



COMPREHENSIVE FEASIBILITY STUDY OF

ALLEGANY HIGH SCHOOL AT THE *BRADDOCK HOSPITAL SITE*

GRIMM + PARKER ARCHITECTS

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**CUMBERLAND AREA SCHOOLS FEASIBILITY STUDY
PHASE TWO**

COMPREHENSIVE FEASIBILITY STUDY OF:
ALLEGANY HIGH SCHOOL AT THE
BRADDOCK HOSPITAL SITE

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SECTION 1 - EXECUTIVE SUMMARY

1 – PURPOSE

The purpose of this study is to evaluate the options for use of the existing Braddock Hospital Campus for the relocation of Allegany High School. The study includes the evaluation of the existing structures on the site and their potential for reuse. Three general options of the use of the existing building and campus were considered:

- Use the existing structures to provide all the program required by the Education Specifications.
- Use only the Diagnostic Annex tower for the high school program since it is a relatively new building, demolishing all remaining structures, and build a new structure that provides the additional space required by the educational specifications.
- Demolish all on-site structures and build an entirely new high school building on site.
- There was also consideration given to a fourth option which was to leave the Medical Office Building and its associated parking on site for potential use as a county wide administrative building.

The study compares the relative costs and the advantages and disadvantages of each proposed alternative.

2 – METHODOLOGY

The study included thorough on-site investigation of the existing building as well as review of the existing drawings. Hospital

personnel who were familiar with the buildings were interviewed on site. The buildings were analyzed for their potential reuse as school buildings, their ability to meet program requirements, conform to existing educational facility code requirements and function efficiently as a school.

The analysis was done with Allegany High School Education Specifications Area Summary. This area summary has a total State Rated Capacity of 857 using the IAC's State Rated Capacity formula for high schools. Each option was created with the same program with the exception of Scheme 3B, so that consistent points of comparison could be evaluated. The final version of the educational specifications to be used for the eventual new school has not been developed. Scheme 3B differs in that the total proposed SRC for the program is 719 students as is indicated in the projections for the school year 2018. The Educational Specifications and more detailed cost estimates related to those education specifications will be developed during the schematic design phase of the project as it moves forward.

Each option, which includes a design scheme, also includes a location for a proposed classroom addition. This addition has been located and planned to create a resulting building that will house 12-16 additional teaching stations, however the core spaces are designed to match the capacity of the building without the addition.

The options all attempted to take into account the existing Lion's Manor Assisted Living Building. The assumption was made that the school would open with that building still in operation but the facility would eventually be moved and building eventually taken down to provide additional field space. Where possible, the schemes attempted to locate the practice field in this location and provide enough parking for the existing facility to continue to function.

The cost estimates each include a calculation for the proposed state participation value for the project. The number is based on the projected enrollment of Allegany High School for the year 2018, the associated state allocated square footage per student and the state supported cost per square foot. The numbers are based on the currently available data and will change over time. These numbers are included for each scheme for analysis purposes and are only a proposed calculation. Since the current proposed capacity for the new high school is higher than the projected enrollment, the local responsibility is consequently higher. As the Education Specifications are finalized the local responsibility will be modified accordingly.

3 – OVERVIEW

The Allegany County Public School system, located in Western Maryland, serve approximately 9,000 students in 22 schools across the county. The City of Cumberland is the county seat for Allegany County and is the home of four public elementary schools, two middle schools, two high schools and a career education facility. This report focuses on the creation of a new high school on the current location of the former Western Maryland Health System (WMHS) Braddock Hospital Campus. The campus is located on Haystack Mountain on the west side of Cumberland, MD at 900 Seton Drive. There are several structures on site totaling approximately 430,290 square feet, on a lot size of 26.25 acres, and built in a time frame spanning from 1967 through 2003. The existing hospital campus is in need of significant improvements and alterations to make the building a safe and effective school environment. It is not lacking in size but is lacking in adequate program space to meet the requirements of the education specifications, as the buildings are currently configured.

4 – DESIGN SCHEMES

The study has focused on the creation of multiple options for the site as appropriate by the existing conditions.

Braddock Hospital Site

Scheme 1: Renovation

This scheme includes the renovation of the existing hospital building without the addition of any new construction and minimal site work, in relation to the built structure.

Scheme 2: Renovation plus Addition

This scheme involves demolition of the hospital complex, with the exception of the Diagnostic annex tower. The Diagnostic tower is used as a classroom bar and the additional support spaces required are housed in an addition located to the east side of the tower.

Scheme 3A: New Construction

In this scheme, a new building is constructed in the location of the existing structure. The large two story volumes in the program are located against the existing retaining wall to make use of the existing remaining wall.

Scheme 3B: New Construction

This scheme is the same as scheme 3A with the exception that it uses the smaller program listed in the area summary

associated with this scheme and is designed for an enrolment of 719 students.

Scheme 4: New Building Retaining the Medical Office Building

In this scheme we investigate the possibility of retaining the Medical Office Building for future use by Allegany County Public Schools for office spaces. Several options were considered but all were determined to undermine the ability of the site to deliver a successful high school program. The sacrifices included athletic field space, parking, traffic flow, and security for the high school.

Since there were no viable options, further details of this scheme have not been included.

5 – RECOMMENDATIONS

There were many scenarios studied and many factors considered in making the following recommendations for this site. Schemes 1 and 4 were both easily ruled out because of the details included on the following pages and the large sacrifices to the delivery of the educational program they would require. Scheme 2, 3A and 3B are viable solutions for the site. However, we recommend either Scheme 3A or 3B as our final recommendation based on the information presented in this study. Between these two schemes the only significant difference is the size of the program which is a decision that needs to be made based on the school systems goals and available funding.

The value of an existing building is significant, often from a financial standpoint and most certainly from an environmental standpoint.

Therefore, Scheme 2 was worth careful consideration. In the end, the decision making factors where the efficiency and educational quality lost by the use of the existing structure. This was mainly due to the fact that the building systems required for health care facilities are very different than those for schools and all systems including the costly HVAC systems would have to be replaced. Consequently, replacement became the least costly option for the school program.

One of the chief educational factors driving the decision was the configuration of the Diagnostic Annex tower. It will be difficult to effectively use the Diagnostic Annex tower for classroom space, but most importantly, the building is currently four stories tall plus a full size mechanical penthouse. A four story classroom bar for this size of a high school spreads out the program in ways that will compromise its delivery. Contrary, in Scheme 3A and 3B, the classroom bar is three stories and is much more flexible since it can be created to best function for the needs of the eventual program.

Flexibility is also a critical decision making factor in this case since the size of the program is not yet determined and it will be beneficial for the City of Cumberland if the resulting school can easily expand its capacity. Since the classroom bar is land locked in Scheme 2, Scheme 3A and 3B become preferable alternatives. Expansion of the classroom bar can be done efficiently and create contiguous classroom space as an addition to the school. It also allows for expansion north and south along the bar of public spaces to increase the size of the support program or provide additional program that is not provided in the original specification.

Many factors were discussed and evaluated in making these decisions and these are just some of the most influential factors considered. More detail is provided in the following analysis.

SECTION 2 – EXISTING CONDITIONS ASSESSMENT

1 – INTRODUCTION

WMHS Braddock Campus was originally constructed in 1967 and added to through the years up until 1990, creating 319,640 square feet. In 1991 the Medical office Building was constructed adding 34,275 square feet. By 2003 the Diagnostic center Tower/annex was constructed bringing the total campus building area to 430,290 square feet. The site has the capacity for 875 parked cars on various outdoor levels. The main building has a sub-basement, basement, ground level, floors 1-5 and a penthouse. The medical office building has three floors, beginning at grade, and the Diagnostic Center/annex has a ground level, floors 1-3 and a mechanical penthouse.

2 – SITE ASSESMENT

A. Site Background

The site is located between Bishop Walsh Road and Seton Drive. The existing site contains approximately 26 acres. There are several buildings on site. These include: Main Hospital, Annex, Medical Office Building, CUP, and Lion's manor. At this time, it is uncertain when the 4 +/- acres that is occupied by Lion's Manor will become part of the project.

B. Accessibility

Site accessibility is accomplished with a connection between Seton Drive and Bishop Walsh Road.

C. Parking

Parking is dispersed throughout the entire property, with the bulk of it contained in the northern corner of the site. There are over 800 spaces available for use. For the most part, accessible spaces meet code and are attached to an accessible route.

D. Service

Service access is provided via a series of elevated docks which face east. An access road from Bishop Walsh Drive connects to the loading area.

E. Pedestrian

There are no defined pedestrian pathways exterior to the property. There is limited pedestrian access within the campus. For the most part, the condition of the sidewalk is beyond repair and will need to be replaced.

No bike racks were found on-site.

F. Water Supply, Drainage and Sewerage

The site is served by domestic water and sewer supplied by the City of Cumberland. The City reported no issues with either system. Taps for an addition or new building

will need to follow City practices. Note that due to the elevation of the buildings, booster pumps for both domestic and fire will be required.

The City of Cumberland uses the 2010 Maryland Stormwater Management Design Manual. Any renovations done on the site will require compliance with the City's Stormwater Management Ordinance. The designer will be required to follow the Environmental Site Design (ESD) guidelines for redevelopment. In addition, any increase in impervious area will most likely be required to form overbank flood protection, Q100, or equivalent storage. Discussions with the City Engineer indicated a desire to reduce the overall impact of the site to pre-development, or woods with good condition, in order to reduce the impact to downstream watershed. The Haystack watershed is prone to flooding so additional precaution is warranted.

ESD focuses on bringing the site back to what engineers term "Woods in Good Condition". This means that every effort must be made in the design to accommodate alternative non-structural practices before a conventional structure can be employed. These techniques can include green roofs, infiltration, grass swales, and permeable pavements. The architect needs to fully consider this when performing preliminary design for any renovation or construction. Green areas will need to be incorporated into the design to facilitate the implementation of ESD practices.

There are two existing stormwater ponds on site that can be used for water quantity management. It has little, if any, value in terms of quality control.

Potomac Edison provides power for the site. Columbia Gas has gas available, but did not comment on the location or capacity. Verizon supplies telephone. Cable is by Atlantic Broadband. No issues with any of these services were disclosed.

G. Circulation

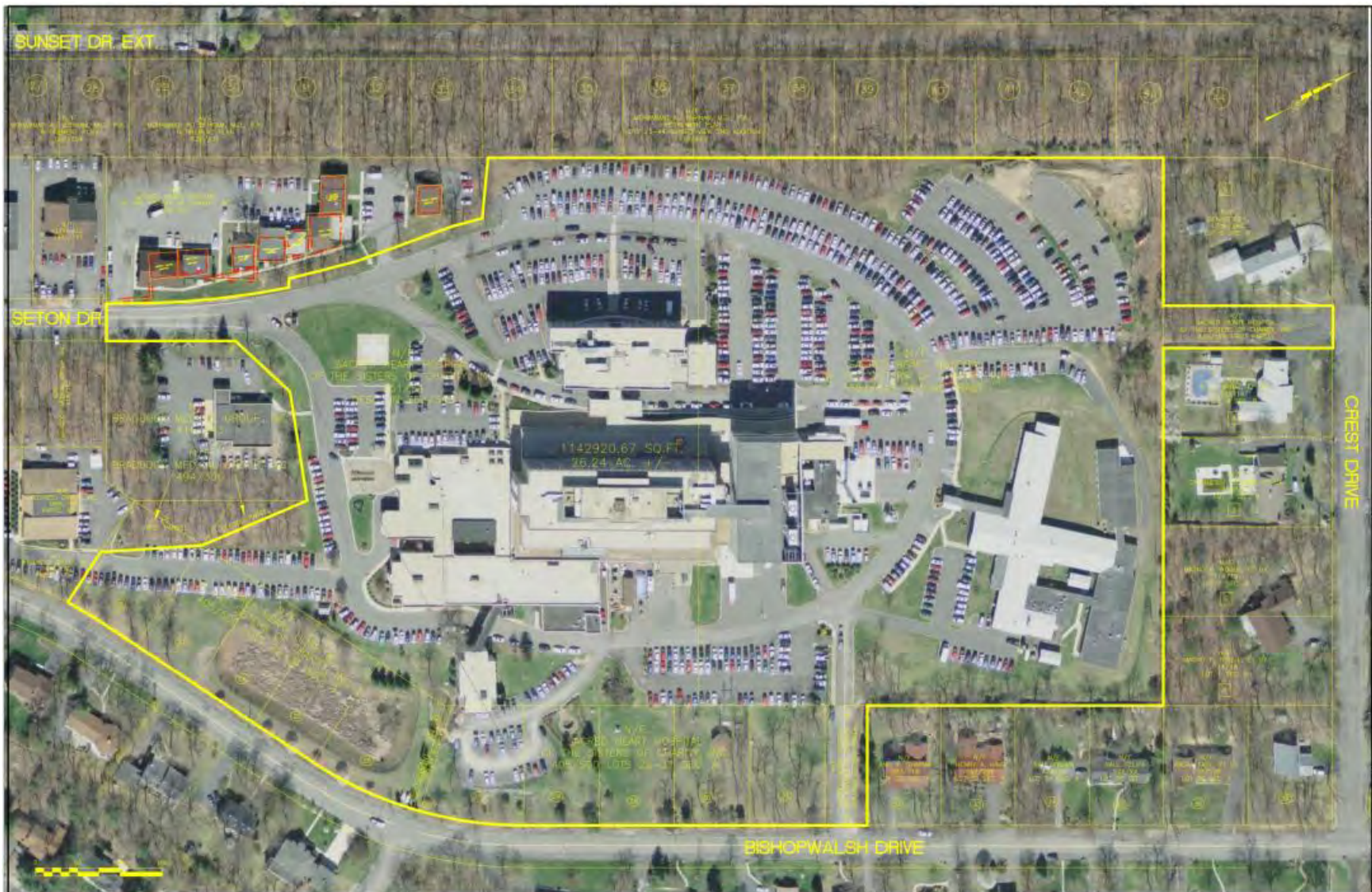
Circulation on site is serviced primarily from Seton Drive, and is supplemented by Bishop Walsh Road. Seton splits at the hospital entrance and becomes one way through the center of the site along the main drop off area heading in the north direction. Seton becomes two directional near the assisted living complex, north of the power plant.

