
	SUBTOTAL					478,250	
<b>TOTAL - FOUNDATIONS</b>							<b>\$573,250</b>
<b>B10 SUPERSTRUCTURE</b>							
<b>B1010 FLOOR CONSTRUCTION</b>							
	Openings in structure for MEP systems	208,113	gsf	0.50	104,057		
	Structural modifications to facilitate science classroom relocations	1	ls	100,000.00	100,000		
	Infill existing stair openings	1,760	sf	45.00	79,200		
	New stage floor structure	1,914	sf	35.00	66,990		
	New code compliant ramp	2	loc	35,000.00	70,000		
	New suspended track	1	ls	750,000.00	750,000		
	Fire stopping floors	1	ls	50,000.00	50,000		
	SUBTOTAL					1,220,247	
<b>B1020 ROOF CONSTRUCTION</b>							
	<u>Roof Structure - Steel:</u>						
	New reinforcing to low roofs for snow loading; 1 bay only against building	11,653	sf	15.00	174,795		
	New structural steel at new stage and fly loft	37.5	tns	6,500.00	243,750		
	New deck at rebuilt stage and fly loft	1,914	sf	18.00	34,452		
	Allowance to reinforce roof diaphragms	30,304	sf	6.00	181,824		
	Support framing for new MEP systems	1	ls	50,000.00	50,000		
	SUBTOTAL					684,821	
<b>TOTAL - SUPERSTRUCTURE</b>							<b>\$1,905,068</b>

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>FULL RENOVATION - OPTION 2A</b>							
<b>B20 EXTERIOR CLOSURE</b>							
<b>B2010 EXTERIOR WALLS</b>							
	Reclad and Insulate exterior walls to meet code; EXT3	52,450	sf	106.00	5,559,700		
	Anchor the top of perimeter masonry partitions to the underside of the floor or structure above	949	loc	500.00	474,500		
	Mechanical screen; includes backup structure	5,000	sf	85.00	425,000		
	SUBTOTAL					6,459,200	
<b>B2020 WINDOWS/CURTAINWALL</b>							
	Replace existing windows; triple glazed; W1	13,112	sf	125.00	1,639,000		
	Replace existing curtainwall; triple glazed; W2	6,375	sf	160.00	1,020,000		
	SUBTOTAL					2,659,000	
<b>B2030 EXTERIOR DOORS</b>							
	Replace exterior glazed door, double	15	pr	9,000.00	135,000		
	Replace exterior glazed door, single	2	ea	4,000.00	8,000		
	Replace exterior single door	10	ea	2,100.00	21,000		
	Replace garage doors	4	ea	10,000.00	40,000		
	Backer rod & double sealant	504	lf	10.00	5,040		
	Wood blocking at openings	504	lf	3.00	1,512		
	SUBTOTAL					210,552	
<b>TOTAL - EXTERIOR CLOSURE</b>							<b>\$9,328,752</b>
<b>B30 ROOFING</b>							
<b>B3010 ROOF COVERINGS</b>							
	Replace existing roofing systems with new TPO roof and 8" XPS insulation; R1	123,704	sf	24.00	2,968,896		
	SUBTOTAL					2,968,896	
<b>B3020 ROOF OPENINGS</b>							
	New stage smoke hatches	3	ea	8,000.00	24,000		
	Replace roof ladders/hatches etc.	1	ls	3,000.00	3,000		
	SUBTOTAL					27,000	
<b>TOTAL - ROOFING</b>							<b>\$2,995,896</b>
<b>C10 INTERIOR CONSTRUCTION</b>							
<b>C1010 PARTITIONS</b>							
	Anchor the top of all masonry partitions to the underside of the floor or structure above	1,970	loc	350.00	689,500		
	New walls for new layouts	208,113	sf	22.00	4,578,486		
	Replace auditorium operable wall	68	lf	1,200.00	81,600		
	Repair/Fill cracks in CMU walls	1	ls	50,000.00	50,000		
	SUBTOTAL					5,399,586	
<b>C1020 INTERIOR DOORS</b>							
	Replace al interior doors, frames + hardware	208,113	sf	6.00	1,248,678		
	SUBTOTAL					1,248,678	
<b>C1030 SPECIALTIES / MILLWORK</b>							
	Toilet Partitions and accessories	208,113	gsf	1.00	208,113		

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F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>FULL RENOVATION - OPTION 2A</b>							
113	New stage proscenium	1	ls	100,000	100,000		
114	New markerboards/tackboards	208,113	gsf	1.25	260,141		
115	Upgrade athletic locker rooms specifically reconfigure showers to provide accessible shower stalls	2	ea	30,000.00	60,000		
116	Lockers, full height	710	ea	350.00	248,500		
117	New catwalk	1	ls	100,000.00	100,000		
119	<b>055000 MISCELLANEOUS METALS</b>						
120	Miscellaneous metals throughout building	208,113	sf	1.25	260,141		
122	<b>061000 ROUGH CARPENTRY</b>						
123	Rough blocking	208,113	sf	0.50	104,057		
125	<b>070001 WATERPROOFING, DAMPPROOFING AND CAULKING</b>						
126	Miscellaneous sealants throughout building	208,113	sf	1.50	312,170		
129	<b>101400 SIGNAGE</b>						
130	Code compliant signage	208,113	sf	0.50	104,057		
132	SUBTOTAL					1,757,179	
133	<b>TOTAL - INTERIOR CONSTRUCTION \$8,405,443</b>						
136	<b>C20 STAIRCASES</b>						
138	<b>C2010 STAIR CONSTRUCTION</b>						
139	Upgrade existing stairs for code	2	flt	10,000.00	20,000		
140	New stairs	4	flt	40,000.00	160,000		
142	SUBTOTAL					180,000	
143	<b>C2020 STAIR FINISHES</b>						
144	New stair finishes; rubber treads/risers/landing and painting	6	flt	7,000.00	42,000		
145	SUBTOTAL					42,000	
147	<b>TOTAL - STAIRCASES \$222,000</b>						
150	<b>C30 INTERIOR FINISHES</b>						
152	<b>C3010 WALL FINISHES</b>						
153	Painting	208,113	gsf	3.00	624,339		
154	Replace wood paneling at auditorium	1	ls	150,000.00	150,000		
155	Replace acoustic panels at gym	1	ls	60,000.00	60,000		
156	Other finishes	208,113	sf	10.00	2,081,130		
158	SUBTOTAL					2,915,469	
159	<b>C3020 FLOOR FINISHES</b>						
161	New linoleum flooring throughout including floor prep	157,294	sf	8.00	1,258,352		
162	New shock-absorbing wood gym floor	16,000	sf	20.00	320,000		
163	Bathroom renovations	5,000	sf	100.00	500,000		
164	New flooring at the stage	1,914	sf	24.00	45,936		
165	New carpet	1,111	sy	45.00	49,995		
166	SUBTOTAL					2,174,283	

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>FULL RENOVATION - OPTION 2A</b>							
168	<b>C3030 CEILING FINISHES</b>						
169	Replace ceiling at auditorium, provide new clouds	1	ls	350,000	350,000		
170	Replace existing ACT/Ceilings/Soffits	157,294	sf	11.00	1,730,234		
171	Paint gym exposed ceiling	16,000	sf	3.00	48,000		
172	SUBTOTAL					2,128,234	
174	<b>TOTAL - INTERIOR FINISHES \$7,217,986</b>						
177	<b>D10 CONVEYING SYSTEMS</b>						
179	Remove existing elevator	1	ls	40,000.00	40,000		
180	Remove existing elevator and install new elevator	1	ls	135,000.00	135,000		
181	New lift	1	ls	45,000.00	45,000		
182	SUBTOTAL					220,000	
184	<b>TOTAL - CONVEYING SYSTEMS \$220,000</b>						
187	<b>D20 PLUMBING</b>						
189	<b>D20 PLUMBING, GENERALLY</b>						
190	Complete system	208,113	sf	16.00	3,329,808		
191	SUBTOTAL					3,329,808	
193	<b>TOTAL - PLUMBING \$3,329,808</b>						
196	<b>D30 HVAC</b>						
199	<b>D30 HVAC, GENERALLY</b>						
200	Geothermal Heating/Cooling System						
200	(2) 225 ton heat recovery chiller-heaters with (200) 6" boreholes, active chilled beams, heat recovery units, and rooftop ahu's	208,113	sf	70.00	14,567,910		
201	SUBTOTAL					14,567,910	
203	<b>TOTAL - HVAC \$14,567,910</b>						
206	<b>D40 FIRE PROTECTION</b>						
208	<b>D40 FIRE PROTECTION, GENERALLY</b>						
209	New sprinkler system	208,113	gsf	6.00	1,248,678		
210	SUBTOTAL					1,248,678	
212	<b>TOTAL - FIRE PROTECTION \$1,248,678</b>						
215	<b>D50 ELECTRICAL</b>						
218	<b>D5010 SERVICE &amp; DISTRIBUTION</b>						
219	<b>Gear &amp; Distribution</b>						
220	5000A 480/277V switchboard	1	ls	140,000.00	140,000		
221	Normal power distribution with associated panelboards, transformers and feeders	208,113	sf	4.00	832,452		
222	Emergency power						
223	Emergency generator and ATS's with associated panelboards, transformers and feeders	208,113	sf	2.50	520,283		
224	PV						

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>FULL RENOVATION - OPTION 2A</b>							
225	PV provisions only, with empty conduit and pull boxes, per	1	ls	5,000.00	5,000		
226	<u>Equipment Wiring</u>						
227	Elevator and cab power feed and connection	1	ea	5,000.00	5,000		
228	Mechanical equipment wiring to HVAC heating and cooling	208,113	sf	2.50	520,283		
229	Misc. equipment wiring	208,113	sf	0.50	104,057		
230	Kitchen equipment wiring	1	ls	25,000.00	25,000		
231	Gym equipment feed and connections	1	ls	15,000.00	15,000		
232	SUBTOTAL					2,167,075	
<b>D5020 LIGHTING &amp; POWER</b>							
236	<u>Lighting &amp; Branch Power</u>				-		
237	Lighting fixtures with installation labor	208,113	sf	6.00	1,248,678		
238	Exterior building lighting	1	ls	15,000.00	15,000		
239	<u>Lighting control system (Daylight Harvesting)</u>						
240	Lighting controls with control panels, sensors and switches	208,113	sf	1.25	260,141		
241	<u>Branch devices</u>						
242	Duplex and GFI receptacles	208,113	sf	0.50	104,057		
243	<u>Lighting and branch circuitry</u>						
244	EMT and MC cable	208,113	sf	4.50	936,509		
245	SUBTOTAL					2,564,385	
<b>D5030 COMMUNICATION &amp; SECURITY SYSTEMS</b>							
249	<u>Fire Alarm</u>						
250	Control panel	1	ea	15,000.00	15,000		
251	Annunciator	1	ea	1,500.00	1,500		
252	Beacon	1	ea	2,250.00	2,250		
253	Knox box	1	ea	350.00	350		
254	Radio master box	1	ea	9,500.00	9,500		
255	Devices and cabling	208,113	sf	2.00	416,226		
256	Mass. Notification	208,113	sf	1.00	208,113		
257	Testing programming	1	ls	5,000.00	5,000		
258	<u>Bi-Directional System</u>						
259	BDA system	1	ls	100,000.00	100,000		
260	<u>Telephone/Data/CATV</u>						
261	Network switches, PBX, IP, VP, CATV (By owner)					By Owner	
262	Telecommunications rough in	208,113	sf	1.00	208,113		
263	Telecommunications devices and cabling	208,113	sf	2.00	416,226		
264	Grounding	1	ls	1,500.00	1,500		
265	<u>Public Address/Clock System</u>						
266	PA/Master Clock system	208,113	sf	1.00	208,113		
267	Classroom Speech Amplification	208,113	sf	0.50	104,057		
268	<u>Audio Visual (rough-in and power only)</u>						
269	AV equipment					By Owner	
270	Rough-In conduit and backboxes only	208,113	sf	0.50	104,057		
271	<u>Auditorium</u>						
272	Rigging system equipment & installation					See equipment	
273	Power to rigging equipment	1	ls	12,000.00	12,000		
274	Stage dimming system with performance fixture package, allow	1	ls	275,000.00	275,000		
275	Installation, rough-in & 120V power to dimming equipment	1	ls	70,000.00	70,000		
276	Performance audio visual equipment, installation & LV cabling,	1	ls	150,000.00	150,000		
277	Performance audio visual rough-in and power	1	ls	60,000.00	60,000		
278	<u>Cafeteria</u>						
279	Sound system	1	ls	15,000.00	15,000		
280	<u>Media Center</u>						
281	Sound system	1	ls	15,000.00	15,000		
282	<u>Gymnasium</u>						

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>FULL RENOVATION - OPTION 2A</b>							
283	Sound system	1	ls	30,000.00	30,000		
284	Scoreboard/ shot clocks with feed and connection	1	ea	15,000.00	15,000		
285	<u>Security System</u>						
286	Head end	1	ls	50,000.00	50,000		
287	Card access system	208,113	sf	1.00	208,113		
288	Intrusion system	208,113	sf	1.00	208,113		
289	CCTV surveillance system	208,113	sf	2.00	416,226		
290	SUBTOTAL					3,324,457	
<b>D5040 OTHER ELECTRICAL SYSTEMS</b>							
293	<u>Miscellaneous</u>						
294	Lightning Protection System, UL Master label	1	ls	95,000.00	95,000		
295	Temp power and lights	1	ls	150,000.00	150,000		
296	Hoisting and rigging	1	ls	10,000.00	10,000		
297	Seismic restraints	1	ls	7,500.00	7,500		
298	Coordination, BIM & shop drawings	1	ls	240,000.00	240,000		
299	Fees & Permits	1	ls	160,000.00	160,000		
300	SUBTOTAL					662,500	
<b>TOTAL - ELECTRICAL</b>							<b>\$8,718,417</b>
<b>E10 EQUIPMENT</b>							
<b>E10 EQUIPMENT, GENERALLY</b>							
308	Gym wall pads	1	ls	20,000.00	20,000		
309	Basketball backstops; swing up; electric operated	12	loc	10,500.00	126,000		
310	Gymnasium dividing net; electrically operated	3	ea	30,000.00	90,000		
311	Volleyball net and standards	1	ls	5,000.00	5,000		
312	Telescoping bleachers	900	seats	240.00	216,000		
313	Theatrical Equipment Stage curtains, rigging and controls	1	ls	350,000.00	350,000		
314	Theatrical AV allowance	1	ls	200,000.00	200,000		
315	Kitchen equipment	2,030	sf	220.00	446,600		
316	SUBTOTAL					1,453,600	
<b>TOTAL - EQUIPMENT</b>							<b>\$1,453,600</b>
<b>E20 FURNISHINGS</b>							
<b>E2010 FIXED FURNISHINGS</b>							
324	Window shades	13,112	sf	7.00	91,784		
325	Entrance mats	1	ls	20,000.00	20,000		
326	Replace auditorium seats	1,100	seat	360.00	396,000		
<b>TOTAL - FIXED FURNISHINGS</b>							<b>2,588,914</b>
328	<b>123553 CASEWORK</b>						
329	Sinks, counters and casework allowance	208,113	sf	10.00	2,081,130		
<b>TOTAL - CASEWORK</b>							<b>2,081,130</b>
<b>E2020 MOVABLE FURNISHINGS</b>							
All movable furnishings to be provided and installed by owner							
<b>TOTAL - MOVABLE FURNISHINGS</b>							<b>NIC</b>
<b>TOTAL - FURNISHINGS</b>							<b>\$2,588,914</b>

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F. COST ESTIMATES

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>FULL RENOVATION - OPTION 2A</b>							
<b>F10 SPECIAL CONSTRUCTION</b>							
	F10 SPECIAL CONSTRUCTION						
	SUBTOTAL						
<b>TOTAL - SPECIAL CONSTRUCTION</b>							
<b>F20 SELECTIVE BUILDING DEMOLITION</b>							
	<b>F2010 BUILDING ELEMENTS DEMOLITION</b>						
	Remove exterior glazing	13,112	sf	7.00	91,784		
	Remove exterior brick façade	52,450	sf	10.00	524,500		
	Remove roofing	123,704	sf	2.00	In HazMat		
	Demolish existing stage	1,914	sf	15.00	28,710		
	Shoring	1	ls	25,000.00	25,000		
	Remove existing stairs	4	flts	5,000.00	20,000		
	Interior demolition	208,113	gsf	6.00	1,248,678		
	Temporary enclosures/protection	208,113	sf	1.50	312,170		
	SUBTOTAL					2,250,842	
	<b>F2020 HAZARDOUS COMPONENTS ABATEMENT</b>						
	See summary						
	SUBTOTAL						
<b>TOTAL - SELECTIVE BUILDING DEMOLITION</b>							<b>\$2,250,842</b>

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>SITWORK RENOVATE HIGH SCHOOL OPTION 2A</b>							
<b>G SITEWORK</b>							
		1,900,000	sf				
	<b>G10 SITE PREPARATION &amp; DEMOLITION</b>						
	Site construction fence/barricades	7,900	lf	18.00	142,200		
	Site construction fence gates	1	ea	10,000.00	10,000		
	Stabilized construction entrance	1	ls	15,000.00	15,000		
	Pavement/curbing removal, crush and re-use for sub-base	250,800	sf	1.00	250,800		
	Walkways	1	ls	20,000.00	20,000		
	Miscellaneous demolition	1	ls	100,000.00	100,000		
	SUBTOTAL					538,000	
	Temporary parking	250	spc				
	gravel base; 12" thick	4,074	cy	40.00	162,960		
	Binder course	12,222	sy	20.00	244,440		
	Construction fence	1,900	lf	18.00	34,200		
	Line markings/painting/signs	250	spc	100.00	25,000		
	Demolish temp parking	110,000	sf	1.00	110,000		
	Blasting for temporary parking	1	ls	150,000.00	150,000		
	SUBTOTAL					726,600	
	<u>Site Earthwork</u>						
	Strip Topsoil and remove; 6" thick	3,148	cy	16.00	50,368		
	Fine grading	200,000	sf	0.20	40,000		
	Silt fence/erosion control, wash bays, stock piles	7,900	lf	12.00	94,800		
	Silt fence maintenance and monitoring	1	ls	40,000.00	40,000		
	<u>Hazardous Waste Remediation</u>						
	Remove existing underground fuel storage tanks; 500 Gal	1	ls	50,000.00	50,000		
	Dispose/treat contaminated soils	1	ls	20,000.00	20,000		
	SUBTOTAL					295,168	
	<b>G20 SITE IMPROVEMENTS</b>						
	<u>Asphalt Paving; parking lot and roadway; mill and pave only</u>	250,800	sf				
	gravel base; 12" thick	9,289	cy	35.00	ETR		
	asphalt; mill and pave	27,867	sy	20.00	557,340		
	VGC	7,231	lf	34.00	ETR		
	Single solid lines, 4" thick	1	ls	10,000.00	10,000		
	Crosswalk Hatching	4	loc	900.00	3,600		
	Other road markings	1	ls	7,500.00	7,500		
	HC curb cuts	8	loc	350.00	2,800		
	Signage	1	ls	20,000.00	20,000		
	<u>Pedestrian Paving</u>						
	Concrete paving						
	gravel base; 8" thick	372	cy	35.00	13,020		
	4" concrete paving	15,000	sf	10.00	150,000		
	SUBTOTAL					764,260	
	<u>Site Athletics</u>						
	<b>STADIUM - Running Track/Turf Football Field/Bleachers</b>						
	Synthetic turf anchor curb integral with trench drain	1,310	lf	80.00	104,800		
	Resilient surface at track	75,525	sf	8.00	604,200		
	Gravel base - assumed 12" thick	3,707	cy	45.00	166,815		
	Geotextile reinforced impermeable liner 20 mill	100,100	sf	1.00	100,100		
	Synthetic turf field - Hybrid infill synthetic field with premolded resilient drainage pad	100,100	sf	12.00	1,201,200		
	Football goals	2	ea	3,500.00	7,000		
	Scoreboard	1	ea	60,000.00	60,000		
	Line markings - allowance	2	ls	2,000.00	4,000		
	1250 seat bleacher	1	loc	450,000.00	450,000		
	Rip-Rap under bleachers	1	ls	25,000.00	25,000		
	Field logo's	1	loc	6,000.00	6,000		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>SITWORK RENOVATE HIGH SCHOOL OPTION 2A</b>							
49	Discus pad & enclosure	1	ea	15,000.00	15,000		
50	Shot put pad & enclosure	1	ea	15,000.00	15,000		
51	Long jump/triple jump	2	ea	10,000.00	20,000		
52	Pole vault and accessories	1	ea	10,000.00	10,000		
53	High jump pads	1	ea	6,000.00	6,000		
54	Javelin with track surfacing runway	1	ea	10,000.00	10,000		
55	Hurdles and starting blocks	1	ls	8,000.00	8,000		
56	Track crossing pad	1	ls	10,000.00	10,000		
57	Trash/recycling receptacles	12	ea	800.00	9,600		
58	Team benches- 7'-5" long	12	ea	1,500.00	18,000		
59	Portable ball control netting, 120' long	4	ea	2,500.00	10,000		
60	Pit covers	2	ea	3,500.00	7,000		
61	Subsurface infiltration/drainage/field drains etc.	175,625	sf	1.25	219,531		
62	Stadium sound system (AV)	1	ls	120,000.00	120,000		
63	SUBTOTAL					3,207,246	
64							
65	Baseball/Field Hockey	1	ea	360,000.00	360,000		
66							
67	Half size field	1	ls	150,000.00	150,000		
68							
69	Synthetic grass soccer fields; Two Fields	140,500	sf	12.00	1,686,000		
70							
71	Softball field	2	ea	250,000.00	500,000		
72							
73	Tennis courts - Six Courts (including pickle courts); 1 basketball court	50,600	sf				
74	gravel base; 8" thick	1,256	cy	40.00	50,240		
75	Asphalt paving	5,622	sy	30.00	168,660		
76	Color coating	50,600	sf	2.00	101,200		
77	Fence with wind break	1,177	lf	80.00	94,160		
78	Tennis court nets	5	set	1,500.00	7,500		
79	Basketball hoops	1	set	5,000.00	5,000		
80	SUBTOTAL					3,122,760	
81							
82	<u>Site Improvements</u>						
83	Flag pole 50' high	1	ea	6,500.00	6,500		
84	Concrete retaining walls				Assumed not required		
85	Repair to stairs	1	ls	50,000.00	50,000		
86	Pre-K playground and equipment	1	ls	150,000.00	150,000		
87	Other site improvements; walls, fences etc.	1	ls	250,000.00	250,000		
88	SUBTOTAL					456,500	
89							
90	<u>Landscaping</u>						
91	Topsoil - Import new topsoil; minimum 6"	3,148	cy	65.00	204,620		
92	Lawn - loam & seed	170,000	sf	0.25	42,500		
93	Allowance for courtyard upgrades	2	loc	75,000.00	150,000		
94	Planting allowance	1	ls	200,000.00	200,000		
95	SUBTOTAL					597,120	
96							
97	<b>G30 CIVIL MECHANICAL UTILITIES</b>						
98	<u>Utilities - Enabling</u>						
99	Allowance for temporary utilities etc.	1	ls	50,000.00	50,000		
100	<u>Water supply; Pricing includes E&amp;B and bedding</u>						
101	New DI piping; 8"	557	lf	100.00	ETR		
102	New DI piping; 8" Fire loop	2,500	lf	120.00	300,000		
103	Connect to existing	1	loc	100,000.00	100,000		
104	FD connection	1	ea	2,000.00	2,000		
105	Gate valves	8	ea	750.00	6,000		
106	Fire hydrant	3	ea	5,000.00	15,000		
107	SUBTOTAL					473,000	
108							

