CLARKE SCIENCE BUILDING AT RHODE ISLAND COLLEGE

FEASIBILITY STUDY

August 2020

SLAM

RHODE ISLAND COLLEGE:
FEASIBILITY STUDY FOR CLARKE SCIENCE BUILDING

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I. EXECUTIVE SUMMARY

Introduction

The S/L/A/M Collaborative, Inc. was engaged by the State of Rhode Island and Rhode Island College to provide a feasibility study for the renovation of and addition to Clarke Science Building including programming, planning and cost estimating services for these facilities at Rhode Island College's flagship campus in Providence, RI. The primary goal for this study was to assess the feasibility of this project. The recommendations presented in this report will provide the College with the necessary information to commence fundraising efforts and also serve as a firm starting point for design and construction in the next three to five years.

Participant List

The design team would like to thank the following individuals for their participation and contribution to the project.

RIC Administrative Committee

- Kevin Fitta
- Jarred Jackson
- Sarah Knowlton
- Jeffrey Martin
- Sue Pearlmutter
- Earl Simson

Physical Sciences

- Sara Knowlton
- Elaine Magyar
- Medini Padmanabhan

Consultant Team

- The S/L/A/M Collaborative—Programming and Concept Design
- Landscape Elements—Landscape Architecture
- Architectural Engineers, Inc—HVAC, Electrical, Plumbing and Fire Protection Engineers
- CDW—Environmental/ Haz Mat Investigation
- SLAM Construction Services — Cost Estimating, Logistics, and Scheduling

Project Approach

The team approach included:

- understanding the objectives, goals, and required outcomes for Rhode Island College
- analysis of existing building conditions, space use, and site conditions
- development of a program of space requirements;
- development of the preferred option to:
  - ◊ meet programmatic needs,
  - ◊ assure that infrastructure capabilities are compatible with and meet appropriate standards,
  - ◊ align with the intent of the campus master plan , and
  - ◊ create a project schedule and cost estimate that aligns with institutional expectations and capabilities

The study process encompassed a series of interactive workshops with the RIC Administrative Committee and the Department of Physical Sciences. Information gathered during these meetings informed the ways in which this study could help increase the RIC's regional role in science research and education.

Findings and recommendations were analyzed and presented in a number of ways to illustrate current challenges, opportunities and solutions to accomplish Rhode Island College's goals and objectives for this study.

Overview

Rhode Island College (RIC) is a comprehensive institution of higher education that offers nearly 90 majors and programs through its five schools: Arts and Sciences, Feinstein School of Education and Human Development, School of Business, School of Nursing, and School of Social Work. Rhode Island College has a long and successful history of preparing students to be skilled workers and contributing citizens throughout Rhode Island and neighboring areas. Since its inception in 1854 as a school to train teachers, RIC has over the centuries evolved into a comprehensive college that meets and anticipates the ever-changing demands of the economy and society.

The mission of Rhode Island College is to be a force for positive change in the lives of its students allowing them to gain the knowledge, skills and insight necessary to contribute to, and benefit from, our ever-evolving culture and economy, as well as provide industry-leading learning experiences to prepare students for a 21st century workforce. The increasingly more complex problems the world will face in the future will need students that are trained in a hands-on, interdisciplinary, collaborative environment.

The institution has maintained an unwavering commitment to provide personalized education of the highest quality and to be the "college of opportunity", especially for those first in their families to attend. The intent is to provide a college experience that engages students to achieve at the highest levels, prepares them for the world of work, and encourages active participation as citizens. This is vital for Rhode Island because 70% of the College's alumni continue to reside in the state. Consequently, RIC has a responsibility to be on the forefront of educational programming that both reflects and forecasts the state's economic and societal needs.

Since the arrival of President Frank D. Sánchez in 2016, the College has embarked on an aggressive strategy to ensure success for its 9,000 undergraduate and graduate students. Key components of this strategy are:

- courses that emphasize experiential learning through projects, research, and internships
- supports, services and resources that assist students with academic and life issues
- an inclusive campus culture that values and embraces diversity
- community partnerships that foster collaborative exchange and mutual benefits
- classroom and campus facilities that enhance learning

The importance of STEM, encompassing the fields of Science, Technology, Engineering, and Mathematics, to the College's mission and to the United States cannot be overemphasized. Our country's place in the global marketplace is to invent and inspire. STEM careers are often considered to be the high-quality jobs of the future. STEM workers use their knowledge to understand how the world works and to solve the challenges facing our region, country, and the world.

The Rhode Island Department of Labor and Training identifies STEM (Science, Technology, Engineering and Mathematics) careers in the state as having strong growth potential. During the 2014 to 2024 Projection Period for Rhode Island, employment in STEM occupations is projected to grow at about 13 percent, much faster than the 7.8 percent growth rate projected for all occupations in the state. During the projection period RI employers will seek to fill over 9,000 openings resulting from both occupational growth and the need to replace workers who leave their occupation. (http://www.dlt.ri.gov/lmi/pdf/stem.pdf)

Background

The existing Clarke Science building currently serves as the home for the Department of Physical Sciences, part of the Faculty of Arts and Science, which includes chemistry, physics, geology, astronomy, and oceanography

This department contributes to the education of many other students at Rhode Island College by providing important services in support of other colleges, departments, and programs including the following

- General Education requirements
- Undergraduate and Graduate Certificate Programs
- Faculty of Arts and Sciences
    - ◊ Communication
    - ◊ Computer Science
    - ◊ Environmental Studies
    - ◊ Health Sciences
    - ◊ Mathematics
    - ◊ Medical Imaging
    - ◊ Psychology
- Feinstein School of Education and Human Development
    - ◊ Community and Public Health Promotion
    - ◊ Secondary Education
    - ◊ Health Education

- ◊ Wellness and Exercise Science
- ◊ Healthcare Administration
- School of Nursing

In recent years, Rhode Island College has transformed its academic programming and has begun to transform its facilities in response to new career demands. Much work remains to upgrade RIC's science spaces into state-of-the art learning environments.

Clarke Science Building Deficiencies

Constructed in 1963, the Clarke Science building has had some deferred maintenance improvements, however the building is showing its age and is in need of major improvements. Note the following observed defects:

- 12'-0" floor-to-floor height limits the HVAC, Electrical, Plumbing and Fire Protection distribution and maintenance access in plenum
- Structure (columns/beams) are unprotected – steel columns / WT decking / web-joists. Limiting structural column bays of 16 x 25 create encumbered spaces
- Built-up gravel ballast roof has exceeded is life expectancy
- Significant heat-gain from existing windows to the non-thermally broken frames causing significant heat gain/ loss
- Some accessibility upgrades have occurred over the years however the building is not universal
- The extensive Clarke Science Feasibility Study dated March 28, 2019 should be referenced for additional detail regarding existing MEP systems assessment, life-cycle evaluation of systems, asset analysis, and hazardous materials assessment.

Within Clarke Science, some chemistry and physics teaching laboratories have remained nearly untouched since they were constructed in 1963. Other rooms last saw upgrades forty years ago. Since chemistry is a requirement for science, nursing and health science majors, as well as an option in the core curriculum, over 1,000 students at RIC take chemistry each year

Significant space deficiencies include a significant lack of faculty-student research space as well as teaching laboratories, classrooms, and collaboration spaces that do not support 21st century pedagogies. There is a growing requirement in the sciences at Rhode Island College for all full-time faculty to be research active. Additionally, an institutional objective is to provide student research space to support scientific discovery at all levels. As a result, a research lab allocation of 375-400 NSF needs to be provided for every full-time faculty member. The program for teaching labs and support is based on the requirement to create opportunities for experiential, hands-on learning in a laboratory-rich environment. Space allocation per student station is based on academic standards that enable this kind of learning environment, with more emphasis on group activities versus passive learning, as well as incorporating evolving technologies.

Recommended Solution

It was determined that the most appropriate way to renovate this building was to relocate most teaching labs to a new addition, which will enable teaching labs to be right-sized to accommodate 21st century pedagogies and required equipment. The geometry and grading of the site on which the Addition is located enables the creation of new ground level space. This can be Shell Space for future initiatives or can be built out as an add alternate as program space as part of this project.

Certain teaching labs have already been renovated within the existing Clarke footprint and, to the extent possible, these will be retained in the new design. Existing vacated space within Clarke will be comprehensively renovated to provide new and improved classrooms, offices, and research labs.

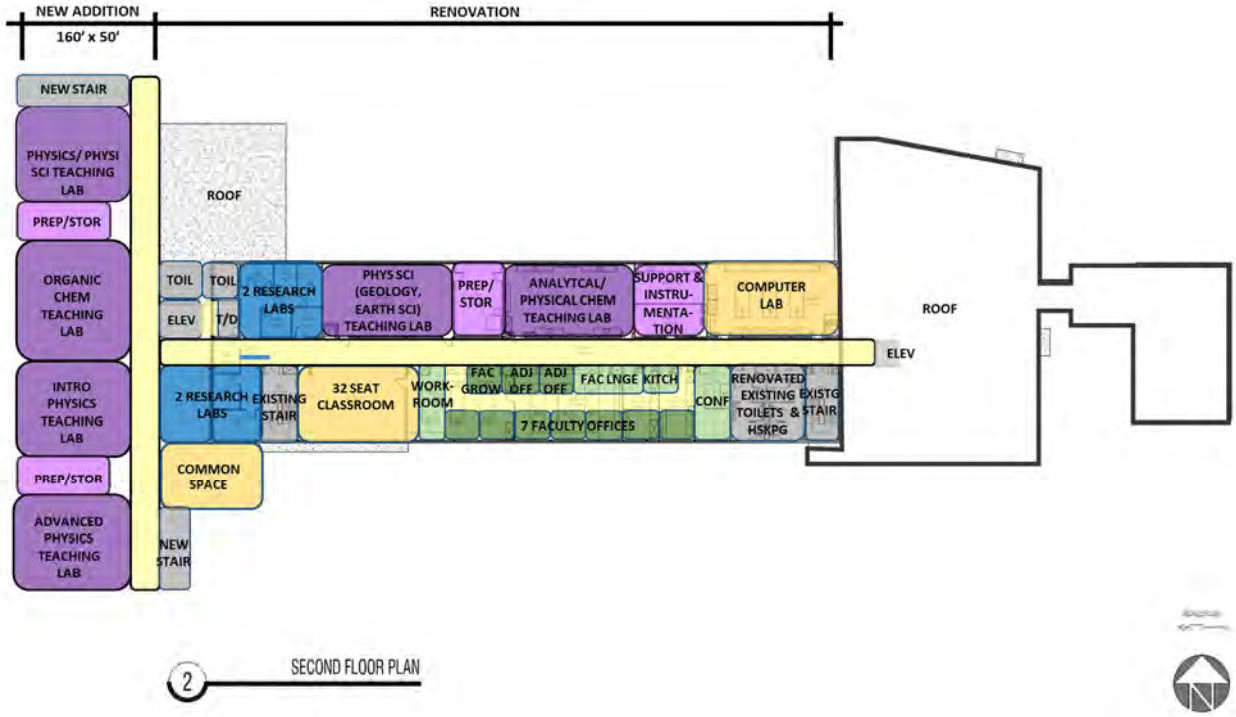
Space Program

The proposed Program of Space Requirements for RIC Department of Physical Sciences is 36,761 NSF which is an increase of 9,040 NSF to the existing 27,721 net square feet. Because some of the existing program space will be used for building support including new toilets, housekeeping closets, tel/data and electrical closets, as well as circulation space within new faculty office suites, the new addition provides approximately 11,600 net square feet of program space.

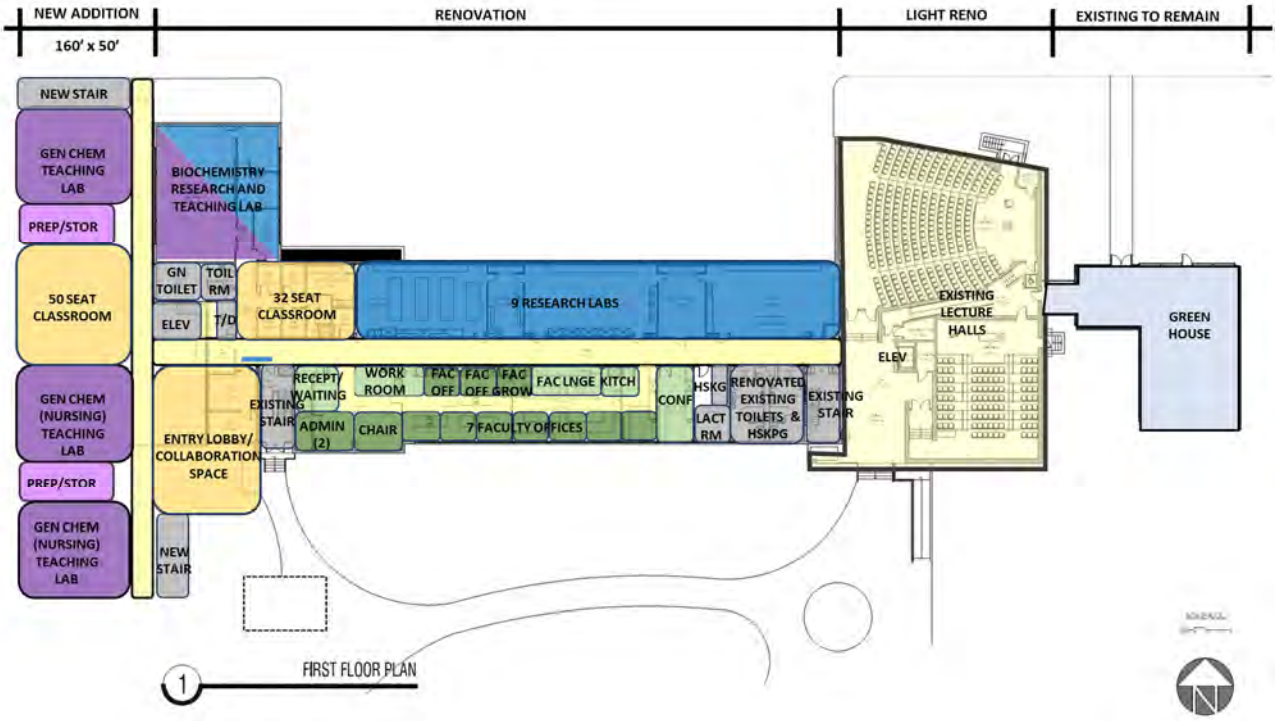
If the new ground floor shell space at the Addition is built out as part of this project, this would yield an additional 4,450 net square feet of program space.

Clarke Science Building Renovation and Addition Diagrammatic Floor Plans

The largest portion of Clarke Science Building existing space is dedicated to teaching labs. It was determined that the most appropriate way to renovate this building was to relocate most teaching labs to a new addition, which will enable teaching labs to be right-sized to accommodate 21st century pedagogies and required equipment. Certain teaching labs have already been renovated within the existing Clarke footprint and, to the extent possible, these will be retained in the new design. Existing vacated space within Clarke will be comprehensively renovated to provide new and improved classrooms, offices, and research labs.