H. Pedestrian and Vehicle Circulation

The site mixes pedestrian and vehicle circulation by being a central building with surrounding parking lots.

I. Athletic Fields

There are not existing athletic fields on the site. All surfaces surrounding the building are taken by parking lots, and require demolition and leveling.



3 – BUILDING CONDITIONS

A. Main Hospital, 1967



A. Exterior Building Envelope

Roof

The existing roof consists of a single ply membrane with ballast. The majority of the roof plane is flat with the exception of areas for skylights and at the location of the dome over the chapel. There is evidence of roof leaks in the upper levels.

Exterior Walls

The building envelope consists of concrete spandrel panels over a concrete frame.

Exterior Doors and Windows

All exterior windows are aluminum frame, single pane glazing which will not meet current energy standards and should be replaced with

thermally broken insulated glass units. Aluminum sun shading is provided on the existing hospital tower.

B. Interior Building Envelope

Floor Finishes

Most areas of the hospital have vinyl laminate flooring (VLT), with areas of carpeting.

Interior Walls

The interior walls are gypsum board and/or ceramic tile on various substrates

Ceilings

The ceilings are gypsum board and suspended ACT with evidence of above ceiling leaks that would need to be removed and repaired where facilities are being re-used.

B. ICU/ED/5 North & Sisters Residence, 1990



A. Exterior Building Envelope

Roof

The existing roof consists of a single ply membrane with ballast. There is evidence of roof leaks in the upper levels.

Exterior Walls

The building envelope consists of pre-cast concrete panels over a concrete frame. In addition elements have stone facing and storefront systems of pre-cast concrete filler panels.

Exterior Doors and Windows

All exterior windows are aluminum frame, single pane glazing which will not meet current energy standards and should be replaced with thermally broken insulated glass units.

B. Interior Building Envelope

Floor Finishes

Most areas of the hospital have vinyl laminate flooring (VLT), with areas of carpeting.

Interior Walls

The interior walls are gypsum board and/or ceramic tile on various substrates

Ceilings

The ceilings are gypsum board and suspended ACT through-out.

C. Medical Office Building, 1991



A. Exterior Building Envelope

Roof

The roof is single ply ballasted over steel joists supported by steel beams. The floors of the building are steel joists over steel beams, with the first floor being slab on grade.

Exterior Walls

The building envelope consists of synthetic plaster over steel studs

Exterior Doors and Windows

All exterior windows are aluminum frame, single pane glazing which will not meet current energy standards and should be replaced with thermally broken insulated glass units.

B. Interior Building Envelope

Floor Finishes

Various flooring is used throughout the medical office building including quarry tile, ceramic tile, vinyl composition tile, sealed concrete, and carpet.

Interior Walls

Interior walls are gypsum wall construction over stud, with varying finishes of brick, vinyl wall coverings and painted.

Ceilings

The ceilings throughout are suspended acoustic tile (ACT)

D. Annex, 2003



A. Exterior Building Envelope

Roof

The roof is a single ply ballasted system over a composite deck.

Exterior Walls

The building envelope is gypsum fiberglass reinforced concrete (gfrc) panels over steel frame construction.

Exterior Windows and Doors

All exterior windows are aluminum frame, single pane glazing which will not meet current energy standards and should be replaced with thermally broken insulated glass units.

B. Interior Building Envelope

Floor Finishes

Floor consists of a variety of carpet and VCT throughout the different office areas with ceramic tile in the toilet rooms. All flooring is in good condition.

Interior Walls

Interior walls are primarily painted gypsum board on metal studs with a few areas of vinyl wall covering. The walls around the stair towers are painted CMU walls. All the walls are in fair condition.

Ceilings

Ceilings consist of a variety of ceiling tile and gypsum board bulkheads. All are painted and in good condition.

4– BUILDING CODE ANALYSIS

The existing hospital has been designed to meet all the code requirements of hospital type occupancy which vary significantly from the requirements of an educational use or an assembly use. All the hospital buildings have fewer egress stairs than would be required for a school and the egress passage ways do not provide the proper egress width for educational facilities. The stair towers would have to be expanded and the access to the stair redesigned to allow them to function as egress passages for an educational use.

The building also exceeds the allowable area per IBC for a school building without fire protected structure. A fire wall would have to be developed in the building if it were to remain in use as a school. The building would have to be separated structurally at the firewall in order for the firewall to function appropriately.

Many of the railings and guardrails in the stairs are not code compliance and the access to the stairs also have many nonconforming arrangements such as doors that swing too far into the path of travel.

5– BUILDING ACCESSABILITY

The existing hospital complex provides elevator access on each floor in multiple locations. ADA access is provided at public entries to the building, the exceptions being at the rear of the hospital in areas for

service and facilities. Interior ADA compliance is not effected as any alterations to the building interior will address the compliances. The Diagnostic Annex tower has two large elevators located near the west entrance along Seton Drive drop-off area, with access to each floor. The main hospital building has two banks of elevators, 5 total (3 large service, 2 passenger), centrally located in the building.

6– STRUCTURAL ANALYSIS

A. Visual Inspection

The exterior of all the buildings and the interior accessible areas, with the exception of the interior of the Medical Office building, were visually inspected.

Some damage such as cracks and spalls alongside walks and other exterior concrete, minor concrete spalls along the exterior wall panels of the 1965 building, signs of water infiltration along the parapet walls of the 1978 addition and damage at the caulk joints along the majority of the exterior walls were detected. This damage, in our opinion, is minor and has not adversely affected the structural integrity of the buildings.

The interior portions of the buildings which were visually inspected also were found to be in good condition and no signs of major structural defects were detected.

B. Existing Plan Review

1967 Original Sacred Heart Hospital

- The ground and first framed concrete floors are 8 1/2" thick two- way reinforced concrete flat slabs supported by reinforced concrete columns. The second framed

and the framed floors above are 8" thick two-way reinforced concrete flat slabs supported by reinforced concrete columns.

- The concrete columns are typically spaced on a 20'-8" by 24' grid.
- The floor to floor dimensions are 11'-0" between the basement and ground level, 12'- 0" between ground level and the first floor, 16'-5" between the first and second floors and 10'-8" between the floors above the second floor.
- The building was designed for the following live loads:
 - Stairs, Kitchen, Laundry and First Floor Lobby 100 psf.
 - Operating rooms, X ray rooms, offices 60 psf.
 - Dining room, Corridors and other Lobbies 60 psf.
 - Patient Rooms 40 psf.
 - Roof 40 psf.
- We conducted a cursory review of several typical bays and confirmed that the framed floor structure can support the design live loads.
- We conducted a cursory review of a typical bay at the roof and confirmed that the roof structure can support the design load.

1978 Addition

- The addition is a two story structure.
- The floor and roof are 9" thick two- way reinforced concrete flat slabs supported by reinforced concrete columns.
- The floor to floor dimensions generally match those of the 1965 building.
- The structural drawings indicate that the framed floor was designed for a live load of 60 psf. A cursory

structural analysis of several typical bays was conducted and it was confirmed that the floor can support the design live load.

- The structural drawings indicate that the roof was designed for a live load of 30 psf. A cursory structural analysis of several typical bays was conducted and it confirmed the design live load.

1990 Addition

- The addition is a 2 story structure.
- Drawings of the framed floor were not provided so its composition could not be confirmed.
- The roof is partially composed of reinforced concrete and of metal deck supported by steel joists and beams.
- The structural drawings indicate that the floor was designed for a live load of 40 psf at the patient rooms and 80 psf at the corridors. The capacity of the floor could not be verified since structural drawings of the floor were not provided.
- The structural drawings indicate that the roof was designed for a live load of 40 psf. A cursory structural analysis of a typical joist and beam was conducted and it confirmed the design live load.

2003 Diagnostic Center

- The building is a steel framed structure.
- The typical floor to floor dimension is 14'-0".
- The structural drawings indicate that the framed floors were designed for a live load of 100 psf. A cursory structural analysis of several typical floor beams was conducted and it confirmed the design live load.
- The structural drawings indicate that the roof was designed for a live load of 40 psf. A cursory structural

analysis of several typical roof beams was conducted and it confirmed the design live load.

C. Conclusions

Allegany County currently follows the 2006 International Building Code (IBC). This code requires that buildings that are renovated must also conform to the requirements of the 2006 International Existing Building Code (IEBC).

IBC requires that educational facilities be designed for the following live loads:

- | | |
|-----------------------------------|----------|
| - Classrooms | 40 psf. |
| - First floor corridors | 100 psf. |
| - Corridors above the first floor | 80 psf. |
| - Places of assembly | 100 psf. |

Based on these requirements, the Diagnostic Center in general meets the IBC live load requirements for educational facilities. Any area that will be designated as a place of assembly should be analyzed further to insure that it can support the 100 psf load without any live load reductions.

The balance of the buildings that were analyzed only meets the IBC live load requirements for class rooms. Floor areas that will be used as corridors and as places of assembly do not meet the load requirements of this code.

IEBC classifies building renovations into 3 levels depending on the amount of modifications to the existing structure. Based on our current understanding of this project, we believe that the proposed renovations will be classified as Level 3 Alterations. This type of alteration requires that the

structural components of the buildings be modified so that in addition to floor live loads, the renovated structures also meet the current IBC wind and seismic requirements. It is our opinion that the Diagnostic Building is the only building in the campus that will meet the current wind and seismic requirements of this code. All other buildings in our opinion will need some type of structural modification in order to resist the wind and seismic requirements of this code.

Review of Proposed Schemes

The study developed several options for the proposed school some of which used sections of the existing facilities. Of the schemes being considered Schemes 2, 3A and 3B are in general new construction that will be partially located over the footprints of the existing Diagnostic Center and the Sacred Heart Hospital.

The schemes with sections of the new building that are placed over the existing footprint of the original building may utilize the existing foundations. In our opinion, this is feasible as long as the potential for differential settlement between foundation on existing footings and foundations on new footings is addressed in the design. In order to avoid differential settlement issues, we recommend that the re-use of existing foundations be considered only where a section of the new building is entirely located over the footprint of the building that was demolished.

The existing foundations of the Sacred Heart Hospital in general have the structural capacity to support the two story sections of the proposed building however these might not line up with new building columns and walls of the new building.

The existing building Hospital building columns are typically spaced in a 24'-0" by 20'-8" grid. New building columns that do not line up directly over existing column footings and new building walls can be supported on new reinforced concrete beams (grade beams) that can be designed to span between the existing footings.

The only additional concern with re-using the existing foundations at this scheme is that they could be damaged during the demolition of the building's super structure. It is our opinion however, that this can be mitigated by developing demolition procedures that will protect the foundations. These procedures probably will add complexity and as a result cost to the demolition but the savings in the re-use of the foundations will outweigh the additional demolition costs.

This scheme also takes advantage of the present grade changes so it provides for the opportunity to re-use several of the building foundation walls. The existing building walls being considered for re-use are reinforced concrete walls that were originally designed as "basement" type retaining walls. From a structural standpoint, these walls can be re-used but these will require temporary bracing until the new structure is built.

The temporary bracing will add cost and complexity to the project but it will save considerable cost in excavation.

Schemes 2, 3A and 3B will be partially built over the footprint of the existing buildings. To avoid differential settlements issues, we recommend that the existing foundations that are within the building's footprint, be

removed in their entirety and that new foundations be constructed.

These schemes use the present grade changes, so the existing foundation walls may be re-used as long as these are properly temporarily braced.

7 – MECHANICAL ANALYSIS

A. General

The total building areas of all structures exceed 430,000 square feet. The main hospital was constructed in 1967. In 1990 the hospital was expanded. In 1991 a separate medical office building consisting of 34,275 square feet was constructed adjacent to the main hospital. In 2003 an annex consisting of 76,375 square feet was constructed between the main hospital and the boiler plant.

B. Existing Conditions

Heating Plan

The main heating plant serves the main hospital and annex. The heating generation plant is located in the mechanical equipment room which houses boilers and chillers. The heating plant generates high pressure steam for the heating medium. Five (5) boilers of various types, capacities and ages are used to generate steam. There is one (original 1965) large water tube boiler rated at 11,000 lbs./hr., one 8000 MBH boiler installed in 1989 (failed) and two (2) 200 BHP flexible steel boilers by UBW which are newer. These boilers are dual fuel (natural gas and fuel oil). Two (2) above ground double wall, 5000 gallon capacity storage tanks are located outside and adjacent to the boiler room. Steam is

distributed throughout the building and is used for humidification, domestic hot water heating, laundry and comfort heating. Multiple steam to water heat exchangers are located throughout the complex to convert steam to hot water heating. Similarly steam pressure reducing stations typically occur where steam is being used. Typically heat exchangers, domestic hot water generators, heating pumps, etc. are original to the time of construction for the area they serve.

Cooling

A central chilled water plant serves the main hospital and annex. Three (3) main chillers are located in the main mechanical equipment room that also houses the heating plant. Two (2) large Trane water cooled centrifugal chillers (± 800 -900 tons each) with variable speed drive compressors, using refrigerant R123 are installed in parallel to a smaller carrier water cooled R134A chiller. The Trane chillers were installed in 2002 and the Carrier chiller was installed in 2001. Each chiller has an independent condenser water pump and cooling tower on the roof. The Carrier chiller was a winter time chiller and the cooling tower is a forced draft type. The main Trane chillers provide the summer time cooling and utilize induced draft type cooling towers.