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>SITWORK RENOVATE HIGH SCHOOL OPTION 2A</b>							
109	<u>Sanitary; Pricing includes E&amp;B and bedding</u>						
110	Manholes	2	ea	4,500.00	9,000		
111	Grease trap	1	ea	15,000.00	15,000		
112	8" PVC	1,000	lf	70.00	70,000		
113	Connect to existing drain	1	ea	3,000.00	3,000		
114	SUBTOTAL					97,000	
115							
116	<u>Storm water; Pricing includes E&amp;B and bedding</u>						
117	Allowance for new drainage systems; piping only	250,800	sf	3.00	752,400		
118	Infiltration systems; cultec chambers	137,500	cf	8.00	1,100,000		
119	Rock excavation	1	ls	250,000.00	250,000		
120	Catch basins	12	ea	3,800.00	45,600		
121	Manholes	10	ea	4,500.00	45,000		
122	WQ structures	3	ea	16,000.00	48,000		
123	Area drains	4	ea	1,500.00	6,000		
124	<u>Gas service</u>						
125	E&B trench for new gas pipe - install by plumbing	557	lf	25.00	13,925		
126	SUBTOTAL					2,260,925	
127							
128	<b>G40 ELECTRICAL UTILITIES</b>						
129							
130	<u>Power</u>						
131	Utility co. backcharges, allow	1	ls	30,000.00	Utility co.		
132	Connections at existing manhole				Utility co.		
133	Manhole	1	ls	8,500.00	8,500		
134	Connections in manhole	1	ls	3,500.00	3,500		
135	Primary ductbank 2-5" ductbank, empty, allow	1000	lf	120.00	120,000		
136	Transformer by utility company				By Utility Co.		
137	Transformer pad	1	ea	2,500.00	2,500		
138	Secondary service	60	lf	1,100.00	66,000		
139	<u>Communications</u>						
140	Connection at riser pole, allow	1	ea	1,500.00	1,500		
141	Telecom ductbank 4-4", allow	1000	lf	152.00	152,000		
142	<u>Site Lighting</u>						
143	Site Parking lighting (allow)	250,800	sf	2.00	501,600		
144	SUBTOTAL					855,600	
145							
146	<b>TOTAL - SITE DEVELOPMENT</b>						<b>\$13,394,179</b>

F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>				
BUILDING SYSTEM	SUB-TOTAL	TOTAL	\$/SF	%
<b>HIGH SCHOOL RENOVATION - OPTION 3A</b>				
<b>A10 FOUNDATIONS</b>				
A1010 Standard Foundations	\$42,500			
A1020 Special Foundations	\$0			
A1030 Lowest Floor Construction	\$63,750	<b>\$106,250</b>	\$2.21	0.7%
<b>B10 SUPERSTRUCTURE</b>				
B1010 Upper Floor Construction	\$1,067,000			
B1020 Roof Construction	\$144,000	<b>\$1,211,000</b>	\$25.23	8.2%
<b>B20 EXTERIOR CLOSURE</b>				
B2010 Exterior Walls	\$1,717,220			
B2020 Windows/Curtainwall	\$456,875			
B2030 Exterior Doors	\$49,284	<b>\$2,223,379</b>	\$46.32	15.1%
<b>B30 ROOFING</b>				
B3010 Roof Coverings	\$636,000			
B3020 Roof Openings	\$5,000	<b>\$641,000</b>	\$13.35	4.4%
<b>C10 INTERIOR CONSTRUCTION</b>				
C1010 Partitions	\$720,000			
C1020 Interior Doors	\$288,000			
C1030 Specialties/Millwork	\$348,000	<b>\$1,356,000</b>	\$28.25	9.2%
<b>C20 STAIRCASES</b>				
C2010 Stair Construction	\$10,000			
C2020 Stair Finishes	\$7,000	<b>\$17,000</b>	\$0.35	0.1%
<b>C30 INTERIOR FINISHES</b>				
C3010 Wall Finishes	\$684,000			
C3020 Floor Finishes	\$607,400			
C3030 Ceiling Finishes	\$251,350	<b>\$1,542,750</b>	\$32.14	10.5%
<b>D10 CONVEYING SYSTEMS</b>				
D1010 Elevator	\$40,000	<b>\$40,000</b>	\$0.83	0.3%
<b>D20 PLUMBING</b>				
D20 Plumbing	\$768,000	<b>\$768,000</b>	\$16.00	5.2%
<b>D30 HVAC</b>				
D30 HVAC	\$3,360,000	<b>\$3,360,000</b>	\$70.00	22.9%
<b>D40 FIRE PROTECTION</b>				
D40 Fire Protection	\$288,000	<b>\$288,000</b>	\$6.00	2.0%
<b>D50 ELECTRICAL</b>				
D5010 Electrical Systems	\$1,691,500	<b>\$1,691,500</b>	\$35.24	11.5%
<b>E10 EQUIPMENT</b>				
E10 Equipment	\$451,000	<b>\$451,000</b>	\$9.40	3.1%

F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>				
BUILDING SYSTEM	SUB-TOTAL	TOTAL	\$/SF	%
<b>HIGH SCHOOL RENOVATION - OPTION 3A</b>				
<b>E20 FURNISHINGS</b>				
E2010 Fixed Furnishings	\$510,585			
E2020 Movable Furnishings	NIC	<b>\$510,585</b>	\$10.64	3.5%
<b>F10 SPECIAL CONSTRUCTION</b>				
F10 Special Construction	\$0	<b>\$0</b>	\$0.00	0.0%
<b>F20 SELECTIVE BUILDING DEMOLITION</b>				
F2010 Building Elements Demolition	\$487,585			
F2020 Hazardous Components Abatement	\$0	<b>\$487,585</b>	\$10.16	3.3%
<b>TOTAL DIRECT COST (Trade Costs)</b>		<b>\$14,694,049</b>	<b>\$306.13</b>	<b>100.0%</b>

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F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL RENOVATION - OPTION 3A</b>							
<b>GROSS FLOOR AREA CALCULATION</b>							
	Level 00				21,500		
	Level 01				26,500		
<b>TOTAL GROSS FLOOR AREA (GFA)</b>					<b>48,000 sf</b>		
<b>A10 FOUNDATIONS</b>							
<b>A1010 STANDARD FOUNDATIONS</b>	Repair cracks and resurface exposed concrete foundations	1	ls	10,000	10,000		
	Allowance for spalled concrete	500	sf	65.00	32,500		
	SUBTOTAL					42,500	
<b>A1020 SPECIAL FOUNDATIONS</b>	No work in this section						
	SUBTOTAL						
<b>A1030 LOWEST FLOOR CONSTRUCTION</b>	Cutting and patching for MEP	1	ls	10,000.00	10,000		
	New slab at bathrooms	550	sf	25.00	13,750		
	Replace loading dock	1	ls	30,000.00	30,000		
	Equipment pads	1	ls	10,000.00	10,000		
	SUBTOTAL					63,750	
<b>TOTAL - FOUNDATIONS</b>							<b>\$106,250</b>
<b>B10 SUPERSTRUCTURE</b>							
<b>B1010 FLOOR CONSTRUCTION</b>	Openings in structure for MEP systems	48,000	gsf	0.50	24,000		
	Sesimic and lateral bracing allowance	48,000	gsf	6.00	288,000		
	New suspended track	1	ls	750,000.00	750,000		
	Fire stopping floors	1	ls	5,000.00	5,000		
	SUBTOTAL					1,067,000	
<b>B1020 ROOF CONSTRUCTION</b>	Roof Structure - Steel:						
	Allowance to reinforce roof diaphragms	21,500	sf	6.00	129,000		
	Support framing for new MEP systems	1	ls	15,000.00	15,000		
	SUBTOTAL					144,000	
<b>TOTAL - SUPERSTRUCTURE</b>							<b>\$1,211,000</b>
<b>B20 EXTERIOR CLOSURE</b>							
<b>B2010 EXTERIOR WALLS</b>	Reclad and Insulate exterior walls to meet code; EXT3	14,620	sf				
	Anchor the top of perimeter masonry partitions to the underside of the floor or structure above	335	loc	500.00	167,500		
	SUBTOTAL					1,717,220	
<b>B2020 WINDOWS/CURTAINWALL</b>	Replace existing windows; triple glazed; W1	3,655	sf	125.00	456,875		
	SUBTOTAL					456,875	
<b>B2030 EXTERIOR DOORS</b>	Replace exterior single door	4	ea	2,100.00	8,400		
	Replace garage doors	4	ea	10,000.00	40,000		

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL RENOVATION - OPTION 3A</b>							
	Backer rod & double sealant	68	lf	10.00	680		
	Wood blocking at openings	68	lf	3.00	204		
	SUBTOTAL					49,284	
<b>TOTAL - EXTERIOR CLOSURE</b>							<b>\$2,223,379</b>
<b>B30 ROOFING</b>							
<b>B3010 ROOF COVERINGS</b>	Replace existing roofing systems with new TPO roof and 8" XPS insulation; R1	26,500	sf	24.00	636,000		
	SUBTOTAL					636,000	
<b>B3020 ROOF OPENINGS</b>	Replace roof ladders/hatches etc.	1	ls	5,000.00	5,000		
	SUBTOTAL					5,000	
<b>TOTAL - ROOFING</b>							<b>\$641,000</b>
<b>C10 INTERIOR CONSTRUCTION</b>							
<b>C1010 PARTITIONS</b>	Partition allowance	48,000	sf	15.00	720,000		
	SUBTOTAL					720,000	
<b>C1020 INTERIOR DOORS</b>	Replace al interior doors, frames + hardware	48,000	sf	6.00	288,000		
	SUBTOTAL					288,000	
<b>C1030 SPECIALTIES / MILLWORK</b>	Toilet Partitions and accessories	48,000	gsf	1.00	48,000		
	New markerboards/tackboards	48,000	gsf	1.25	60,000		
	Upgrade athletic locker rooms specifically reconfigure showers to provide accessible shower stalls	2	ea	30,000.00	60,000		
<b>055000 MISCELLANEOUS METALS</b>	Miscellaneous metals throughout building	48,000	sf	1.25	60,000		
<b>061000 ROUGH CARPENTRY</b>	Rough blocking	48,000	sf	0.50	24,000		
<b>070001 WATERPROOFING, DAMPPROOFING AND CAULKING</b>	Miscellaneous sealants throughout building	48,000	sf	1.50	72,000		
<b>101400 SIGNAGE</b>	Code compliant signage	48,000	sf	0.50	24,000		
	SUBTOTAL					348,000	
<b>TOTAL - INTERIOR CONSTRUCTION</b>							<b>\$1,356,000</b>
<b>C20 STAIRCASES</b>							
<b>C2010 STAIR CONSTRUCTION</b>	Upgrade existing stairs for code	1	flt	10,000.00	10,000		
	SUBTOTAL					10,000	
<b>C2020 STAIR FINISHES</b>	New stair finishes; rubber treads/risers/landing and painting	1	flt	7,000.00	7,000		

F. COST ESTIMATES

DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL RENOVATION - OPTION 3A</b>						
SUBTOTAL					7,000	
<b>TOTAL - STAIRCASES</b>						<b>\$17,000</b>
<b>C30 INTERIOR FINISHES</b>						
<b>C3010 WALL FINISHES</b>						
Painting	48,000	gsf	3.00	144,000		
Replace acoustic panels at gym	1	ls	60,000.00	60,000		
Other finishes	48,000	sf	10.00	480,000		
SUBTOTAL					684,000	
<b>C3020 FLOOR FINISHES</b>						
New linoleum flooring throughout including floor prep	29,050	sf	8.00	232,400		
New shock-absorbing wood gym floor	16,000	sf	20.00	320,000		
Bathroom renovations	550	sf	100.00	55,000		
SUBTOTAL					607,400	
<b>C3030 CEILING FINISHES</b>						
Replace existing ACT	29,050	sf	7.00	203,350		
Paint gym exposed ceiling	16,000	sf	3.00	48,000		
SUBTOTAL					251,350	
<b>TOTAL - INTERIOR FINISHES</b>						<b>\$1,542,750</b>
<b>D10 CONVEYING SYSTEMS</b>						
Remove existing elevator	1	ls	40,000.00	40,000		
SUBTOTAL					40,000	
<b>TOTAL - CONVEYING SYSTEMS</b>						<b>\$40,000</b>
<b>D20 PLUMBING</b>						
<b>D20 PLUMBING, GENERALLY</b>						
Plumbing allowance	48,000	gsf	16.00	768,000		
SUBTOTAL					768,000	
<b>TOTAL - PLUMBING</b>						<b>\$768,000</b>
<b>D30 HVAC</b>						
<b>D30 HVAC, GENERALLY</b>						
<u>Geothermal Heating/Cooling System</u>						
(2) 225 ton heat recovery chiller-heaters with (200) 6" boreholes, active chilled beams, heat recovery units, and rooftop ahu's	48,000	sf	70.00	3,360,000		
SUBTOTAL					3,360,000	
<b>TOTAL - HVAC</b>						<b>\$3,360,000</b>
<b>D40 FIRE PROTECTION</b>						
<b>D40 FIRE PROTECTION, GENERALLY</b>						
New sprinkler system	48,000	gsf	6.00	288,000		
SUBTOTAL					288,000	
<b>TOTAL - FIRE PROTECTION</b>						<b>\$288,000</b>

F. COST ESTIMATES

DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>HIGH SCHOOL RENOVATION - OPTION 3A</b>						
<b>D50 ELECTRICAL</b>						
<b>D5010 SERVICE &amp; DISTRIBUTION</b>						
<b>Gear &amp; Distribution</b>						
5000A 480/277V switchboard	1	ls	140,000.00	w/addition		
Normal power distribution with associated panelboards, transformers and feeders	48,000	sf	4.00	192,000		
<b>Emergency power</b>						
Emergency generator and ATS's with associated panelboards, transformers and feeders	48,000	sf	2.50	120,000		
<b>Equipment Wiring</b>						
Elevator and cab power feed and connection	1	ea	5,000.00	5,000		
Mechanical equipment wiring to HVAC heating and cooling equipment	48,000	sf	2.50	120,000		
Misc. equipment wiring	48,000	sf	0.50	24,000		
Gym equipment feed and connections	1	ls	15,000.00	15,000		
SUBTOTAL					476,000	
<b>D5020 LIGHTING &amp; POWER</b>						
<b>Lighting &amp; Branch Power</b>						
Lighting fixtures with installation labor	48,000	sf	6.00	288,000		
Lighting control system (Daylight Harvesting)	48,000	sf	1.25	60,000		
Lighting controls with control panels, sensors and switches	48,000	sf	1.25	60,000		
<b>Branch devices</b>						
Duplex and GFI receptacles	48,000	sf	0.50	24,000		
Lighting and branch circuitry	48,000	sf	4.50	216,000		
EMT and MC cable	48,000	sf	4.50	216,000		
SUBTOTAL					588,000	
<b>D5030 COMMUNICATION &amp; SECURITY SYSTEMS</b>						
<b>Fire Alarm</b>						
Control panel	1	ea	15,000.00	w/addition		
Annunciator	1	ea	1,500.00	w/addition		
Beacon	1	ea	2,250.00	w/addition		
Knox box	1	ea	350.00	w/addition		
Radio master box	1	ea	9,500.00	w/addition		
Devices and cabling	48,000	sf	2.00	96,000		
Mass. Notification	48,000	sf	1.00	48,000		
Testing programming	1	ls	5,000.00	5,000		
<b>Bi-Directional System</b>						
BDA system	1	ls	100,000.00	w/addition		
<b>Telephone/Data/CATV</b>						
Network switches, PBX, IP, VP, CATV (By owner) By Owner						
Telecommunications rough in	48,000	sf	1.00	48,000		
Telecommunications devices and cabling	48,000	sf	2.00	96,000		
Grounding	1	ls	1,500.00	1,500		
<b>Public Address/Clock System</b>						
PA/Master Clock system	48,000	sf	1.00	48,000		
Classroom Speech Amplification	48,000	sf	0.50	24,000		
<b>Audio Visual (rough-in and power only)</b>						
AV equipment By Owner						
Rough-In conduit and backboxes only	48,000	sf	0.50	24,000		
<b>Gymnasium</b>						
Sound system	1	ls	30,000.00	30,000		
Scoreboard/ shot clocks with feed and connection	1	ea	15,000.00	15,000		
<b>Security System</b>						
Head end	1	ls	50,000.00	w/addition		
Card access system	48,000	sf	1.00	48,000		
Intrusion system	48,000	sf	1.00	48,000		
CCTV surveillance system	48,000	sf	2.00	96,000		