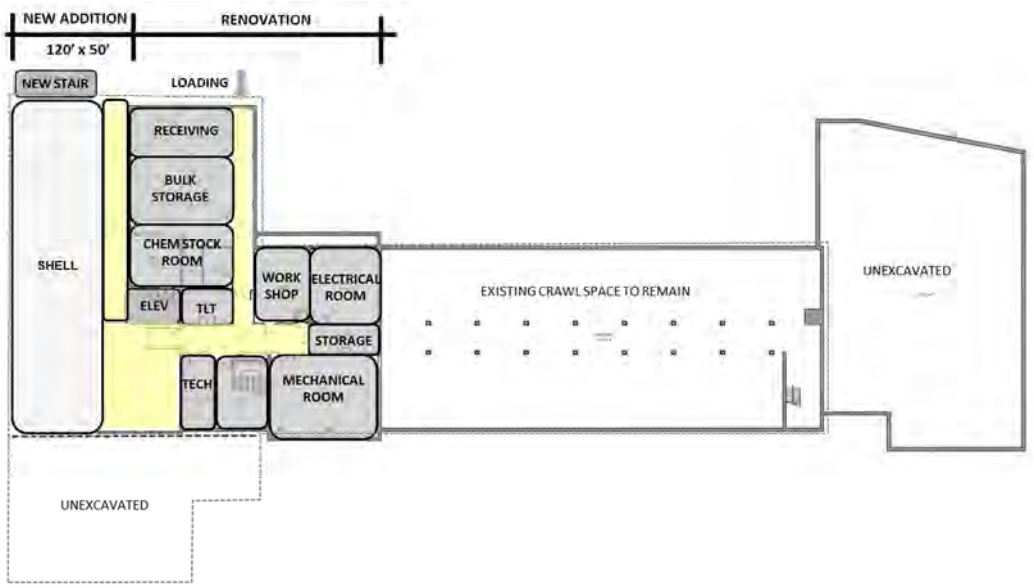
2 SECOND FLOOR PLAN



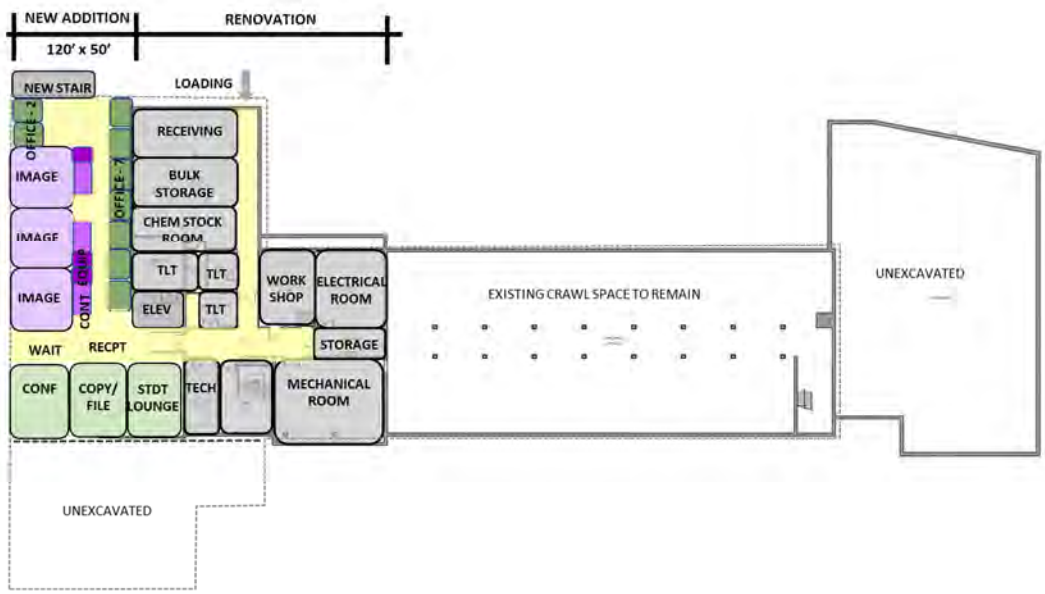
1 FIRST FLOOR PLAN

Because of the site grading and geometry at the location of the Addition, there will be shell space or an add alternate of additional program space available at the Ground Level. If used as shell space, then minimum infrastructure to meet building code and life safety requirements will be provided. This would include sprinklers, minimum HVAC to provide air movement, minimal lighting, and no exposed wall supports (metal studs).

This shell space could be fitted out as an add alternate to accommodate a new initiative such as Medical Imaging. Spaces would include imaging and support spaces, offices, reception, conference, workroom/copy/file and a student lounge.



0 GROUND FLOOR PLAN—WITH SHELL SPACE



0 GROUND FLOOR PLAN—ALTERNATE WITH IMAGING

Implementation Options

This project can be accomplished in any of three possible phasing approaches. Further, each approach can be delivered by the General Contractor (GC) or Construction Manager (CM) Approach as follows::

- Option 1A —No Phasing / GC
- Option 1B—No Phasing / CM
- Option 2A —2 Phases / GC
- Option 2B—2 Phases / CM
- Option 3A —3 Phases / GC
- Option 3B—3 Phases / CM

See Appendix A for detailed phasing diagrams.

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Summary Comparison of Options

All implementation options and delivery approaches result in the identical final product. However, each approach has different impacts on schedule, cost, and operational disruptions as shown below in Chart 1.1: Summary Comparison of Options below.

The earliest project completion date of January 2024 is achieved by Options 1B—No Phasing/CM delivered and a similar date of March 2024 is achieved by Option 3B—3 Phases/CM delivered.

The lowest project cost of $37,582,121 is achieved by Option 3B—3 Phases/CM delivered.

The least disruption to ongoing departmental operations is achieved by Option 3B—3 Phases/CM delivered. This option does not require the use of portable buildings to house temporarily house teaching and research labs.

Recommended Option

Option 3B is the recommended option because it provides the earliest completion date, the lowest cost, the least disruption to and relocation of ongoing departmental operations, and does not required the use of portable buildings.

OPTIONS	DELIVERY METHOD	CONSTRUCTION START	COMPLETION		TOTAL BASE COST***	REMARKS
			ADDITION	RENOVATION		
OPTION 1A	NO PHASE GC	Aug.-22*	Oct-24	Oct-24	$41,444,760	12 PORTABLES
OPTION 1B	NO PHASE CM	Mar.22**	Sep-23	Jan-24	$40,830,917	12 PORTABLES
OPTION 2A	PHASED GC	Jul-22	Jan-24	Oct-24	$38,947,456	2 PORTABLES
OPTION 2B	PHASED CM	Nov-21	Sep-23	Apr-24	$38,856,250	2 PORTABLES
OPTION 3A	PHASED GC	Jul-22	Feb-24	Sep-24	$38,019,905	NO PORTABLES
OPTION 3B	PHASED CM	Mar-22	Sep-23	Mar-24	$37,582,121	NO PORTABLES

* start portable construction Mar. 2022 and Addition Aug. 2022

** start portable constrution Oct. 2021 and Addition / Reno Mar. 2022

***exclusive of ground floor fit-out

Chart 1.1: Summary Comparison of Options

II: PROGRAM

The proposed Program of Space Requirements for the Department of Physical Sciences is 36,761 NSF which is an increase of 9,040 NSF to the existing 27,721 net square feet. Because some of the existing program space will be used for building support including new toilets, housekeeping closets, tel/data and electrical closets, as well as circulation space within new faculty office suites, the new addition provides approximately 11,600 net square feet of program space. The Program of Space Requirements for RIC Department of Physical Sciences is shown in Tables 2.1 through 2.3 on these facing pages.

Table 2.1: Summary of Space Requirements for the Department of Physical Sciences showing existing net square feet and proposed net square feet

PHYSICAL SCIENCES SUMMARY		
Type	**Existing**	**Renovate Existing / Addition Program**
Lecture Halls	5,101	5,101
Classrooms	1,607	3,420
Collaboration	276	0
Offices and Support	3,018	4,840
Teaching Labs and Support	11,544	15,900
Research Labs	2,536	5,200
Teaching and Research Shared Support	552	600
Building Support	3,087	1,700
Total Net Square Feet	**27,721**	**36,761**

Table 2.2: Space Requirements for Lecture Halls and Classrooms

PHYSICAL SCIENCES PROGRAM								
						Renovate Existing/Addition Program		
Type	Name	No. of Personnel	No. of Seats per Room	NSF per Seat	NSF per Room	Quantity	Sub-Total	*Sub-Total*
Lecture Halls and Support								
	Auditorium Large		200	25	5,000	1	2,972	
	Auditorium Small		125	25	3,125	1	1,659	
	A/V Room				100	1	40	
	ADA Access					1	430	
								5,101
Classroom								
	Classroom		50	30	1,500	1	1,500	
	Classroom		32	30	960	2	1,920	
								3,420

Table 2.3: Space Requirements for Offices, Teaching Labs, Research Labs, and Building Support

PHYSICAL SCIENCES PROGRAM								
						Renovate Existing/Addition Program		
Type	Name	No. of Personnel	No. of Seats per Room	NSF per Seat	NSF per Room	Quantity	Sub-Total	*Sub-Total*
Offices and Support								
	Chair	1			220	1	220	
	Faculty	16			110	16	1,760	
	Faculty - Growth	2			110	2	220	
	Adjuncts	8			110	2	220	
	Departmental Reception				220	1	220	
	Admin and Tech	2			110	2	220	
	Workroom				220	2	440	
	Conference		20	25	440	2	880	
	Faculty Lounge		8	25	220	2	440	
	Kitchenette				110	2	220	
								4,840
Teaching Labs and Support								
	Biochemistry Teaching Lab		24	50	1,200	1	1,200	
	Organic Chemistry Teaching Lab		24	75	1,800	1	1,800	
	Nursing/General Chem		24	50	1,200	2	2,400	
	General Chemistry		24	50	1,200	1	1,200	
	Analytical, Environmental/Physical Chem		24	50	1,200	1	1,200	
	Physical Science - Geology/Earth Science		24	50	1,200	1	1,200	
	Physics - Intro		24	50	1,200	1	1,200	
	Advanced Physics		24	50	1,200	1	1,200	
	Physics/Physical Sciences Lab		24	50	1,200	1	1,200	
	Computer Lab		24	50	1,200	1	1,200	
	Biochem Prep				300	1	300	
	Prep for Organic and Analytical/Enviro/ PChem				300	1	300	
	Prep for Nursing and Gen Chem				300	1	300	
	Prep for Physics Labs				300	2	600	
	Prep for Physical Sciences				600	1	600	
								15,900
Research Labs								
	Research Labs				400	13	5,200	
								5,200
Research and Teaching Shared Support								
	Instumentation				600	1	600	
								600
Building Support								
	Receiving				200	1	200	
	Vented Chemical Stockroom				600	1	600	
	Workshop				300	1	300	
	Bulk Storage				600	1	600	
	Chemical Storage - Hazmat					0	0	
								1,700
PHYSICAL SCIENCES GRAND TOTAL								**36,761**

ADD ALTERNATE GROUND LEVEL SHELL SPACE PROGRAM

Because of the site grading and geometry at the location of the Addition, there will be shell or an add alternate of additional program space available at the Ground Floor of the Addition. If used for Medical Imaging , this would yield an additional 4,450 net square feet of program space.

Table 2.4: Summary of Space Requirements for Medical Imaging showing proposed net square feet

MEDICAL IMAGING PROGRAM								
Type	Name	No. of Personnel	No. of Seats per Room	NSF per Seat	NSF per Room	Quantity	Sub-Total	*Sub-Total*
Imaging Labs and Support								
	Imaging Labs				500	3	1,500	
	Control/Equipent				150	3	450	
								1,950
Offices and Support								
	Faculty	9			100	9	900	
	Departmental Reception				400	1	400	
	Workroom				400	1	400	
								1,700
Collaboration								
	Conference Room		16	25	400	1	400	
	Student Lounge		16	25	400	1	400	
								800
MEDICAL IMAGING GRAND TOTAL NET SQUARE FEET								**4,450**

The base cost for shell space in the Ground Level includes minimum infrastructure to meet building code and life safety requirements. The complete build-out would be an Add Alternate and would include the spaces included in the program above.

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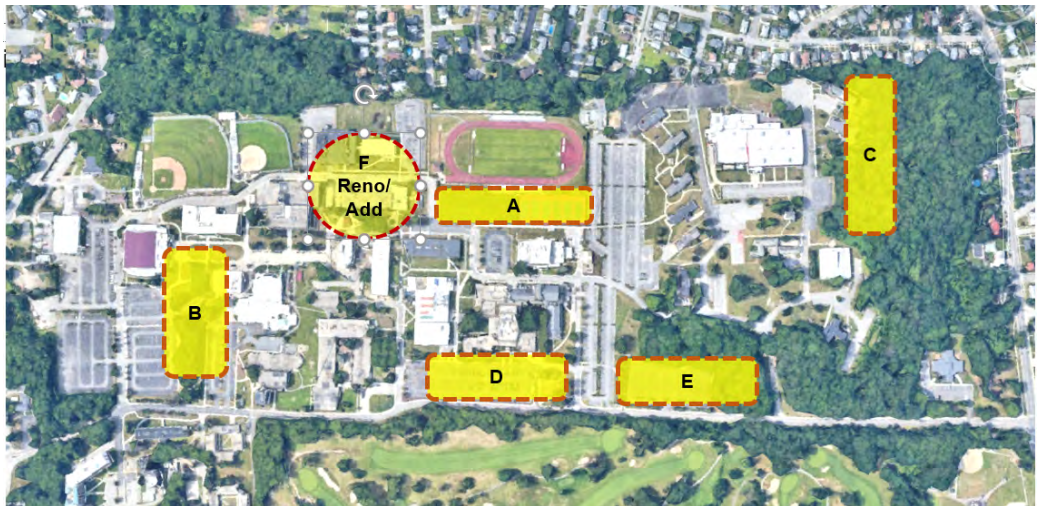
III. CONCEPTUAL DESIGN

Site Selection

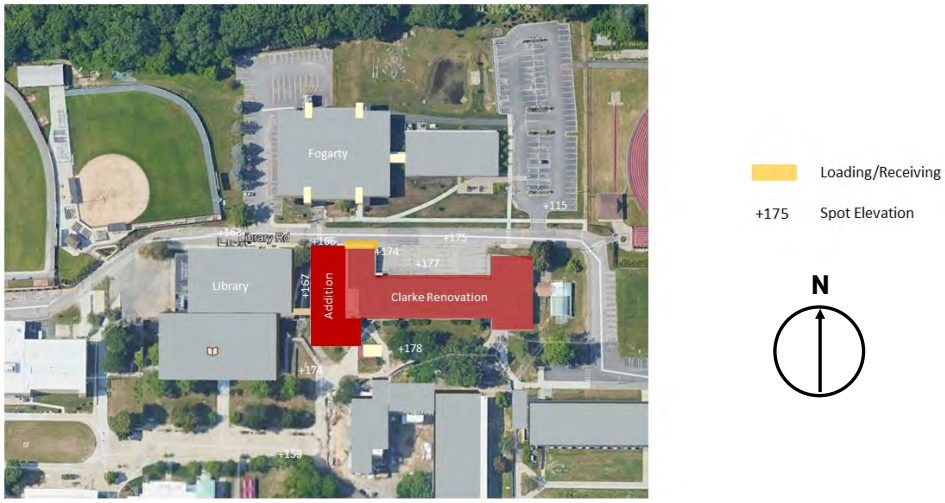
Several available sites for the location of the Department of Physical Sciences were considered as shown in Plan 3.1. Site selection criteria included:

- reinforce academic mall
- support 21st century STEM and increase enrollments ("if you build it, they will come")
- brand/flagship/image
- enhance community space for residential and commuter students
- support industry partnerships
- align with RIC Strategic Plan,
- optimize cost / value.