The chilled water system is primary-secondary utilizing constant volume base mounted end suction pumps.

The secondary (distribution) pumps are horizontal split case type and utilize speed drives for variable flow.

The pumps were manufactured by Bell and Gossett and were installed in 2002/2003.

Air Distribution Systems

Three (3) custom/built up air handling units as manufactured by Miller Picking and installed in 2003 are located in the penthouse of the annex.

One (1) of the three units serves the annex building and is variable air volume. The remaining two (2) units are manifolded together and currently serve a portion of the main building but were sized to serve a greater portion of the main hospital as it was being converted from the original induction box system to variable air volume. The units typically consist of a mixing box, sound attenuator, pre-filter, pre-heat coil, cooling coil, supply fan, diffuser plate, final filter and humidification. An in-line fan is used for return air. Supply and return fans utilize variable speed drives.

Within the original 1967 building there are multiple air handling units. A main dual duct unit (original to the building) serves the lower two levels while a unit in the penthouse serves the upper level patient floors. Patient rooms utilize under the window induction boxes equipped with a terminal coil. Patient floors that were renovated are served by the VAV system located in the annex.

Multiple small air handling units and systems serve specialty areas, (surgery suites, etc.) Similarly the addition has its own independent air handling units and systems.

PROS

- Annex Building air distribution system and equipment may be able to be reused.
- Existing oil tanks may be able to be reused.

- Existing annex building can be reused for classroom functions.
- Ample mechanical equipment space to house boilers, chillers and pumps.

CONS

- Steam systems not utilized in schools.
- Existing heating capacity exceeds that needed.
- Existing cooling capacity exceeds that needed.
- Original 1965 air handling systems are not usable.
- Medical office building mechanical units need to be replaced.
- Original hospital building mechanical units/system are not usable.

C. Evaluations / Recommendations

General

The 2003 annex is in good condition and some systems and equipment may be able to be reused. The original main hospital and associated equipment are over 40 years old and need to be replaced.

Heating System

The type of heating equipment, capacity of each and the use of steam is not recommended for a high school application. The two (2) newer boilers could be converted from steam to hot water but due to their large capacity and limited turn down capability a higher efficiency heating plant sized for precise capacity needed for full and part load conditions of the high school is recommended.

Cooling System

The existing cooling equipment is oversized for the proposed high school. The anticipated maximum capacity for the high school is 500-550 tons or just more than 50% of a single large chiller. Even with variable speed drive compressors the capacity cannot be turned down to efficiently provide cooling to the building. The small Carrier machine could be reused in conjunction with a similar size/capacity machine.

Similarly the pumps and cooling towers are oversized for the capacity needed for the high school. There is a possibility the cooling towers could be reused however it is desired to have the cooling tower capacity closely match the capacity of chiller it serves.

Air Distribution System

The custom air handling unit serving the annex can be reused if the annex is reused for classrooms. Depending on the design of the rest of the school, the two (2) air handling units currently serving the main hospital may be able to be modified to serve the proposed school. The built up units typically have a 35-40 year life expectancy so it is desirable to modify and reuse these units if possible.

9 – FIRE PROTECTION ANALYSIS

A. Existing Conditions

The main hospital complex and medical office building are served by an independent public water system. The main hospital has a horizontal split case fire pump.

The fire alarm control panel in the Main Hospital is a Simplex 4100U, located in the main electrical room, with the original Simplex 4602 zoned system panel is located behind the Information Desk. The 4100U is networked with the Simplex 4100U control panel (FACP) for the Diagnostic Center, located in the electric closet across the hall from the Boiler Plant.

The Medical Office Building fire alarm control panel is a Simplex 4005, located at the parking lot entry. The system is original to the building. A general alarm signal is sent from this system, as well as the Sister's Residence, to the main hospital system.

10 – ELECTRICAL ANALYSIS

A. Existing Conditions

Main Hospital 1967

The electrical service for the main hospital consists of redundant dual 12.47kV primary feeders with automatic transfer. The primary feeders originate from separate substations. At the site, the feeders are routed to Square D HVL 15kV, 600A switchgear with C/T and fused switch feeder sections from a common utility pole. The switchgear was installed in 1998 and serves pad-mount transformers L, H, and P.

Electric service to the hospital was originally configured with two 480/277V, 3 phase, 4 wire secondary oil-filled transformers, and two 208/120V, 3 phase, 4 wire secondary oil-filled transformers serving secondary switchgear in a main-tie-main configuration. The transformers were

located in dedicated vaults within the building, with the switchgear in the center of the main electrical room.

This equipment has been removed and replaced with a radial system, consisting of transformers H and P, located outside the main hospital building at the loading dock outside the main electrical room. Secondary feeders from these transformers serve Switchboards H and L, respectively, each located in one of the original transformer vaults. Switchboard-H is a Square D QED 3, rated for 2500A, 480/277V, 3 phase, 4 wire with draw-out circuit breakers. Switchboard-L is also a Square D QED 3 with draw-out circuit breakers, rated for 3000A, 208/120V, 3 phase, 4 wire.

With the exception of the service entrance equipment described above, the original distribution equipment, manufactured by FPE is still in place throughout the facility. These consist of fused switch distribution panels, with recessed branch circuit panelboards recessed mounted in corridor walls. Supplemental equipment by Westinghouse had been installed in the 1980's, with Square D equipment more recently.

Medical Office Building 1991

The Medical Office Building has a stand-alone 480/277V, 3 phase, 4 wire secondary service via a utility pad-mount transformer located adjacent to the building.

The main distribution switchboard is 1200A, 480/277V, 3 phase, 4 wire. It is configured with a utility C/T section, main fused switch, and distribution section. The switchboard is an AV- 2, manufactured by General Electric. A 150kVA dry type transformer is located within the main electrical room and provides 208/120V, 3 phase, 4 wire

service for the building. Panels are typically located in closets on each floor, with the exception of the Linear Accelerator, with Westinghouse PRL4 panels recessed in the walls.

Annex 2003

The primary switchgear was extended in 2002 to accommodate pad-mount transformer T-3, serving Switchboard A1 for the Diagnostic Center, located in the Plant main electrical room. A second Square D HVL 15kV switchgear lineup was installed, with a 600A feeder extension from the original, to accommodate adjacent pad-mount transformers T-5 and T-11 serving the Plant.

The equipment in the Diagnostic Center is by Square D, installed in 2002, and is in good condition. Distribution equipment is typically located within electric closets, with local dry type transformers providing 208/120V, 3 phase, 4 wire service.

PROS

- Primary feeders are adequate and can be reused for secondary service.
- Emergency generator capacity can accommodate shelter function.
- Existing Diagnostic Center electrical distribution system can be reused.

CONS

- Existing primary service exceeds what is needed, requires personnel qualified in medium voltage (15kV).

- Low voltage systems (telephone/data/video, paging/intercom, access control/intrusion detection/video surveillance, fire alarm) will need to be reconfigured and/or replaced.
- Medical office building electrical equipment needs to be replaced.
- Original hospital building electrical equipment needs to be replaced.

B. Recommendations

The systems within the buildings, with the exception of the Diagnostic center, are generally past their useful life, or are not compatible with the function of a school. These include the nurse call systems, telecommunications systems.

The Simplex 4100U fire alarm system could be reused and expanded, with voice evacuation capability for assembly areas, especially if a significant portion of the Diagnostic Center is maintained. The option of a new system, in lieu of modification of the existing system, is recommended as a proprietary system may not be the most cost effective solution.

The lighting systems will be required to meet current energy codes not only for maintaining the lighting power density, but for automatic shutoffs that are not present in a facility that operates 24/7. Additional energy savings may be required in order to obtain LEED Silver certification. New site lighting would be provided to suit the new campus layout.

The primary electric service to the campus has more than adequate capacity to accommodate the proposed high school. A single utility secondary transformer is sufficient for most commercial buildings, and would suit the proposed program requirements. The Diagnostic Center, constructed in 2003, has adequate electrical systems with equipment in good condition that can be reconfigured as necessary to accommodate space revisions. The switchboards are located in/adjacent to the Plant Building, so this would be required to be maintained. Most of the Square D equipment installed in the main hospital is oversized for use in a high school. None of the original Federal Pacific or Westinghouse equipment is recommended to be reused as they are already well past their anticipated useful life, and replacement parts are becoming difficult and/or costly to obtain.

11 - EDUCATIONAL SPECIFICATION ANALYSIS

For the purposes of this study, there were two programs used for the design of the schemes. The first program represented the minimal spaces proposed by the planning committee for the new Allegany High School Educational Specifications. This program represents an enrollment of 857 students and a total building area of 140,500 square feet. The second program is based on the first but has been cut in several significant ways in order to create a program that matches the projected enrolment of 719 students and the state support total square footage of 118,040. The following chart shows a comparison of the two programs and in which department the area has been lost.

See chart on following page

Department	Area Allocation (Sq. Ft.)		Difference (Sq. Ft.)
	857 SRC	719 SRC	
Administration Suite	2370	2370	0
Guidance Suite	830	830	0
Health Suite	875	875	0
Instructional Art	3150	3150	0
Business Education	2500	1300	1,200
Computer Science	1250	1250	0
English	5400	4650	750
Foreign Language	2400	1650	750
Health and Physical Education	24400	18400	6,000
Family and Consumer Science	2700	1500	1,200
Mathematics	4050	4050	0
Media Center	4100	3700	400
Music	4610	3960	650
Science Cluster	8790	6140	2,650
Special Education	2220	1820	400
Technology Education	5100	3700	1,400
Cafeteria/Food Service	7700	6910	790
Auditorium and Drama	8775	5900	2,875
Faculty Lounge/Dining/Planning Rooms	1300	1000	300
Custodial and Operations Services	2350	2350	0
TOTAL NET SQUARE FOOTAGE	100,660	81,505	19,155

Teaching Stations	41	33
Special Education Teaching Stations	2	2

SECTION 3 – CONCEPT PLANS

SCHEME 1: RENOVATION OF EXISTING HOSPITAL FOR EDUCATION BUILDING

Introduction

Scheme 1 leaves the existing hospital structure in its entirety to be adapted for use as a high school

General Building Plan/Site Objectives

This scheme leaves the existing hospital site intact and retrofits the interiors of the building to allow for a high school to work within. This requires alterations to the existing structure to fit large program spaces within the existing hospital buildings. Site work involves relocating parking and altering the grading to allow for athletic fields.

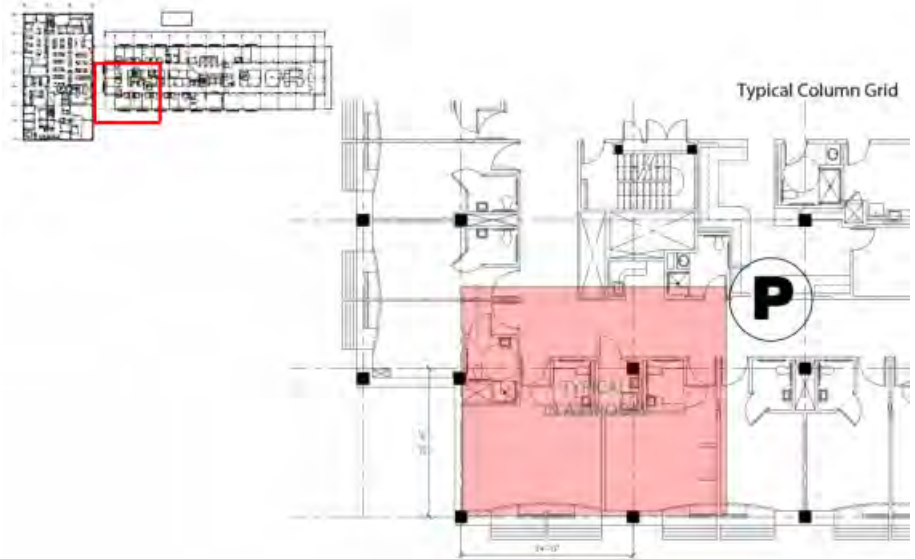
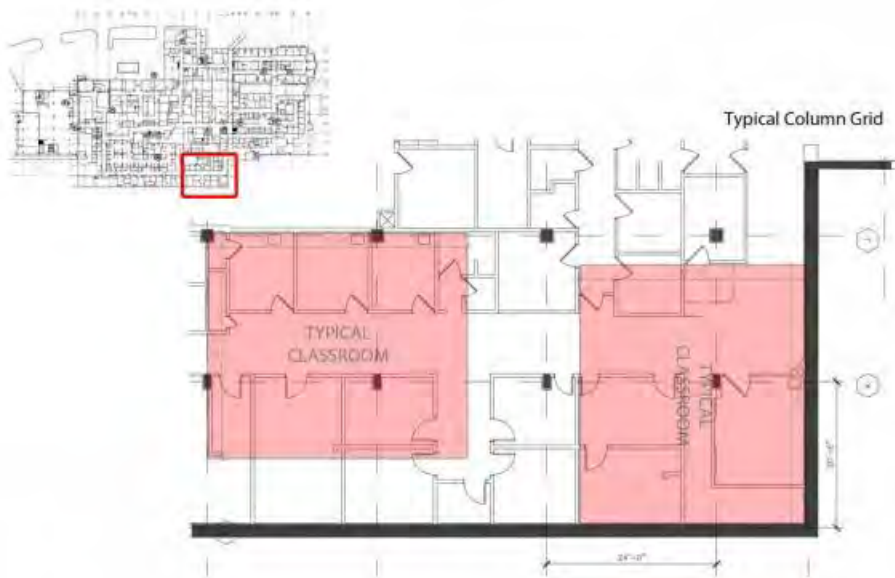
Analysis

There are many significant difficulties with the consideration of this scheme. In the following analysis we show diagrams that provide some information regarding how this may be accomplished but we have not included actual floor plans for this scheme. This scheme failed in accomplishing a viable project before floor plans were even developed. The following are the most significant failures for this scheme:

1. The building has a very small structural grid. This grid works well for the smaller sizes of hospital spaces but cannot work for classrooms. The grid size would need to be altered at considerable expense to create unobstructed classroom spaces.
2. The structural system was built to older codes and hospital loading requirements. The structure would have to be reinforced to accommodate a school which would be costly and more greatly intrude upon the spaces.
3. The floor to floor height of the building is very small and limits the possible options for HVAC systems. This limits the ability to provide the most efficient system, while increasing maintenance costs and installation costs.
4. The egress pathways are nowhere close to the size required for the occupancy of a school and would have to be expanded and added to at considerable expense.
5. All systems and walls in the building would need to be removed and replaced. The structure and exterior walls would be the only component saved and these would both need to be modified to meet current school requirements.