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F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
243	<b>HIGH SCHOOL RENOVATION - OPTION 3A</b>						
244	SUBTOTAL					627,500	
245	<b>D5040 OTHER ELECTRICAL SYSTEMS</b>						
246	Miscellaneous						
247	Lightning Protection System, UL Master label	1	ls	95,000.00	w/addition		
248	Temp power and lights	1	ls	150,000.00	w/addition		
249	Hoisting and rigging	1	ls	10,000.00	w/addition		
250	Seismic restraints	1	ls	7,500.00	w/addition		
251	Coordination, BIM & shop drawings	1	ls	240,000.00	w/addition		
252	Fees & Permits	1	ls	160,000.00	w/addition		
253	SUBTOTAL						
254	<b>TOTAL - ELECTRICAL</b>						
255							<b>\$1,691,500</b>
256	<b>E10 EQUIPMENT</b>						
257	<b>E10 EQUIPMENT, GENERALLY</b>						
258	Gym wall pads	1	ls	20,000.00	20,000		
259	Basketball backstops; swing up; electric operated	12	loc	10,000.00	120,000		
260	Gymnasium dividing net; electrically operated	3	ea	30,000.00	90,000		
261	Volleyball net and standards	1	ls	5,000.00	5,000		
262	Telescoping bleachers	900	seats	240.00	216,000		
263	SUBTOTAL					451,000	
264	<b>TOTAL - EQUIPMENT</b>						
265							<b>\$451,000</b>
266	<b>E20 FURNISHINGS</b>						
267	<b>E2010 FIXED FURNISHINGS</b>						
268	Window shades	3,655	sf	7.00	25,585		
269	Entrance mats	1	ls	5,000.00	5,000		
270	<b>E2020 MOVABLE FURNISHINGS</b>						
271	All movable furnishings to be provided and installed by owner						
272	SUBTOTAL					NIC	
273	<b>TOTAL - FURNISHINGS</b>						
274							<b>\$510,585</b>
275	<b>F10 SPECIAL CONSTRUCTION</b>						
276	<b>F10 SPECIAL CONSTRUCTION</b>						
277	SUBTOTAL						
278	<b>TOTAL - SPECIAL CONSTRUCTION</b>						
279							
280	<b>F20 SELECTIVE BUILDING DEMOLITION</b>						
281	<b>F2010 BUILDING ELEMENTS DEMOLITION</b>						
282	Remove exterior glazing	3,655	sf	7.00	25,585		
283	Remove roofing	26,500	sf	2.00	In HazMat		
284	Interior demolition	48,000	gsf	6.00	288,000		
285	Temporary exterior	750	sf	40.00	30,000		

F. COST ESTIMATES

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
303	<b>HIGH SCHOOL RENOVATION - OPTION 3A</b>						
304	Temporary enclosures/protection	48,000	sf	3.00	144,000		
305	SUBTOTAL					487,585	
306	<b>F2020 HAZARDOUS COMPONENTS ABATEMENT</b>						
307	See summary						
308	SUBTOTAL						
309	<b>TOTAL - SELECTIVE BUILDING DEMOLITION</b>						
310							<b>\$487,585</b>
311							

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<b>CONSTRUCTION COST SUMMARY</b>					
BUILDING SYSTEM		SUB-TOTAL	TOTAL	\$/SF	%
<b>OPTION 3A NEW ADDITION</b>					
<b>A10 FOUNDATIONS</b>					
A1010	Standard Foundations	\$592,000			
A1020	Special Foundations	\$2,960,000			
A1030	Lowest Floor Construction	\$1,087,935	<b>\$4,639,935</b>	\$29.03	7.4%
<b>A20 BASEMENT CONSTRUCTION</b>					
A2010	Basement Excavation	\$0			
A2020	Basement Walls	\$235,875	<b>\$235,875</b>	\$1.48	0.4%
<b>B10 SUPERSTRUCTURE</b>					
B1010	Upper Floor Construction	\$3,659,564			
B1020	Roof Construction	\$2,709,300	<b>\$6,368,864</b>	\$39.85	10.1%
<b>B20 EXTERIOR CLOSURE</b>					
B2010	Exterior Walls	\$8,327,636			
B2020	Windows	\$4,357,164			
B2030	Exterior Doors	\$101,640	<b>\$12,786,440</b>	\$80.00	20.3%
<b>B30 ROOFING</b>					
B3010	Roof Coverings	\$2,016,000			
B3020	Roof Openings	\$32,500	<b>\$2,048,500</b>	\$12.82	3.3%
<b>C10 INTERIOR CONSTRUCTION</b>					
C1010	Partitions	\$3,835,848			
C1020	Interior Doors	\$958,962			
C1030	Specialties/Millwork	\$1,548,057	<b>\$6,342,867</b>	\$39.69	10.1%
<b>C20 STAIRCASES</b>					
C2010	Stair Construction	\$215,000			
C2020	Stair Finishes	\$31,436	<b>\$246,436</b>	\$1.54	0.4%
<b>C30 INTERIOR FINISHES</b>					
C3010	Wall Finishes	\$2,237,578			
C3020	Floor Finishes	\$1,438,443			
C3030	Ceiling Finishes	\$1,758,097	<b>\$5,434,118</b>	\$34.00	8.6%
<b>D10 CONVEYING SYSTEMS</b>					
D1010	Elevator	\$120,000	<b>\$120,000</b>	\$0.75	0.2%
<b>D20 PLUMBING</b>					
D20	Plumbing	\$2,557,232	<b>\$2,557,232</b>	\$16.00	4.1%
<b>D30 HVAC</b>					
D30	HVAC	\$11,187,890	<b>\$11,187,890</b>	\$70.00	17.8%

F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>					
BUILDING SYSTEM		SUB-TOTAL	TOTAL	\$/SF	%
<b>OPTION 3A NEW ADDITION</b>					
<b>D40 FIRE PROTECTION</b>					
D40	Fire Protection	\$958,962	<b>\$958,962</b>	\$6.00	1.5%
<b>D50 ELECTRICAL</b>					
D5010	Complete System	\$6,998,765	<b>\$6,998,765</b>	\$43.79	11.1%
<b>E10 EQUIPMENT</b>					
E10	Equipment	\$1,259,100	<b>\$1,259,100</b>	\$7.88	2.0%
<b>E20 FURNISHINGS</b>					
E2010	Fixed Furnishings	\$1,814,056			
E2020	Movable Furnishings NIC		<b>\$1,814,056</b>	\$11.35	2.9%
<b>F10 SPECIAL CONSTRUCTION</b>					
F10	Special Construction	\$0	<b>\$0</b>	\$0.00	0.0%
<b>F20 HAZMAT REMOVALS</b>					
F2010	Building Elements Demolition	\$0			
F2020	Hazardous Components Abatement	\$0	<b>\$0</b>	\$0.00	0.0%
<b>TOTAL DIRECT COST (Trade Costs)</b>			<b>\$62,999,040</b>	<b>\$394.17</b>	<b>100.0%</b>

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 3A NEW ADDITION</b>							
<b>GROSS FLOOR AREA CALCULATION</b>							
	Level 00				33,708		
	Level 01				51,555		
	Level 02				40,658		
	Level 03				33,906		
<b>TOTAL GROSS FLOOR AREA (GFA)</b>					<b>159,827</b>	<b>sf</b>	
<b>A10 FOUNDATIONS</b>							
	SOG	74,000					
<b>A1010 STANDARD FOUNDATIONS</b>							
	Allowance for standard foundations; 50% of building footprint	37,000	sf	16.00	592,000		
<b>SUBTOTAL</b>						592,000	
<b>A1020 SPECIAL FOUNDATIONS</b>							
	Allowance for shallow pier foundations; 50% of building footprint	37,000	sf	80.00	2,960,000		
<b>SUBTOTAL</b>						2,960,000	
<b>A1030 LOWEST FLOOR CONSTRUCTION</b>							
<u>New Slab on grade, 5" thick</u>							
	Gravel fill, 12"	2,741	cy	40.00	109,640		
	Rigid insulation	74,000	sf	2.25	166,500		
	Vapor barrier	74,000	sf	1.00	74,000		
	Compact existing sub-grade	74,000	sf	0.50	37,000		
	Mesh reinforcing 15% lap	85,100	sf	1.15	97,865		
	Concrete - 5" thick; 4,000 psi	1,209	cy	125.00	151,125		
	Placing concrete	1,209	cy	45.00	54,405		
	Finishing and curing concrete	74,000	sf	2.50	185,000		
	Control joints - saw cut	74,000	sf	0.10	7,400		
<u>Miscellaneous</u>							
	Premium for rock excavation to 50% of foundations	1	ls	100,000.00	100,000		
	Premium for sloped floor at auditorium	1	ls	50,000.00	50,000		
	New Elevator pit	1	ea	40,000.00	40,000		
	Equipment pads	1	ls	15,000.00	15,000		
<b>SUBTOTAL</b>						1,087,935	
<b>TOTAL - FOUNDATIONS</b>							<b>\$4,639,935</b>
<b>A20 BASEMENT CONSTRUCTION</b>							
<b>A2010 BASEMENT EXCAVATION</b>							
<b>SUBTOTAL</b>						-	
<b>A2020 BASEMENT WALLS</b>							
	Allowance for retaining walls	185	lf	1,275.00	235,875		
<b>SUBTOTAL</b>						235,875	
<b>TOTAL - BASEMENT CONSTRUCTION</b>							<b>\$235,875</b>
<b>B10 SUPERSTRUCTURE</b>							
		14.50	lbs/sf		-		
<b>B1010 FLOOR CONSTRUCTION</b>							
<u>Floor Structure - Steel:</u>							
	Steel beams and columns to new addition; 14.5#/SF	622	tns	3,800.00	2,363,600		
	Premium for HSS	156	tns	300.00	46,800		
	Shear studs	17,165	ea	2.50	42,913		
<u>Floor Structure</u>							
	2" 18 Ga. Metal galvanized floor Deck	85,827	sf	4.00	343,308		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 3A NEW ADDITION</b>							
	WWF reinforcement	98,701	sf	0.80	78,961		
	Concrete Fill to metal deck; 6" Normal Weight	2,003	cy	135.00	270,405		
	Place and finish concrete	85,827	sf	2.50	214,568		
	Rebar to decks	25,748	lbs	1.20	30,898		
	Misc. angles	85,827	sf	0.50	Incl		
<u>Miscellaneous</u>							
	Fire proofing to columns and beams	85,827	sf	2.25	193,111		
	Intumescent paint	1	ls	50,000.00	50,000		
	Fire stopping floors	1	ls	25,000.00	25,000		
<b>SUBTOTAL</b>						3,659,564	
<b>B1020 ROOF CONSTRUCTION</b>							
<u>Roof Structure - Steel:</u>							
	Steel beams and columns to new addition; 14.5#/SF	537	tns	3,800.00	2,040,600		
	Premium for HSS	134	tns	300.00	40,200		
	Exposed steel	1	ls	50,000.00	50,000		
<u>Roof Structure</u>							
	Acoustic deck allowance	5,000	sf	9.00	45,000		
	3" 20 Ga. galvanized Metal Roof Deck	69,000	sf	3.50	241,500		
<u>Miscellaneous</u>							
	Concrete under RTU's	8,500	sf	10.00	85,000		
	Fire proofing to columns, beams and deck	69,000	sf	3.00	207,000		
<b>SUBTOTAL</b>						2,709,300	
<b>TOTAL - SUPERSTRUCTURE</b>							<b>\$6,368,864</b>
<b>B20 EXTERIOR CLOSURE</b>							
<b>B2010 EXTERIOR WALLS</b>							
	Exterior Wall Area; EXT 1	65,785	sf				
<u>MISC. METALS</u>							
	Stainless steel sign at main entrance	1	ls	10,000.00	10,000		
<u>WATERPROOFING, DAMPPROOFING AND CAULKING</u>							
	Air barrier; fluid applied	65,785	sf	6.00	394,710		
	Air barrier/flashing at windows	15,822	lf	6.25	98,888		
	Miscellaneous sealants to closure	65,785	sf	1.00	65,785		
<u>THERMAL INSULATION</u>							
	Insulation; 6" XPS	65,785	sf	5.50	361,818		
	Insulation; 4" spray	65,785	sf	4.25	279,586		
<u>CLADDING</u>							
	Metal panel; rainscreen system	65,785	sf	70.00	4,604,950		
	Mechanical screen; includes backup structure	5,693	sf	85.00	483,905		
	Soffits; including all backup; S1	8,233	sf	100.50	827,417		
<u>GYPSUM BOARD ASSEMBLIES</u>							
	6" metal stud backup	65,785	sf	12.00	789,420		
	Gypsum Sheathing	65,785	sf	2.75	180,909		
	Drywall lining to interior face of stud backup	65,785	sf	3.50	230,248		
<b>SUBTOTAL</b>						8,327,636	
<b>B2020 WINDOWS</b>							
	Exterior Wall Area	26,898	sf				
<u>ROUGH CARPENTRY</u>							

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>OPTION 3A NEW ADDITION</b>								
124	Wood blocking at openings	15,822	lf	12.00	189,864			
125	070001 WATERPROOFING, DAMPPROOFING AND CAULKING							
126	Backer rod & double sealant	15,822	lf	10.00	158,220			
128	080001 METAL WINDOWS							
129	Windows, triple glazed; fiberglass; W1	16,446	sf	125.00	2,055,750			
130	Curtainwall, triple glazed; BOD Kawneer 1600 sys 2 1" IGU; W2	10,452	sf	165.00	1,724,580			
131	Sunshades; 3" aluminum trellis	1,500	lf	140.00	210,000			
132	089000 LOUVERS							
133	Louvers	250	sf	75.00	18,750			
134	SUBTOTAL					4,357,164		
135	<b>B2030 EXTERIOR DOORS</b>							
136	Glazed entrance doors including frame and hardware; double door	10	pr	9,000.00	90,000			
137	HM doors, frames and hardware- Double	4	pr	2,000.00	8,000			
138	Backer rod & double sealant	280	lf	10.00	2,800			
139	Wood blocking at openings	280	lf	3.00	840			
140	SUBTOTAL					101,640		
141	<b>TOTAL - EXTERIOR CLOSURE</b>						<b>\$12,786,440</b>	
142	<b>B30 ROOFING</b>							
143	<b>B3010 ROOF COVERINGS</b>							
144	New roofing complete; TPO 8" Insulation; R1	74,000	sf	24.00	1,776,000			
145	Allowance for green roof; includes planted areas, paving, fencing etc.	4,000	sf	60.00	240,000			
146	SUBTOTAL					2,016,000		
147	<b>B3020 ROOF OPENINGS</b>							
148	Skylights, allow	1	ls	30,000.00	30,000			
149	Roof hatch	1	loc	2,500.00	2,500			
150	SUBTOTAL					32,500		
151	<b>TOTAL - ROOFING</b>						<b>\$2,048,500</b>	
152	<b>C10 INTERIOR CONSTRUCTION</b>							
153	<b>C1010 PARTITIONS</b>							
154	Miscellaneous partitions/glazed partitions/borrowed lights/blocking etc.	159,827	gsf	24.00	3,835,848			
155	SUBTOTAL					3,835,848		
156	<b>C1020 INTERIOR DOORS</b>							
157	Interior doors, frames and hardware	159,827	gsf	6.00	958,962			
158	SUBTOTAL					958,962		
159	<b>C1030 SPECIALTIES / MILLWORK</b>							
160	Toilet Partitions and accessories	159,827	gsf	1.00	159,827			
161	Backer panels in electrical closets	1	ls	1,000.00	1,000			
162	Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms	159,827	sf	1.25	199,784			
163	Room Signs	159,827	gsf	0.50	79,914			
164	Fire extinguisher cabinets	53	ea	350.00	18,550			
165	Lockers, full height	710	ea	350.00	248,500			
166	New catwalk	1	ls	100,000.00	100,000			
167	Janitors Work Shop Accessories	1	ls	1,500.00	1,500			
168	Janitors Closet Accessories	3	rms	300.00	900			
169	Media							
170	Reception desks	2	loc	25,000	50,000			
171	Railings to open to below areas	362	lf	300.00	108,600			
172	Library shelving at perimeters 7' Tall						F,F & E	