Plan 3.1: Location of sites considered for the Department of Physical Sciences

It was decided that a renovated Clarke Science building along with an addition, as shown in Plan 3.2 would be the best site for the Department of Physical Sciences. This location allows for all RIC science programs to remain together in the central campus.



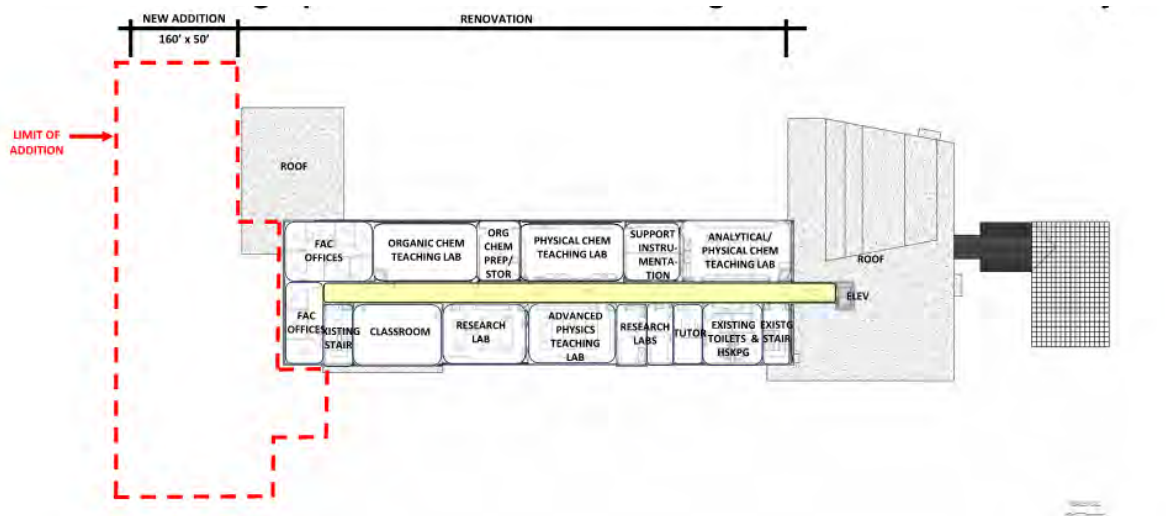
Plan 3.2: Detail of Site Plan for Clarke Science Building and Addition showing existing building, addition, and location of loading/receiving

Clarke Science Building Existing Floor Plans

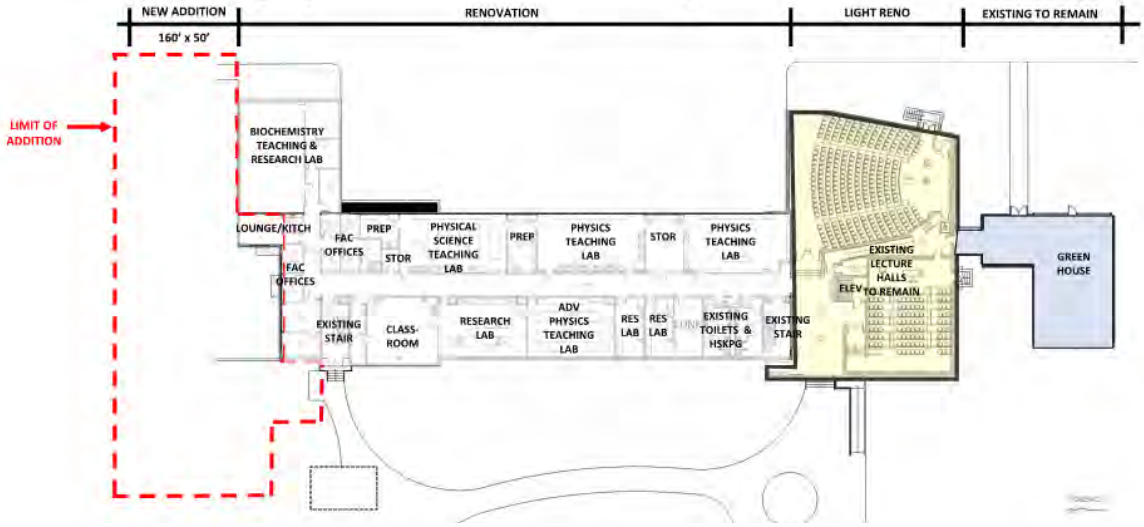
Overall, the building is showing its age and is in in need of major maintenance and improvements. Notable observed defects that planning decisions must mitigate include:

- Existing structural column bays of 16 x 25 create encumbered spaces not suitable for 21st teaching and learning:
- Inadequate space allocation per student in teaching and learning spaces to support hands-on experiential learning
- Lack of faculty office suites that provide a welcoming, collaborative environment for faculty and students
- Inadequate research space for faculty and students
- Lack of preparatory and storage space
- Lack of informal student collaboration spaces
- Lack of visual connection to central quad
- Lack of welcoming environment for entire RIC community

Second Floor Existing Conditions

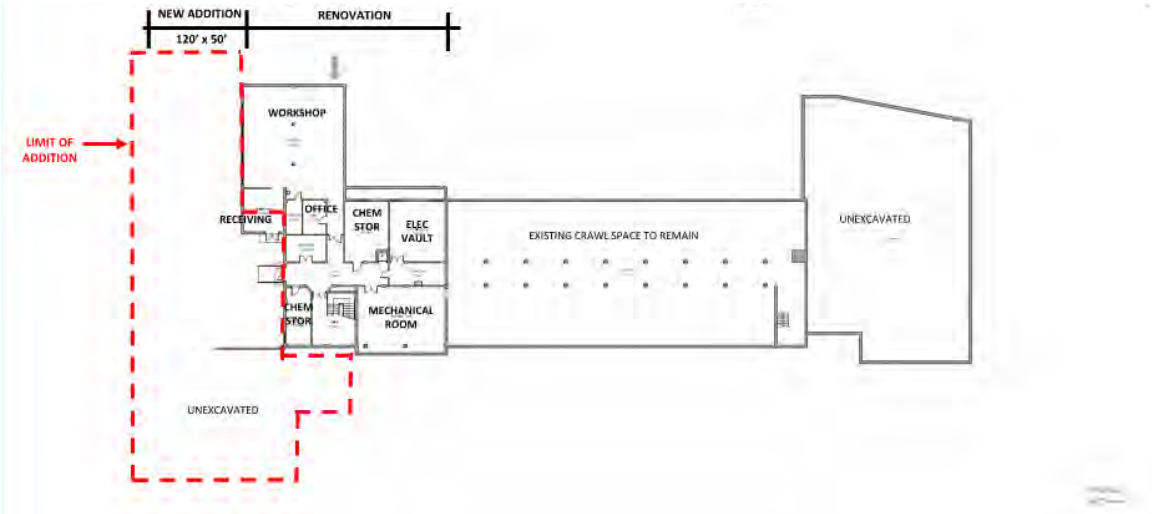


First Floor Existing Conditions



View of Existing Clarke Science Building from the East

Ground Floor Existing Conditions



Clarke Science Building Renovation and Addition Diagrammatic Floor Plans

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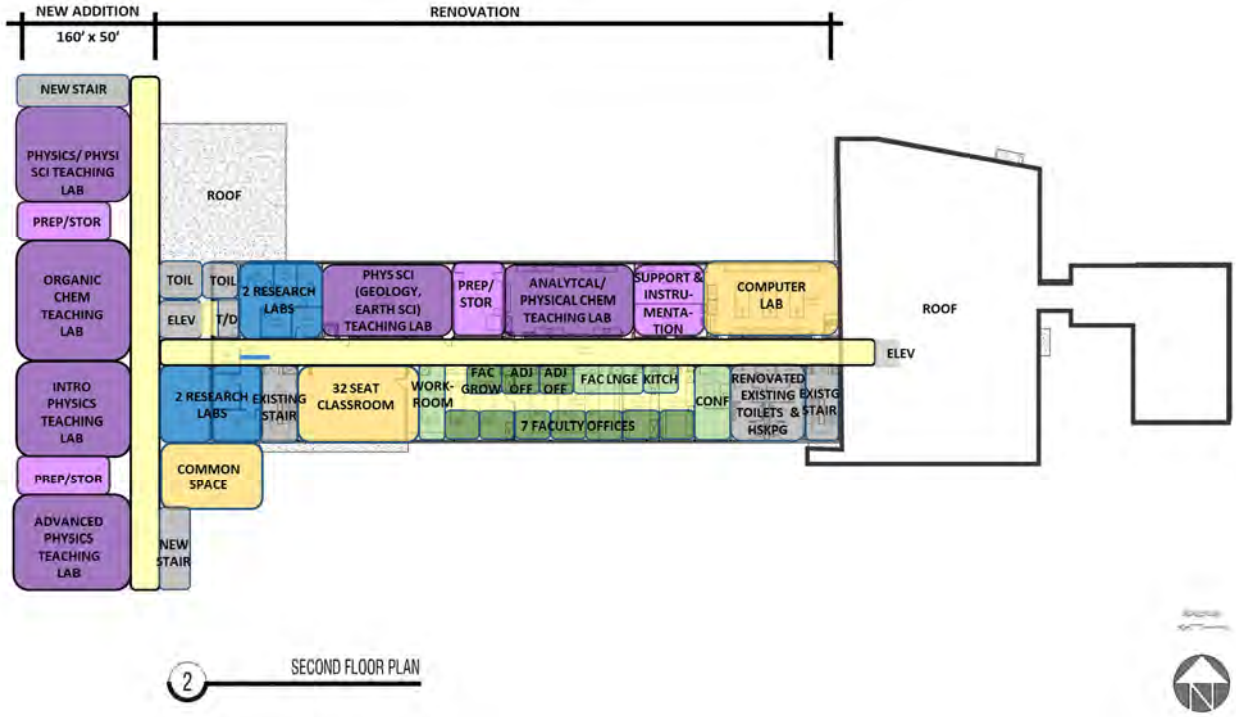
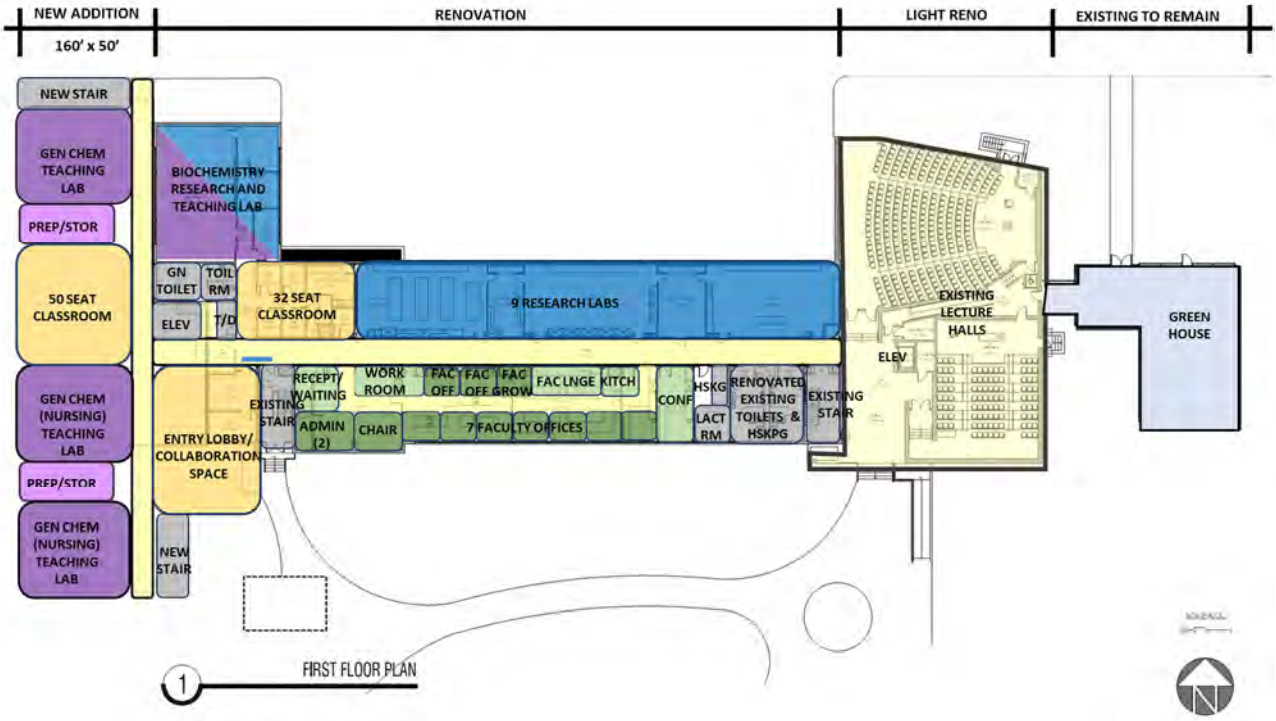