6. The size of the building is too large and the spaces that could not be used are the upper floors of the hospital bar. Since these floors sit above spaces that would be occupied they would be left in place and moth balled creating additional long term maintenance costs.
7. The building footprint is larger than it needs to be and does impede on the ability to locate all site program elements on the site.

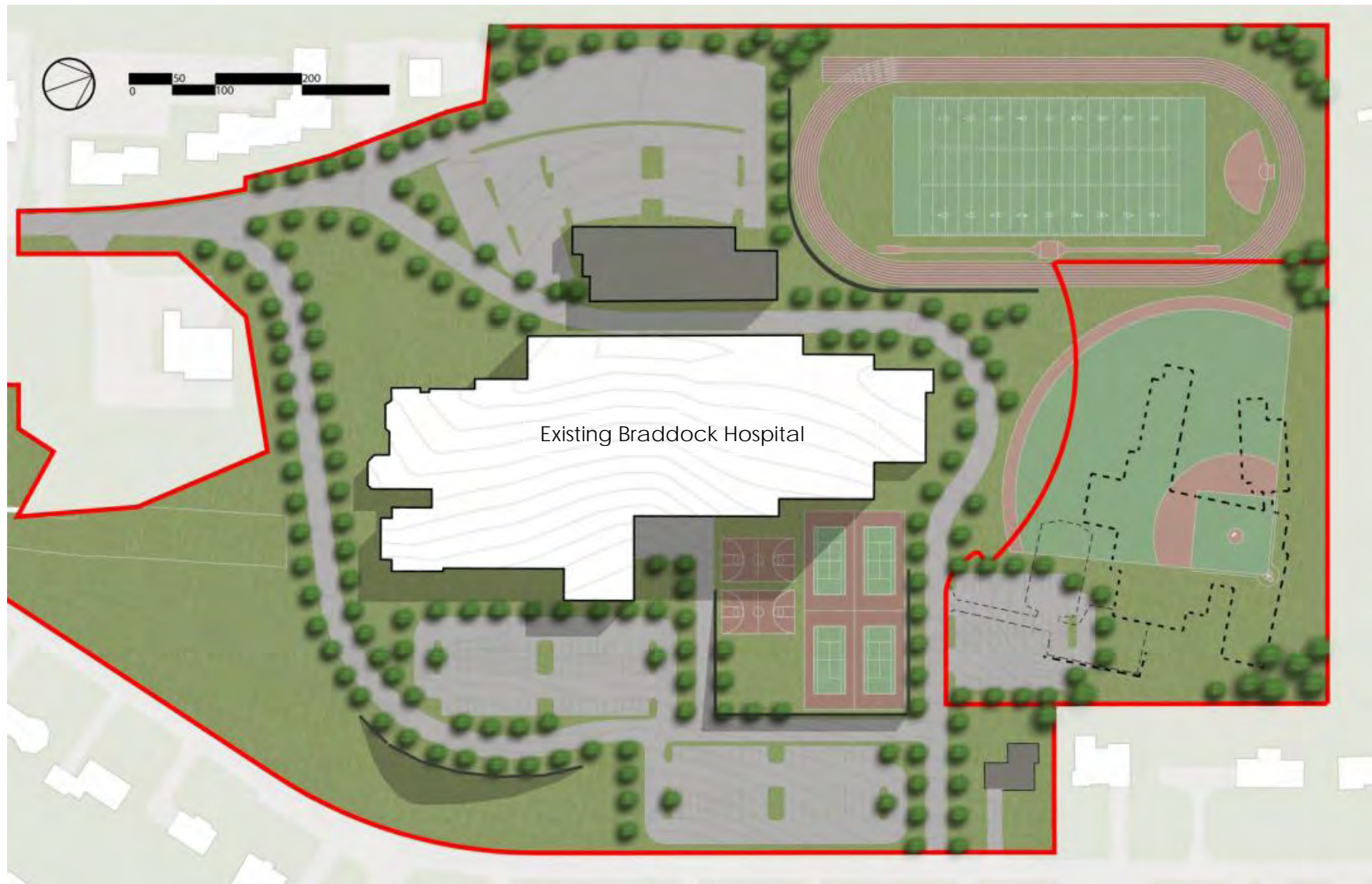
Supportive data is provided in the Building Assessment section of this report and on the following pages.



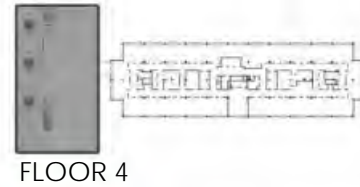
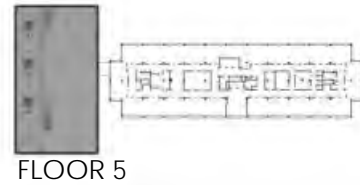
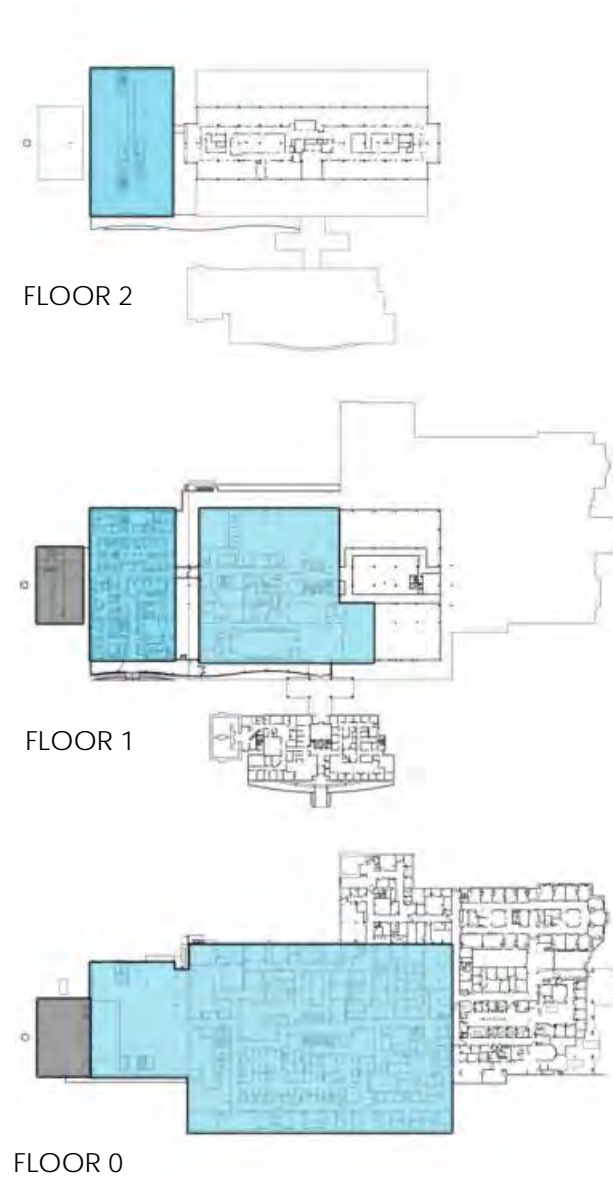
SCHEME 1 - ADVANTAGE / DISADVANTAGE

SCHEME 1	ADVANTAGES	DISADVANTAGES
BUILDING		<ul style="list-style-type: none"> • Structural grid interferes with classroom spaces • Alterations to structure to allow for larger spaces • Inadequate structure loads • Low floor to ceiling heights • Required program space far less than total space of the hospital complex • Inadequate mechanical and electrical systems • Existing Entrances are on opposite sides of Hospital, if shared entrance is not desired. • Classrooms within building will be buried from daylight
SITE		<ul style="list-style-type: none"> • Large building footprint, centrally located • Assisted Living facility impedes space for athletic fields • Existing Medical Office Building reduces space for track and field • Grade changes on rest of site require substantial leveling to allow for field locations • Shared car/bus loop and drop-off

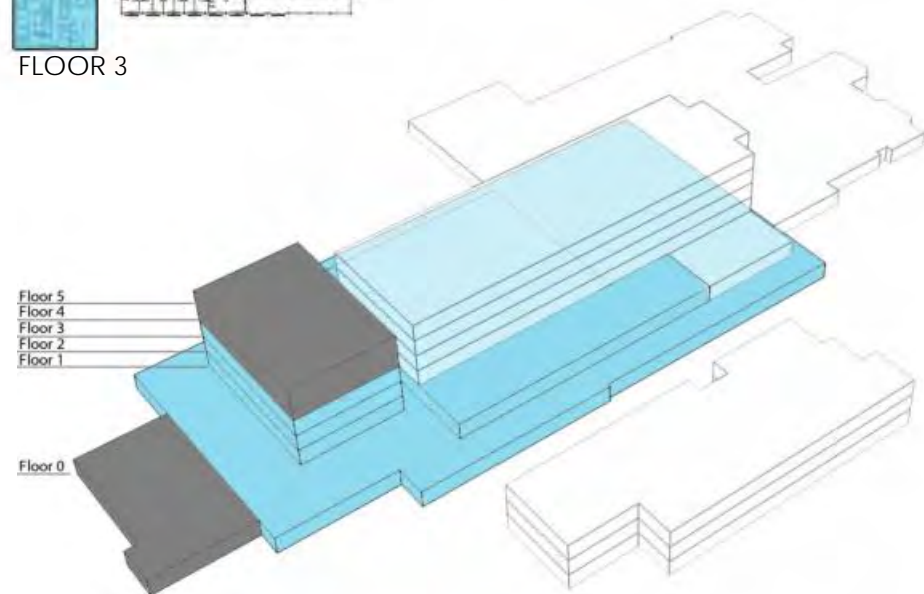
SCHEME 1 – SITE PLAN



SCHEME 1 – FLOOR PLANS



145,830 Square Feet	Space for High School Program
171,172 Square Feet	Remainder Of Hospital Space
33,778 Square Feet	Mechanical Space



SCHEME 2: RENOVATION OF ANNES TOWER PLUS ADDITION

Introduction

Scheme 2 follows the potential of utilizing the Diagnostic Annex tower for classroom spaces, but pulls the support functions to the east, exposing all sides of the tower, providing daylight to all levels. The space between the Diagnostic tower and supportive space creates a “main street” allowing the two to function separately.

General Building Plan / Site Objectives

Keeping the Diagnostic Center as a classroom tower, and exposing the sides to natural light, gives the opportunity for every classroom to have natural daylight. Pulling the supportive spaces east, away from the tower, takes into play the grade change, and an opportunity to add one level below the main floor, keeping the footprint compact. The Main Street acts as an organizing element, with every function stemming directly from it. Using the graded topography for the building provides the existing hospital footprint as space for hardscape activities and parking, reducing the need to modify the grades of the site.

Analysis

Several options were explored where the Diagnostic Annex tower was retained and reprogrammed for use as part of the new high school building. It was determined that due to the newness of the building and the configuration of the structure, this portion of the existing hospital would have value to the new school building. The scheme shown below is the most successful scheme based on this premise. The Diagnostic Annex tower was found to be in good condition and therefore worthy of reuse but due to the design of the building almost all building systems would need to be replaced so that systems appropriate to a high school building could be provided. This scheme is based on a total student capacity of 857. It was found to not save cost over the design of a new facility.

One of the factors affecting the cost of this scheme is its inefficiency. Since the proportions of the Diagnostic Annex tower are not ideally suited of a school, some efficiency is lost in this design, resulting in a greater square footage overall cost. Also, in order to allow light into the classrooms located in the tower, the new construction to the east of the tower, cannot take advantage of the reuse of the existing foundations.