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>OPTION 3A NEW ADDITION</b>								
187	Library shelving at perimeters 3' Tall						F,F & E	
188	Stage proscenium	1	ls	100,000	100,000			
189	Display cases	159,827	gsf	0.25	39,957			
190	Miscellaneous metals throughout building	159,827	sf	1.25	199,784			
191	Miscellaneous sealants throughout building	159,827	sf	1.50	239,741			
192	SUBTOTAL					1,548,057		
193	<b>TOTAL - INTERIOR CONSTRUCTION</b>						<b>\$6,342,867</b>	
194	<b>C20 STAIRCASES</b>							
195	<b>C2010 STAIR CONSTRUCTION</b>							
196	Metal pan stair; egress stair	3	flt	35,000.00	105,000			
197	Main staircase	2	flt	50,000.00	100,000			
198	Concrete fill to stairs	5	flt	2,000.00	10,000			
199	SUBTOTAL					215,000		
200	<b>C2020 STAIR FINISHES</b>							
201	High performance coating to stairs including all railings etc.	5	flt	3,000.00	15,000			
202	Rubber tile at stairs - landings	500	sf	10.00	5,000			
203	Rubber tile at stairs - treads & risers	600	lft	19.06	11,436			
204	SUBTOTAL					31,436		
205	<b>TOTAL - STAIRCASES</b>						<b>\$246,436</b>	
206	<b>C30 INTERIOR FINISHES</b>							
207	<b>C3010 WALL FINISHES</b>							
208	Wall finishes	159,827	sf	14.00	2,237,578			
209	SUBTOTAL					2,237,578		
210	<b>C3020 FLOOR FINISHES</b>							
211	Floor finishes	159,827	sf	9.00	1,438,443			
212	SUBTOTAL					1,438,443		
213	<b>C3030 CEILING FINISHES</b>							
214	Ceiling finishes	159,827	sf	11.00	1,758,097			
215	SUBTOTAL					1,758,097		
216	<b>TOTAL - INTERIOR FINISHES</b>						<b>\$5,434,118</b>	
217	<b>D10 CONVEYING SYSTEMS</b>							
218	<b>D1010 ELEVATOR</b>							
219	New elevator; 3 stop; oversize; 5,000 lbs	1	ea	120,000.00	120,000			
220	SUBTOTAL					120,000		
221	<b>TOTAL - CONVEYING SYSTEMS</b>						<b>\$120,000</b>	
222	<b>D20 PLUMBING</b>							
223	<b>D20 PLUMBING, GENERALLY</b>							
224	Plumbing; complete system	159,827	sf	16.00	2,557,232			
225	SUBTOTAL					2,557,232		
226	<b>TOTAL - PLUMBING</b>						<b>\$2,557,232</b>	
227	<b>D30 HVAC</b>							
228	<b>D30 HVAC, GENERALLY</b>							
229	Geothermal Heating/Cooling System							
230	(2) 225 ton heat recovery chiller-heaters with (200) 6" boreholes, active chilled beams, heat recovery units, and rooftop ahu's	159,827	sf	70.00	11,187,890			
231	SUBTOTAL					11,187,890		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 3A NEW ADDITION</b>							
<b>TOTAL - HVAC</b>							<b>\$11,187,890</b>
<b>D40 FIRE PROTECTION</b>							
<b>D40</b>	<b>FIRE PROTECTION, GENERALLY</b>						
	Fire protection system	159,827	gsf	6.00	958,962		
	SUBTOTAL					958,962	
<b>TOTAL - FIRE PROTECTION</b>							<b>\$958,962</b>
<b>D50 ELECTRICAL</b>							
<b>D5010</b>	<b>SERVICE &amp; DISTRIBUTION</b>						
	<b>Gear &amp; Distribution</b>						
	5000A 480/277V switchboard	1	ls	140,000.00	140,000		
	Normal power distribution with associated panelboards, transformers and feeders	159,827	sf	4.00	639,308		
	<u>Emergency power</u>						
	Emergency generator and ATS's with associated panelboards, transformers and feeders	159,827	sf	2.50	399,568		
	<u>Equipment Wiring</u>						
	Elevator and cab power feed and connection	1	ea	5,000.00	5,000		
	Mechanical equipment wiring to HVAC heating and cooling equipment	159,827	sf	2.50	399,568		
	Misc. equipment wiring	159,827	sf	0.50	79,914		
	Gym equipment feed and connections	1	ls	15,000.00	15,000		
	SUBTOTAL					1,678,358	
<b>D5020</b>	<b>LIGHTING &amp; POWER</b>						
	<u>Lighting &amp; Branch Power</u>						
	Lighting fixtures with installation labor	159,827	sf	6.00	958,962		
	Lighting control system (Daylight Harvesting)						
	Lighting controls with control panels, sensors and switches	159,827	sf	1.25	199,784		
	<u>Branch devices</u>						
	Duplex and GFI receptacles	159,827	sf	0.50	79,914		
	<u>Lighting and branch circuitry</u>						
	EMT and MC cable	159,827	sf	4.50	719,222		
	SUBTOTAL					1,957,882	
<b>D5030</b>	<b>COMMUNICATION &amp; SECURITY SYSTEMS</b>						
	<u>Fire Alarm</u>						
	Control panel	1	ea	15,000.00	15,000		
	Annunciator	1	ea	1,500.00	1,500		
	Beacon	1	ea	2,250.00	2,250		
	Knox box	1	ea	350.00	350		
	Radio master box	1	ea	9,500.00	9,500		
	Devices and cabling	159,827	sf	2.00	319,654		
	Mass. Notification	159,827	sf	1.00	159,827		
	Testing programming	1	ls	5,000.00	5,000		
	<u>Bi-Directional System</u>						
	BDA system	1	ls	100,000.00	100,000		
	<u>Telephone/Data/CATV</u>						
	Network switches, PBX, IP, VP, CATV (By owner)					By Owner	
	Telecommunications rough in	159,827	sf	1.00	159,827		
	Telecommunications devices and cabling	159,827	sf	2.00	319,654		
	Grounding	1	ls	1,500.00	1,500		
	<u>Public Address/Clock System</u>						
	PA/Master Clock system	159,827	sf	1.00	159,827		
	Classroom Speech Amplification	159,827	sf	0.50	79,914		
	<u>Audio Visual (rough-in and power only)</u>						
	AV equipment					By Owner	
	Rough-In conduit and backboxes only	159,827	sf	0.50	79,914		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 3A NEW ADDITION</b>							
	<u>Auditorium</u>						
	Rigging system equipment & installation					See equipment	
	Power to rigging equipment	1	ls	12,000.00	12,000		
	Stage dimming system with performance fixture package, allow	1	ls	275,000.00	275,000		
	Installation, rough-in & 120V power to dimming equipment	1	ls	70,000.00	70,000		
	Performance audio visual equipment, installation & LV cabling, allow	1	ls	150,000.00	150,000		
	Performance audio visual rough-in and power	1	ls	60,000.00	60,000		
	<u>Cafeteria</u>						
	Sound system	1	ls	15,000.00	15,000		
	<u>Media Center</u>						
	Sound system	1	ls	15,000.00	15,000		
	<u>Security System</u>						
	Head end	1	ls	50,000.00	50,000		
	Card access system	159,827	sf	1.00	159,827		
	Intrusion system	159,827	sf	1.00	159,827		
	CCTV surveillance system	159,827	sf	2.00	319,654		
	SUBTOTAL						2,700,025
<b>D5040</b>	<b>OTHER ELECTRICAL SYSTEMS</b>						
	<u>Miscellaneous</u>						
	Lightning Protection System, UL Master label	1	ls	95,000.00	95,000		
	Temp power and lights	1	ls	150,000.00	150,000		
	Hoisting and rigging	1	ls	10,000.00	10,000		
	Seismic restraints	1	ls	7,500.00	7,500		
	Coordination, BIM & shop drawings	1	ls	240,000.00	240,000		
	Fees & Permits	1	ls	160,000.00	160,000		
	SUBTOTAL						662,500
<b>TOTAL - ELECTRICAL</b>							<b>\$6,998,765</b>
<b>E10 EQUIPMENT</b>							
<b>E10</b>	<b>EQUIPMENT, GENERALLY</b>						
	Theatrical Equipment Stage curtains, rigging and controls	1	ls	350,000.00	350,000		
	Theatrical AV allowance	1	ls	200,000.00	200,000		
	Kitchen equipment	2,030	sf	220.00	446,600		
	Auditorium seats	750	seat	350.00	262,500		
	SUBTOTAL						1,259,100
<b>TOTAL - EQUIPMENT</b>							<b>\$1,259,100</b>
<b>E20 FURNISHINGS</b>							
<b>E2010</b>	<b>FIXED FURNISHINGS</b>						
	Entry mats & frames - recessed with carpet/rubber strips	500	sf	55.00	27,500		
	Window blinds	26,898	sf	7.00	188,286		
123553	<u>CASEWORK</u>						
	Sinks, counters and casework; allowance	159,827	sf	10.00	1,598,270		
	SUBTOTAL						1,814,056
<b>E2020</b>	<b>MOVABLE FURNISHINGS</b>						
	All movable furnishings to be provided and installed by owner						NIC
<b>TOTAL - FURNISHINGS</b>							<b>\$1,814,056</b>
<b>F10 SPECIAL CONSTRUCTION</b>							
<b>F10</b>	<b>SPECIAL CONSTRUCTION</b>						
	No items in this section						

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 3A NEW ADDITION							
	SUBTOTAL						
<b>TOTAL - SPECIAL CONSTRUCTION</b>							
	<b>F20 SELECTIVE BUILDING DEMOLITION</b>						
<b>F2010</b>	<b>BUILDING ELEMENTS DEMOLITION</b>						
	No items in this section						
	SUBTOTAL						
<b>F2020</b>	<b>HAZARDOUS COMPONENTS ABATEMENT</b>						
	See main summary for HazMat allowance				See Summary		
	SUBTOTAL						
<b>TOTAL - SELECTIVE BUILDING DEMOLITION</b>							

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F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK OPTION 3A							
	<b>G SITEWORK</b>	1,900,000	sf		-		
<b>G10</b>	<b>SITE PREPARATION &amp; DEMOLITION</b>						
	Site construction fence/barricades	7,900	lf	18.00	142,200		
	Site construction fence gates	1	ea	10,000.00	10,000		
	Stabilized construction entrance	1	ls	15,000.00	15,000		
	Pavement/curbing removal, crush and re-use for sub-base	250,800	sf	1.00	250,800		
	Demolish tennis courts	56,200	sf	1.50	84,300		
	Demolish track/football field	175,625	sf	1.00	175,625		
	Walkways	1	ls	20,000.00	20,000		
	Miscellaneous demolition	1	ls	100,000.00	100,000		
	SUBTOTAL					797,925	
	Temporary parking	190	spc				
	gravel base; 12" thick	2,981	cy	40.00	119,240		
	Binder course	8,944	sy	20.00	178,880		
	Construction fence	1,135	lf	18.00	20,430		
	Line markings/painting/signs	190	spc	100.00	19,000		
	Demolish temp parking	110,000	sf	1.00	110,000		
	Blasting for temporary parking	1	ls	150,000.00	150,000		
	SUBTOTAL					597,550	
	<u>Site Earthwork</u>						
	Strip Topsoil and remove; 6" thick	3,148	cy	16.00	50,368		
	Fine grading	659,695	sf	0.20	131,939		
	Cut and Fill; assumed AV 1ft; balanced site	24,433	cy	10.00	244,330		
	Silt fence/erosion control, wash bays, stock piles	7,900	lf	12.00	94,800		
	Silt fence maintenance and monitoring	1	ls	40,000.00	40,000		
	<u>Hazardous Waste Remediation</u>						
	Remove existing underground fuel storage tanks; 500 Gal	1	ls	50,000.00	50,000		
	Dispose/treat contaminated soils	1	ls	20,000.00	20,000		
	SUBTOTAL					631,437	
<b>G20</b>	<b>SITE IMPROVEMENTS</b>						
	<u>Asphalt Paving: parking lot and roadway</u>	250,800					
	gravel base; 12" thick	9,289	cy	40.00	371,560		
	asphalt; 4" thick	27,867	sy	25.00	696,675		
	VGC	10,032	lf	40.00	401,280		
	Single solid lines, 4" thick	1	ls	10,000.00	10,000		
	Crosswalk Hatching	4	loc	900.00	3,600		
	Other road markings	1	ls	7,500.00	7,500		
	HC curb cuts	8	loc	350.00	2,800		
	Signage	1	ls	20,000.00	20,000		
	<u>Pedestrian Paving</u>						
	Concrete paving						
	gravel base; 8" thick	372	cy	35.00	13,020		
	4" concrete paving	15,000	sf	9.00	135,000		
	<u>Drop Off Plaza</u>	16,720	sf				
	Precast pavers; 50%	8,360	sf	40.00	334,400		
	Poured in place rubber safety surface; 25%	4,180	sf	26.00	108,680		
	Planted areas; 25%	4,180	sf	10.00	41,800		
	<u>Ground Level Garden: Pre-K Playground</u>	10,450	sf		-		
	Rubber surface over concrete	7,838	sf	18.00	141,084		
	Raised planters; green space	2,613	sf	10.00	26,130		
	Shade structure	1	loc	30,000.00	30,000		
	Music elements	1	loc	35,000.00	35,000		
	Play equipment	1	loc	50,000.00	50,000		
	SUBTOTAL					2,428,529	
	<u>Site Athletics</u>						
	<b>STADIUM - Running Track/Turf Football Field/Bleachers</b>						

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F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>SITEWORK OPTION 3A</b>							
63	Synthetic turf anchor curb integral with trench drain	1,310	lf	80.00	104,800		
64	Resilient surface at track	75,525	sf	8.00	604,200		
65	Gravel base - assumed 12" thick	3,707	cy	45.00	166,815		
66	Geotextile reinforced impermeable liner 20 mill	100,100	sf	1.00	100,100		
67	Synthetic turf field - Hybrid infill synthetic field with premolded resilient drainage pad	100,100	sf	12.00	1,201,200		
68	Football goals	2	ea	3,500.00	7,000		
69	Scoreboard	1	ea	60,000.00	60,000		
70	Line markings - allowance	2	ls	2,000.00	4,000		
71	1250 seat bleacher	1	loc	450,000.00	450,000		
72	Rip-Rap under bleachers	1	ls	25,000.00	25,000		
73	Field logo's	1	loc	6,000.00	6,000		
74	Discus pad & enclosure	1	ea	15,000.00	15,000		
75	Shot put pad & enclosure	1	ea	15,000.00	15,000		
76	Long jump/triple jump	2	ea	10,000.00	20,000		
77	Pole vault and accessories	1	ea	10,000.00	10,000		
78	High jump pads	1	ea	6,000.00	6,000		
79	Javelin with track surfacing runway	1	ea	10,000.00	10,000		
80	Hurdles and starting blocks	1	ls	8,000.00	8,000		
81	Track crossing pad	1	ls	10,000.00	10,000		
82	Trash/recycling receptacles	12	ea	800.00	9,600		
83	Team benches - 7'-5" long	12	ea	1,500.00	18,000		
84	Portable ball control netting, 120' long	4	ea	2,500.00	10,000		
85	Pit covers	2	ea	3,500.00	7,000		
86	Subsurface infiltration/drainage/field drains etc.	175,625	sf	1.25	219,531		
87	Stadium sound system (AV)	1	ls	120,000.00	120,000		
88	SUBTOTAL					3,207,246	
89	Baseball/Field Hockey	1	ea	360,000.00	360,000		
90	Synthetic grass soccer fields; Two Fields	140,500	sf	12.00	1,686,000		
91	Full size field; grass	1	ea	300,000.00	300,000		
92	Softball field	1	ea	250,000.00	250,000		
93	Tennis courts - Six Courts (including pickle courts); 1 basketball court	50,600	sf				
94	gravel base; 8" thick	1,256	cy	40.00	50,240		
95	Asphalt paving	5,622	sy	30.00	168,660		
96	Color coating	50,600	sf	2.00	101,200		
97	Fence with wind break	1,177	lf	80.00	94,160		
98	Tennis court nets	5	set	1,500.00	7,500		
99	Basketball hoops	1	set	5,000.00	5,000		
100	SUBTOTAL					3,022,760	
101	<u>Site Improvements</u>						
102	Flag pole 50' high	1	ea	6,500.00	6,500		
103	Concrete retaining walls	1	ls	500,000.00	500,000		
104	Other site improvements; walls, fences etc.	1	ls	200,000.00	200,000		
105	Outdoor dining	1	ls	50,000.00	50,000		
106	SUBTOTAL					756,500	
107	<u>Landscaping</u>						
108	Topsoil - reuse existing	3,148	cy	25.00	78,700		
109	Topsoil - Import new topsoil; minimum 6"	581	cy	65.00	37,765		
110	Seeding	964,805	sf	0.15	144,721		
111	Green space	31,350	sf	10.00	313,500		
112	SUBTOTAL					574,686	
113	<b>G30 CIVIL MECHANICAL UTILITIES</b>						
114	<u>Water supply; Pricing includes E&amp;B and bedding</u>						
115	Temporary water line	650	lf	120.00	78,000		
116	New DI piping; 8"	450	lf	100.00	45,000		
117	New DI piping; 8" Fire loop	2,800	lf	100.00	280,000		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>SITEWORK OPTION 3A</b>								
126	Connect to existing	1	loc	5,000.00	5,000			
127	FD connection	1	ea	2,000.00	2,000			
128	Gate valves	8	ea	750.00	6,000			
129	Fire hydrant	3	ea	5,000.00	15,000			
130	SUBTOTAL					431,000		
131	<u>Sanitary; Pricing includes E&amp;B and bedding</u>							
132	Temporary sewer line	1	ls	50,000.00	50,000			
133	Manholes	4	ea	4,000.00	16,000			
134	Grease trap	1	ea	15,000.00	15,000			
135	8" PVC	1,000	lf	60.00	60,000			
136	Connect to existing drain	1	ea	3,000.00	3,000			
137	SUBTOTAL					144,000		
138	<u>Storm water; Pricing includes E&amp;B and bedding</u>							
139	Temporary storm (relocate existing 15" line + new manholes)	1	ls	125,000.00	125,000			
140	Allowance for new drainage systems; piping only	250,800	sf	3.00	752,400			
141	Infiltration systems; cultec chambers	137,500	cf	8.00	1,100,000			
142	Rock excavation	1	ls	250,000.00	250,000			
143	Catch basins	12	ea	3,800.00	45,600			
144	Manholes	10	ea	4,500.00	45,000			
145	WQ structures	3	ea	16,000.00	48,000			
146	Area drains	4	ea	1,500.00	6,000			
147	Work to culvert	1	ls	250,000.00	250,000			
148	<u>Gas service</u>							
149	E&B trench for new gas pipe - install by plumbing	450	lf	25.00	11,250			
150	SUBTOTAL					2,633,250		
151	<b>G40 ELECTRICAL UTILITIES</b>							
152	<u>Power</u>							
153	Utility co. backcharges, allow	1	ls	30,000.00	Utility co.			
154	Connections at existing manhole				Utility co.			
155	Manhole	1	ls	8,500.00	8,500			
156	Connections in manhole	1	ls	3,500.00	3,500			
157	Primary ductbank 2-5" ductbank, empty, allow	1000	lf	120.00	120,000			
158	Transformer by utility company				By Utility Co.			
159	Transformer pad; temporary for relocated transformer	1	ea	5,000.00	5,000			
160	Secondary service	60	lf	1,100.00	66,000			
161	<u>Communications</u>							
162	Connection at riser pole, allow	1	ea	1,500.00	1,500			
163	Telecom ductbank 4-4", allow	1000	lf	152.00	152,000			
164	<u>Site Lighting</u>							
165	Site Parking lighting (allow)	250,800	sf	2.00	501,600			
166	SUBTOTAL					858,100		
167	<b>TOTAL - SITE DEVELOPMENT</b>							<b>\$16,082,983</b>

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<b>CONSTRUCTION COST SUMMARY</b>					
BUILDING SYSTEM		SUB-TOTAL	TOTAL	\$/SF	%
<b>OPTION 4A NEW BUILDING</b>					
<b>A10 FOUNDATIONS</b>					
A1010	Standard Foundations	\$663,248			
A1020	Special Foundations	\$3,316,240			
A1030	Lowest Floor Construction	\$1,244,117	<b>\$5,223,605</b>	\$25.13	7.0%
<b>A20 BASEMENT CONSTRUCTION</b>					
A2010	Basement Excavation	\$0			
A2020	Basement Walls	\$408,000	<b>\$408,000</b>	\$1.96	0.5%
<b>B10 SUPERSTRUCTURE</b>					
B1010	Upper Floor Construction	\$5,794,842			
B1020	Roof Construction	\$3,015,189	<b>\$8,810,031</b>	\$42.39	11.7%
<b>B20 EXTERIOR CLOSURE</b>					
B2010	Exterior Walls	\$7,093,817			
B2020	Windows	\$3,638,838			
B2030	Exterior Doors	\$101,640	<b>\$10,834,295</b>	\$52.13	14.4%
<b>B30 ROOFING</b>					
B3010	Roof Coverings	\$2,229,744			
B3020	Roof Openings	\$32,500	<b>\$2,262,244</b>	\$10.89	3.0%
<b>C10 INTERIOR CONSTRUCTION</b>					
C1010	Partitions	\$4,987,848			
C1020	Interior Doors	\$1,246,962			
C1030	Specialties/Millwork	\$1,766,357	<b>\$8,001,167</b>	\$38.50	10.7%
<b>C20 STAIRCASES</b>					
C2010	Stair Construction	\$237,000			
C2020	Stair Finishes	\$37,723	<b>\$274,723</b>	\$1.32	0.4%
<b>C30 INTERIOR FINISHES</b>					
C3010	Wall Finishes	\$2,909,578			
C3020	Floor Finishes	\$1,870,443			
C3030	Ceiling Finishes	\$2,286,097	<b>\$7,066,118</b>	\$34.00	9.4%
<b>D10 CONVEYING SYSTEMS</b>					
D1010	Elevator	\$160,000	<b>\$160,000</b>	\$0.77	0.2%
<b>D20 PLUMBING</b>					
D20	Plumbing	\$3,325,232	<b>\$3,325,232</b>	\$16.00	4.4%
<b>D30 HVAC</b>					
D30	HVAC	\$14,547,890	<b>\$14,547,890</b>	\$70.00	19.4%

F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>					
BUILDING SYSTEM		SUB-TOTAL	TOTAL	\$/SF	%
<b>OPTION 4A NEW BUILDING</b>					
<b>D40 FIRE PROTECTION</b>					
D40	Fire Protection	\$1,246,962	<b>\$1,246,962</b>	\$6.00	1.7%
<b>D50 ELECTRICAL</b>					
D5010	Complete System	\$8,723,426	<b>\$8,723,426</b>	\$41.97	11.6%
<b>E10 EQUIPMENT</b>					
E10	Equipment	\$1,832,600	<b>\$1,832,600</b>	\$8.82	2.4%
<b>E20 FURNISHINGS</b>					
E2010	Fixed Furnishings	\$2,275,882			
E2020	Movable Furnishings NIC		<b>\$2,275,882</b>	\$10.95	3.0%
<b>F10 SPECIAL CONSTRUCTION</b>					
F10	Special Construction	\$0	<b>\$0</b>	\$0.00	0.0%
<b>F20 HAZMAT REMOVALS</b>					
F2010	Building Elements Demolition	\$0			
F2020	Hazardous Components Abatement	\$0	<b>\$0</b>	\$0.00	0.0%
<b>TOTAL DIRECT COST (Trade Costs)</b>			<b>\$74,992,175</b>	<b>\$360.84</b>	<b>100.0%</b>