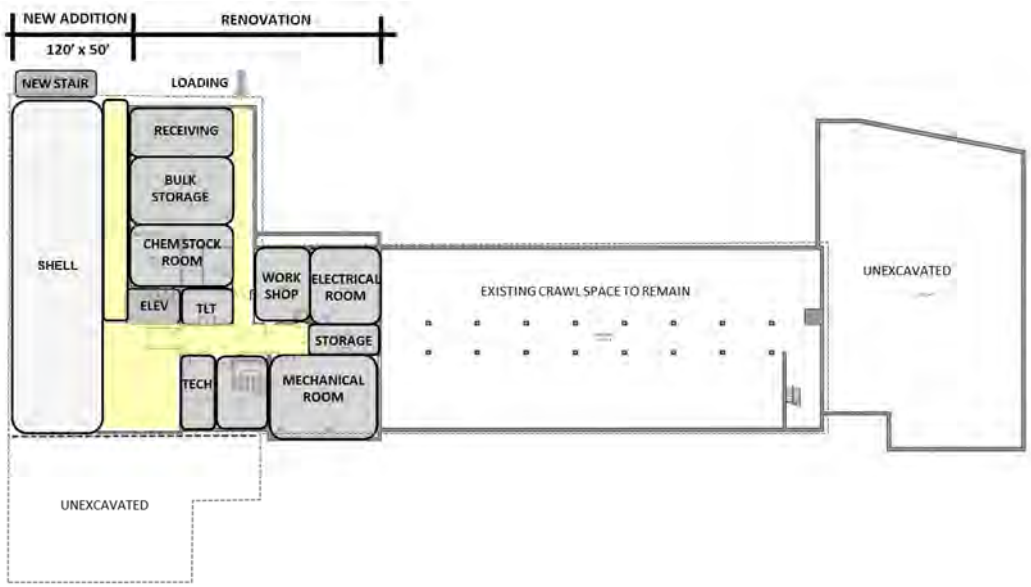
2 SECOND FLOOR PLAN



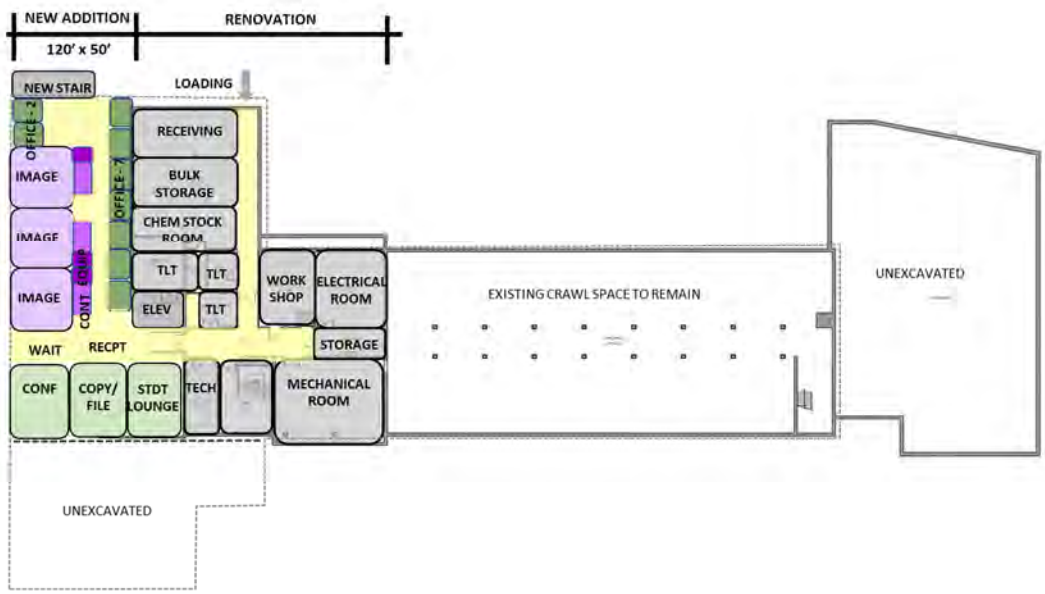
1 FIRST FLOOR PLAN

Because of the site grading and geometry at the Addition, there will be shell space or an add alternate of additional program space available at the Ground Floor. If used as shell space, then minimum infrastructure to meet building code and life safety requirements will be provided. This would include sprinklers, minimum HVAC to provide air movement, minimal lighting, and no exposed wall supports (metal studs).

This shell space could be fitted out as an add alternate to accommodate a new initiative such as Medical Imaging. Spaces would include imaging and support spaces, offices, reception, conference, workroom/copy/file ad a student lounge.



GROUND FLOOR PLAN—WITH SHELL SPACE



GROUND FLOOR PLAN—ALTERNATE WITH IMAGING

IV. ARCHITECTURAL AND ENGINEERING NARRATIVES—EXISTING AND PROPOSED

The extensive Clarke Science Feasibility Study dated March 28, 2019 by Kite Architects should be referenced for additional detail regarding existing conditions including MEP systems assessment, life-cycle evaluation of systems, and hazardous materials assessment. Some of the existing condition observations from that report are included in this section.

ARCHITECTURAL

Existing Conditions

The Clarke Science Building was constructed in 1963 as the campus's primary physical science lecture and lab facility. The building continues to accommodate these functions, housing lab, lecture, and office spaces. The main volume of the building is a two-story bar with a single, central double loaded corridor. To the east is a high-volume wing containing two lecture halls, and beyond that a single-story greenhouse.

The Clarke Science building has had some deferred maintenance improvements. The last major renovation of the building occurred in 2008 with improvements to the two lecture halls on the east side of the building. While some individual teaching lab renovations have been made during the life of the building, other chemistry and physics teaching laboratories have remained nearly untouched since they were constructed. The building's chilled water plant, terminal unit ventilators and temperature control systems were replaced and the building was fit with a fire protection sprinkler system following the 2010 Facilities Assessment and Master Plan

Structural systems appear to be in good condition. The first floor is constructed on precast concrete and concrete joists. The second floor and roof decks are composite concrete supported on structural steel frame and steel joists. The structural grid of the building limits spaces on either side of the corridor to a maximum of 24'-0" in width, which results in spaces that are too narrow for contemporary pedagogical needs. Interior walls are primarily masonry block infill.

Exterior cladding is primarily brick masonry. The exterior cavity wall is constructed with brick veneer, an uninsulated cavity and masonry back-up wall. Window systems are original 1960's era aluminum framed, single glazed storefront systems that have reached the end of life expectancy. Interior finishes consist of VCT, carpet, and ceramic tile. In general, interior finishes are dated and deteriorating and should be replaced. Lecture halls at the east end of the building have been more recently renovated. Both spaces have been subjected to repeated flooding. Excavation may be required to investigate drainage of exterior foundation wall and to possibly install waterproofing. Consideration of a supplemental subsurface drainage system may be required to reduce hydrostatic pressure.

The majority of the building is ADA accessible, but is far from being universal. Parking, ramps, entrances and exits, paths of travel and accessible routes meet basic criteria for compliance. One hydraulic elevator on the east end of the building services the first and second floors. There is currently no elevator access to the lower level on the west end of the building. Restrooms require upgrades to meet ADA clearances .

Given the age of the building, hazardous materials are present throughout the building. Abatement of hazardous materials will be required prior to any new or renovation construction.

Overall, the building is showing its age and is in in need of major maintenance and improvements. Notable observed defects include the following:

- 12'-0" floor-to-floor height limits the HVAC, Electrical, Plumbing and Fire Protection distribution and maintenance access in plenum
- Structure (columns/beams) are unprotected – steel columns / WT decking / web-joists. Limiting structural column bays of 16 x 25 create encumbered spaces
- Built-up gravel ballast roof has exceeded is life expectancy
- Significant heat-gain from existing windows to the non-thermally broken single-glazed frames causing significant heat gain/loss

Project Goals

Image/Identity

- Improved connection to pedestrian quad
- Adherence to campus master plan
- Enhancement of campus environment

Planning

- Provide an Addition of appropriate dimensions to accommodate 21st century teaching labs

- Create faculty suites on the first and second floors to provide a welcoming environment to users and visitors, to group faculty together to encourage informal interaction, and provide collaboration opportunities
- Create a new entry that is visible to the central quad and provides opportunities for informal collaboration
- Increase amount of research space; enable open, shared labs as appropriate
- Develop an implementation strategy that enables all functions to remain operational during construction

Learning Spaces
- Create teaching lab and classrooms spaces that support 21st century pedagogies, e.g. square footage allocations per student, aspect rations, floor-to-floor heights
- Support hands-on, experiential learning
- Provide appropriate preparatory and storage spaces

Research Labs
- Provide adequate space for all faculty to be research active
- Support student research and scientific discovery at all levels

Efficient, Transparent, Collaborative Environment
- Use existing and new construction for best and highest use
- Create spaces that support intended uses
- Create opportunities for collaboration

Implementation Strategy
- Develop an option that enables all components to remain operational during construction of the Addition
- Provide swing space and temporary facilities as required

Universal Design
- Provide accessibility to all areas of the building
- Improve access to the building

Technology
- Assure integration of digital technologies

Outline Specifications for Clarke Science Building

Improvements to Exterior of Existing Building
- Roof Replacement – thermoplastic polyolefin (TPO) 60 mil single-ply
- Window Replacement – Kawneer double glazed
- Brick and Mortar – point, tuck, and cleaning
- Entry Vestibule Storefront – Kawneer Tri-Gab VG 451T

New Addition
- Face brick – modular, 2-inch rigid insulation, spray-applied AVP, 5/8-inch sheathing
- Metal Panel – Centria insulated planel, spray-applied AVP, 5/8-inch sheathing
- Storefront and Curtainwall – Kawneer
- Roofing – thermoplastic polyolefin (TPO) 60 mil single-ply
- Elevator – Otis Gen-Two 4000#

Improvements and Finishes Throughout (Addition and Renovation)
- Laboratory Casework – New England Lab, painted steel, epoxy resin countertops (Durcon)
- New walls/partitions – metal stud, gypsum board to deck both sides, acoustic batts; cmu at infill partitions
- Corridors – luxury vinyl tile (LVT)
- Research Labs and Support – seamless sheet vinyl floor, epoxy paint, ACT 2x2 (Armstrong tegular tiles, 9/16" grid)
- Teaching Labs – seamless sheet vinyl floor, epoxy paint, ACT 2x2
- Analytical/Physical Chem Teaching Lab – Epoxy floor (Stonhard), ACT 2x2, epoxy paint
- Support & Instrumentation Room adjacent to Analytical Lab – Epoxy floor, ACT 2x2, epoxy paint
- Offices – carpet (Interface Tile), paint, ACT 2x2
- Mechanical Spaces – sealed concrete floor, exposed ceilings
- Toilet Rooms – porcelain tile full-height all walls, floor. Hard ceiling
- Window covering – MechoShade (EuroTwill 6000 Series, 3% open), manually operated at all window openings
- Doors – Occupiable spaces: maple veneer, 5 ply; unoccupied spaces and egress only doors: metal hollow core
- Conference Rooms – Carpet, Paint, ACT 2 x 2
- Premium Ceiling – 400 sf allowance (Armstrong Woodworks)
- Computer Lab – luxury vinyl tile (LVT) floor, paint, ACT 2 x 2
- Egress Stairs – resilient stair treads (Nora)

Lecture Hall Refresh
- Floors – Carpet
- Walls – Paint
- No New Seating

HEATING, VENTILATION, AND AIR CONDITIONING

Existing Conditions

Mechanical Systems

Given the age of the terminal systems and the scope of building improvements planned, all existing HVAC systems, including piping and ductwork within the building will be removed and replaced. Systems removal will included the removal of the existing steam and condensate piping connections to the campus's central distribution systems.

The building is served by a mechanical room located on its basement level. Connections to the campus's central steam and condensate return piping systems are provided within this basement mechanical space.

The systems within the basement mechanical room have been upgraded since the 2010 facilities assessment. The original chiller and pumping systems have been removed and replaced along with the original temperature control systems. The automated temperature controls have been upgraded to the campus standard Siemens DDC (direct digital control) type system.

40 PSI steam enters the basement mechanical room from the campus steam plant. Steam is reduced to low pressure where it is distributed to air handling unit coils and to steam to hot water heat exchangers. One heat exchanger serves a hot water loop for finned tube and convectors. The second heat exchanger serves a dual temperature loop for unit ventilators located along the perimeter of the building. Steam condensate is returned to the central plant by duplex pump and receiver in the mechanical room. Chilled water is generator by an air cooled chiller located at grade level in the corner of the parking lot next to the building. Chilled water is distributed by pumps in the basement mechanical room.

There are several exhaust fans on the roof or penetrating the serving the science classrooms, bathrooms, and various fume hoods.

There is a compressor in the basement use for pneumatic automatic temperature controls. Control valves and dampers through the building are pneumatically operated.

Proposed New Systems

Demolition

It is recommended the HVAC system is demolished and removed in its entirety including all ductwork, exhaust fans, air handling equipment, unit ventilators, controls, steam piping, condensate piping, hot water and chilled water piping, and the chiller.

Wall and roof penetrations from unit ventilators and various intake and exhaust openings should be infilled. Existing steam and condensate piping entering the mechanical room will be provided with new isolation valves and capped to facilitate the connection of new systems. This work must be phased with both the building renovation phasing and the heating season to ensure the active sections of the building are provided with heating through the duration of the heating season.

The existing capacity of the incoming steam and condensate service is likely adequate to serve the new larger building area, but this must be verified in design.

Heating

A new pressure reducing valve in the basement mechanical room will be provided to reduce incoming steam pressure from 40 PSI to 15 PSI. A new pair of redundant steam to hot water heat exchangers will be provided to generate building hot water. A new steam condensate receiver and duplex pumps will be provided to return condensate back to the steam plant. The steam and condensate lines shall be provided with new flow meters.

Hot water will be circulated by a new pair of redundant base-mounted hot water pumps in the mechanical room. Each new pump should be provided with a new variable frequency drives (VFDs) connected to the building management system.

Hot water perimeter baseboard shall be provided throughout the building. This measure will significantly increase energy savings by allowing airside systems to turn off during unoccupied periods. New thermostats and DDC controls will be provided for all spaces to stage heating from VAV box reheat coils and perimeter baseboards.

Cooling

A new 200 ton air cooled chiller should be installed at grade level to provide chilled water for cooling in the building. To distribute the chilled water to terminal units throughout the building, a new pair of redundant base-mounted chilled water pumps shall be provided in the mechanical room. Each new pump should be provided with a new variable frequency drives (VFDs) connected to the building management system. The chilled water system shall be provided with a buffer tank, glycol feed system, chemical storage tank, expansion tank, and air/dirt separator. Chilled water will be piped up to new energy recovery units on the roof.

Chart 4.1: Fume Hood System

Space	Qty	Length	Approx. CFM at 18" Sash 100 FPM
Biochemistry Teaching Research Lab	(1)	8'	1,025
Organic Chem Teaching Lab	(13)	6'	735
Nursing/Gen Chem	(2)	6'	735
Analytical/Env./Physical Chem	(1)	6'	735
Prep Rooms	(2)	6'	735
Research Labs	(8)	6'	735
Total Fume Hood Qty:	(27)	Total CFM:	20,135

Ventilation

New rooftop energy recovery units shall be provided for Phase 1 and Phase 2 area roofs. It is recommended (2) units are provided for each phase for a total of (4) units. Units will be approximately 12,000 CFM each. It is anticipated that for the units going on the existing structure (Phase 2) structural steel dunnage will be required.