SCHEME 2 - ADVANTAGE / DISADVANTAGE

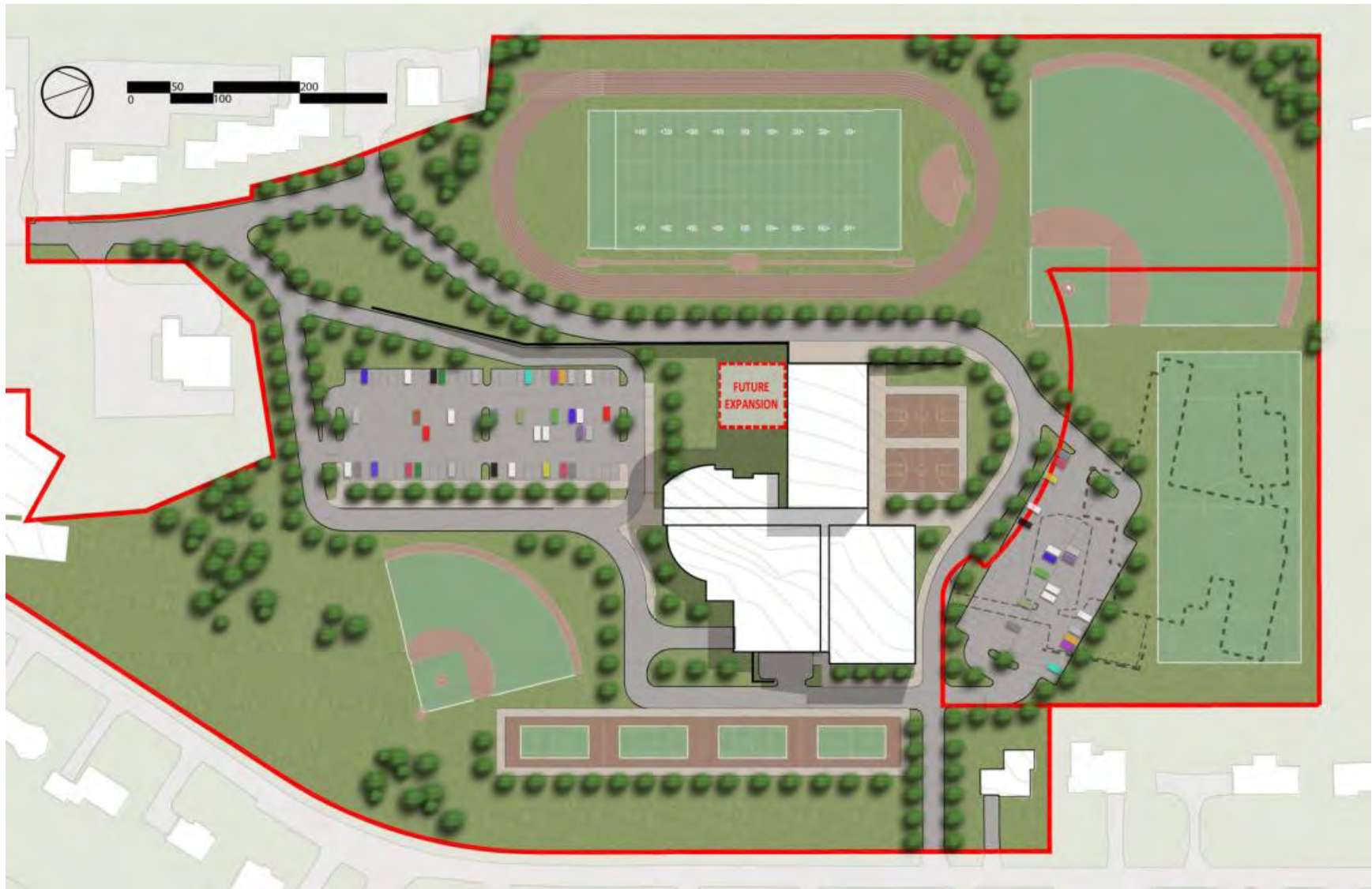
SCHEME 2	ADVANTAGES	DISADVANTAGES
BUILDING	<ul style="list-style-type: none"> • Utilize the changing site grades • Splits the classroom (private) and supportive (public) spaces • Gym and Drama have access after hours without interfering with rest of building • Diagnostic center supports all the classroom spaces in one mass • All (4)sides of classroom tower exposed to daylight • Minimal additional circulation required • Building services grouped in one location with direct access 	<ul style="list-style-type: none"> • Existing tower requires additional stairs for safety • Gymnasium is pulled away from athletic fields • Building pulled away from existing foundations, new footings would be required • Existing structural grid mitigates orientation of classrooms in Diagnostic Annex tower • Penthouse Floor minimally used and costly to remove or maintain • Minimal space for future expansion • Four story classroom bar
SITE	<ul style="list-style-type: none"> • Provides ample space for parking in front of building • Bus loop separate from vehicle access • Fields are located in northern corner 	<ul style="list-style-type: none"> • Space with existing conditions (assisted living facility) not adequate for a baseball field • Existing Assisted living facility impedes parking spaces on site

SCHEME 2 - CONSTRUCTION COSTS

Category	Area (s.f.)/Qty.	Cost (\$/s.f.)	Cost
Demolition Area	347,366	\$5	\$1,736,830
Renovated Area	57,700	\$207	\$11,943,900
New Area	87,000	\$207	\$18,009,000
Total Gross Area	144,700	66%	
Total Building Costs			\$31,689,730
Site Development	144,700	24.48	\$3,542,256
Demolition of Mechanical Penthouse			\$150,000
Retaining Walls			\$847,250
Regional Adjustment		\$13	\$1,881,100
Total Construction Costs			\$38,110,336
Contingency	2.50%		\$952,758
Furniture & Equipment	8%		\$3,048,827
Project Costs	2%		\$762,207
A/E Services	7%		\$2,667,724
Total Project Costs			\$45,541,852
State Participation	93%		\$26,450,000
Energy Eff Building Credit	2.00%		\$762,207
Total Local Funding			\$18,329,645

State Supported Funding	Area (s.f.)/Qty.		Cost
Proposed Program			
State Rated Capacity	857		
Teaching Stations	41		
Special Education	2		
Projected Enrollment (2019)	719		
State Allocated Square Footage	118,040		
State Participation:	93%		
Building			\$22,801,000
Site			\$2,736,000
Contingency			\$638,000
High Performance Construction			\$275,000
Total State Participation			\$26,450,000

SCHEME 2 - SITE PLAN



SCHEME 2 – FLOOR PLANS



FLOOR 00



FLOOR 01



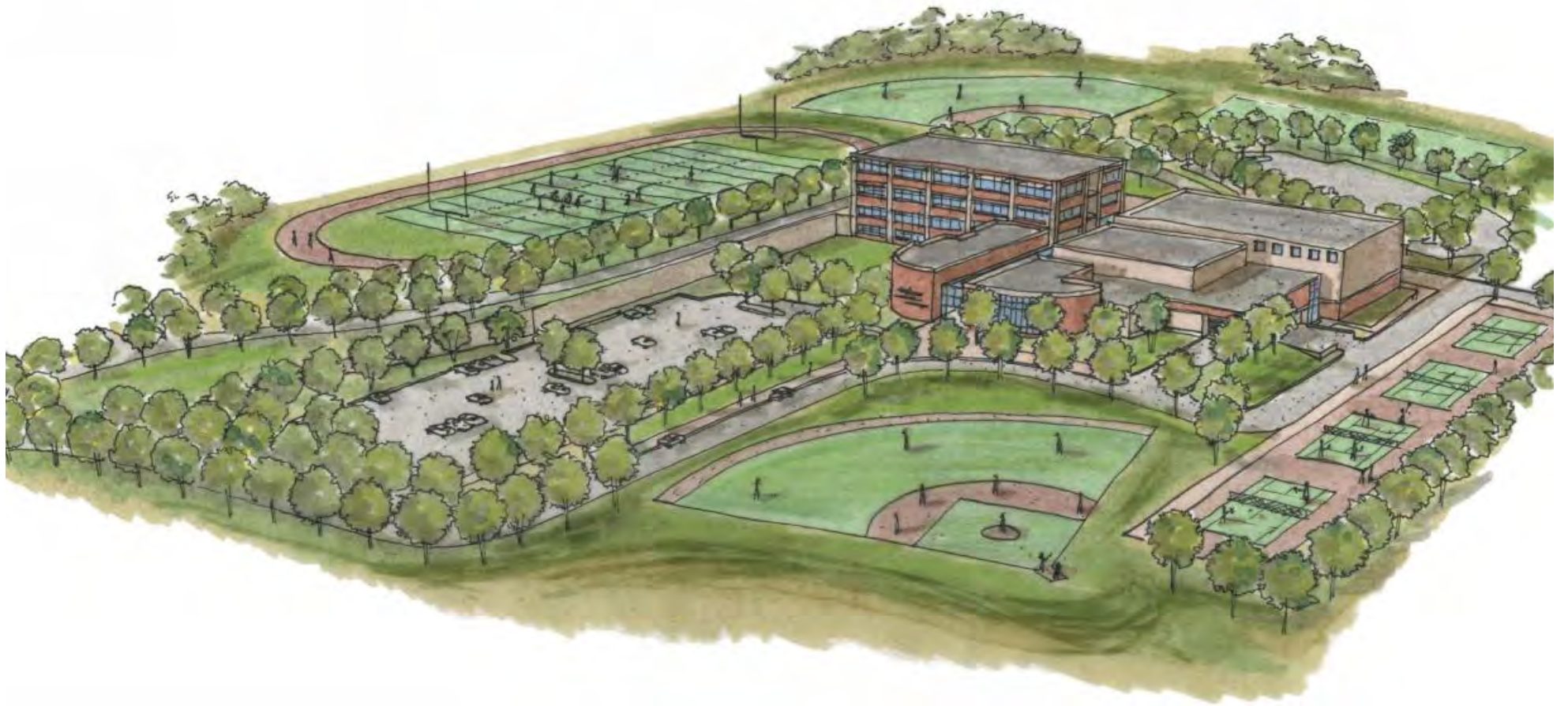
FLOOR 02



FLOOR 03



FLOOR 04



SCHEME 3A: NEW CONSTRUCTION – 857 SRC

Introduction

Scheme 3A is the creation of an all new building on the site, with a more efficient layout of all required curriculum spaces called for in the education specification.

General Building Plan / Site Objectives

Scheme 3A, being a new building, is set with the idea that the entire Hospital complex would be demolished, allowing for placement and layout of the building to be made most efficient for the site. The objectives are to create a separate bus and car loop for the school and a separated student entry. The athletic fields are located in a way that they are adjacent to the gymnasium.

Analysis

With the ability to create the building from new, the layout is more efficient for the program, and allows for future expansion of both the classroom wing, and of the supportive program space. Utilizing the existing grade changes allows for creation of a lower level to the classroom bar, and providing opportunity for a separate student entrance at the lower grade. The new building eliminates the need to renovate and bring older structures to current code, and allows for the required systems (HVAC, electrical) to work within the building envelope. Most of the building structures in this scheme are located over the existing foundation. It is likely this is feasible and will generate a significant savings in the total cost of the project.

SCHEME 3A - ADVANTAGE / DISADVANTAGE

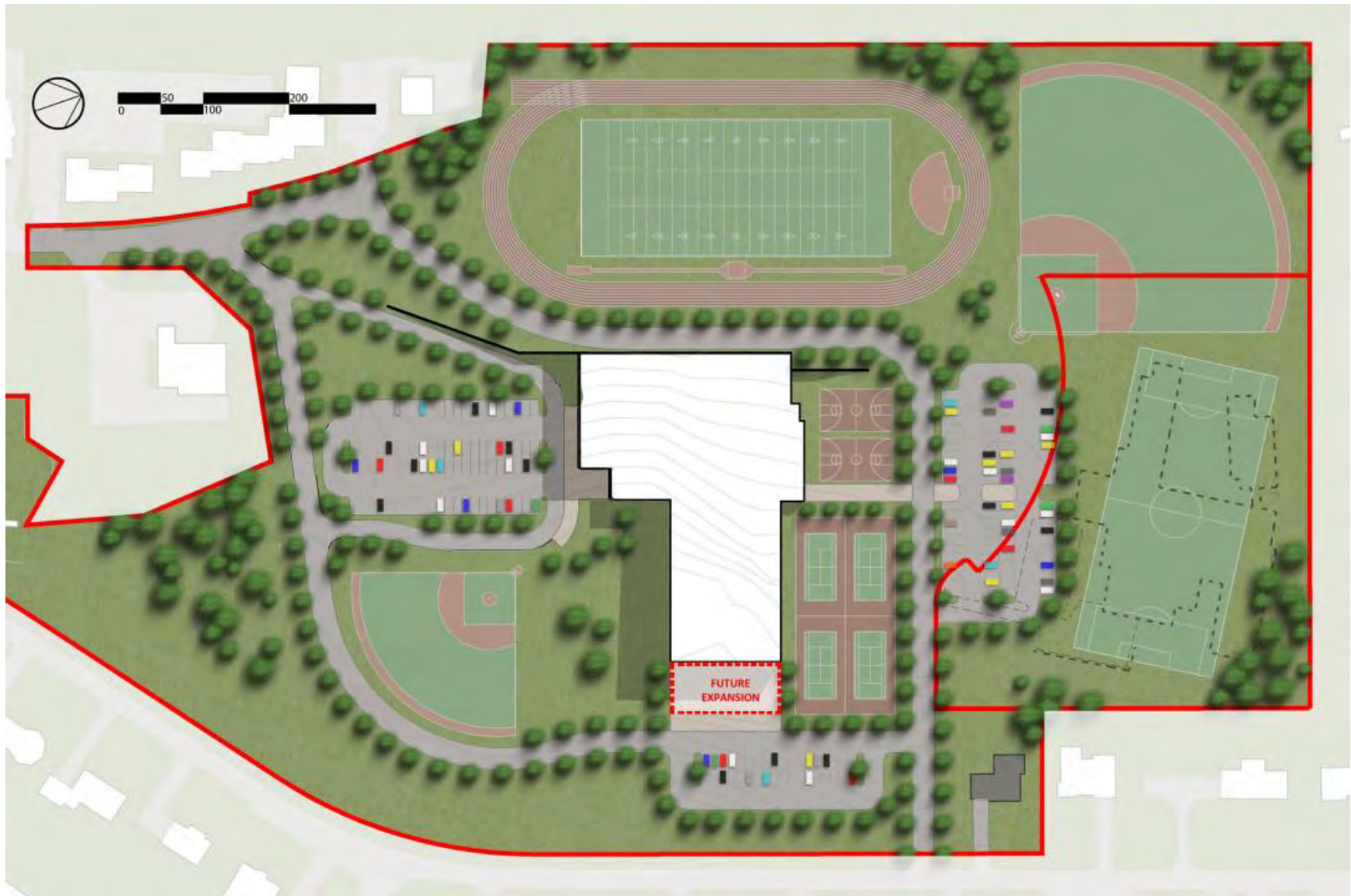
SCHEME 3A	ADVANTAGES	DISADVANTAGES
BUILDING	<ul style="list-style-type: none"> • Ability to support all Ed-Spec Requirements • Gymnasium centrally located, adjacent to all athletic functions • Main Street to separate classrooms from supportive spaces • Gym and Auditorium able to support after hour functions without interfering with classrooms • Utilize grade change to add level below for classrooms • Separated student entry from administration • Centralized circulation • Ability to have code appropriate egress • Allows for expansion to the east for classroom bar • Allows for expansion north and south for support program 	<ul style="list-style-type: none"> • Required full tear down of all facilities
SITE	<ul style="list-style-type: none"> • Separate car and bus loop • Student parking separate from administration/general lot • Altered Seton Drive provides space for parking adjacent to the athletic fields 	<ul style="list-style-type: none"> • Space with existing conditions (assisted living facility) not adequate for a baseball field