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F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4A NEW BUILDING</b>							
<b>GROSS FLOOR AREA CALCULATION</b>							
	Level 00			54,707			
	Level 01			82,906			
	Level 02			36,207			
	Level 03			34,007			
<b>TOTAL GROSS FLOOR AREA (GFA)</b>				<b>207,827</b>	<b>sf</b>		
<b>A10 FOUNDATIONS</b>							
<b>A1010</b>	<b>STANDARD FOUNDATIONS</b>						
	Allowance for standard foundations; 50% of building footprint	<b>41,453</b>	sf	16.00	663,248		
	SUBTOTAL					663,248	
<b>A1020</b>	<b>SPECIAL FOUNDATIONS</b>						
	Allowance for shallow pier foundations; 50% of building footprint	<b>41,453</b>	sf	80.00	3,316,240		
	SUBTOTAL						\$3,316,240
<b>A1030</b>	<b>LOWEST FLOOR CONSTRUCTION</b>						
	<u>New Slab on grade, 5" thick</u>						
	Gravel fill, 12"	<b>3,071</b>	cy	40.00	122,840		
	Rigid insulation	<b>82,906</b>	sf	2.25	186,539		
	Vapor barrier	<b>82,906</b>	sf	1.00	82,906		
	Compact existing sub-grade	<b>82,906</b>	sf	0.50	41,453		
	Mesh reinforcing 15% lap	<b>95,342</b>	sf	1.15	109,643		
	Concrete - 5" thick; 4,000 psi	<b>1,354</b>	cy	125.00	169,250		
	Placing concrete	<b>1,354</b>	cy	45.00	60,930		
	Finishing and curing concrete	<b>82,906</b>	sf	2.50	207,265		
	Control joints - saw cut	<b>82,906</b>	sf	0.10	8,291		
	<u>Miscellaneous</u>						
	Premium for rock excavation to 50% of foundations	<b>1</b>	ls	150,000.00	150,000		
	Premium for sloped floor at auditorium	<b>1</b>	ls	50,000.00	50,000		
	New Elevator pit	<b>1</b>	ea	40,000.00	40,000		
	Equipment pads	<b>1</b>	ls	15,000.00	15,000		
	SUBTOTAL						1,244,117
<b>TOTAL - FOUNDATIONS</b>							<b>\$5,223,605</b>
<b>A20 BASEMENT CONSTRUCTION</b>							
<b>A2010</b>	<b>BASEMENT EXCAVATION</b>						
	SUBTOTAL						-
<b>A2020</b>	<b>BASEMENT WALLS</b>						
	Allowance for retaining walls	<b>320</b>	lf	1,275.00	408,000		
	SUBTOTAL						408,000
<b>TOTAL - BASEMENT CONSTRUCTION</b>							<b>\$408,000</b>
<b>B10 SUPERSTRUCTURE</b>							
		14.50	lbs/sf		-		
<b>B1010</b>	<b>FLOOR CONSTRUCTION</b>	1,507	tns		-		
	<u>Floor Structure - Steel:</u>						
	Steel beams and columns to new addition; 14.5#/SF	<b>906</b>	tns	3,800.00	3,442,800		
	Premium for HSS	<b>227</b>	tns	300.00	68,100		
	Shear studs	<b>24,984</b>	ea	2.50	62,460		
	<u>Floor Structure</u>						
	2" 18 Ga. Metal galvanized floor Deck	<b>124,921</b>	sf	4.00	499,684		

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4A NEW BUILDING</b>							
	WWF reinforcement	<b>143,659</b>	sf	0.80	114,927		
	Concrete Fill to metal deck; 6" Normal Weight	<b>2,915</b>	cy	135.00	393,525		
	Place and finish concrete	<b>124,921</b>	sf	2.50	312,303		
	Rebar to decks	<b>37,476</b>	lbs	1.20	44,971		
	Misc. angles	<b>124,921</b>	sf	0.50	Incl		
	<u>Miscellaneous</u>						
	Allowance for running track	<b>1</b>	ls	500,000.00	500,000		
	Fire proofing to columns and beams	<b>124,921</b>	sf	2.25	281,072		
	Intumescent paint	<b>1</b>	ls	50,000.00	50,000		
	Fire stopping floors	<b>1</b>	ls	25,000.00	25,000		
	SUBTOTAL						5,794,842
<b>B1020</b>	<b>ROOF CONSTRUCTION</b>						
	<u>Roof Structure - Steel:</u>						
	Steel beams and columns to new addition; 14.5#/SF	<b>601</b>	tns	3,800.00	2,283,800		
	Premium for HSS	<b>150</b>	tns	300.00	45,000		
	Exposed steel	<b>1</b>	ls	50,000.00	50,000		
	<u>Roof Structure</u>						
	Acoustic deck allowance	<b>5,000</b>	sf	9.00	45,000		
	3" 20 Ga. galvanized Metal Roof Deck	<b>77,906</b>	sf	3.50	272,671		
	<u>Miscellaneous</u>						
	Concrete under RTU's	<b>8,500</b>	sf	10.00	85,000		
	Fire proofing to columns, beams and deck	<b>77,906</b>	sf	3.00	233,718		
	SUBTOTAL						3,015,189
<b>TOTAL - SUPERSTRUCTURE</b>							<b>\$8,810,031</b>
<b>B20 EXTERIOR CLOSURE</b>							
<b>B2010</b>	<b>EXTERIOR WALLS</b>						
	<b>Exterior Wall Area; EXT 1</b>	<b>61,602</b>	sf				
<b>055000</b>	<b>MISC. METALS</b>						
	Stainless steel sign at main entrance	<b>1</b>	ls	10,000.00	10,000		
<b>070001</b>	<b>WATERPROOFING, DAMPPROOFING AND CAULKING</b>						
	Air barrier	<b>61,602</b>	sf	7.00	431,214		
	Air barrier/flashing at windows	<b>13,309</b>	lf	6.25	83,181		
	Miscellaneous sealants to closure	<b>61,602</b>	sf	1.00	61,602		
<b>072100</b>	<b>THERMAL INSULATION</b>						
	Insulation; 6" XPS	<b>61,602</b>	sf	5.50	338,811		
	Insulation; 4" spray	<b>61,602</b>	sf	4.25	261,809		
<b>076400</b>	<b>CLADDING</b>						
	Metal panel; rainscreen system	<b>61,602</b>	sf	70.00	4,312,140		
	Mechanical screen; includes backup structure	<b>1,700</b>	sf	85.00	144,500		
	Soffits; including all backup; S1	<b>3,215</b>	sf	101.50	326,323		
<b>092900</b>	<b>GYPSUM BOARD ASSEMBLIES</b>						
	6" metal stud backup	<b>61,602</b>	sf	12.00	739,224		
	Gypsum Sheathing	<b>61,602</b>	sf	2.75	169,406		
	Drywall lining to interior face of stud backup	<b>61,602</b>	sf	3.50	215,607		
	SUBTOTAL						7,093,817
<b>B2020</b>	<b>WINDOWS</b>						
	<b>Exterior Wall Area</b>	<b>22,626</b>	sf				

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F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4A NEW BUILDING</b>							
061000	<b>ROUGH CARPENTRY</b>						
	Wood blocking at openings	13,309	lf	12.00	159,708		
070001	<b>WATERPROOFING, DAMPPROOFING AND CAULKING</b>						
	Backer rod & double sealant	13,309	lf	10.00	133,090		
080001	<b>METAL WINDOWS</b>						
	Windows, triple glazed; fiberglass; W1	15,400	sf	125.00	1,925,000		
	Curtainwall, triple glazed; BOD Kawneer 1600 sys 2 1" IGU; W2	7,226	sf	165.00	1,192,290		
	Sunshades; 3" aluminum trellis	1,500	lf	140.00	210,000		
089000	<b>LOUVERS</b>						
	Louvers	250	sf	75.00	18,750		
	<b>SUBTOTAL</b>					3,638,838	
B2030	<b>EXTERIOR DOORS</b>						
	Glazed entrance doors including frame and hardware; double door	10	pr	9,000.00	90,000		
	HM doors, frames and hardware- Double	4	pr	2,000.00	8,000		
	Backer rod & double sealant	280	lf	10.00	2,800		
	Wood blocking at openings	280	lf	3.00	840		
	<b>SUBTOTAL</b>					101,640	
<b>TOTAL - EXTERIOR CLOSURE</b>							<b>\$10,834,295</b>
<b>B30 ROOFING</b>							
B3010	<b>ROOF COVERINGS</b>						
	New roofing complete; TPO 8" Insulation; R1	82,906	sf	24.00	1,989,744		
	Roof garden/outdoor sensory garden; 50% decking/50% planters; includes furnishings and planting	4,000	sf	60.00	240,000		
	<b>SUBTOTAL</b>					2,229,744	
B3020	<b>ROOF OPENINGS</b>						
	Skyights, allow	1	ls	30,000.00	30,000		
	Roof hatch	1	loc	2,500.00	2,500		
	<b>SUBTOTAL</b>					32,500	
<b>TOTAL - ROOFING</b>							<b>\$2,262,244</b>
<b>C10 INTERIOR CONSTRUCTION</b>							
C1010	<b>PARTITIONS</b>						
	Miscellaneous partitions/glazed partitions/borrowed lights/blocking etc.	207,827	gsf	24.00	4,987,848		
	<b>SUBTOTAL</b>					4,987,848	
C1020	<b>INTERIOR DOORS</b>						
	Interior doors, frames and hardware	207,827	gsf	6.00	1,246,962		
	<b>SUBTOTAL</b>					1,246,962	
C1030	<b>SPECIALTIES / MILLWORK</b>						
	Toilet Partitions and accessories	207,827	gsf	1.00	207,827		
	Backer panels in electrical closets	1	ls	1,000.00	1,000		
	Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms	207,827	sf	1.25	259,784		
	Room Signs	207,827	gsf	0.50	103,914		
	Fire extinguisher cabinets	69	ea	350.00	24,150		
	Lockers, full height	710	ea	350.00	248,500		
	New catwalk	1	ls	100,000.00	100,000		
	Janitors Work Shop Accessories	1	ls	1,500.00	1,500		
	Janitors Closet Accessories	3	rms	300.00	900		
	Media						
	Reception desks	2	loc	25,000	50,000		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4A NEW BUILDING</b>							
	Railings to open to below areas	151	lf	300	45,300		
	Library shelving at perimeters 7' Tall				F,F & E		
	Library shelving at perimeters 3' Tall				F,F & E		
	Stage proscenium	1	ls	100,000	100,000		
	Display cases	207,827	sf	0.25	51,957		
	Miscellaneous metals throughout building	207,827	sf	1.25	259,784		
	Miscellaneous sealants throughout building	207,827	sf	1.50	311,741		
	<b>SUBTOTAL</b>					1,766,357	
<b>TOTAL - INTERIOR CONSTRUCTION</b>							<b>\$8,001,167</b>
<b>C20 STAIRCASES</b>							
C2010	<b>STAIR CONSTRUCTION</b>						
	Metal pan stair; egress stair	5	flt	35,000.00	175,000		
	Main staircase	1	flt	50,000.00	50,000		
	Concrete fill to stairs	6	flt	2,000.00	12,000		
	<b>SUBTOTAL</b>					237,000	
C2020	<b>STAIR FINISHES</b>						
	High performance coating to stairs including all railings etc.	6	flt	3,000.00	18,000		
	Rubber tile at stairs - landings	600	sf	10.00	6,000		
	Rubber tile at stairs - treads & risers	720	lft	19.06	13,723		
	<b>SUBTOTAL</b>					37,723	
<b>TOTAL - STAIRCASES</b>							<b>\$274,723</b>
<b>C30 INTERIOR FINISHES</b>							
C3010	<b>WALL FINISHES</b>						
	Wall finishes	207,827	sf	14.00	2,909,578		
	<b>SUBTOTAL</b>					2,909,578	
C3020	<b>FLOOR FINISHES</b>						
	Floor finishes	207,827	sf	9.00	1,870,443		
	<b>SUBTOTAL</b>					1,870,443	
C3030	<b>CEILING FINISHES</b>						
	Ceiling finishes	207,827	sf	11.00	2,286,097		
	<b>SUBTOTAL</b>					2,286,097	
<b>TOTAL - INTERIOR FINISHES</b>							<b>\$7,066,118</b>
<b>D10 CONVEYING SYSTEMS</b>							
D1010	<b>ELEVATOR</b>						
	New elevator; 4 stop; oversize; 5,000 lbs	1	ea	160,000.00	160,000		
	<b>SUBTOTAL</b>					160,000	
<b>TOTAL - CONVEYING SYSTEMS</b>							<b>\$160,000</b>
<b>D20 PLUMBING</b>							
D20	<b>PLUMBING, GENERALLY</b>						
	Plumbing; complete system	207,827	sf	16.00	3,325,232		
	<b>SUBTOTAL</b>					3,325,232	
<b>TOTAL - PLUMBING</b>							<b>\$3,325,232</b>
<b>D30 HVAC</b>							
D30	<b>HVAC, GENERALLY</b>						
	Geothermal Heating/Cooling System						
	(2) 225 ton heat recovery chiller-heaters with (200) 6" boreholes, active chilled beams, heat recovery units, and rooftop ahu's	207,827	sf	70.00	14,547,890		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>OPTION 4A NEW BUILDING</b>								
255	SUBTOTAL					14,547,890		
256	<b>TOTAL - HVAC</b>						<b>\$14,547,890</b>	
257								
258	<b>D40 FIRE PROTECTION</b>							
259	<b>D40 FIRE PROTECTION, GENERALLY</b>							
260	Fire protection system	207,827	gsf	6.00	1,246,962			
261	SUBTOTAL					1,246,962		
262	<b>TOTAL - FIRE PROTECTION</b>						<b>\$1,246,962</b>	
263								
264	<b>D50 ELECTRICAL</b>							
265	<b>D5010 SERVICE &amp; DISTRIBUTION</b>							
266	<b>Gear &amp; Distribution</b>							
267	5000A 480/277V switchboard	1	ls	140,000.00	140,000			
268	Normal power distribution with associated panelboards, transformers and feeders	207,827	sf	4.00	831,308			
269	<u>Emergency power</u>							
270	Emergency generator and ATS's with associated panelboards, transformers and feeders	207,827	sf	2.50	519,568			
271	<u>PV</u>							
272	PV provisions only, with empty conduit and pull boxes, per narrative	1	ls	5,000.00	5,000			
273	<u>Equipment Wiring</u>							
274	Elevator and cab power feed and connection	1	ea	5,000.00	5,000			
275	Mechanical equipment wiring to HVAC heating and cooling equipment	207,827	sf	2.50	519,568			
276	Misc. equipment wiring	209,000	sf	0.50	104,500			
277	Kitchen equipment wiring	1	ls	25,000.00	25,000			
278	Gym equipment feed and connections	1	ls	15,000.00	15,000			
279	SUBTOTAL					2,164,944		
280	<b>D5020 LIGHTING &amp; POWER</b>							
281	<u>Lighting &amp; Branch Power</u>							
282	Lighting fixtures with installation labor	207,827	sf	6.00	1,246,962			
283	Exterior building lighting	1	ls	15,000.00	15,000			
284	<u>Lighting control system (Daylight Harvesting)</u>							
285	Lighting controls with control panels, sensors and switches	207,827	sf	1.25	259,784			
286	<u>Branch devices</u>							
287	Duplex and GFI receptacles	207,827	sf	0.50	103,914			
288	<u>Lighting and branch circuitry</u>							
289	EMT and MC cable	207,827	sf	4.50	935,222			
290	SUBTOTAL					2,560,882		
291	<b>D5030 COMMUNICATION &amp; SECURITY SYSTEMS</b>							
292	<u>Fire Alarm</u>							
293	Control panel	1	ea	15,000.00	15,000			
294	Annunciator	1	ea	1,500.00	1,500			
295	Beacon	1	ea	2,250.00	2,250			
296	Knox box	1	ea	350.00	350			
297	Radio master box	1	ea	9,500.00	9,500			
298	Devices and cabling	209,000	sf	2.00	418,000			
299	Mass. Notification	209,000	sf	1.00	209,000			
300	Testing programming	1	ls	5,000.00	5,000			
301	<u>Bi-Directional System</u>							
302	BDA system	1	ls	100,000.00	100,000			
303	<u>Telephone/Data/CATV</u>							
304	Network switches, PBX, IP, VP, CATV (By owner)						By Owner	
305	Telecommunications rough in	209,000	sf	1.00	209,000			
306	Telecommunications devices and cabling	209,000	sf	2.00	418,000			
307	Grounding	1	ls	1,500.00	1,500			
308	Public Address/Clock System							

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>OPTION 4A NEW BUILDING</b>								
320	PA/Master Clock system	209,000	sf	1.00	209,000			
321	Classroom Speech Amplification	209,000	sf	0.50	104,500			
322	<u>Audio Visual (rough-in and power only)</u>							
323	AV equipment						By Owner	
324	Rough-In conduit and backboxes only	209,000	sf	0.50	104,500			
325	<u>Auditorium</u>							
326	Rigging system equipment & installation						See equipment	
327	Power to rigging equipment	1	ls	12,000.00	12,000			
328	Stage dimming system with performance fixture package, allow	1	ls	275,000.00	275,000			
329	Installation, rough-in & 120V power to dimming equipment	1	ls	70,000.00	70,000			
330	Performance audio visual equipment, installation & LV cabling, allow	1	ls	150,000.00	150,000			
331	Performance audio visual rough-in and power	1	ls	60,000.00	60,000			
332	<u>Cafeteria</u>							
333	Sound system	1	ls	15,000.00	15,000			
334	<u>Media Center</u>							
335	Sound system	1	ls	15,000.00	15,000			
336	<u>Gymnasium</u>							
337	Sound system	1	ls	30,000.00	30,000			
338	Scoreboard/ shot clocks with feed and connection	1	ea	15,000.00	15,000			
339	<u>Security System</u>							
340	Head end	1	ls	50,000.00	50,000			
341	Card access system	209,000	sf	1.00	209,000			
342	Intrusion system	209,000	sf	1.00	209,000			
343	CCTV surveillance system	209,000	sf	2.00	418,000			
344	SUBTOTAL						3,335,100	
345	<b>D5040 OTHER ELECTRICAL SYSTEMS</b>							
346	<u>Miscellaneous</u>							
347	Lightning Protection System, UL Master label	1	ls	95,000.00	95,000			
348	Temp power and lights	1	ls	150,000.00	150,000			
349	Hoisting and rigging	1	ls	10,000.00	10,000			
350	Seismic restraints	1	ls	7,500.00	7,500			
351	Coordination, BIM & shop drawings	1	ls	240,000.00	240,000			
352	Fees & Permits	1	ls	160,000.00	160,000			
353	SUBTOTAL						662,500	
354	<b>TOTAL - ELECTRICAL</b>						<b>\$8,723,426</b>	
355								
356	<b>E10 EQUIPMENT</b>							
357	<b>E10 EQUIPMENT, GENERALLY</b>							
358	Gym wall pads	1	ls	20,000.00	20,000			
359	Basketball backstops; swing up; electric operated	12	loc	10,000.00	120,000			
360	Gymnasium dividing net; electrically operated	3	ea	30,000.00	90,000			
361	Volleyball net and standards	1	ls	5,000.00	5,000			
362	Telescoping bleachers	900	seats	240.00	216,000			
363	Theatrical Equipment Stage curtains, rigging and controls	1	ls	350,000.00	350,000			
364	Theatrical AV allowance	1	ls	200,000.00	200,000			
365	Kitchen equipment	2,030	sf	220.00	446,600			
366	Auditorium seats	1,100	seat	350.00	385,000			
367	SUBTOTAL						1,832,600	
368	<b>TOTAL - EQUIPMENT</b>						<b>\$1,832,600</b>	
369								
370	<b>E20 FURNISHINGS</b>							
371	<b>E2010 FIXED FURNISHINGS</b>							
372	Entry mats & frames - recessed with carpet/rubber strips	500	sf	55.00	27,500			
373	Window blinds	22,626	sf	7.00	158,382			

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4A NEW BUILDING</b>							
382	123553 CASEWORK						
383	Sinks, counters and casework; allowance	209,000	sf	10.00	2,090,000		
384	SUBTOTAL					2,275,882	
385	<b>E2020 MOVABLE FURNISHINGS</b>						
386	All movable furnishings to be provided and installed by owner						
387	SUBTOTAL					NIC	
388	<b>TOTAL - FURNISHINGS</b>						
389							<b>\$2,275,882</b>
391	<b>F10 SPECIAL CONSTRUCTION</b>						
392	<b>F10 SPECIAL CONSTRUCTION</b>						
393	No items in this section						
394	SUBTOTAL						
395	<b>TOTAL - SPECIAL CONSTRUCTION</b>						
396							
397	<b>F20 SELECTIVE BUILDING DEMOLITION</b>						
398	<b>F2010 BUILDING ELEMENTS DEMOLITION</b>						
399	No items in this section						
400	SUBTOTAL						
401	<b>F2020 HAZARDOUS COMPONENTS ABATEMENT</b>						
402	See main summary for HazMat allowance						
403					See Summary		
404	SUBTOTAL						
405	<b>TOTAL - SELECTIVE BUILDING DEMOLITION</b>						
406							
407							
408							
409							
410							
411							
412							