The units shall be provided with electric preheat coils for frost protection, energy recovery wheels, chilled water cooling coils, hot water reheat coils, supply and exhaust air fans, filters, dampers, and full airside economizer section. All motors shall be provided with variable frequency drives to allow for variable air volume operation. Supply and return air will be ducted to each space.

Variable air volume (VAV) units with hot water reheat coils will be provided for each space. Return air shall be fully ducted back to the roof mounted energy recovery units. High occupancy spaces, including classrooms and conference rooms, will be provided with CO2 sensors and demand ventilation controls.

See Chart 4.1: Fume Hood System for a summary of required fume hoods. Due to amount of exhaust air required, it is recommended a fume hood exhaust fan set be provided to serve these fume hoods instead of having a smaller dedicated fan for each hood. This will reduce energy usage and maintenance requirements.

Three (3) high plume dilution fume hood exhaust fans will be provided on the roof. The fans will be sized for N+1 for redundancy. The fans will be ducted to a common exhaust plenum. Stainless steel exhaust duct will be routed on the roof level and down to each fume hood air valve and general exhaust air valve.

A heat recovery coil shall be located in the common exhaust plenum. This coil will be connected to a glycol run around loop and piped to the make-up air unit. This loop will require a pump, expansion tank, air separator, and appropriate valving as typical for a closed loop system. It should be verified during design if any of the laboratories require specialty exhaust systems that should be separated from the common fume hood exhaust system, such as perchloric acid.

Each fume hood shall be provided with a venturi air valve, sash position sensor, face velocity sensor, and occupancy sensor. A general exhaust air valve and supply air valve shall also be provided for each science laboratory. A differential pressure monitor will be provided for each science laboratory to ensure the space is slightly negatively pressurized with respect to the corridor.

A dedicated make up air unit shall be provided for the fume hood systems. This unit shall be located on the roof and shall be sized to provide enough outside air to offset the exhaust air being removed from the building. The make-up air unit shall be provided with a preheat coil piped to the glycol run around heat recovery loop, a chilled water

coiling coil, glycol reheat coil, supply air fan, filters, and dampers. Supply air duct will be routed on the roof level and down to each supply air valve.

Controls

All HVAC equipment shall be provided with full direct digital controls and connected to the existing Siemens building management system. New graphics, alarms, and trending will be provided for all systems.

Miscellaneous

Split systems will be provided for various IT rooms and elevator machine rooms where required. Condensing units

will be located on the roof or on the wall where able to provide at grade level.

Supplement split systems or chilled water fan coil units for cooling may be required for some high load areas, like the computer room.

New toilet exhaust fans will be provided on the roof. Utility spaces will be provided with hot water unit heaters or electric unit heaters when water cannot be provided. Stairs will be provided with hot water cabinet unit heaters. Vestibules shall be provided with air curtains with a hot water coil.

Workshops and chemical storage rooms will be provided with specialty dedicated exhaust fans where required.

ELECTRICAL

Existing Conditions

Currently, the Clarke Life Science Building is suppled by two indoor oil filled transformers. Unit Substation #1 is 225 kVA, 4160 volt to 120/208 volt three phase with a 800 amp main breaker. Unit substation #2 is 225 kVA 4160 volt to 480/277 volt three phase with a 400 amp breaker.

The building is supplied by a 250 Kw 120/208-volt Kohler emergency generator. The generator is located outside of the building. The automatic transfer switch for the generator is located in the main electric room.

The lighting throughout the build appears to be original fluorescent fixture retrofit with LED lamps. Lighting is controlled by wall switches.

There is no Clock/ PA system in the building.

Tel/Data outlets are located in offices and selected areas. WI-Fi network is accessible in the majority of spaces. The building is supplied by a FCI addressable fire alarm control panel. The control panel is located at the main entrance. The system utilizes signal via fire alarm master box (1944) which is also located at the main entrance.

Proposed New Systems

Normal Electrical

Replace both indoor oil filled transformers with dry type. The distribution switchboard for unit #2 to be replaced with new 1600 amp 480/277 volt switchboard and 750 kVA secondary transformer . The existing panel board enclosures to be retro-fit with new bussing and circuit breakers. The feeders and conduit to the panels can be reused where practical . New panels and feeders provided per renovation and addition needs. New power distribution to support proposed mechanical equipment.

Emergency Electrical

Maintain existing emergency generator and provide new emergency distribution to support emergency lighting and optional stand by for mechanical heat pipe freeze.

Lighting

Provide new LED lighting and automated controls in addition and renovated spaces.

Fire Alarm System

Upgrade the existing addressable FCI Fire Alarm Control Panel with new. Replace all devices and wiring.

PA/Clock System

Provide new public address and clock system

FIRE PROTECTION

General

Currently, the Clarke Life Science Building fire protection system is a wet type fire protection system. The building is not equipped with standpipes for fire fighter use due to the limited height of the building. Given the scope of renovations and new additions to the building, the existing fire protection sprinkler system will undergo significant revisions.

Service

Due to the age of the existing backflow preventer assembly, alarm valve assembly and fire department connection with check valve, it is recommended that this equipment be removed and replaced. The existing incoming 6" fire water service can remain. A new backflow preventer assembly, wet alarm valve assembly and 4" connection to a new exterior fire department connection will then be installed. The exact location of this equipment will be determined upon final floor plan layouts. A new 6" sprinkler main will extend from the new alarm valve and connect to a new sprinkler main at the ceiling. The existing sprinkler mains on all floors of the existing building will remain.

Sprinkler System

The building is currently protected by a wet sprinkler system throughout. The existing wet sprinkler system will be extended into the new addition spaces for the Clarke Building. New sprinkler mains will be extended throughout the addition spaces as required. New branch sprinkler piping and sprinkler heads will provide the new spaces with complete protection throughout.

All existing sprinkler heads will be removed and replaced. Existing branch sprinkler piping and sprinkler head layouts will be revised as required to provide complete protection of the renovated spaces as required by the new floor plan layouts.

Sprinkler heads types will vary based on the areas they are protecting and the type of ceiling in the area. All ACT ceilings shall have concealed type sprinkler heads. Areas without ceilings shall be protected by upright sprinkler heads. The use of sidewall sprinkler heads will be allowed where ceiling conditions will not allow for piping above them. All sprinkler heads will be the "quick-response" type as required by current Code standards.

Since the height of the building is less than 30'-0" above grade, standpipes for fire fighter use will not be required to be installed.

Fire Protection Piping

The wet pipe sprinkler system shall have Schedule 40, black steel piping and fittings. Piping 1-1/2" in diameter and Smaller shall be installed with screwed joints and fittings. Piping 2" and larger shall be installed with grooved joints and fittings. PVC piping is not being proposed at this time..

Final pipe sizing will be defined by the installing fire protection contractor based upon current hydrant flow test results that will be defined in the Bid Set of documents.

Zone isolation valves with zone flow switches and inspector's test drains will be provided for each sprinkler zone as defined in the final Bid documents.

Seismic Restraints

The design of the new/renovated fire protection systems will include seismic restraining as required by the Rhode Island State Building Code, Rhode Island Fire Laws & Rules, and NFPA 13.

Design Parameters

The Clarke Life Sciences Building sprinkler system renovations and additions will be designed to meet the standards as defined in the Rhode Island State Building Code, Rhode Island Fire Laws & Rules, and NFPA 13.
The proposed occupancy of the building will require the sprinkler flow densities as follows.

- Offices, Classrooms, Auditorium and Egress Spaces:
  - Occupancy Classification: Light
  - Sprinkler Flow Density: 0.10 / 1500 sf (less credit for quick response heads)
  - Hose Allowance: 100 gpm (interior and exterior)
  - Maximum Head Spacing: 225 sf

- Laboratory, Research, Mechanical, Electrical, Storage Spaces:
  - Occupancy Classification: Ordinary Group I
  - Sprinkler Flow Density: 0.20 / 1500 sf (less credit for quick response heads)
  - Hose Allowance: 250 gpm (interior and exterior)
  - Maximum Head Spacing: 130 sf

PLUMBING

General

Currently, the Clarke Life Sciences Building plumbing systems and fixtures are in fair condition and recommended to be replaced during a renovation and addition to the building.

New Plumbing Systems

Since the building plan layouts will change significantly during the renovation/addition to the building, it is proposed that the existing plumbing systems be removed back to their origins in the building. New piping systems should be run back through the building to serve all new plumbing fixtures. These systems include sanitary waste and vent, lab waste and vent, domestic hot and cold water, non-potable hot and cold water, storm drainage and natural gas.

Plumbing Fixtures

All existing plumbing fixtures should be removed, and new fixtures be furnished and installed as required by the new floor plan layouts. All new plumbing fixtures should be low-flow type fixtures as required by current code standards. All new bathrooms should be designed to meet all current ADA standards and be provided at all floor levels.

Domestic Cold Water System

The existing 4" domestic water service can remain. It is recommended that a new 4" main shut-off valve be provided in place of the existing valve. A new water meter will be required as well. A new domestic cold water main with the extend out from this service entrance and feed all plumbing fixtures requiring domestic cold water. The system shall be equipped with new riser and horizontal main isolation valves as may be required.

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Domestic Hot Water System

The existing domestic water heating system should be replaced with a new gas-fired water heater, size to be determined based on the final occupancy count of the new building. A new master mixing valve should be provided that will limit the hot water supply at 120°F. New hot water supply and return piping systems shall extend out from this equipment and feed all plumbing fixtures requiring domestic hot water. The system shall be equipped with new riser and horizontal main isolation valves as may be required.

Sanitary Waste and Vent System

The existing sanitary waste and vent piping system should be removed. New sanitary waste piping systems shall extend from the service entrance in the lower level to all plumbing fixtures and equipment requiring waste and vent connections.

Storm Drainage System

The building storm drainage system consists of a series of normal and overflow roof drains across the flat roof. These drains appeared to be in good condition and can remain and additional drains will be added on the new building additions. The existing interior normal and overflow storm drainage piping systems should be removed. New normal and overflow storm drainage piping systems shall extend from all roof drains and reconnect to the existing normal and overflow storm drainage exits from the building. New normal and overflow storm drain exits are anticipated for the drains on the building addition.

Lab Waste Neutralization System

The Clarke Building is equipped with a central lab waste chemical neutralization system located in basement mechanical room. This system consists of pH adjustment tanks and a central monitoring system. All of this equipment will remain. All existing lab waste and vent piping to fixtures in the labs on the floors above should be removed back to this system. New lab waste and vent piping shall extend throughout the building and connect to all lab sinks and fume hood sinks as required by the new floor plan layouts in the exiting building and the new addition.

Natural Gas System

The building is supplied with a natural gas service that

connects to the campus's central gas distribution system. All natural gas piping should be removed back to its source at the existing gas meter on the exterior of the building. New natural gas piping shall extend throughout the building and connect to all new lab bench mounted turrets as required by the new floor plan layout in both the exiting building and the new addition.

Pipe Insulation

All plumbing systems piping insulation shall be removed as the existing piping systems are also removed. New pipe insulation shall be provided on all new domestic hot and cold water, non-potable hot and cold water, and horizontal storm drainage piping in both the existing building and the new addition.

Compressed Air

The air compressor located on the lowest level should be removed and replaced in kind, including all appurtenances. All existing compressed air piping should be removed and replaced at this time as well and be extended to new lab bench mounted turrets as required

Teaching Labs and Research Labs

As noted above, all new teaching labs and research labs shall be provided with new lab waste and vent, non-potable hot and cold water, and natural gas piping systems as may be required to suit the new layouts.
A typical teaching or research lab should include the following:

- Deck mounted natural gas and compressed air (CA) turrets on all lab benches.
- Separate lab bench with gas and CA turrets and integral sink with faucet for an instructor in teaching labs. Faucet to be served by non-potable hot and cold water.
- Deck mounted eyewash units at all lab sinks.
- Fume hoods with integral cup sinks and faucet. Hoods to be supplied with non-potable cold water, natural gas and CA as may be required to suit the needs of the individual lab.
- Combination emergency shower/eyewash units located near the door of the lab and supplied with tempered water per current code standards.
- Master gas shut-off valve also located near the exit of the teaching or research lab to allow for complete shut-off of gas supply to the room in an emergency.

Piping Materials

All plumbing systems being installed in the Clarke Building will be furnished with the following materials:

Service	Material	Joint
Domestic Cold Water	Type L Copper	ProPress
Domestic Hot Water	Type L Copper	ProPress
Domestic Hot Water Return	Type L Copper	ProPress
Lab Cold Water	Type L Copper	ProPress
Lab Hot Water (120°F)	Type L Copper	ProPress
Lab Hot Water Return(120°F)	Type L Copper	ProPress
Tempered Water	Type L Copper	ProPress
Tempered Water Return	Type L Copper	ProPress
Sanitary Waste	Cast Iron	Mechanical
Sanitary Vent	Cast Iron	Mechanical
Laboratory Waste	Schedule 40 Polypro.	Fused
Laboratory Vent	Schedule 40 Polypro.	Fused
Natural Gas	Schedule 40 Black Steel	MegaPress

V . PROJECT DELIVERY METHODS AND PHASING OPTIONS

This project can be accomplished in either of two delivery methods - General Contractor (GC) and Construction Manager (CM) . Further, this project can be accomplished in any of three possible phasing approaches. All delivery and phasing options result in the identical final product as per Figure 5.1. However, each approach has different impacts on operational disruptions, cost, and schedule

Project phasing and delivery options are as follows::

OPTION 1—NO PHASING

- Option 1A —No Phasing / GC
- Option 1B—No Phasing / CM

OPTION 2—2 PHASES

- Option 2A —2 Phases / GC
- Option 2B—2 Phases / CM

OPTION 3—3 PHASE RENOVATION

- Option 3A —3 Phases / GC
- Option 3B—3 Phases / CM

This Section provides a comparison of General Contractor vs. Construction Manager delivery methods as well as an overview of Phasing Options 1, 2, and 3. See Appendix A for detailed phasing diagrams.