SCHEME 3A - CONSTRUCTION COSTS

Category	Area (s.f.)/Qty.	Cost (\$/s.f.)	Cost
Demolition Area	405,066	\$5	\$2,025,330
Renovated Area	0	\$207	\$0
New Area	140,500	\$207	\$29,083,500
Total Gross Area	140,500	68.00%	
Total Building Costs			\$31,108,830
Site Development	140,500	24.48	\$3,439,440
Reuse Existing Foundation			-\$500,000
Retaining Walls			\$655,569
Regional Adjustment		\$13	\$1,826,500
Total Construction Costs			\$36,530,339
Contingency	2.50%		\$913,258
Furniture & Equipment	8%		\$2,922,427
Project Costs	2%		\$730,607
A/E Services	7%		\$2,557,124
Total Project Costs			\$43,653,756
State Participation	93%		\$26,450,000
Energy Eff Building Credit	2.00%		\$730,607
Total Local Funding			\$16,473,149

State Supported Funding	Area (s.f.)/Qty.	Cost
Proposed Program		
State Rated Capacity	857	
Teaching Stations	41	
Special Education	2	
Projected Enrollment (2019)	719	
State Allocated Square Footage	118,040	
State Participation:	93%	
Building		\$22,801,000
Site		\$2,736,000
Contingency		\$638,000
High Performance Construction		\$275,000
Total State Participation		\$26,450,000

SCHEME 3A – SITE PLAN



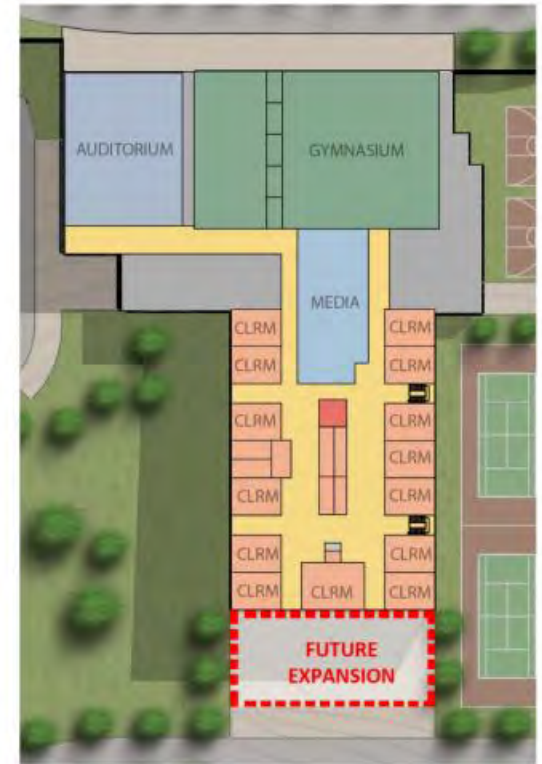
SCHEME 3A- FLOOR PLANS



FLOOR 00



FLOOR 01



FLOOR 02



SCHEME 3B: NEW CONSTRUCTION - 719 SRC

Introduction

Scheme 3B is the creation of an all new building on the site, modeled after scheme 3A, but using a smaller education specification.

General Building Plan / Site Objectives

Scheme 3B, being a new building, is set with the idea that the entire Hospital complex would be demolished, allowing for placement and layout of the building to be made most efficient for the site. The objectives are to create a separate bus and car loop for the school and a separated student entry. The athletic fields are located in a way that they are adjacent to the gymnasium.

Analysis

Scheme 3B, like 3A has the ability to create the building from new, the layout is more efficient for the program, and allows for future expansion of both the classroom wing, and of the supportive program space. Utilizing the existing grade changes allows for creation of a lower level to the classroom bar, and providing opportunity for a separate student entrance at the lower grade. The new building eliminates the need to renovate and bring older structures to current code, and allows for the required systems (HVAC, electrical) to work within the building envelope. Most of the building structures in this scheme are located over the existing foundation. It is likely this is feasible and will generate a significant savings in the total cost of the project.

SCHEME 3B – ADVANTAGE/DISADVANTAGE

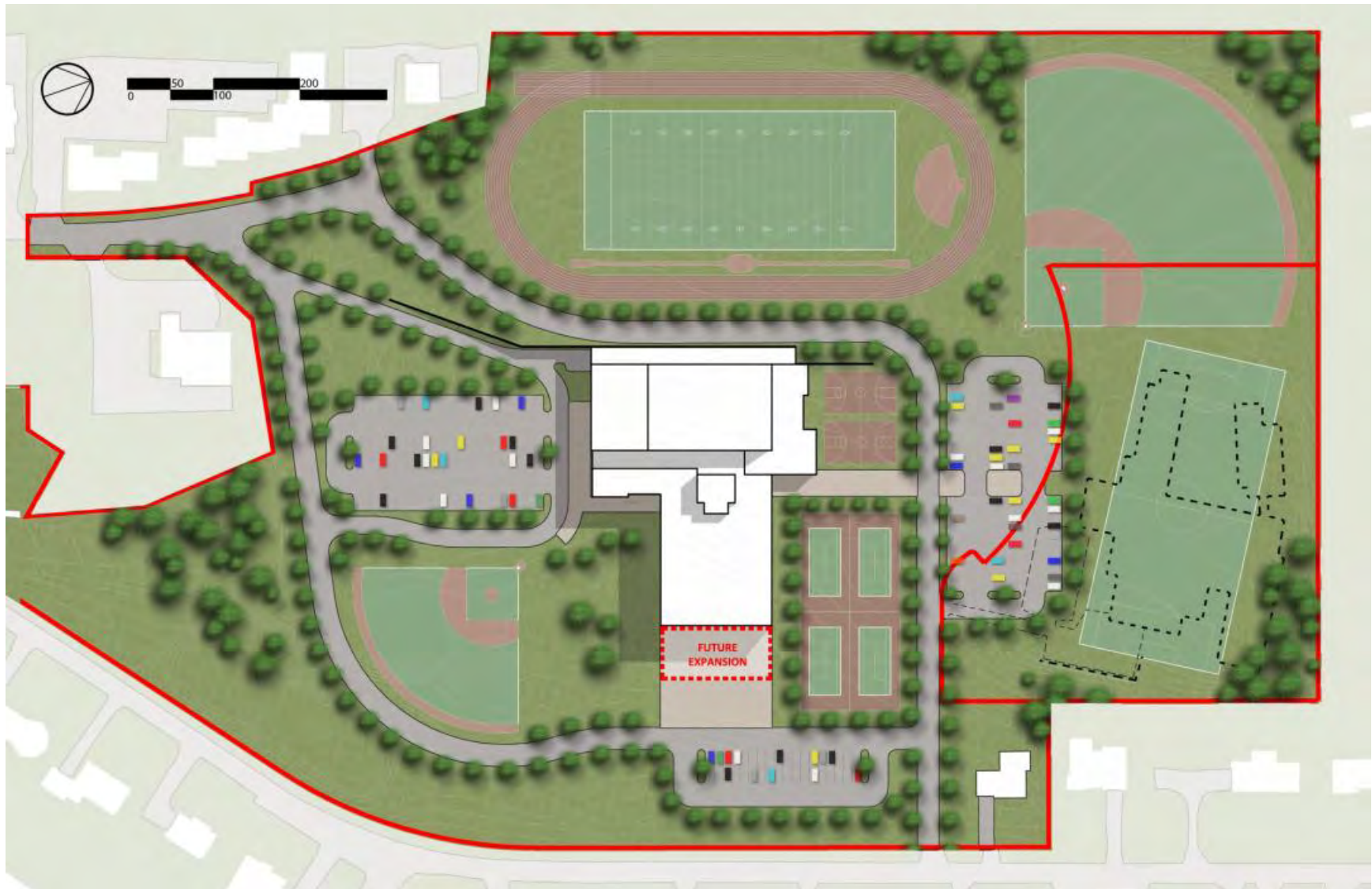
SCHEME 3B	ADVANTAGES	DISADVANTAGES
BUILDING	<ul style="list-style-type: none"> Gymnasium centrally located, adjacent to all athletic functions Main Street to separate classrooms from supportive spaces Gym and Auditorium able to support after hour functions without interfering with classrooms Utilize grade change to add level below for classrooms Separated student entry from administration Centralized circulation Ability to have code appropriate egress Allows for expansion to the east for classroom bar Allows for expansion north and south for support program 	<ul style="list-style-type: none"> Required full tear down of all facilities
SITE	<ul style="list-style-type: none"> Separate car and bus loop Student parking separate from administration/general lot Altered Seton Drive provides space for parking adjacent to the athletic fields 	<ul style="list-style-type: none"> Space with existing conditions (assisted living facility) not adequate for a baseball field

SCHEME 3B – CONSTRUCTION COSTS

Category	Area (s.f.)/Qty.	Cost (\$/s.f.)	Cost
Demolition Area	405,066	\$5	\$2,025,330
Renovated Area	0	\$207	\$0
New Area	118,040	\$207	\$24,434,280
Total Gross Area	118,040	68.00%	
Total Building Costs			\$26,459,610
Site Development	118,040	24.48	\$2,889,619
Reuse Existing Foundation			-\$500,000
Retaining Walls			\$655,569
Regional Adjustment		\$13	\$1,534,520
Total Construction Costs			\$31,039,319
Contingency	2.50%		\$775,983
Furniture & Equipment	8%		\$2,483,145
Project Costs	2%		\$620,786
A/E Services	7%		\$2,172,752
Total Project Costs			\$37,091,986
State Participation	93%		\$26,450,000
Energy Eff Building Credit	2%		\$620,786
Total Local Funding			\$10,021,199

State Supported Funding	Area (s.f.)/Qty.	Cost
Proposed Program		
State Rated Capacity	719	
Teaching Stations	33	
Special Education	2	
Projected Enrollment (2019)	719	
State Allocated Square Footage	118,040	
State Participation:		
Building		\$22,801,000
Site		\$2,736,000
Contingency		\$638,000
High Performance Construction		\$275,000
Total State Participation		\$26,450,000

SCHEME 3B: SITE PLAN



SCHEME 3B: FLOOR PLANS



FLOOR 0



FLOOR 1



FLOOR 2



SECTION 4 – MECHANICAL 35 YEAR ENERGY COST ANALYSIS

Annual energy costs were developed utilizing computer modeling for the four (4) proposed building schemes (A1, A2, A3a, & A3b) for the Allegany Public Schools – Allegany High School Feasibility Study. The annual operating cost was then multiplied by 35 years to provide a simple cost analysis for a 35 year life span. Two types of HVAC systems were analyzed for all four building schemes. A 4-pipe fan coil unit system coupled with dedicated outdoor air units (DOAS), and a geothermal heat pump system coupled with geothermal dedicated outdoor air units.

The existing building and associated building envelope will be less efficient as compared to a new building. Therefore, the mechanical systems will be less efficient since these existing physical-condition limitations will increase energy consumption by mechanical equipment, thus lowering the energy efficiency of the renovation/addition options when compared to the new building scheme.

The following are summaries of the 35-year energy cost based on today's electric/fuel rates. The 35-year cost is a simple cost and does not reflect inflation of the fuel sources.

The simulated 4-pipe fan coil unit system use chilled and heating water to condition each space and energy recovery units to supply ventilation air to the building. A more detailed breakdown of the modeled system may be found in the Mechanical Analysis Recommendations Narrative section in the feasibility study.

FOUR-PIPE FAN COIL UNIT SYSTEM				
Option	Estimated Installation Cost	Estimated Maintenance and Service Cost	Estimated Annual Operating Cost	35-Year Energy Cost
SCHEME A1 (167,996 S.F.)	\$5,879,860	\$268,800	\$198,868	\$6,960,380
SCHEME A2 (144,700 S.F.)	\$5,064,500	\$231,500	\$166,693	\$5,834,255
SCHEME A3a (140,500 S.F.)	\$4,917,500	\$224,800	\$158,073	\$5,532,555
SCHEME A3b (118,040 S.F.)	\$4,131,400	\$188,900	\$136,050	\$4,761,750

The simulated geothermal heat pump system rejects or extracts heat to/from a geothermal water loop to condition each space and water cooled energy recovery units to supply ventilation air to the building. A more detailed breakdown of the modeled system may be found in the Mechanical Analysis Recommendations Narrative section in the feasibility study.

GEOTHERMAL HEAT PUMP SYSTEM				
Option	Estimated Installation Cost	Estimated Maintenance and Service Cost	Estimated Annual Operating Cost	35-Year Energy Cost
SCHEME A1 (167,996 S.F.)	\$6,427,600	\$137,950	\$194,453	\$6,805,855
SCHEME A2 (144,700 S.F.)	\$5,552,000	\$118,900	\$161,258	\$5,644,030
SCHEME A3a (140,500 S.F.)	\$5,379,700	\$115,200	\$152,996	\$5,354,860
SCHEME A3b (118,040 S.F.)	\$4,519,700	\$96,800	\$131,074	\$4,587,590

In summary, the projected life-cycle costs are less for the new building options of equal or lesser square footage than for the renovation/addition options. There will be less value per dollars spent in terms of projected life-cycle costs for the renovation / addition options than for the new building option.