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>SITEWORK OPTION 4A</b>							
1	<b>G SITEWORK</b>						
2		1,900,000	sf				
3	<b>G10 SITE PREPARATION &amp; DEMOLITION</b>						
4	Site construction fence/barricades	7,900	lf	18.00	142,200		
5	Site construction fence gates	1	ea	10,000.00	10,000		
6	Stabilized construction entrance	1	ls	15,000.00	15,000		
7	Pavement/curbing removal, crush and re-use for sub-base	250,800	sf	1.00	250,800		
8	Demolish tennis courts	56,200	sf	1.50	84,300		
9	Demolish track/football field	175,625	sf	1.00	175,625		
10	Walkways	1	ls	20,000.00	20,000		
11	Miscellaneous demolition	1	ls	100,000.00	100,000		
12	SUBTOTAL					797,925	
13	Temporary parking	250	spc				
14	gravel base; 12" thick	4,074	cy	40.00	162,960		
15	Binder course	12,222	sy	20.00	244,440		
16	Construction fence	1,900	lf	18.00	34,200		
17	Line markings/painting/signs	250	spc	100.00	25,000		
18	Demolish temp parking	110,000	sf	1.00	110,000		
19	Blasting for temporary parking	1	ls	150,000.00	150,000		
20	SUBTOTAL					726,600	
21	<b>Site Earthwork</b>						
22	Strip Topsoil and remove; 6" thick	3,148	cy	16.00	50,368		
23	Fine grading	659,695	sf	0.20	131,939		
24	Cut and Fill; assumed AV 1ft; balanced site	24,433	cy	10.00	244,330		
25	Silt fence/erosion control, wash bays, stock piles	7,900	lf	12.00	94,800		
26	Silt fence maintenance and monitoring	1	ls	40,000.00	40,000		
27	<b>Hazardous Waste Remediation</b>						
28	Remove existing underground fuel storage tanks; 500 Gal	1	ls	50,000.00	50,000		
29	Dispose/treat contaminated soils	1	ls	20,000.00	20,000		
30	SUBTOTAL					631,437	
31	<b>G20 SITE IMPROVEMENTS</b>						
32	<b>Asphalt Paving: parking lot and roadway</b>	250,800					
33	gravel base; 12" thick	9,289	cy	40.00	371,560		
34	asphalt; 4" thick	27,867	sy	25.00	696,675		
35	VGC	10,032	lf	40.00	401,280		
36	Single solid lines, 4" thick	1	ls	10,000.00	10,000		
37	Crosswalk Hatching	4	loc	900.00	3,600		
38	Other road markings	1	ls	7,500.00	7,500		
39	HC curb cuts	8	loc	350.00	2,800		
40	Signage	1	ls	20,000.00	20,000		
41	<b>Pedestrian Paving</b>						
42	Concrete paving						
43	gravel base; 8" thick	372	cy	35.00	13,020		
44	4" concrete paving	15,000	sf	9.00	135,000		
45	<b>Drop Off Plaza</b>						
46	Precast pavers; 50%	16,720	sf				
47	Poured in place rubber safety surface; 25%	8,360	sf	40.00	334,400		
48	Planted areas; 25%	4,180	sf	26.00	108,680		
49	<b>Ground Level Garden: Pre-K Playground</b>						
50	Rubber surface over concrete	10,450	sf				
51	Raised planters; green space	7,838	sf	18.00	141,084		
52	Shade structure	2,613	sf	10.00	26,130		
53	Shade structure	1	loc	30,000.00	30,000		
54	Music elements	1	loc	35,000.00	35,000		
55	Play equipment	1	loc	50,000.00	50,000		
56	SUBTOTAL					2,428,529	
57	<b>Site Athletics</b>						
58	<b>STADIUM - Running Track/Turf Football Field/Bleachers</b>						
59							
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F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>SITEWORK OPTION 4A</b>							
63	Synthetic turf anchor curb integral with trench drain	1,310	lf	80.00	104,800		
64	Resilient surface at track	75,525	sf	8.00	604,200		
65	Gravel base - assumed 12" thick	3,707	cy	45.00	166,815		
66	Geotextile reinforced impermeable liner 20 mill	100,100	sf	1.00	100,100		
67	Synthetic turf field - Hybrid infill synthetic field with premolded resilient drainage pad	100,100	sf	12.00	1,201,200		
68	Football goals	2	ea	3,500.00	7,000		
69	Scoreboard	1	ea	60,000.00	60,000		
70	Line markings - allowance	2	ls	2,000.00	4,000		
71	1250 seat bleacher	1	loc	450,000.00	450,000		
72	Rip-Rap under bleachers	1	ls	25,000.00	25,000		
73	Field logo's	1	loc	6,000.00	6,000		
74	Discus pad & enclosure	1	ea	15,000.00	15,000		
75	Shot put pad & enclosure	1	ea	15,000.00	15,000		
76	Long jump/triple jump	2	ea	10,000.00	20,000		
77	Pole vault and accessories	1	ea	10,000.00	10,000		
78	High jump pads	1	ea	6,000.00	6,000		
79	Javelin with track surfacing runway	1	ea	10,000.00	10,000		
80	Hurdles and starting blocks	1	ls	8,000.00	8,000		
81	Track crossing pad	1	ls	10,000.00	10,000		
82	Trash/recycling receptacles	12	ea	800.00	9,600		
83	Team benches- 7'-5" long	12	ea	1,500.00	18,000		
84	Portable ball control netting, 120' long	4	ea	2,500.00	10,000		
85	Pit covers	2	ea	3,500.00	7,000		
86	Subsurface infiltration/drainage/field drains etc.	175,625	sf	1.25	219,531		
87	Stadium sound system (AV)	1	ls	120,000.00	120,000		
88	SUBTOTAL					3,207,246	
89	Baseball/Field Hockey	1	ea	360,000.00	360,000		
90	Synthetic grass soccer fields; Two Fields	140,500	sf	12.00	1,686,000		
91	Half size field; grass	1	ea	150,000.00	150,000		
92	Softball field	1	ea	250,000.00	250,000		
93	Tennis courts - Six Courts (including pickle courts); 1 basketball court	50,600	sf				
94	gravel base; 8" thick	1,256	cy	40.00	50,240		
95	Asphalt paving	5,622	sy	30.00	168,660		
96	Color coating	50,600	sf	2.00	101,200		
97	Fence with wind break	1,177	lf	80.00	94,160		
98	Tennis court nets	5	set	1,500.00	7,500		
99	Basketball hoops	1	set	5,000.00	5,000		
100	SUBTOTAL					2,872,760	
101	<u>Site Improvements</u>						
102	Flag pole 50' high	1	ea	6,500.00	6,500		
103	Concrete retaining walls	1	ls	500,000.00	500,000		
104	Other site improvements; walls, fences etc.	1	ls	200,000.00	200,000		
105	Outdoor dining	1	ls	50,000.00	50,000		
106	SUBTOTAL					756,500	
107	<u>Landscaping</u>						
108	Topsoil - reuse existing	3,148	cy	25.00	78,700		
109	Topsoil - Import new topsoil; minimum 6"	581	cy	65.00	37,765		
110	Seeding	964,805	sf	0.15	144,721		
111	Green space	31,350	sf	10.00	313,500		
112	SUBTOTAL					574,686	
113	<b>G30 CIVIL MECHANICAL UTILITIES</b>						
114	<u>Water supply; Pricing includes E&amp;B and bedding</u>						
115	Temporary water line	650	lf	120.00	78,000		
116	New DI piping; 8"	450	lf	100.00	45,000		
117	New DI piping; 8" Fire loop	2,800	lf	100.00	280,000		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>SITEWORK OPTION 4A</b>								
125	Connect to existing	1	loc	5,000.00	5,000			
126	FD connection	1	ea	2,000.00	2,000			
127	Gate valves	8	ea	750.00	6,000			
128	Fire hydrant	3	ea	5,000.00	15,000			
129	SUBTOTAL					431,000		
129	<u>Sanitary; Pricing includes E&amp;B and bedding</u>							
130	Temporary sewer line	1	ls	50,000.00	50,000			
131	Manholes	4	ea	4,000.00	16,000			
132	Grease trap	1	ea	15,000.00	15,000			
133	8" PVC	1,000	lf	60.00	60,000			
134	Connect to existing drain	1	ea	3,000.00	3,000			
135	SUBTOTAL					144,000		
135	<u>Storm water; Pricing includes E&amp;B and bedding</u>							
136	Temporary storm (relocate existing 15" line + new manholes)	1	ls	125,000.00	125,000			
137	Allowance for new drainage systems; piping only	250,800	sf	3.00	752,400			
138	Infiltration systems; cultec chambers	137,500	cf	8.00	1,100,000			
139	Rock excavation	1	ls	250,000.00	250,000			
140	Catch basins	12	ea	3,800.00	45,600			
141	Manholes	10	ea	4,500.00	45,000			
142	WQ structures	3	ea	16,000.00	48,000			
143	Area drains	4	ea	1,500.00	6,000			
144	Work to culvert	1	ls	250,000.00	250,000			
145	<u>Gas service</u>							
146	E&B trench for new gas pipe - install by plumbing	450	lf	25.00	11,250			
147	SUBTOTAL					2,633,250		
148	<b>G40 ELECTRICAL UTILITIES</b>							
149	<u>Power</u>							
150	Utility co. backcharges, allow	1	ls	30,000.00	Utility co.			
151	Connections at existing manhole				Utility co.			
152	Manhole	1	ls	8,500.00	8,500			
153	Connections in manhole	1	ls	3,500.00	3,500			
154	Primary ductbank 2-5" ductbank, empty, allow	1000	lf	120.00	120,000			
155	Transformer by utility company				By Utility Co.			
156	Transformer pad; temporary for relocated transformer	1	ea	5,000.00	5,000			
157	Secondary service	60	lf	1,100.00	66,000			
158	<u>Communications</u>							
159	Connection at riser pole, allow	1	ea	1,500.00	1,500			
160	Telecom ductbank 4-4", allow	1000	lf	152.00	152,000			
161	<u>Site Lighting</u>							
162	Site Parking lighting (allow)	250,800	sf	2.00	501,600			
163	SUBTOTAL					858,100		
164	<b>TOTAL - SITE DEVELOPMENT</b>						<b>\$16,062,033</b>	

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<b>CONSTRUCTION COST SUMMARY</b>					
BUILDING SYSTEM		SUB-TOTAL	TOTAL	\$/SF	%
<b>OPTION 4B NEW BUILDING</b>					
<b>A10 FOUNDATIONS</b>					
A1010	Standard Foundations	\$1,649,216			
A1020	Special Foundations	\$0			
A1030	Lowest Floor Construction	\$1,584,851	<b>\$3,234,067</b>	\$15.56	4.3%
<b>A20 BASEMENT CONSTRUCTION</b>					
A2010	Basement Excavation	\$0			
A2020	Basement Walls	\$0	<b>\$0</b>	\$0.00	0.0%
<b>B10 SUPERSTRUCTURE</b>					
B1010	Upper Floor Construction	\$4,949,168			
B1020	Roof Construction	\$3,712,194	<b>\$8,661,362</b>	\$41.68	11.6%
<b>B20 EXTERIOR CLOSURE</b>					
B2010	Exterior Walls	\$7,952,263			
B2020	Windows	\$4,447,560			
B2030	Exterior Doors	\$101,640	<b>\$12,501,463</b>	\$60.15	16.8%
<b>B30 ROOFING</b>					
B3010	Roof Coverings	\$2,713,824			
B3020	Roof Openings	\$32,500	<b>\$2,746,324</b>	\$13.21	3.7%
<b>C10 INTERIOR CONSTRUCTION</b>					
C1010	Partitions	\$4,987,848			
C1020	Interior Doors	\$1,246,962			
C1030	Specialties/Millwork	\$1,766,357	<b>\$8,001,167</b>	\$38.50	10.7%
<b>C20 STAIRCASES</b>					
C2010	Stair Construction	\$282,000			
C2020	Stair Finishes	\$37,723	<b>\$319,723</b>	\$1.54	0.4%
<b>C30 INTERIOR FINISHES</b>					
C3010	Wall Finishes	\$2,909,578			
C3020	Floor Finishes	\$1,870,443			
C3030	Ceiling Finishes	\$2,286,097	<b>\$7,066,118</b>	\$34.00	9.5%
<b>D10 CONVEYING SYSTEMS</b>					
D1010	Elevator	\$120,000	<b>\$120,000</b>	\$0.58	0.2%
<b>D20 PLUMBING</b>					
D20	Plumbing	\$3,325,232	<b>\$3,325,232</b>	\$16.00	4.5%
<b>D30 HVAC</b>					
D30	HVAC	\$14,547,890	<b>\$14,547,890</b>	\$70.00	19.5%

F. COST ESTIMATES

<b>CONSTRUCTION COST SUMMARY</b>					
BUILDING SYSTEM		SUB-TOTAL	TOTAL	\$/SF	%
<b>OPTION 4B NEW BUILDING</b>					
<b>D40 FIRE PROTECTION</b>					
D40	Fire Protection	\$1,246,962	<b>\$1,246,962</b>	\$6.00	1.7%
<b>D50 ELECTRICAL</b>					
D5010	Complete System	\$8,723,426	<b>\$8,723,426</b>	\$41.97	11.7%
<b>E10 EQUIPMENT</b>					
E10	Equipment	\$1,710,100	<b>\$1,710,100</b>	\$8.23	2.3%
<b>E20 FURNISHINGS</b>					
E2010	Fixed Furnishings	\$2,309,748			
E2020	Movable Furnishings NIC		<b>\$2,309,748</b>	\$11.11	3.1%
<b>F10 SPECIAL CONSTRUCTION</b>					
F10	Special Construction	\$0	<b>\$0</b>	\$0.00	0.0%
<b>F20 HAZMAT REMOVALS</b>					
F2010	Building Elements Demolition	\$0			
F2020	Hazardous Components Abatement	\$0	<b>\$0</b>	\$0.00	0.0%
<b>TOTAL DIRECT COST (Trade Costs)</b>			<b>\$74,513,582</b>	<b>\$358.54</b>	<b>100.0%</b>

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F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4B NEW BUILDING</b>							
<b>GROSS FLOOR AREA CALCULATION</b>							
	Level 01			103,076			
	Level 02			62,426			
	Level 03			42,325			
<b>TOTAL GROSS FLOOR AREA (GFA)</b>					<b>207,827 sf</b>		
<b>A10 FOUNDATIONS</b>							
<b>A1010 STANDARD FOUNDATIONS</b>	Allowance for standard foundations	<b>103,076</b>	sf	16.00	1,649,216		
	SUBTOTAL					1,649,216	
<b>A1020 SPECIAL FOUNDATIONS</b>	No work assumed						
	SUBTOTAL						
<b>A1030 LOWEST FLOOR CONSTRUCTION</b>	New Slab on grade, 5" thick						
	Gravel fill, 12"	<b>3,818</b>	cy	40.00	152,720		
	Rigid insulation	<b>103,076</b>	sf	2.25	231,921		
	Vapor barrier	<b>103,076</b>	sf	1.00	103,076		
	Compact existing sub-grade	<b>103,076</b>	sf	0.50	51,538		
	Mesh reinforcing 15% lap	<b>118,537</b>	sf	1.15	136,318		
	Concrete - 5" thick; 4,000 psi	<b>1,684</b>	cy	125.00	210,500		
	Placing concrete	<b>1,684</b>	cy	45.00	75,780		
	Finishing and curing concrete	<b>103,076</b>	sf	2.50	257,690		
	Control joints - saw cut	<b>103,076</b>	sf	0.10	10,308		
	Miscellaneous						
	Premium for rock excavation to 100% of foundations	<b>1</b>	ls	250,000.00	250,000		
	Premium for sloped floor at auditorium	<b>1</b>	ls	50,000.00	50,000		
	New Elevator pit	<b>1</b>	ea	40,000.00	40,000		
	Equipment pads	<b>1</b>	ls	15,000.00	15,000		
	SUBTOTAL					1,584,851	
<b>TOTAL - FOUNDATIONS</b>							<b>\$3,234,067</b>
<b>A20 BASEMENT CONSTRUCTION</b>							
<b>A2010 BASEMENT EXCAVATION</b>							
	SUBTOTAL						
<b>A2020 BASEMENT WALLS</b>							
	SUBTOTAL						
<b>TOTAL - BASEMENT CONSTRUCTION</b>							
<b>B10 SUPERSTRUCTURE</b>							
		14.49	lbs/sf		-		
<b>B1010 FLOOR CONSTRUCTION</b>	Floor Structure - Steel:	1,506	tns		-		
	Steel beams and columns to new addition; 14.5#/SF	<b>759</b>	tns	3,800.00	2,884,200		
	Premium for HSS	<b>190</b>	tns	300.00	57,000		
	Shear studs	<b>20,950</b>	ea	2.50	52,375		
	Floor Structure						
	2" 18 Ga. Metal galvanized floor Deck	<b>104,751</b>	sf	4.00	419,004		
	WWF reinforcement	<b>120,464</b>	sf	0.80	96,371		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4B NEW BUILDING</b>							
	Concrete Fill to metal deck; 6" Normal Weight	<b>2,444</b>	cy	135.00	329,940		
	Place and finish concrete	<b>104,751</b>	sf	2.50	261,878		
	Rebar to decks	<b>31,425</b>	lbs	1.20	37,710		
	Misc. angles	<b>104,751</b>	sf	0.50	Incl		
	Miscellaneous						
	Allowance for running track	<b>1</b>	ls	500,000.00	500,000		
	Fire proofing to columns and beams	<b>104,751</b>	sf	2.25	235,690		
	Intumescent paint	<b>1</b>	ls	50,000.00	50,000		
	Fire stopping floors	<b>1</b>	ls	25,000.00	25,000		
	SUBTOTAL					4,949,168	
<b>B1020 ROOF CONSTRUCTION</b>	Roof Structure - Steel:						
	Steel beams and columns to new addition; 14.5#/SF	<b>747</b>	tns	3,800.00	2,838,600		
	Premium for HSS	<b>187</b>	tns	300.00	56,100		
	Exposed steel	<b>1</b>	ls	50,000.00	50,000		
	Roof Structure						
	Acoustic deck allowance	<b>5,000</b>	sf	9.00	45,000		
	3" 20 Ga. galvanized Metal Roof Deck	<b>98,076</b>	sf	3.50	343,266		
	Miscellaneous						
	Concrete under RTU's	<b>8,500</b>	sf	10.00	85,000		
	Fire proofing to columns, beams and deck	<b>98,076</b>	sf	3.00	294,228		
	SUBTOTAL					3,712,194	
<b>TOTAL - SUPERSTRUCTURE</b>							<b>\$8,661,362</b>
<b>B20 EXTERIOR CLOSURE</b>							
<b>B2010 EXTERIOR WALLS</b>	Exterior Wall Area; EXT 1	66,817	sf				
055000	MISC. METALS						
	Stainless steel sign at main entrance	<b>1</b>	ls	10,000.00	10,000		
070001	WATERPROOFING, DAMPPROOFING AND CAULKING						
	Air barrier	<b>66,817</b>	sf	7.00	467,719		
	Air barrier/flashing at windows	<b>16,155</b>	lf	6.25	100,969		
	Miscellaneous sealants to closure	<b>66,817</b>	sf	1.00	66,817		
072100	THERMAL INSULATION						
	Insulation; 6" XPS	<b>66,817</b>	sf	5.50	367,494		
	Insulation; 4" spray	<b>66,817</b>	sf	4.25	283,972		
076400	CLADDING						
	Metal panel; rainscreen system	<b>66,817</b>	sf	70.00	4,677,190		
	Mechanical screen; includes backup structure	<b>1,004</b>	sf	85.00	85,340		
	Soffits; including all backup; S1	<b>6,634</b>	sf	101.50	673,351		
092900	GYPSUM BOARD ASSEMBLIES						
	6" metal stud backup	<b>66,817</b>	sf	12.00	801,804		
	Gypsum Sheathing	<b>66,817</b>	sf	2.75	183,747		
	Drywall lining to interior face of stud backup	<b>66,817</b>	sf	3.50	233,860		
	SUBTOTAL					7,952,263	
<b>B2020 WINDOWS</b>	Exterior Wall Area	27,464	sf				
061000	ROUGH CARPENTRY						