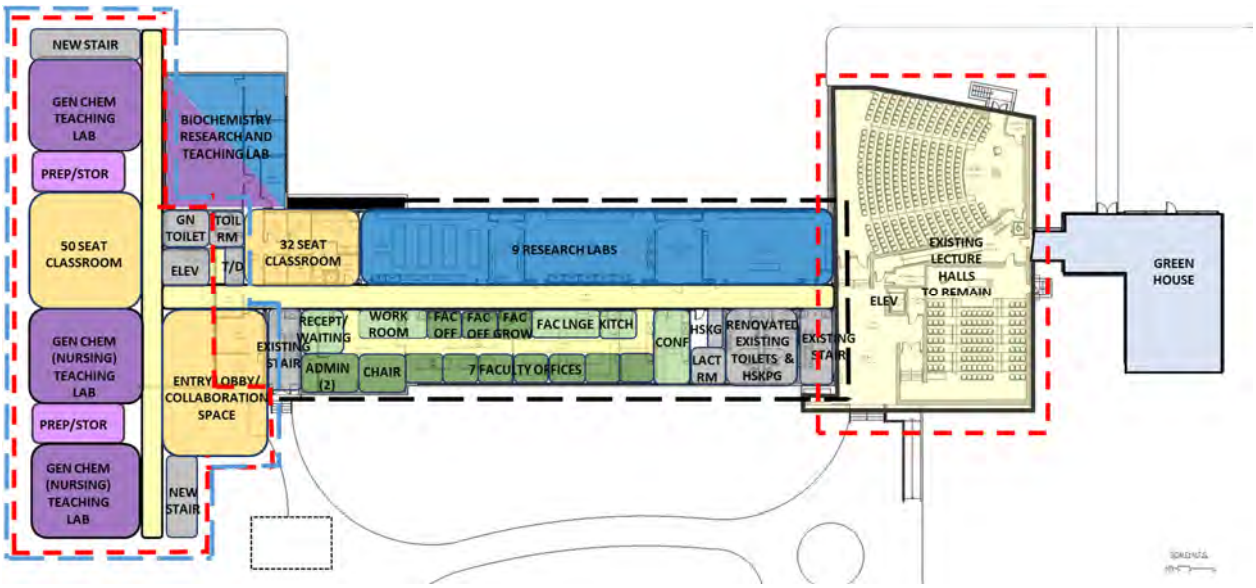

Figure 5.1 Identical Final Product Regardless of Delivery Method and Phasing Option

PROJECT DELIVERY METHODS

The project delivery methods under consideration for this project are the General Contractor (GC) method and the Construction Manager (CM) method.

The most notable difference is that preconstruction services are provided for a fee by Construction Managers while General Contractors do not provide pre-construction services as part of their scope of work. While outside consultants can also provide these services, they have little ownership in the outcome. See Figure 5.1: Delivery Method Relationships and Control.

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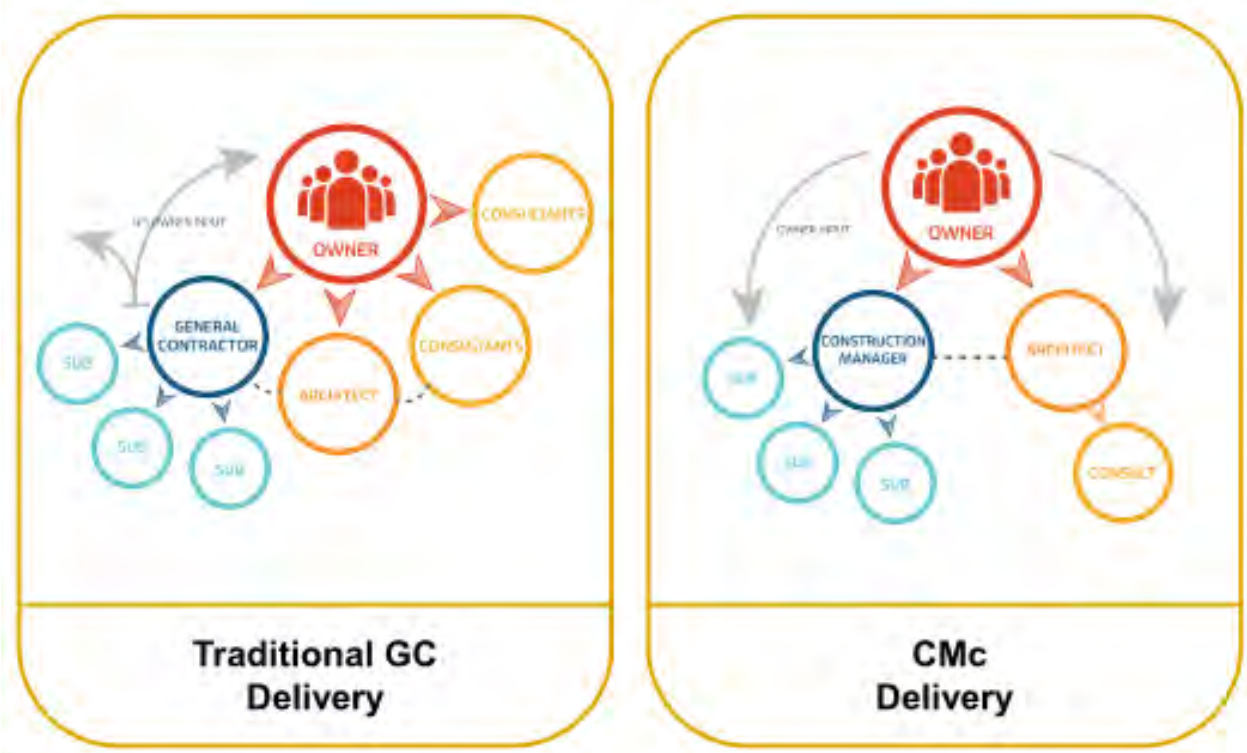


Figure 5.2 Delivery Method Relationships and Control

Comparison of Project Delivery Methods

Preconstruction services are very beneficial to the Owner. The information provided to the team from the construction industry during design phases of the project informs the client about the probable cost, logistics, approach (phasing) and constructability issues that are unique to each project.

It is especially important to pre-plan an approach and sequence of work in a complicated, multi-phased addition/renovation project such as the Clarke Science Building, where the expectation is to maintain teaching, research, and administrative operations of the Department of Physical Sciences during construction.

A design effort that does not include preconstruction services can create unnecessary financial and scheduling risk. Preconstruction services by a construction manager provide vital information to the client and design team and aid in a more predictable outcome for the project. See Figure 5.3: Comparison of Delivery Method Attributes.

	GC	CMc w/GMP
Pre-Construction Services		✔
Guaranteed Maximum Price (GMP)		✔
Lowest Risk to Owner		✔
Highest Risk to Owner	✔	
Shared Savings Clause		✔
Open Book (Financials)		✔
Fastest Delivery Method		
Owner input in Selection of Subcontractors		✔

Figure 5.3 Comparison of Delivery Method Attributes

Budget and Final cost

On bid day the General Contractor delivered project will always be less than a CM delivered project by approximately 7-10%. The main reasons are::

- GC's do not carry construction contingencies, fixed fees and allowances that a CM carries in their GMP
- GC fee on bid day are near zero, where the CM will carry a transparent fee range of 2-4%
- GC's may not provide the appropriate staffing levels necessary to manage the project properly (General Conditions) to save cost and make their bid appear more competitive.

However, at the end of the project, when you add in all the Change Orders accumulated during the course of construction the General Contractor is most likely to end up more expensive with a later completion date than the Construction Manager. This is because GC's make up for their low bid on bid day through profit from change orders. This erodes any bid day savings since General Contractors do not carry construction contingencies to fall back on; where as the CM will traditionally return the unused Contingency or use it to fund other client "wish list" scope. See Figure 5.4: Comparative Cost by Delivery Method.

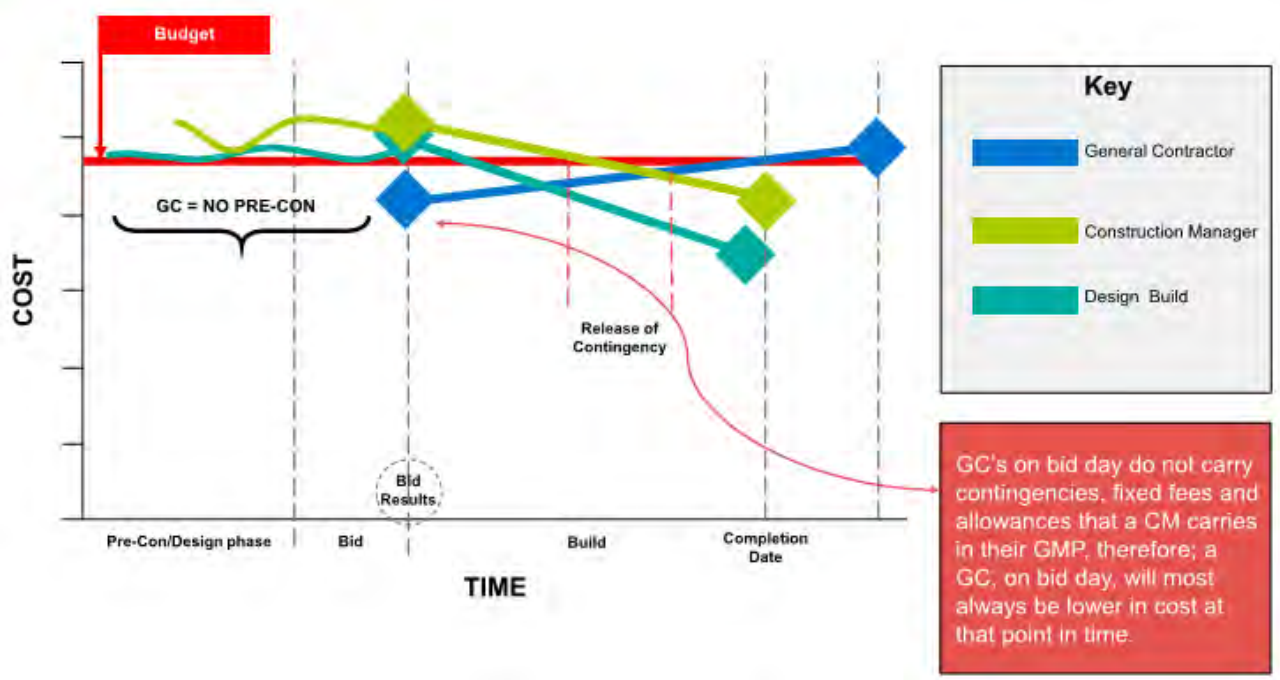
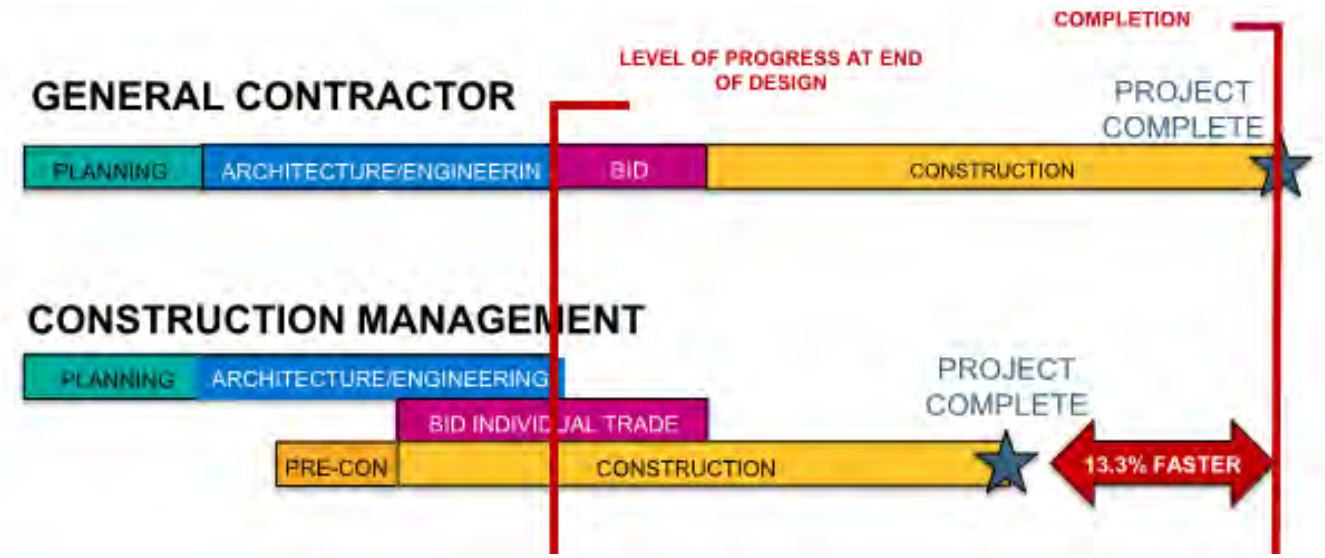


Figure 5.4 Comparative Cost by Delivery Method

Schedule

If speed of delivery is a desired, Construction Managers have the ability to fast track a project in the preconstruction phase. See Figure 5.5: Speed to Completion by Delivery Method.

- CM's can carve out scope of work, bid and award trades to advance long lead items or pieces of work (enabling projects) that allow work to proceed while the design continues to develop. GC's do not.
- CM's can preplan the early bid packages needed to fit within the Teams delivery goals based on the availability of materials, lead times, targeted windows of construction (spring break, summer start etc). GC's do not.



Source: Construction Industry Institute/Penn State Study "Comparison of U.S. Project Delivery Systems," Mark Konchar & Victor Sanvido, Journal of Construction Engineering and Management, Vol. 124, No. 6 (1998), pp. 435-444. Revised 2011

Figure 5.5 Speed to Completion by Delivery Method

Bidding

CM's do a much better job preparing and informing the bidders before bids are received . The detailed schedule, breakdown scopes of work and responsibilities, sequencing plan, and site specific safety requirements are developed before it goes out to bid and vetted before a sub is hired. This leads to less field fighting, less change orders, and less claims and lawsuits. See Figure 5.6: Bidding Comparison.

GC's are incentivized to work the above details out in the field. The GC process creates more RFI's leading in turn to change orders, for which GC's will receive a higher mark-up than for work they carried in their bid.

Traditional GC Bid

Bidding subcontractors

Subcontractor Bids	A	B	C
Division 2	Low	3	3
Division 3	3	Low	3
Division 4	3	Low	3
Division 5	Low	3	3
Division 6	3	3	Low
Division 7	3	3	Low
Division 8	Low	3	3
Division 9	3	Low	3
Division 10	3	Low	3
Division 11	3	3	Low
Division 12	3	Low	3
Division 13	Low	3	3
Division 14	3	Low	3
Division 15	Low	3	3
Division 16	3	3	Low
Total Lowest Bids	5	6	4

…trade contractors give different prices to general contractors for the same project, No one GC gets all the low bids

VS

CM

Bidding Subcontractors

Single Point of Bid
Low
Low
Low
Low
Low
Low
Low
Low
Low
Low
Low
Low
Low
Low
Low
15

…trade contractors give one price to single construction manager, they collect all the bids

Figure 5.6 Bidding Comparison

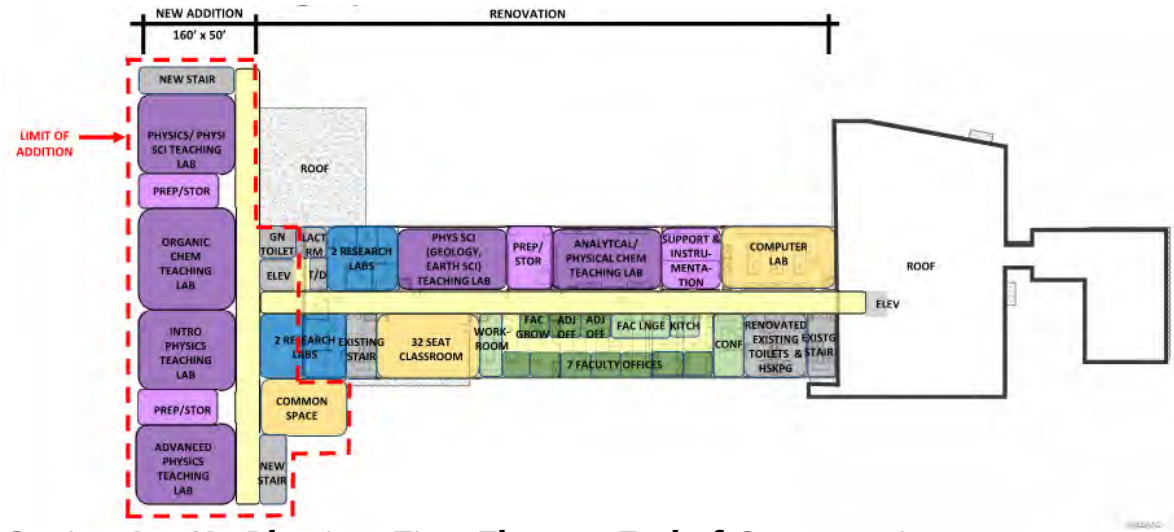
PHASING OPTIONS

The phases for each project is explained and illustrated on the following pages.