SECTION 5 – COST COMPARISON

SCOPE	1 - Existing Hospital Use	2 - Renovate Plus Addition	3A - New Building - 140,500 sq.ft.	3B - New Building 118,040 sq.ft.
School Data				
Students	857	857	857	719
Teaching Stations	41	41	41	33
Area Break Down (sf)				
Area of Demolition		347,366	405,066	405,066
Area of Renovation		57,700	0	0
Area for New Construction		87,000	140,500	118,040
TOTAL AREA		144,700	140,500	118,040
TOTAL CONSTRUCTION COST		\$38,110,336	\$36,530,339	\$31,039,319
TOTAL PROJECT COSTS		\$45,541,852	\$43,653,756	\$37,091,986
TOTAL LOCAL		\$18,329,645	\$16,473,149	\$10,021,199
35 YEAR LIFE CYCLE COST				
Geothermal Heat Pump	\$6,805,855	\$5,644,030	\$5,354,860	\$4,587,590
Four Pipe Fan Coil Unit	\$6,960,380	\$5,834,255	\$5,532,555	\$4,761,750

SECTION 6 – SUSTAINABLE DESIGN STRATEGIES

The design of this project will consider several strategies to achieve a “green building” with a LEED Silver rating. A plan will be developed for the modernization and/or construction of the project that will incorporate many environmental design elements that significantly reduce or eliminate the building’s impact on the environment, while providing an inviting, friendly, and comfortable place for faculty, staff student and community users of the facility. These sustainable design features, systems, and materials may include the following:

SITE

- An erosion control plan during construction to prevent storm water runoff and wind erosion.
- A storm water management plan that reduces discharge rate and quantity of storm water discharge
- Water efficient landscaping or native species.
- Pervious paving.
- Landscaped shading for at least 50% of the site hardscape through the use of trees and other shade devices.
- A rainwater harvesting system for landscape irrigation and/or use graywater to flush toilets.
- Reserved parking for carpools and for fuel efficient and low-emitting cars.
- Provide Bike racks.

BUILDING

- Low flow toilets, sinks and urinal fixtures to increase water efficiency.
- Involve a building commissioner throughout the design and construction process to verify building systems and involve a construction cost estimator to maximize use of “Green” systems.
- The use of locally manufactured building materials.
- The use of high-recycled content materials including: steel, carpet, acoustical ceiling panels, drywall, and concrete.
- Consideration for replacing large quantities of Portland cement with either fly ash or ground granulated blast furnace slag (ggbfs) in concrete in site-cast concrete. Both fly ash and ggbfs are by-products of steel production. Utilization of slag cement or fly ash in concrete lessens the burden on landfills, reduces emissions, and ultimately conserves energy.
- The use of Forest Conservation certified wood.
- Maintenance of existing interior and exterior walls, slabs, and roof deck where possible.
- Recycling of demolition and construction debris and redirect from landfills to manufacturing process, reuse on site, or at other sites.

- The use of low-emitting materials to protect indoor air quality for occupants such as low VOC carpet and paint.
- The use of green roofs to help optimize energy efficiency, reducing storm water generated and improving the microclimate by reducing the heat island effect.
- The use of large windows in new construction and where possible in existing construction to provide views of the outdoors while also allowing for natural daylighting and winter solar heating.
- The use double glazed “low-e” glass and/or shading devices on windows to enhance the energy efficiency of the building.
- The use of operable windows for natural ventilation and individual control, particularly near work stations.
- Building orientation for new construction to maximize natural daylighting and solar control.
- Use energy efficient fixtures and multiple switching daylight controls.
- Maximize daylighting opportunities for building occupants.
- Minimize light pollution from the building and site by specifying exterior and site lighting with lower foot-candle output, more stringent cutoff to reduce light spill onto neighboring properties.
- The use of LED lighting.
- Reductions background noise levels in classrooms to a 35-40 DB level through high performance acoustical design.
- On new construction, use approved roofing assembly with a highly reflective top coat with an R value of 20 or greater to reduce heat island effect.
- On new construction, design exterior walls to have an R-value of 19 or greater.
- Use vegetated roofs areas.
- Design building as an integral part of the community by providing for its use for non-school functions and events.
- Reduce potable water demand by specifying low water use showers, dishwashers, ice machines and clothes washers.
- Provide a dedicated area for the collection, separation, and storage of materials for recycling.
- Use of onsite renewable energy sources e.g. geothermal or solar.
- Use of an Energy Management System (EMS) to monitor and efficiently control the major building systems and their energy consumption.
- Monitoring and control of temperature throughout the building with the use of sensors.
- Storage for chemical products, such as cleaning, printing, and copying supplies, is contained in isolated or ventilated rooms.

CONCLUSION

LEED (Leadership in Energy and Environmental Design) Green Building Rating System® is one method of tracking and measuring the “greenness” of a building. LEED is a national rating system and accreditation tool for developing high-performance, sustainable buildings. Buildings are awarded points and achieve different levels of certification based on project procedures and design elements. There are four levels of LEED certification: certification, silver, gold, and platinum. The level achieved is based on the total number earned across seven categories: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Regional Priority and Innovation & Design Process.

To achieve LEED Certification, the school will have to supplement the already sustainable design features listed above with additional tactics to meet the qualifications for more points,

These tactics include (but are not limited to) the following:

- Encourage staff and students to ride bikes to work by providing secure bike storage and showers/changing rooms in the building.
- Encourage staff and visitors to carpool and vanpool by reserving prime parking spots with additional striping and signage.
- Encourage staff and students to use public transportation to reduce the number of required parking spaces.

- Purchase electricity from green-certified sources that guarantee that at least a fraction of it is derived from non-polluting renewable technologies.
- Use energy-efficient fluorescent T5 and compact-fluorescent lamps in the school’s lighting design. Advantages of using T5 lighting over the standard T8 lighting include better lighting due to a higher color-rendering index and better light distribution. T5 lamps are approximately 40% smaller than T8 lamps and this smaller diameter tube lends itself to lower profile and sleeker fixtures. T5 lighting has twice as many lumens per bulb as its T8 counterpart, which results in fewer fixtures needed and a savings on installation and maintenance. The T5 bulb also has a coating that stops glass and phosphorus from absorbing mercury. This coating keeps light levels close to its initial output.
- Extend contract with commissioning team to include additional commissioning reviews in early design phases.
- Incorporate design strategies to meet LEED requirements minimum daylight factor for regularly-occupied spaces. Commission a simulation from a Daylighting Consultant to determine best geometries and locations for daylighting devices. Strategies may include introducing light from above via skylights, light tubes, clerestory windows and/or roof monitors and controlling that light with light shelves, louvers and/or shades. Designing overhead daylight devices and cost of the simulations could make it cost prohibitive to meet the LEED requirements for introducing and controlling sunlight in new additions

The Green strategies identified above and others that may be considered during the design process will need to be evaluated for their energy savings and cost effectiveness.

Additional costs to the project include retaining a commissioning team that does not include individuals directly responsible for project design or construction management to implement commissioning procedures as outlined to meet LEED requirements.

Further supplemental costs include Registration and Certification Review fees, retaining a LEED consultant to complete the requisite documentation for project registration and certification, and most significantly, direct costs to be borne by the contractor will affect the cost of the project.

APPENDIX A – Existing Conditions Photographs



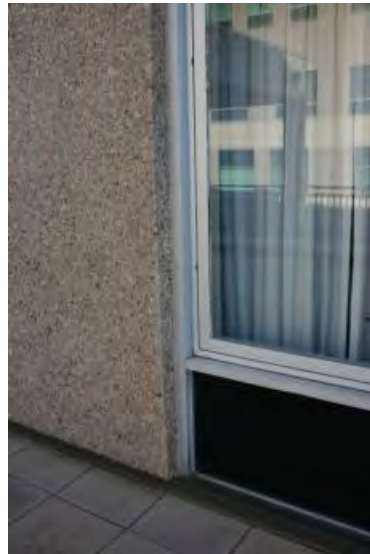
Entrance at Diagnostic
Annex Tower



Entrances at emergency
department



Covered drop off at
hospital entrance and
medical office building



Exterior conditions at windows, and canopies at the main hospital building



Exterior condition in service areas of main hospital building, Diagnostic Annex Tower, and Emergency department



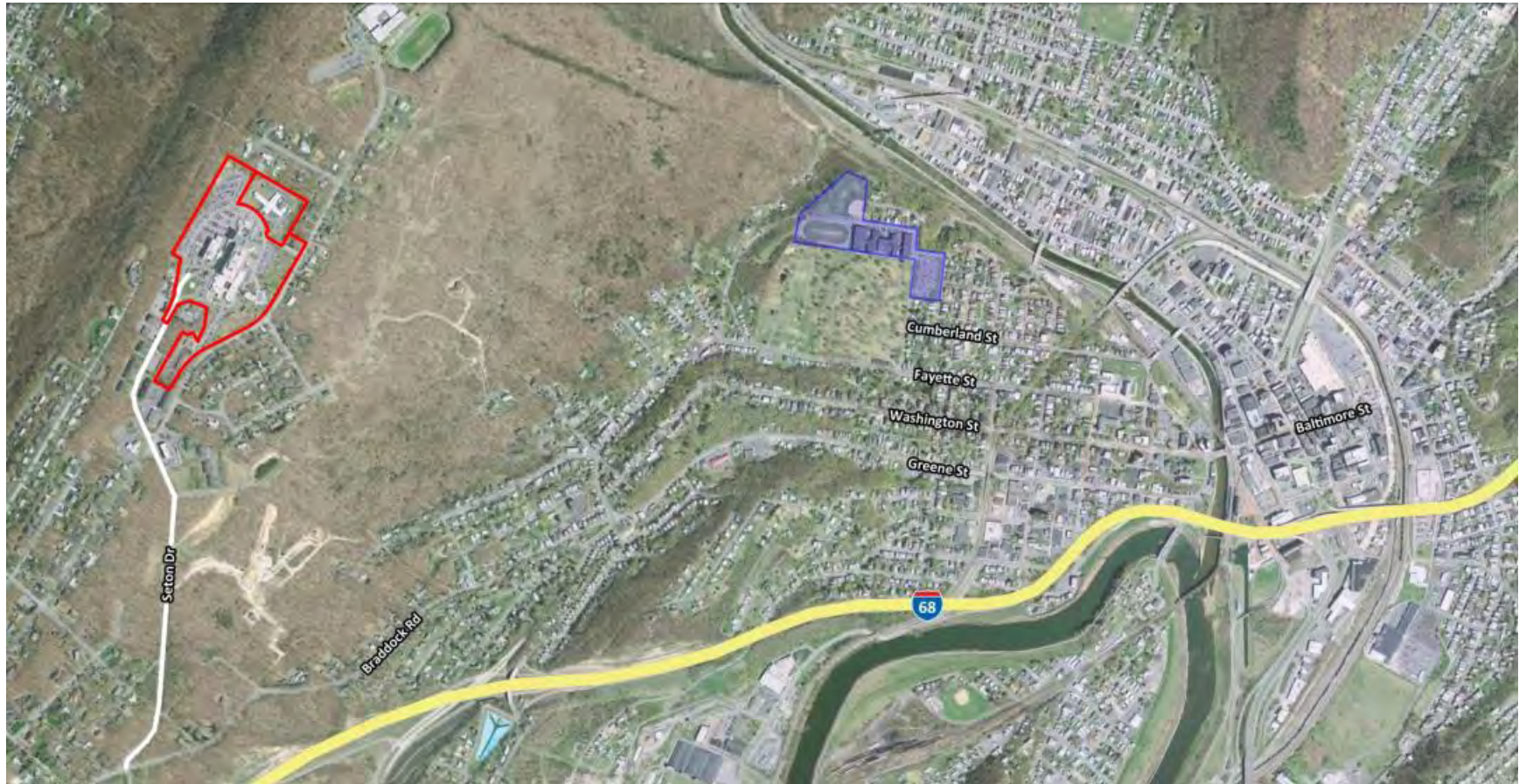
Ballasted roof over Emergency Department / Intensive Care Unit