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F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>OPTION 4B NEW BUILDING</b>								
123	Wood blocking at openings	16,155	lf	12.00	193,860			
124	070001 WATERPROOFING, DAMPPROOFING AND CAULKING							
125	Backer rod & double sealant	16,155	lf	10.00	161,550			
126	080001 METAL WINDOWS							
127	Windows, triple glazed; fiberglass; W1	16,704	sf	125.00	2,088,000			
128	Curtainwall, triple glazed; BOD Kawneer 1600 sys 2 1" IGU; W2	10,760	sf	165.00	1,775,400			
129	Sunshades; 3" aluminum trellis	1,500	lf	140.00	210,000			
130	089000 LOUVERS							
131	Louvers	250	sf	75.00	18,750			
132	SUBTOTAL					4,447,560		
133	<b>B2030 EXTERIOR DOORS</b>							
134	Glazed entrance doors including frame and hardware; double door	10	pr	9,000.00	90,000			
135	HM doors, frames and hardware- Double	4	pr	2,000.00	8,000			
136	Backer rod & double sealant	280	lf	10.00	2,800			
137	Wood blocking at openings	280	lf	3.00	840			
138	SUBTOTAL					101,640		
139	<b>TOTAL - EXTERIOR CLOSURE</b>						<b>\$12,501,463</b>	
140	<b>B30 ROOFING</b>							
141	<b>B3010 ROOF COVERINGS</b>							
142	New roofing complete; TPO 8" Insulation; R1	103,076	sf	24.00	2,473,824			
143	Roof garden/outdoor sensory garden; 50% decking/50% planters; includes furnishings and planting	4,000	sf	60.00	240,000			
144	SUBTOTAL					2,713,824		
145	<b>B3020 ROOF OPENINGS</b>							
146	Skylights, allow	1	ls	30,000.00	30,000			
147	Roof hatch	1	loc	2,500.00	2,500			
148	SUBTOTAL					32,500		
149	<b>TOTAL - ROOFING</b>						<b>\$2,746,324</b>	
150	<b>C10 INTERIOR CONSTRUCTION</b>							
151	<b>C1010 PARTITIONS</b>							
152	Miscellaneous partitions/glazed partitions/borrowed lights/blocking etc.	207,827	gsf	24.00	4,987,848			
153	SUBTOTAL					4,987,848		
154	<b>C1020 INTERIOR DOORS</b>							
155	Interior doors, frames and hardware	207,827	gsf	6.00	1,246,962			
156	SUBTOTAL					1,246,962		
157	<b>C1030 SPECIALTIES / MILLWORK</b>							
158	Toilet Partitions and accessories	207,827	gsf	1.00	207,827			
159	Backer panels in electrical closets	1	ls	1,000.00	1,000			
160	Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms	207,827	sf	1.25	259,784			
161	Room Signs	207,827	gsf	0.50	103,914			
162	Fire extinguisher cabinets	69	ea	350.00	24,150			
163	Lockers, full height	710	ea	350.00	248,500			
164	New catwalk	1	ls	100,000.00	100,000			
165	Janitors Work Shop Accessories	1	ls	1,500.00	1,500			
166	Janitors Closet Accessories	3	rms	300.00	900			
167	Media							
168	Reception desks	2	loc	25,000	50,000			
169	Railings to open to below areas	151	lf	300	45,300			

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>OPTION 4B NEW BUILDING</b>								
185	Library shelving at perimeters 7' Tall				F,F & E			
186	Library shelving at perimeters 3' Tall				F,F & E			
187	Stage proscenium	1	ls	100,000	100,000			
188	Display cases	207,827	sf	0.25	51,957			
189	Miscellaneous metals throughout building	207,827	sf	1.25	259,784			
190	Miscellaneous sealants throughout building	207,827	sf	1.50	311,741			
191	SUBTOTAL					1,766,357		
192	<b>TOTAL - INTERIOR CONSTRUCTION</b>						<b>\$8,001,167</b>	
193	<b>C20 STAIRCASES</b>							
194	<b>C2010 STAIR CONSTRUCTION</b>							
195	Metal pan stair; egress stair	2	flt	35,000.00	70,000			
196	Main staircase	4	flt	50,000.00	200,000			
197	Concrete fill to stairs	6	flt	2,000.00	12,000			
198	SUBTOTAL					282,000		
199	<b>C2020 STAIR FINISHES</b>							
200	High performance coating to stairs including all railings etc.	6	flt	3,000.00	18,000			
201	Rubber tile at stairs - landings	600	sf	10.00	6,000			
202	Rubber tile at stairs - treads & risers	720	flt	19.06	13,723			
203	SUBTOTAL					37,723		
204	<b>TOTAL - STAIRCASES</b>						<b>\$319,723</b>	
205	<b>C30 INTERIOR FINISHES</b>							
206	<b>C3010 WALL FINISHES</b>							
207	Wall finishes	207,827	sf	14.00	2,909,578			
208	SUBTOTAL					2,909,578		
209	<b>C3020 FLOOR FINISHES</b>							
210	Floor finishes	207,827	sf	9.00	1,870,443			
211	SUBTOTAL					1,870,443		
212	<b>C3030 CEILING FINISHES</b>							
213	Ceiling finishes	207,827	sf	11.00	2,286,097			
214	SUBTOTAL					2,286,097		
215	<b>TOTAL - INTERIOR FINISHES</b>						<b>\$7,066,118</b>	
216	<b>D10 CONVEYING SYSTEMS</b>							
217	<b>D1010 ELEVATOR</b>							
218	New elevator; 3 stop; oversize; 5,000 lbs	1	ea	120,000.00	120,000			
219	SUBTOTAL					120,000		
220	<b>TOTAL - CONVEYING SYSTEMS</b>						<b>\$120,000</b>	
221	<b>D20 PLUMBING</b>							
222	<b>D20 PLUMBING, GENERALLY</b>							
223	Plumbing; complete system	207,827	sf	16.00	3,325,232			
224	SUBTOTAL					3,325,232		
225	<b>TOTAL - PLUMBING</b>						<b>\$3,325,232</b>	
226	<b>D30 HVAC</b>							
227	<b>D30 HVAC, GENERALLY</b>							
228	Geothermal Heating/Cooling System							
229	(2) 225 ton heat recovery chiller-heaters with (200) 6" boreholes, active chilled beams, heat recovery units, and rooftop ahu's	207,827	sf	70.00	14,547,890			
230	SUBTOTAL					14,547,890		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4B NEW BUILDING</b>							
<b>TOTAL - HVAC</b>							<b>\$14,547,890</b>
<b>D40 FIRE PROTECTION</b>							
<b>D40</b>	<b>FIRE PROTECTION, GENERALLY</b>						
	Fire protection system	207,827	gsf	6.00	1,246,962		
	SUBTOTAL					1,246,962	
<b>TOTAL - FIRE PROTECTION</b>							<b>\$1,246,962</b>
<b>D50 ELECTRICAL</b>							
<b>D5010</b>	<b>SERVICE &amp; DISTRIBUTION</b>						
	<b>Gear &amp; Distribution</b>						
	5000A 480/277V switchboard	1	ls	140,000.00	140,000		
	Normal power distribution with associated panelboards, transformers and feeders	207,827	sf	4.00	831,308		
	<b>Emergency power</b>						
	Emergency generator and ATS's with associated panelboards, transformers and feeders	207,827	sf	2.50	519,568		
	<b>PV</b>						
	PV provisions only, with empty conduit and pull boxes, per narrative	1	ls	5,000.00	5,000		
	<b>Equipment Wiring</b>						
	Elevator and cab power feed and connection	1	ea	5,000.00	5,000		
	Mechanical equipment wiring to HVAC heating and cooling equipment	207,827	sf	2.50	519,568		
	Misc. equipment wiring	209,000	sf	0.50	104,500		
	Kitchen equipment wiring	1	ls	25,000.00	25,000		
	Gym equipment feed and connections	1	ls	15,000.00	15,000		
	SUBTOTAL					2,164,944	
<b>D5020</b>	<b>LIGHTING &amp; POWER</b>						
	<b>Lighting &amp; Branch Power</b>						
	Lighting fixtures with installation labor	207,827	sf	6.00	1,246,962		
	Exterior building lighting	1	ls	15,000.00	15,000		
	<b>Lighting control system (Daylight Harvesting)</b>						
	Lighting controls with control panels, sensors and switches	207,827	sf	1.25	259,784		
	<b>Branch devices</b>						
	Duplex and GFI receptacles	207,827	sf	0.50	103,914		
	<b>Lighting and branch circuitry</b>						
	EMT and MC cable	207,827	sf	4.50	935,222		
	SUBTOTAL					2,560,882	
<b>D5030</b>	<b>COMMUNICATION &amp; SECURITY SYSTEMS</b>						
	<b>Fire Alarm</b>						
	Control panel	1	ea	15,000.00	15,000		
	Annunciator	1	ea	1,500.00	1,500		
	Beacon	1	ea	2,250.00	2,250		
	Knox box	1	ea	350.00	350		
	Radio master box	1	ea	9,500.00	9,500		
	Devices and cabling	209,000	sf	2.00	418,000		
	Mass. Notification	209,000	sf	1.00	209,000		
	Testing programming	1	ls	5,000.00	5,000		
	<b>Bi-Directional System</b>						
	BDA system	1	ls	100,000.00	100,000		
	<b>Telephone/Data/CATV</b>						
	Network switches, PBX, IP, VP, CATV (By owner)						By Owner
	Telecommunications rough in	209,000	sf	1.00	209,000		
	Telecommunications devices and cabling	209,000	sf	2.00	418,000		
	Grounding	1	ls	1,500.00	1,500		
	<b>Public Address/Clock System</b>						
	PA/Master Clock system	209,000	sf	1.00	209,000		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4B NEW BUILDING</b>							
319	Classroom Speech Amplification	209,000	sf	0.50	104,500		
320	Audio Visual (rough-in and power only)						
321	AV equipment						By Owner
322	Rough-In conduit and backboxes only	209,000	sf	0.50	104,500		
323	Auditorium						
324	Rigging system equipment & installation						See equipment
325	Power to rigging equipment	1	ls	12,000.00	12,000		
326	Stage dimming system with performance fixture package, allow	1	ls	275,000.00	275,000		
327	Installation, rough-in & 120V power to dimming equipment	1	ls	70,000.00	70,000		
328	Performance audio visual equipment, installation & LV cabling, allow	1	ls	150,000.00	150,000		
329	Performance audio visual rough-in and power	1	ls	60,000.00	60,000		
330	Cafeteria						
331	Sound system	1	ls	15,000.00	15,000		
332	Media Center						
333	Sound system	1	ls	15,000.00	15,000		
334	Gymnasium						
335	Sound system	1	ls	30,000.00	30,000		
336	Scoreboard/ shot clocks with feed and connection	1	ea	15,000.00	15,000		
337	Security System						
338	Head end	1	ls	50,000.00	50,000		
339	Card access system	209,000	sf	1.00	209,000		
340	Intrusion system	209,000	sf	1.00	209,000		
341	CCTV surveillance system	209,000	sf	2.00	418,000		
342	SUBTOTAL					3,335,100	
<b>D5040</b>	<b>OTHER ELECTRICAL SYSTEMS</b>						
	<b>Miscellaneous</b>						
346	Lightning Protection System, UL Master label	1	ls	95,000.00	95,000		
347	Temp power and lights	1	ls	150,000.00	150,000		
348	Hoisting and rigging	1	ls	10,000.00	10,000		
349	Seismic restraints	1	ls	7,500.00	7,500		
350	Coordination, BIM & shop drawings	1	ls	240,000.00	240,000		
351	Fees & Permits	1	ls	160,000.00	160,000		
352	SUBTOTAL					662,500	
<b>TOTAL - ELECTRICAL</b>							<b>\$8,723,426</b>
<b>E10 EQUIPMENT</b>							
<b>E10</b>	<b>EQUIPMENT, GENERALLY</b>						
	Gym wall pads	1	ls	20,000.00	20,000		
	Basketball backstops; swing up; electric operated	12	loc	10,000.00	120,000		
	Gymnasium dividing net; electrically operated	3	ea	30,000.00	90,000		
	Volleyball net and standards	1	ls	5,000.00	5,000		
	Telescoping bleachers	900	seats	240.00	216,000		
	Theatrical Equipment Stage curtains, rigging and controls	1	ls	350,000.00	350,000		
	Theatrical AV allowance	1	ls	200,000.00	200,000		
	Kitchen equipment	2,030	sf	220.00	446,600		
	Auditorium seats	750	seat	350.00	262,500		
	SUBTOTAL					1,710,100	
<b>TOTAL - EQUIPMENT</b>							<b>\$1,710,100</b>
<b>E20 FURNISHINGS</b>							
<b>E2010</b>	<b>FIXED FURNISHINGS</b>						
	Entry mats & frames - recessed with carpet/rubber strips	500	sf	55.00	27,500		
	Window blinds	27,464	sf	7.00	192,248		
123553	CASEWORK						

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>OPTION 4B NEW BUILDING</b>							
381	Sinks, counters and casework; allowance	209,000	sf	10.00	2,090,000		
382	SUBTOTAL					2,309,748	
383	<b>E2020 MOVABLE FURNISHINGS</b>						
384	All movable furnishings to be provided and installed by owner						
385	SUBTOTAL					NIC	
<b>TOTAL - FURNISHINGS</b>							<b>\$2,309,748</b>
<b>F10 SPECIAL CONSTRUCTION</b>							
391	<b>F10 SPECIAL CONSTRUCTION</b>						
392	No items in this section						
393	SUBTOTAL						
<b>TOTAL - SPECIAL CONSTRUCTION</b>							
<b>F20 SELECTIVE BUILDING DEMOLITION</b>							
401	<b>F2010 BUILDING ELEMENTS DEMOLITION</b>						
402	No items in this section						
403	SUBTOTAL						
404	<b>F2020 HAZARDOUS COMPONENTS ABATEMENT</b>						
405	See main summary for HazMat allowance				See Summary		
406	SUBTOTAL						
<b>TOTAL - SELECTIVE BUILDING DEMOLITION</b>							

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>SITEWORK OPTION 4B</b>							
1	<b>G SITEWORK</b>						
2		1,900,000	sf		-		
3	<b>G10 SITE PREPARATION &amp; DEMOLITION</b>						
4	Site construction fence/barricades	7,900	lf	18.00	142,200		
5	Site construction fence gates	1	ea	10,000.00	10,000		
6	Stabilized construction entrance	1	ls	15,000.00	15,000		
7	Pavement/curbing removal, crush and re-use for sub-base	250,800	sf	1.00	250,800		
8	Demolish tennis courts	56,200	sf	1.50	84,300		
9	Demolish track/football field	175,625	sf	1.00	175,625		
10	Walkways	1	ls	20,000.00	20,000		
11	Miscellaneous demolition	1	ls	100,000.00	100,000		
12	SUBTOTAL					797,925	
13	<b>Site Earthwork</b>						
14	Temporary parking	190	spc				
15	gravel base; 12" thick	2,981	cy	40.00	119,240		
16	Binder course	8,944	sy	20.00	178,880		
17	Construction fence	1,135	lf	18.00	20,430		
18	Line markings/painting/signs	190	spc	100.00	19,000		
19	Demolish temp parking	110,000	sf	1.00	110,000		
20	Blasting for temporary parking	1	ls	150,000.00	150,000		
21	SUBTOTAL					597,550	
22	<b>Hazardous Waste Remediation</b>						
23	Remove existing underground fuel storage tanks; 500 Gal	1	ls	50,000.00	50,000		
24	Dispose/treat contaminated soils	1	ls	20,000.00	20,000		
25	SUBTOTAL					631,437	
26	<b>G20 SITE IMPROVEMENTS</b>						
27	<b>Asphalt Paving: parking lot and roadway</b>						
28	gravel base; 12" thick	9,289	cy	40.00	371,560		
29	asphalt; 4" thick	27,867	sy	25.00	696,675		
30	VGC	10,032	lf	40.00	401,280		
31	Single solid lines, 4" thick	1	ls	10,000.00	10,000		
32	Crosswalk Hatching	4	loc	900.00	3,600		
33	Other road markings	1	ls	7,500.00	7,500		
34	HC curb cuts	8	loc	350.00	2,800		
35	Signage	1	ls	20,000.00	20,000		
36	<b>Pedestrian Paving</b>						
37	Concrete paving						
38	gravel base; 8" thick	372	cy	35.00	13,020		
39	4" concrete paving	15,000	sf	9.00	135,000		
40	<b>Drop Off Plaza</b>						
41	Precast pavers; 50%	16,720	sf				
42	Poured in place rubber safety surface; 25%	8,360	sf	40.00	334,400		
43	Planted areas; 25%	4,180	sf	26.00	108,680		
44	<b>Ground Level Garden: Pre-K Playground</b>						
45	Rubber surface over concrete	10,450	sf				
46	Raised planters; green space	7,838	sf	18.00	141,084		
47	Shade structure	2,613	sf	10.00	26,130		
48	Shade structure	1	loc	30,000.00	30,000		
49	Music elements	1	loc	35,000.00	35,000		
50	Play equipment	1	loc	50,000.00	50,000		
51	SUBTOTAL					2,428,529	
52	<b>Site Athletics</b>						
53	<b>STADIUM - Running Track/Turf Football Field/Bleachers</b>						

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
<b>SITEWORK OPTION 4B</b>							
63	Synthetic turf anchor curb integral with trench drain	1,310	lf	80.00	104,800		
64	Resilient surface at track	75,525	sf	8.00	604,200		
65	Gravel base - assumed 12" thick	3,707	cy	45.00	166,815		
66	Geotextile reinforced impermeable liner 20 mill	100,100	sf	1.00	100,100		
67	Synthetic turf field - Hybrid infill synthetic field with premolded resilient drainage pad	100,100	sf	12.00	1,201,200		
68	Football goals	2	ea	3,500.00	7,000		
69	Scoreboard	1	ea	60,000.00	60,000		
70	Line markings - allowance	2	ls	2,000.00	4,000		
71	1250 seat bleacher	1	loc	450,000.00	450,000		
72	Rip-Rap under bleachers	1	ls	25,000.00	25,000		
73	Field logo's	1	loc	6,000.00	6,000		
74	Discus pad & enclosure	1	ea	15,000.00	15,000		
75	Shot put pad & enclosure	1	ea	15,000.00	15,000		
76	Long jump/triple jump	2	ea	10,000.00	20,000		
77	Pole vault and accessories	1	ea	10,000.00	10,000		
78	High jump pads	1	ea	6,000.00	6,000		
79	Javelin with track surfacing runway	1	ea	10,000.00	10,000		
80	Hurdles and starting blocks	1	ls	8,000.00	8,000		
81	Track crossing pad	1	ls	10,000.00	10,000		
82	Trash/recycling receptacles	12	ea	800.00	9,600		
83	Team benches- 7'-5" long	12	ea	1,500.00	18,000		
84	Portable ball control netting, 120' long	4	ea	2,500.00	10,000		
85	Pit covers	2	ea	3,500.00	7,000		
86	Subsurface infiltration/drainage/field drains etc.	175,625	sf	1.25	219,531		
87	Stadium sound system (AV)	1	ls	120,000.00	120,000		
88	SUBTOTAL					3,207,246	
89	Baseball/Field Hockey	1	ea	360,000.00	360,000		
90	Half size field	1	ea	150,000.00	150,000		
91	Synthetic grass soccer fields; Two Fields	140,500	sf	12.00	1,686,000		
92	Softball field	1	ea	250,000.00	250,000		
93	Tennis courts - Six Courts (including pickle courts); 1 basketball court	50,600	sf				
94	gravel base; 8" thick	1,256	cy	40.00	50,240		
95	Asphalt paving	5,622	sy	30.00	168,660		
96	Color coating	50,600	sf	2.00	101,200		
97	Fence with wind break	1,177	lf	80.00	94,160		
98	Tennis court nets	5	set	1,500.00	7,500		
99	Basketball hoops	1	set	5,000.00	5,000		
100	SUBTOTAL					2,872,760	
101	<u>Site Improvements</u>						
102	Flag pole 50' high	1	ea	6,500.00	6,500		
103	Concrete retaining walls	1	ls	500,000.00	500,000		
104	Other site improvements; walls, fences etc.	1	ls	200,000.00	200,000		
105	Outdoor dining	1	ls	50,000.00	50,000		
106	SUBTOTAL					756,500	
107	<u>Landscaping</u>						
108	Topsoil - reuse existing	3,148	cy	25.00	78,700		
109	Topsoil - Import new topsoil; minimum 6"	581	cy	65.00	37,765		
110	Seeding	964,805	sf	0.15	144,721		
111	Green space	31,350	sf	10.00	313,500		
112	SUBTOTAL					574,686	
113	<b>G30 CIVIL MECHANICAL UTILITIES</b>						
114	<u>Water supply; Pricing includes E&amp;B and bedding</u>						
115	Temporary water line	650	lf	120.00	78,000		
116	New DI piping; 8"	450	lf	100.00	45,000		
117	New DI piping; 8" Fire loop	2,800	lf	100.00	280,000		