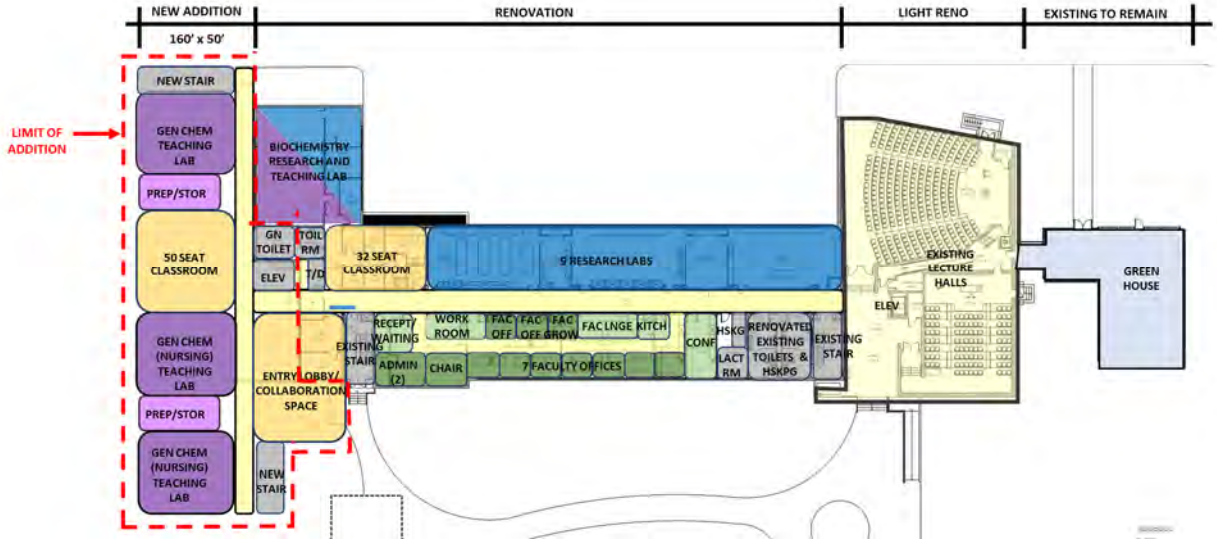
Option 1 — No Phasing

The No Phasing Option is based on completely vacating the existing building for the duration of construction.. This would include relocating 10 teaching labs to temporary portable buildings in Parking Lot B and relocating classrooms and faculty offices to available space on-campus. Research activity could either take place in teaching labs for the duration of construction or in an additional two temporary portable buildings in Parking Lot B. The constructor could then build the addition and renovate the existing building concurrently. The addition and renovated building would be occupied upon completion of all construction.

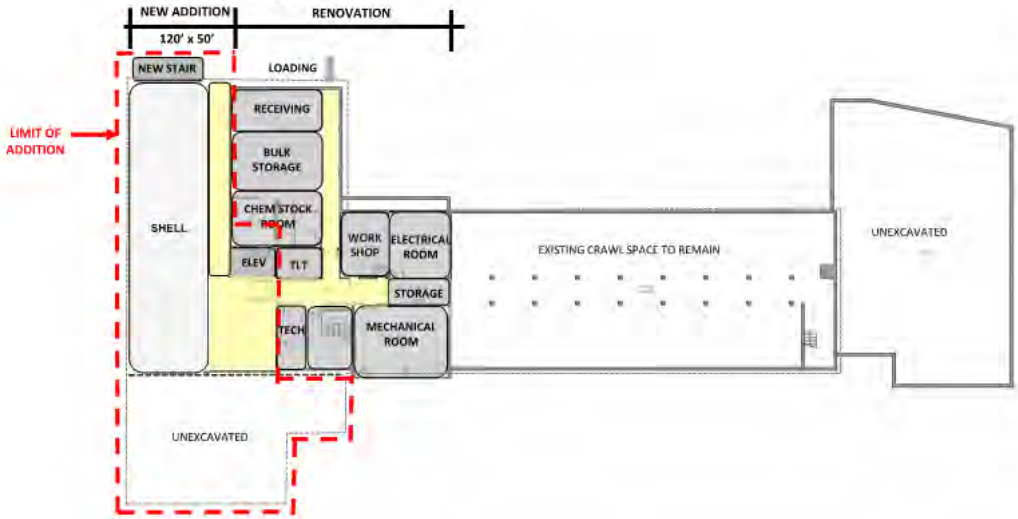
Option 1 - No Phasing: Second Floor at End of Construction



Option 1 - No Phasing: First Floor at End of Construction



Option 1 - No Phasing: Ground Floor at End of Construction



Option 2—2 Phases

Option 2—2 Phases uses minimum sequential construction phasing. The Addition as well as some renovations to the west edge of the existing building would be constructed during Phase 1. All existing building operations, academic curriculum and on-going research in the existing Clarke Science Building can easily be maintained during Phase 1 with the exception of some existing faculty offices that would be required to be relocated to other available space on campus. At the end of Phase 1, 8 teaching labs and one 50 seat classroom will be located in the Addition.

At the start of Phase 2, all remaining faculty offices and classrooms would be relocated to other available space on campus. Research activity could either take place in teaching labs for the duration of Phase 2 or in two temporary portable buildings. Also at the start of Phase 2, the Biochemistry Teaching/Research Lab on the first floor and the Analytical/Physical Chemistry Teaching Lab on the second floor would be renovated in place and remain operational during the renovation of the existing building. The Addition would also remain fully operational during the renovation of the existing building.

OPTION 2 PHASE 1

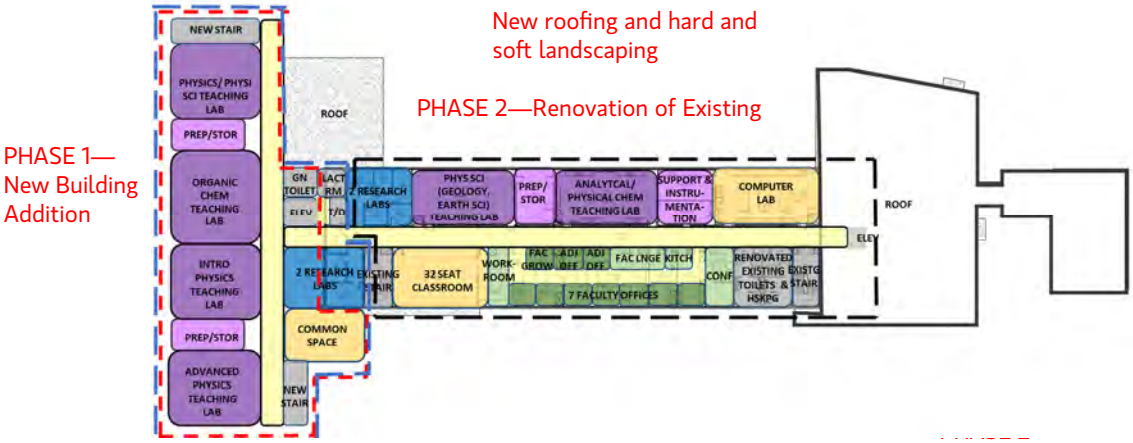
Construction of the new building addition that houses academic Teaching Labs, Classrooms and building lobby and Common Spaces. In order to begin this phase enabling work including modifications to existing site utilities and other sitework will need to be performed prior to start of the addition. This phase will also include all Ground Floor work to support the new addition and future phases of the project

OPTION 2 PHASE 2

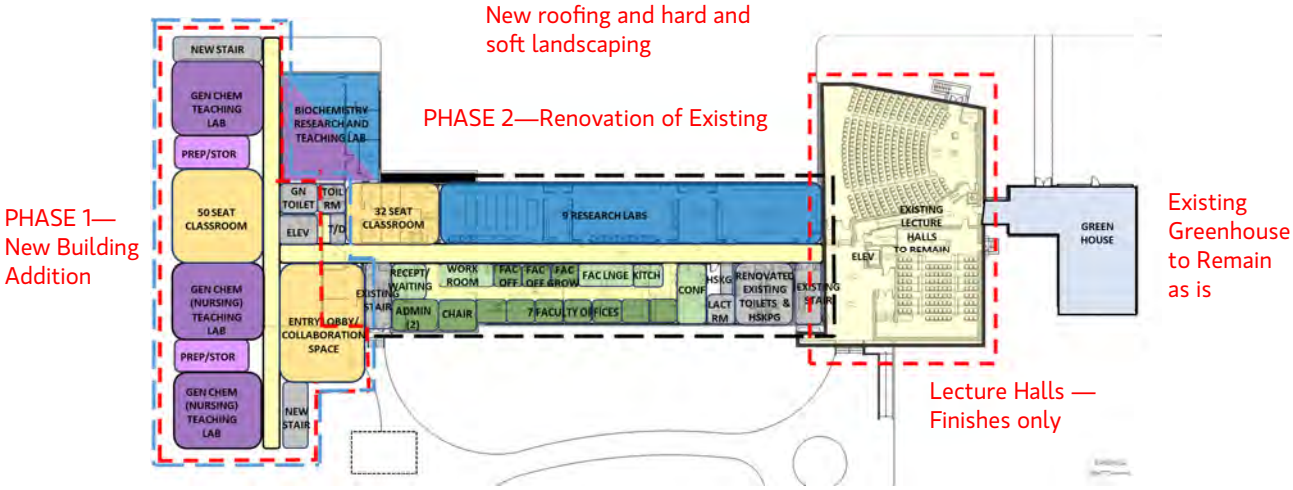
The existing building will be renovated in one phase. This phase will also include exterior envelope work that includes new windows, existing brick pointing and cleaning.

The timing of new roofing and hard and soft landscape work as well as light renovation of finishes and upgrades to the existing lecture hall wing is flexible. This work will occur on a schedule that is most convenient to the College, such as summer break. For example, plantings can be planted in the fall season with final punch-list and planting approvals taking place in the spring/summer season to assure the plants take. Lecture hall upgrades could occur during summer break.

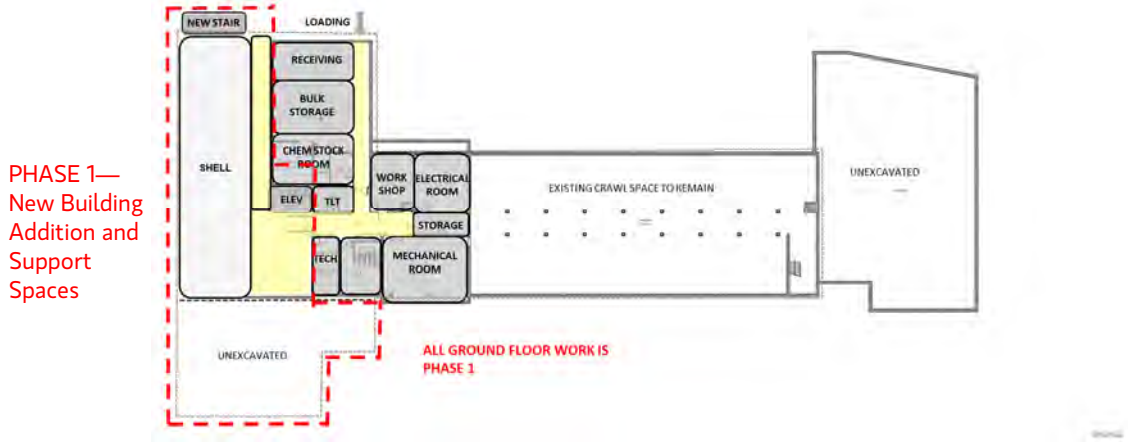
Option 2 - 2 Phases: Second Floor at End of Construction



Option 2 - 2 Phase Renovation: First Floor at End of Construction



Option 2 - 2 Phases: Ground Floor at End of Construction



Option 3—3 Phases

Option 3 uses sequential construction phasing. The Addition as well as some renovations to the west edge of the existing building would be constructed during Phase 1. All existing building operations, academic curriculum and on-going research in the existing Clarke Science Building can easily be maintained during Phase 1 with the exception of some existing faculty offices that would be required to be relocated to other available space on campus. At the end of Phase 1, 8 teaching labs and one 50 seat classroom will be located in the Addition.

At the start of Phase 2, all remaining faculty offices and classrooms on the first floor would be relocated to other available space on campus. Research activity could either take place in teaching labs or be consolidated into the existing second floor research labs for the duration of Phase 2. The Addition and the existing second floor would remain fully operational during the renovation of the first floor of the existing building. At the start of Phase 2, the Biochemistry Teaching/Research Lab on the first floor and the Analytical/Physical Chemistry Teaching Lab on the second floor would be renovated in place and remain operational during the renovation of the existing building. The Addition would also remain fully operational during the renovation of the existing building..

At the start of Phase 3, all remaining faculty offices and classrooms on the second floor would be relocated to other available space on campus. Research activity would occupy new research labs on the first floor. The Addition and newly renovated first floor would remain fully operational during the renovation of the second floor of the existing building.