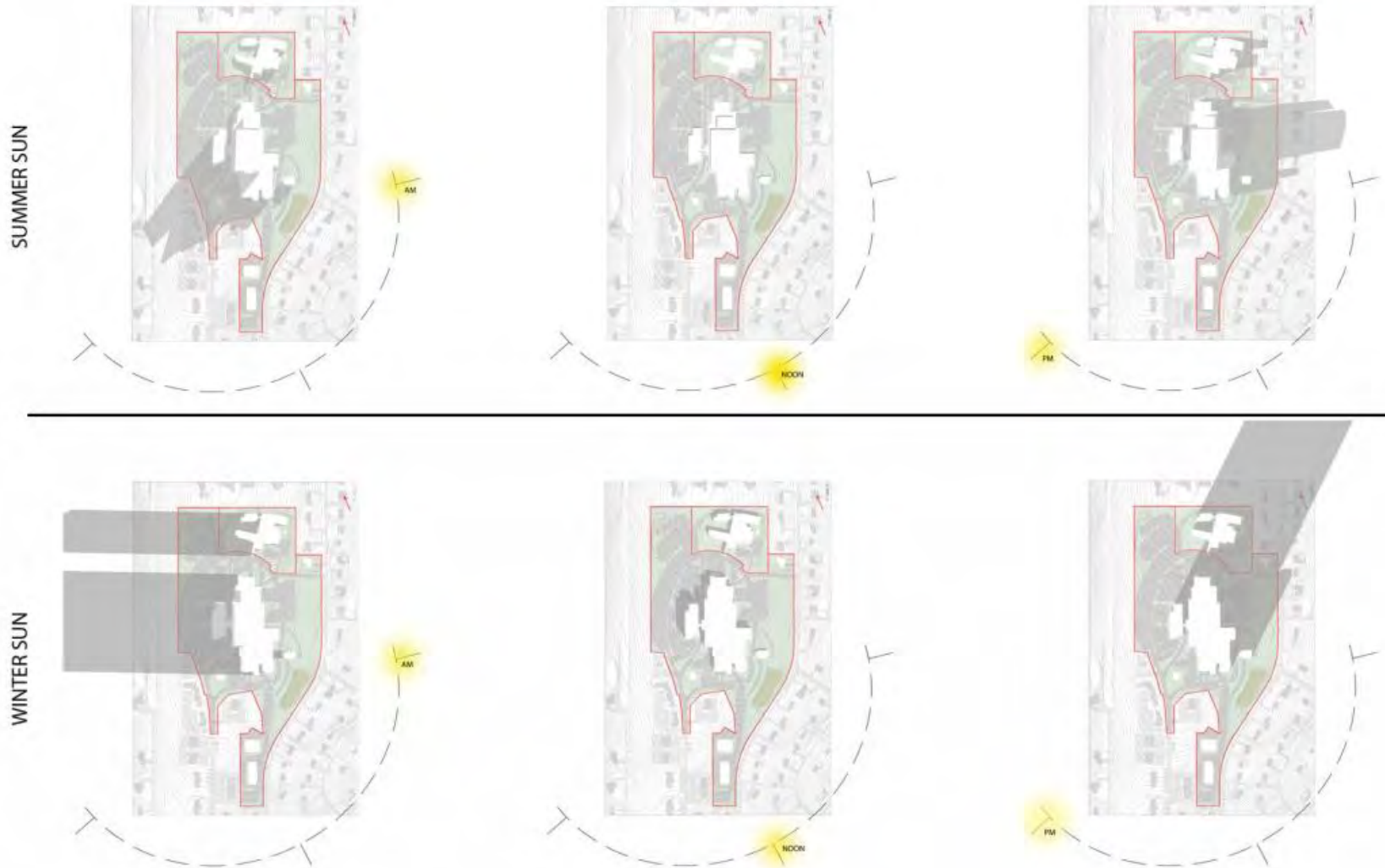
Existing corridors within Main Hospital, Emergency Department, and Diagnostic Annex Tower

APPENDIX B – Site Analysis

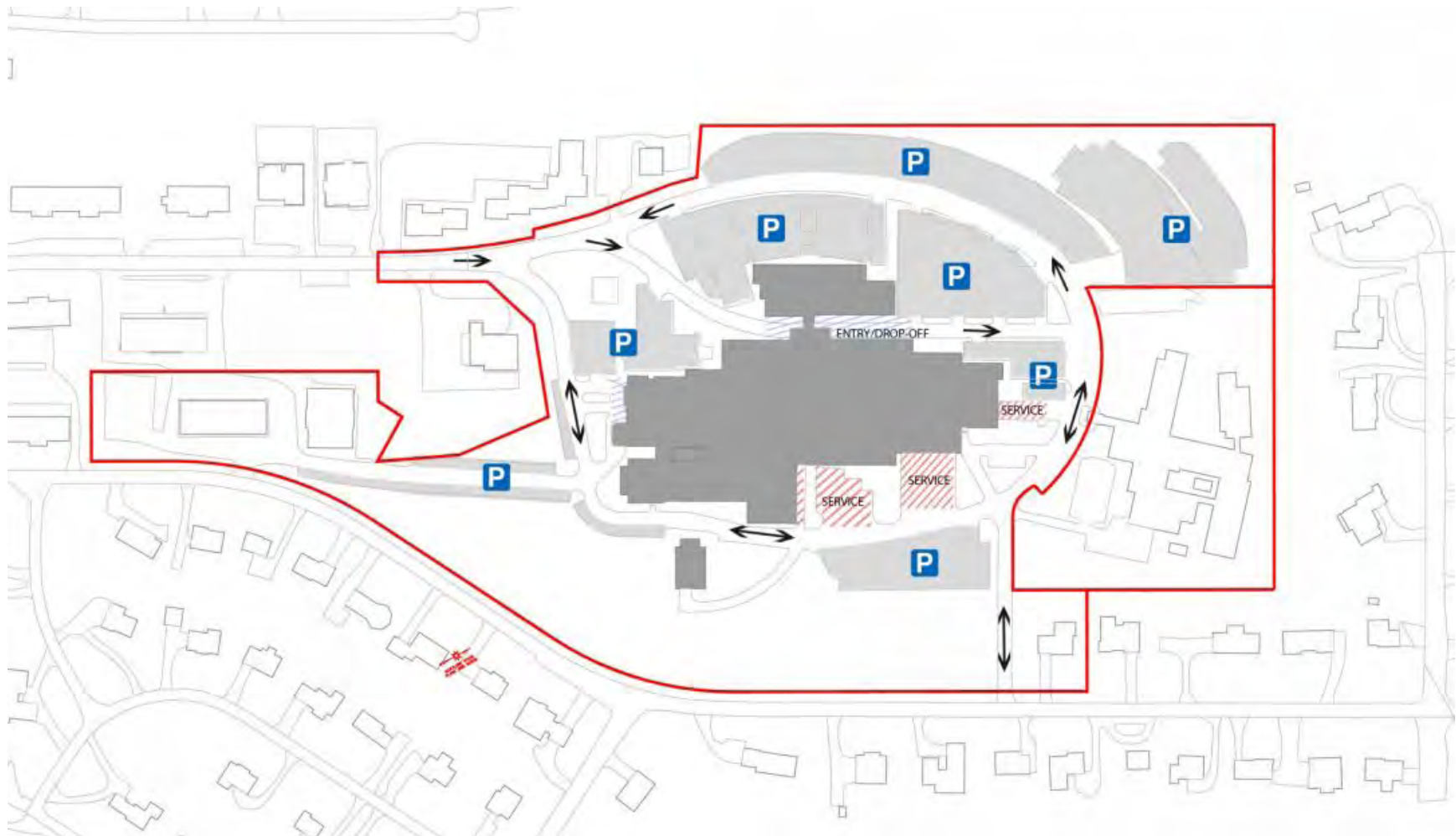
Site Location



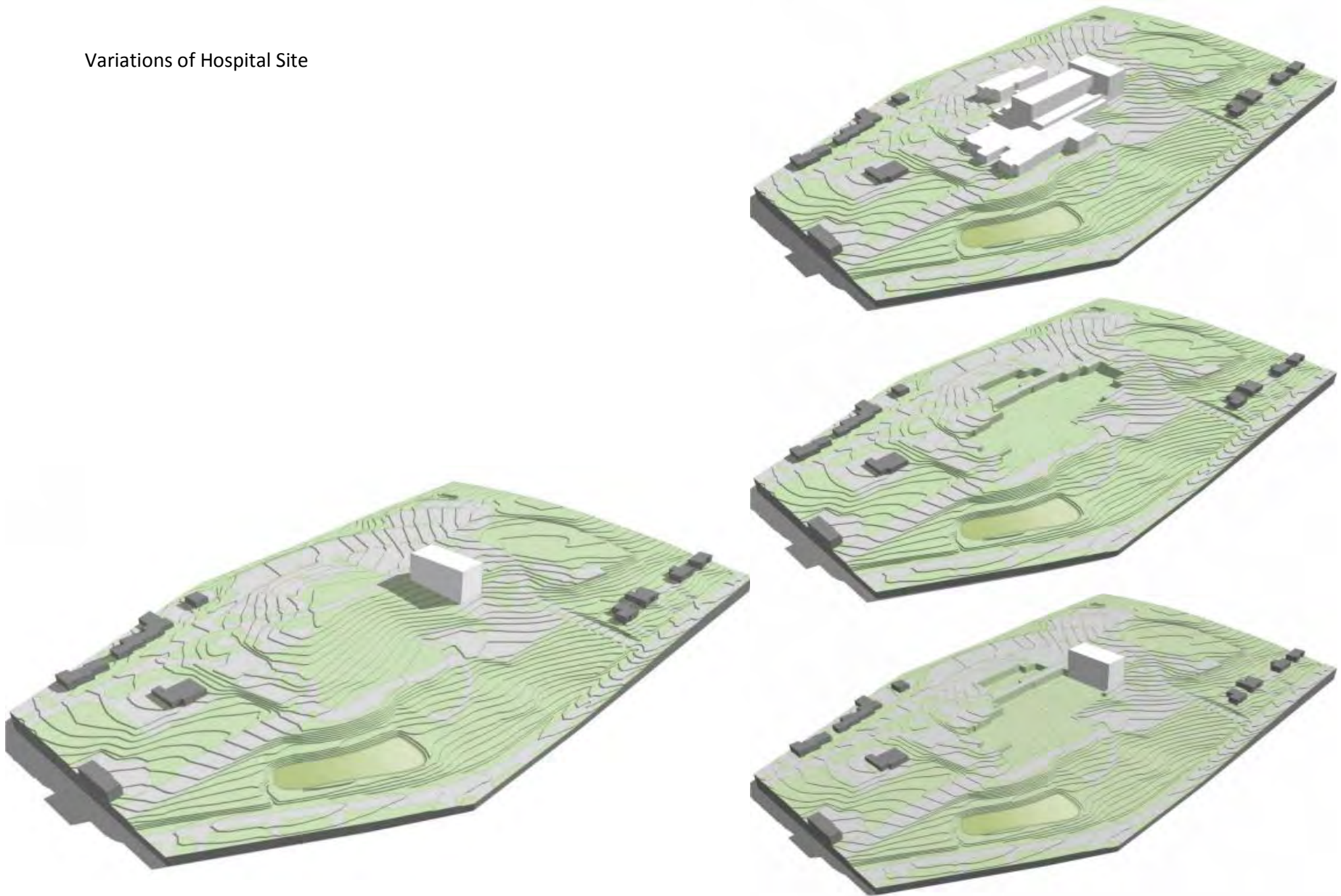
Solar Orientation



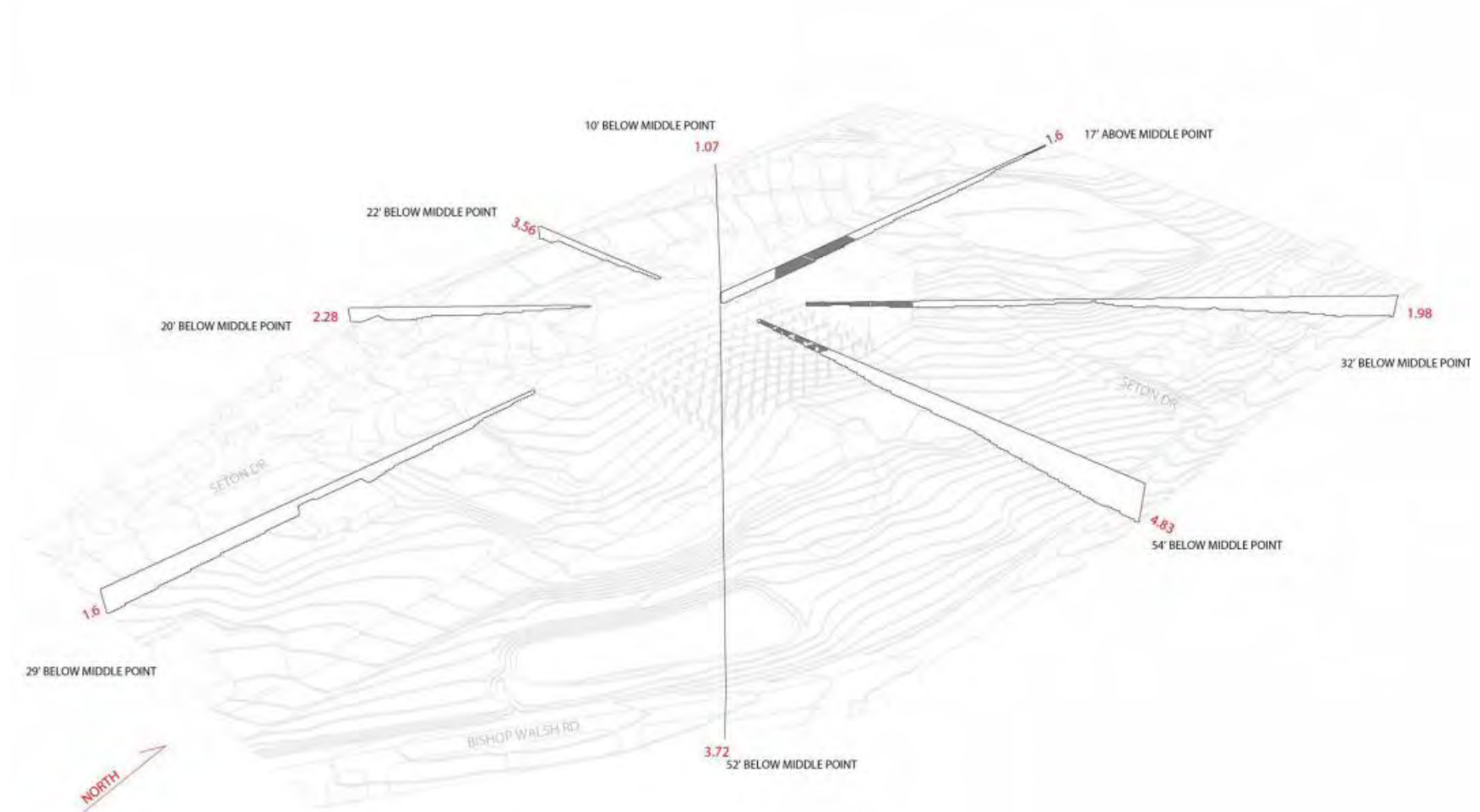
Site Circulation



Variations of Hospital Site



Site Slopes and Grade Changes



Site Slopes and Grade Changes