F. COST ESTIMATES

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST	
<b>SITEWORK OPTION 4B</b>								
126	Connect to existing	1	loc	5,000.00	5,000			
127	FD connection	1	ea	2,000.00	2,000			
128	Gate valves	8	ea	750.00	6,000			
129	Fire hydrant	3	ea	5,000.00	15,000			
130	SUBTOTAL					431,000		
131	<u>Sanitary; Pricing includes E&amp;B and bedding</u>							
132	Temporary sewer line	1	ls	50,000.00	50,000			
133	Manholes	4	ea	4,000.00	16,000			
134	Grease trap	1	ea	15,000.00	15,000			
135	8" PVC	1,000	lf	60.00	60,000			
136	Connect to existing drain	1	ea	3,000.00	3,000			
137	SUBTOTAL					144,000		
138	<u>Storm water; Pricing includes E&amp;B and bedding</u>							
139	Temporary storm (relocate existing 15" line + new manholes)	1	ls	125,000.00	125,000			
140	Allowance for new drainage systems; piping only	250,800	sf	3.00	752,400			
141	Infiltration systems; cultec chambers	137,500	cf	8.00	1,100,000			
142	Rock excavation	1	ls	250,000.00	250,000			
143	Catch basins	12	ea	3,800.00	45,600			
144	Manholes	10	ea	4,500.00	45,000			
145	WQ structures	3	ea	16,000.00	48,000			
146	Area drains	4	ea	1,500.00	6,000			
147	Work to culvert	1	ls	250,000.00	250,000			
148	<u>Gas service</u>							
149	E&B trench for new gas pipe - install by plumbing	450	lf	25.00	11,250			
150	SUBTOTAL					2,633,250		
151	<b>G40 ELECTRICAL UTILITIES</b>							
152	<u>Power</u>							
153	Utility co. backcharges, allow	1	ls	30,000.00	Utility co.			
154	Connections at existing manhole				Utility co.			
155	Manhole	1	ls	8,500.00	8,500			
156	Connections in manhole	1	ls	3,500.00	3,500			
157	Primary ductbank 2-5" ductbank, empty, allow	1000	lf	120.00	120,000			
158	Transformer by utility company				By Utility Co.			
159	Transformer pad; temporary for relocated transformer	1	ea	5,000.00	5,000			
160	Secondary service	60	lf	1,100.00	66,000			
161	<u>Communications</u>							
162	Connection at riser pole, allow	1	ea	1,500.00	1,500			
163	Telecom ductbank 4-4", allow	1000	lf	152.00	152,000			
164	<u>Site Lighting</u>							
165	Site Parking lighting (allow)	250,800	sf	2.00	501,600			
166	SUBTOTAL					858,100		
167	<b>TOTAL - SITE DEVELOPMENT</b>						<b>\$15,932,983</b>	

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<b>SPORTS LIGHTING</b>							
<b>G40 ELECTRICAL UTILITIES</b>							
<u>Sports Field Lighting and Sound System</u>							
	Football field lighting, bases and circuitry	1	ls	540,000.00	540,000		
	Soccer Field Lighting	2	loc	400,000.00	800,000		
	Remote lighting control system	1	ls	100,000.00	100,000		
<b>TOTAL - SPORTS LIGHTING</b>							<b>1,440,000</b>

F. COST ESTIMATES

ESTIMATED TOTAL PROJECT BUDGET

The Total Project Budget for Option 1A – Code Repair Only is \$115,523,799.

The Total Project Budget for Option 2A – Renovation Only is \$168,437,931.

The Total Project Budget for Option 3A – Renovation and Additions is \$181,956,184.

The Total Project Budget for Option 4A – New Construction is \$177,433,426.

The Total Project Budget for Option 4B – New Construction is \$176,208,977.

F. COST ESTIMATES  
TOTAL PROJECT BUDGET

PM&C Estimate  
Dated 12/3/20

SF	Option	PDP Phase Project Costs			PSR Phase Project Costs			
			Project Cost/SF			Project Cost/SF		
208,113	Code Repairs Only Option 1A	Construction Cost	\$88,047,467		\$87,064,326			
		Building Cost	\$78,183,395		\$77,258,529			
		Site Cost	\$3,795,310		\$3,750,414			
		Concession/Locker Room Building	\$0		\$0			
		Demo/HazMat Cost	\$6,068,762		\$6,055,383			
		Temporary Classroom Modulares	\$5,600,000		\$5,600,000			
		Fees,Testing, Utilities, and Expenses	\$15,156,408		\$15,023,684			
		FFE/Technology	\$0		\$0			
		Contingencies	\$6,163,323		\$7,835,789			
		<b>total</b>	<b>\$114,967,198</b>	<b>\$552</b>	<b>\$115,523,799</b>	<b>\$555</b>		
		208,113	Renovation Only Option 2A	Construction Cost	\$134,079,253		\$129,540,192	
Building Cost	\$101,123,150				\$97,665,445			
Site Cost	\$24,824,019				\$26,005,549			
Concession/Locker Room Building	\$2,250,000				\$0			
Demo/HazMat Cost	\$5,882,084				\$5,869,198			
Temporary Classroom Modulares	\$5,600,000				\$5,600,000			
Fees,Testing, Utilities, and Expenses	\$22,036,949				\$21,727,926			
FFE/Technology	\$2,502,000				\$2,502,000			
Contingencies	\$9,228,048				\$9,067,813			
<b>total</b>	<b>\$173,446,250</b>			<b>\$833</b>	<b>\$168,437,931</b>	<b>\$809</b>		
207,827	Renovation/Addition Option 3A			Construction Cost	\$140,176,603		\$145,405,962	
		Building Cost	\$102,795,319		\$109,855,783			
		Site Cost	\$28,287,704		\$25,953,240			
		Concession/Locker Room Building	\$2,250,000		\$2,880,106			
		Demo/HazMat Cost	\$6,843,580		\$6,716,833			
		Fees,Testing, Utilities, and Expenses	\$22,860,091		\$23,869,805			
		FFE/Technology	\$2,502,000		\$2,502,000			
		Contingencies	\$9,654,862		\$10,178,417			
		<b>total</b>	<b>\$175,193,556</b>	<b>\$858</b>	<b>\$181,956,184</b>	<b>\$876</b>		
		207,827	New Construction Option 4A	Construction Cost	\$139,833,139		\$141,652,636	
				Building Cost	\$102,795,502		\$103,847,292	
Site Cost	\$28,051,645				\$28,390,704			
Concession/Locker Room Building	\$2,250,000				\$2,838,789			
Demo/HazMat Cost	\$6,735,992				\$6,575,851			
Fees,Testing, Utilities, and Expenses	\$22,813,724				\$23,363,106			
FFE/Technology	\$2,502,000				\$2,502,000			
Contingencies	\$9,630,820				\$9,915,684			
<b>total</b>	<b>\$174,779,683</b>			<b>\$856</b>	<b>\$177,433,426</b>	<b>\$854</b>		
207,827	New Construction Option 4B			Construction Cost	\$138,271,461		\$140,636,495	
				Building Cost	\$101,572,664		\$103,056,537	
		Site Cost	\$27,709,717		\$28,176,998			
		Concession/Locker Room Building	\$2,250,000		\$2,835,267			
		Demo/HazMat Cost	\$6,739,080		\$6,567,693			
		Fees,Testing, Utilities, and Expenses	\$22,602,897		\$23,225,927			
		FFE/Technology	\$2,502,000		\$2,502,000			
		Contingencies	\$9,521,502		\$9,844,555			
		<b>total</b>	<b>\$172,897,860</b>	<b>\$847</b>	<b>\$176,208,977</b>	<b>\$848</b>		

F. COST ESTIMATES  
TOTAL PROJECT BUDGET

PM&C Estimate  
Dated 12/3/20

	Code Repair Only Option 1A	Renovation Only Option 2A	Renovation/ Addition Option 3A	New Construction Option 4A	New Construction Option 4B
<b>Building Costs</b>					
Foundations	\$573,250	\$573,250	\$4,875,810	\$5,631,605	\$3,234,067
Superstructure	\$1,289,522	\$1,905,068	\$6,368,864	\$8,810,031	\$8,661,362
Exterior Closure	\$3,250,002	\$9,328,752	\$12,786,440	\$10,834,295	\$12,501,463
Roofing	\$2,748,488	\$2,995,896	\$2,048,500	\$2,262,244	\$2,746,324
Interior Construction	\$3,826,957	\$8,405,443	\$6,342,867	\$8,001,167	\$8,001,167
Staircases	\$222,000	\$222,000	\$246,436	\$274,723	\$319,723
Interior Finishes	\$7,217,986	\$7,217,986	\$5,434,118	\$7,066,118	\$7,066,118
Conveying Systems	\$220,000	\$220,000	\$120,000	\$160,000	\$120,000
Plumbing	\$3,347,726	\$3,329,808	\$2,557,232	\$3,325,232	\$3,325,232
HVAC	\$11,446,215	\$14,567,910	\$11,187,890	\$14,547,890	\$14,547,890
Fire Protection	\$1,248,678	\$1,248,678	\$958,962	\$1,246,962	\$1,246,962
Electrical	\$8,589,892	\$8,718,417	\$6,998,765	\$8,723,426	\$8,723,426
Equipment	\$1,453,600	\$1,453,600	\$1,259,100	\$1,832,600	\$1,710,100
Furnishings	\$2,588,914	\$2,588,914	\$1,814,056	\$2,275,882	\$2,309,748
Selective Renovations	\$0	\$0	\$14,694,049	\$0	\$0
Selective Demolition	\$1,834,616	\$2,250,842	\$0	\$0	\$0
Building Demolition	\$0	\$0	\$1,280,904	\$1,248,678	\$1,248,678
Hazardous Materials	\$4,025,000	\$4,025,000	\$3,500,000	\$3,500,000	\$3,500,000
Phasing	\$1,495,735	\$1,950,797	\$500,000	\$0	\$0
<b>Subtotal</b>	<b>\$55,378,581</b>	<b>\$71,002,361</b>	<b>\$82,973,993</b>	<b>\$79,740,853</b>	<b>\$79,262,260</b>
<b>Sitework</b>					
General Sitework	\$2,492,892	\$8,500,933	\$10,936,737	\$10,915,787	\$10,786,737
Concession/Locker Room	\$0	\$0	\$2,050,000	\$2,050,000	\$2,050,000
Two Synthetic Soccer Fields	\$0	\$1,686,000	\$1,686,000	\$1,686,000	\$1,686,000
Synthetic Football Field, Track, Bleachers	\$0	\$3,207,246	\$3,207,246	\$3,207,246	\$3,207,246
Sports Lighting - three Fields	\$0	\$1,440,000	\$1,440,000	\$1,440,000	\$1,440,000
Two New Traffic Signals	\$0	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000
Temporary Utilities	\$0	\$0	\$253,000	\$253,000	\$253,000
<b>Subtotal</b>	<b>\$2,492,892</b>	<b>\$17,834,179</b>	<b>\$22,572,983</b>	<b>\$22,552,033</b>	<b>\$22,422,983</b>
<b>Mark-ups</b>					
Escalation	\$3,761,646	\$5,774,375	\$6,582,706	\$7,302,062	\$7,074,544
Design Contingency	\$8,680,721	\$13,325,481	\$12,665,637	\$12,275,146	\$12,202,229
General Conditions	\$7,680,000	\$7,680,000	\$5,760,000	\$5,280,000	\$5,280,000
General Requirements	\$3,515,692	\$5,396,820	\$4,991,813	\$4,874,804	\$4,838,481
Bonds	\$703,138	\$1,079,364	\$1,247,953	\$1,218,701	\$1,209,620
Insurance	\$984,394	\$1,511,110	\$1,747,134	\$1,706,181	\$1,693,468
Permit	\$0	\$0	\$0	\$0	\$0
Temporary Classrooms	\$5,600,000	\$5,600,000	\$0	\$0	\$0
CM Fee	\$1,757,846	\$2,698,410	\$3,119,883	\$3,046,752	\$3,024,050
CM Contingency	\$2,109,415	\$3,238,092	\$3,743,860	\$3,656,103	\$3,628,860
<b>Subtotal</b>	<b>\$34,792,852</b>	<b>\$46,303,652</b>	<b>\$39,858,986</b>	<b>\$39,359,749</b>	<b>\$38,951,252</b>
<b>TOTAL</b>	<b>\$92,664,325</b>	<b>\$135,140,192</b>	<b>\$145,405,962</b>	<b>\$141,652,635</b>	<b>\$140,636,495</b>

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G. PERMITTING REQUIREMENTS

The following permitting requirements for the Stoneham High School applies to all of the options. This list will be updated as the project develops further and more information becomes available.

PERMITTING MATRIX  
12/23/2020

Permit	Phase	Jurisdiction
<b>Health Department</b>		
Demolition Permit	CA	Building Dept.
Dumpster Permit	CA	Building Dept.
<b>Fire Department</b>		
Demolition Permit	DD	SFD
Fire Alarm Review	DD	SFD
Fire Protection Plan Review	DD	SFD
Temporary Heating for Construction	DD	SFD
Combustible Fuel Storage	DD	SFD
<b>Department of Public Works</b>		
Street Opening Permit	CA	DPW
Trenching Permits	CA	DPW
Right of Way Occupancy Permits	CA	DPW
Water Work services and Mains	CA	DPW
Installation and Connection Permits	CA	DPW
Wetlands Protection Act	N/A	DPW
<b>Engineering Division</b>		
Erosion Control Permits	CD	SCC
Sewer and Storm water Connection Permits	DD/CD	SWSRB
Building Permits	CA	Building Dept.
Electrical Permit	CA	Building Dept.
Plumbing and Gas Permit	CA	Building Dept.
Gas Utility Shut Off Notice	CA	National Grid
<b>Environmental Protections Agency</b>		
Dewatering Permit	CD	EPA
National Pollution Discharge Elimination System (NPDES) Program	CD	EPA
<b>MA Dept. Environmental Protection</b>		
Notice of Abatement	CA	MA DEP
Surface Water Supply Protection (310 CMR 22.20)	CA	MA DEP
<b>Stoneham Water and Sewer Review Board</b>		
Water and Sewer Demolition Permit	DD/CD (5-6 months)	SWSRB
Domestic & Fire Protection Water New Service Permit	DD/CD	SWSRB
New Sewer Services Permit	DD/CD	SWSRB
Hydrant Metering Permit	Construction	SWSRB
Storm Water New Connection Permit (just needs to be filed)	DD/CD	SWSRB
<b>Massachusetts Environmental Policy Act</b>		
Land Regulations (301 CMR 11.00)	CD	MA EPA
Rare Species Regulations (301 CMR 11.00)	CD	MA EPA
Wetlands Regulations (301 CMR 11.00)	CD	MA EPA
Water Regulations (301 CMR 11.00)	CD	MA EPA
Wastewater Regulations (301 CMR 11.00)	CD	MA EPA
Area of Environmental Concern (ACEC) Regulations (301 CMR 11.00)	CD	MA EPA

H. DESIGN AND CONSTRUCTION SCHEDULE

The project schedule for Option 1A – Code Repair Only anticipates MSBA Board of Director’s approval to proceed into Schematic Design at their February 11, 2021 meeting and MSBA Board of Director’s approval of the Project Scope and Budget Agreement at their August 25, 2021 meeting. Local appropriation voting will occur within 120 days thereafter. Following local appropriation voting, the Design Documents will be developed, leading to an early construction package for temporary classroom modulars in the summer of 2022, followed by phased occupied renovations through the summer of 2026.

The project schedule for Option 2A – Renovation Only anticipates MSBA Board of Director’s approval to proceed into Schematic Design at their February 11, 2021 meeting and MSBA Board of Director’s approval of the Project Scope and Budget Agreement at their August 25, 2021 meeting. Local appropriation voting will occur within 120 days thereafter. Following local appropriation voting, the Design Documents will be developed, leading to an early construction package for temporary classroom modulars in the summer of 2022, followed by phased occupied renovations through the summer of 2026.

The project schedule for Option 3A – Renovation and Addition anticipates MSBA Board of Director’s approval to proceed into Schematic Design at their February 11, 2021 meeting and MSBA Board of Director’s approval of the Project Scope and Budget Agreement at their August 25, 2021 meeting. Local appropriation voting will occur within 120 days thereafter. Following local appropriation voting, the Design Documents will be developed, leading to construction commencement on the additions in the summer of 2022, with a move-in date of summer 2024. Renovation of the existing gymnasium will commence and be completed by February 2025. The remainder of the existing building will be demolished and final site work will be completed late fall 2024/summer 2025.

The project schedule for Option 4A – New Construction anticipates MSBA Board of Director’s approval to proceed into Schematic Design at their February 11, 2021 meeting and MSBA Board of Director’s approval of the Project Scope and Budget Agreement at their August 25, 2021 meeting. Local appropriation voting will occur within 120 days thereafter.

Following local appropriation voting, the Design Documents will be developed, leading to construction commencement in the summer of 2022, with a move-in date of summer 2024. The existing school building will then be demolished and final site work will be completed by late fall 2024/spring 2025.

The project schedule for Option 4B – New Construction anticipates MSBA Board of Director’s approval to proceed into Schematic Design at their February 11, 2021 meeting and MSBA Board of Director’s approval of the Project Scope and Budget Agreement at their August 25, 2021 meeting. Local appropriation voting will occur within 120 days thereafter.

Following local appropriation voting, the Design Documents will be developed, leading to construction commencement in the summer of 2022, with a move-in date of summer 2024. The existing school building will then be demolished and final site work will be completed by late fall 2024/spring 2025.

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**I. PRELIMINARY DESIGN PRICING**

The estimated construction costs and project costs for the above options are defined in the table below. The detailed estimates are appended at the end of this section.

Option	Total Gross Square Feet	Square Feet of Renovated Space	Square Feet of New Construction	Site, Building Takedown, HazMat Cost	Estimated Total Construction Cost	Estimated Total Project Costs
		(cost/sf)	(cost/sf)		(cost/sf)	
Code Repair Only Option 1A	208,113	208,113 \$360/sf	n/a	\$17,656,044	\$92,664,325 \$445/sf	\$ 115,523,799
Renovation Only Option 2A	208,113	208,113 \$456/sf	n/a	\$40,319,373	\$135,140,192 \$649/sf	\$ 168,437,931
Renovation and Addition Option 3A	207,827	48,000 \$422/sf	159,827 \$543/sf	\$38,372,689	\$145,405,962 \$699/sf	\$ 181,956,184
New Construction Option 4A	207,827	n/a	207,827 \$499/sf	\$37,805,343	\$141,652,635 \$681/sf	\$ 177,433,426
<b>New Construction Option 4B**</b>	<b>207,827</b>	<b>n/a</b>	<b>207,827 \$496/sf</b>	<b>\$37,579,957</b>	<b>\$140,636,495 \$677/sf</b>	<b>\$ 176,208,977</b>

\*\* Option 4B is the Preferred Option

**J. QUALITATIVE MATRIX**

In order to assist the Stoneham High School Building Committee in their decision-making process, the design team worked with the committee to develop a matrix that would allow for each design option to be weighed according to a series of criteria. These criteria ranged from delivery of educational program to traffic to the impact to neighbors and scheduling, with each member discussing and selecting their preferred option by open vote, the results adding up to a higher ranked option. This matrix, in conjunction with the cost analysis and sustainability goals provided the means for the Committee to make a decision about the preferred option. This matrix was used as a vehicle to facilitate discussions around the options presented.

**Evaluation Criteria included:**

- Ed Program Compliance
- Traffic: Queing / Site Circulation / Parking
- Parking proximity to stadium & fields
- Neighborhood Impact: Stadium / Fields / Lights
- Construction Access Impacts
- Phasing Complexity
- Existing fields preservation
- Optimized construction schedule
- Zero Net Energy Achievability
- Civic presence
- Reuse of existing Gymnasium

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