OPTION 3 PHASE 1

Construction of the new building addition that houses academic Teaching Labs, Classrooms and building lobby and Common Spaces. In order to begin this phase enabling work including the existing site utilities and other sitework will need to be performed prior to start of the addition. This phase will also include the entire Ground Floor work to support the new addition and future phases of the project

OPTION B PHASE 2

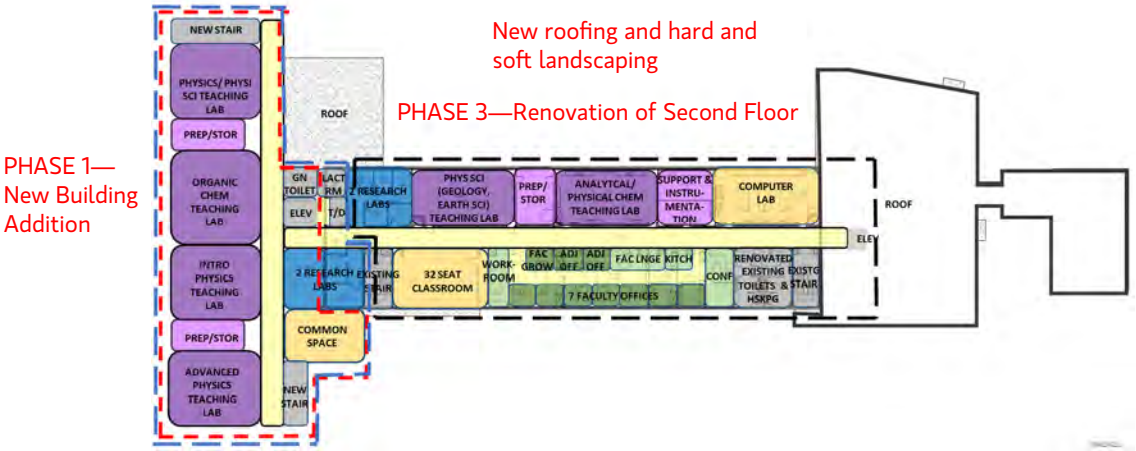
The existing building will be renovated in two phases in order to maintain on-going teaching and research operations. Phase 2 will included the renovation of the first floor. The proposed phasing accommodates vertical shafts, plumbing and electrical risers. Horizontal distribution of systems will likely be located in the main corridor ceiling. This phase will also include exterior envelope work including new windows, existing brick pointing and cleaning . At the end of Phase 2, research activity will occupy new research labs on the first floor.

OPTION B PHASE 3

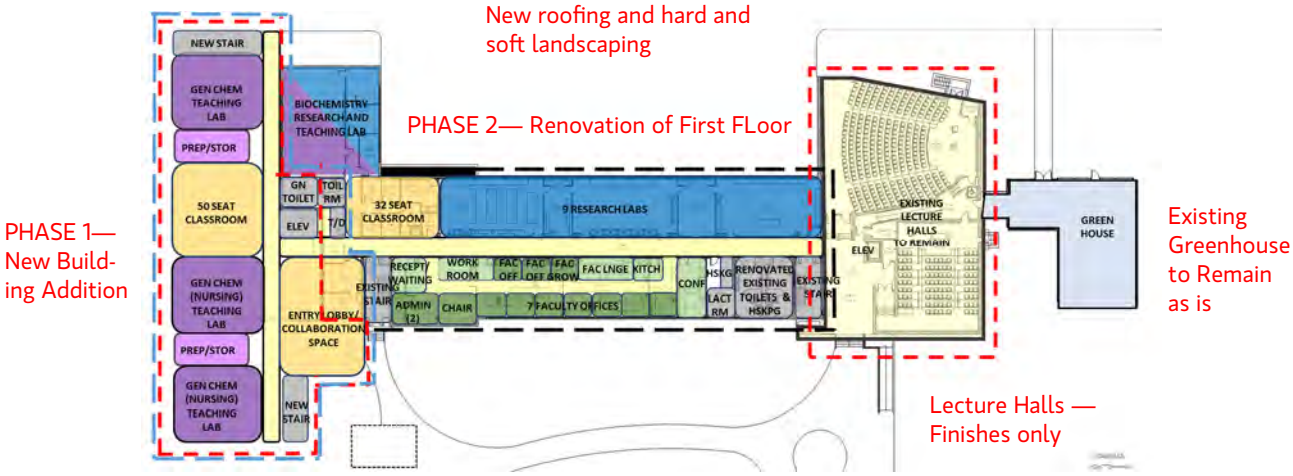
This phase will include the renovation of the second floor. This phase will also include exterior envelope work that includes new windows, existing brick pointing and cleaning. .

The timing of new roofing and hard and soft landscape work as well as light renovation of finishes and upgrades to the existing lecture hall wing is flexible. This work will occur on a schedule that is most convenient to the College, such as summer break. For example, plantings can be planted in the fall season with final punch-list and planting approvals taking place in the spring/summer season to assure the plants take. Lecture hall upgrades could occur during summer break.

Option 3 - 3 Phase Renovation: Second Floor at End of Construction



Option 3 - 3 Phases: First Floor at End of Construction



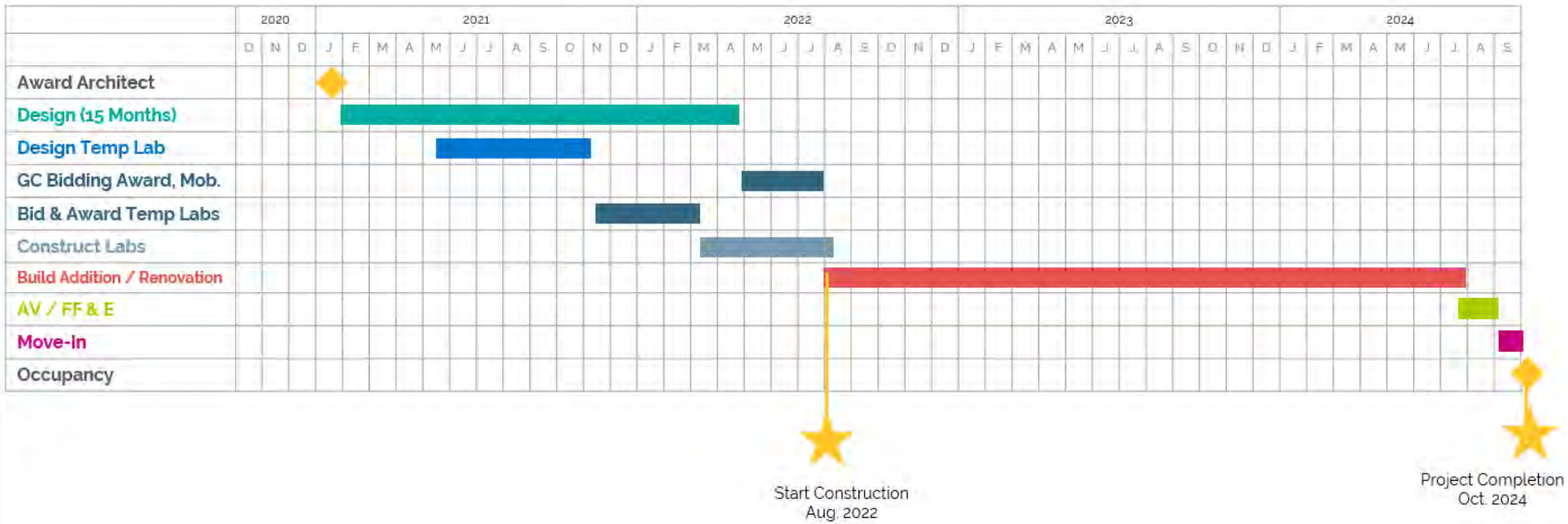
Option 3 - 3 Phases: Ground Floor at End of Construction

FEASIBILITY STUDY

VI. SCHEDULES AND COST ESTIMATES

The schedule for each Option has various benefits and disadvantages. These are related to seasonal start date, completion of the Addition, date of occupancy for the entire project, which functions and how many of each need to be temporarily relocated elsewhere, and overall cost. Highlights are noted below each schedule.

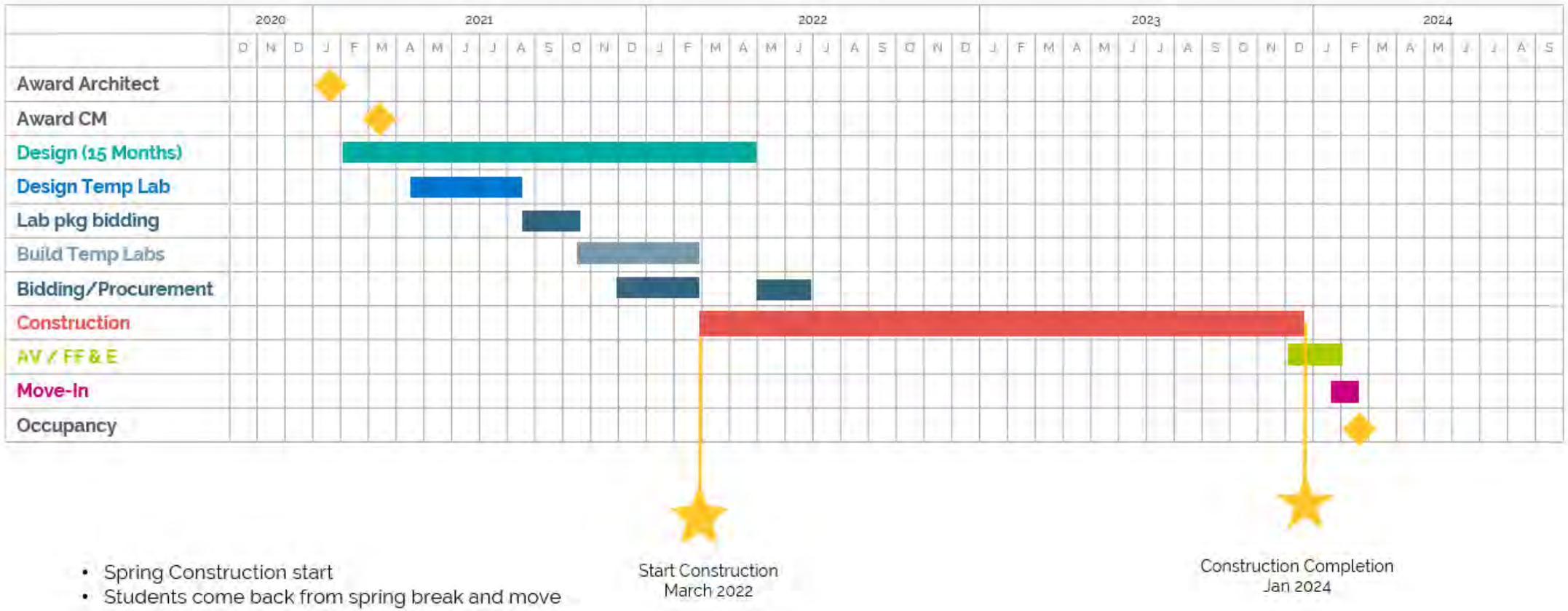
OPTION 1A—NO PHASING/GC DELIVERY: VACATE EXISTING BUILDING, USE OTHER EXISTING BUILDINGS AS OFFICE AND CLASSROOM SWING SPACE, USE PORTABLE TEMPORARY BUILDINGS FOR TEACHING AND RESEARCH LABS



- Poor bid timing
- Open Dec. 2024
- Miss ability to use existing portion of building during Fall semester 2024
- Need 10 teaching labs & 2 research labs

VI. SCHEDULES AND COST ESTIMATES

OPTION 1B—NO PHASING/CM DELIVERY: VACATE EXISTING BUILDING, USE OTHER EXISTING BUILDINGS AS OFFICE AND CLASSROOM SWING SPACE, USE PORTABLE TEMPORARY BUILDINGS FOR TEACHING AND RESEARCH LABS

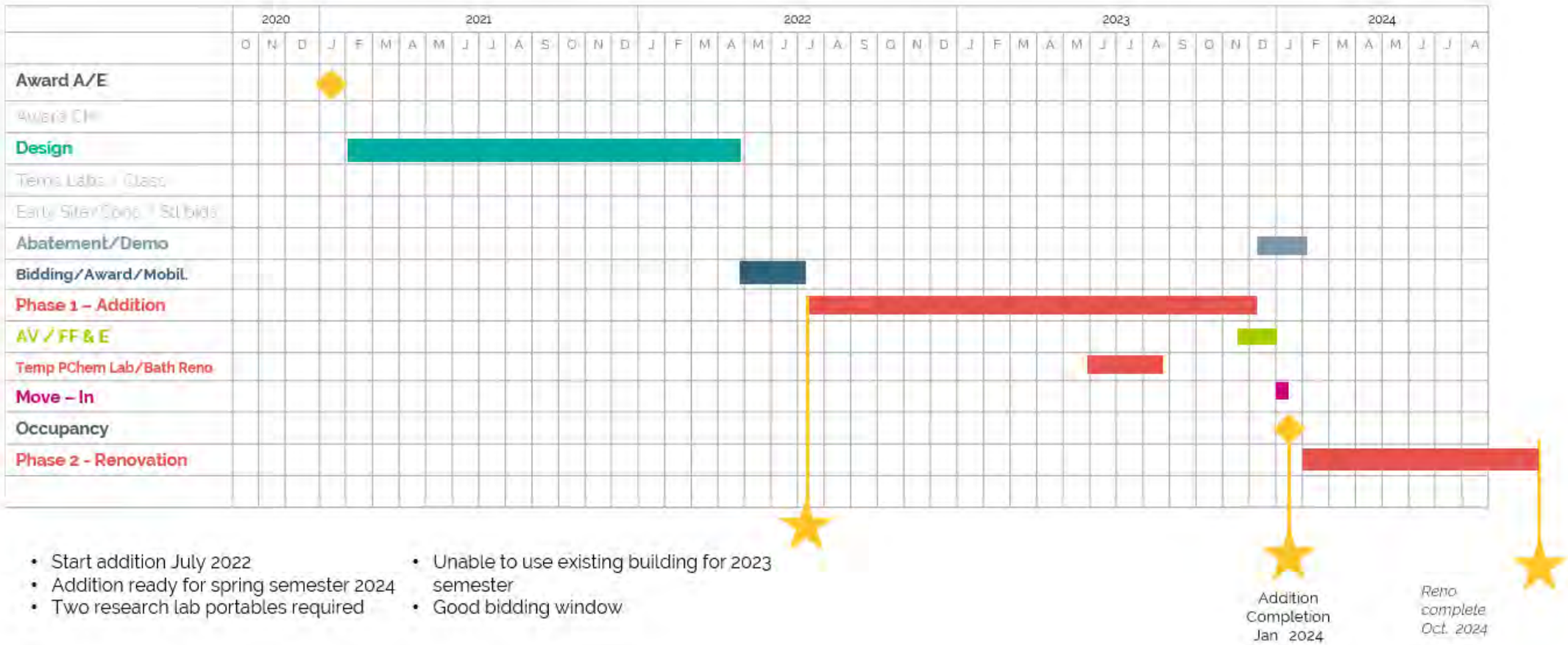


- Spring Construction start
- Students come back from spring break and move into portables
- Addition could be ready for Sept 2023
- Need 10 teaching labs & 2 research labs
- Good overall option for speed, time, very costly temp labs

FEASIBILITY STUDY

VI. SCHEDULES AND COST ESTIMATES

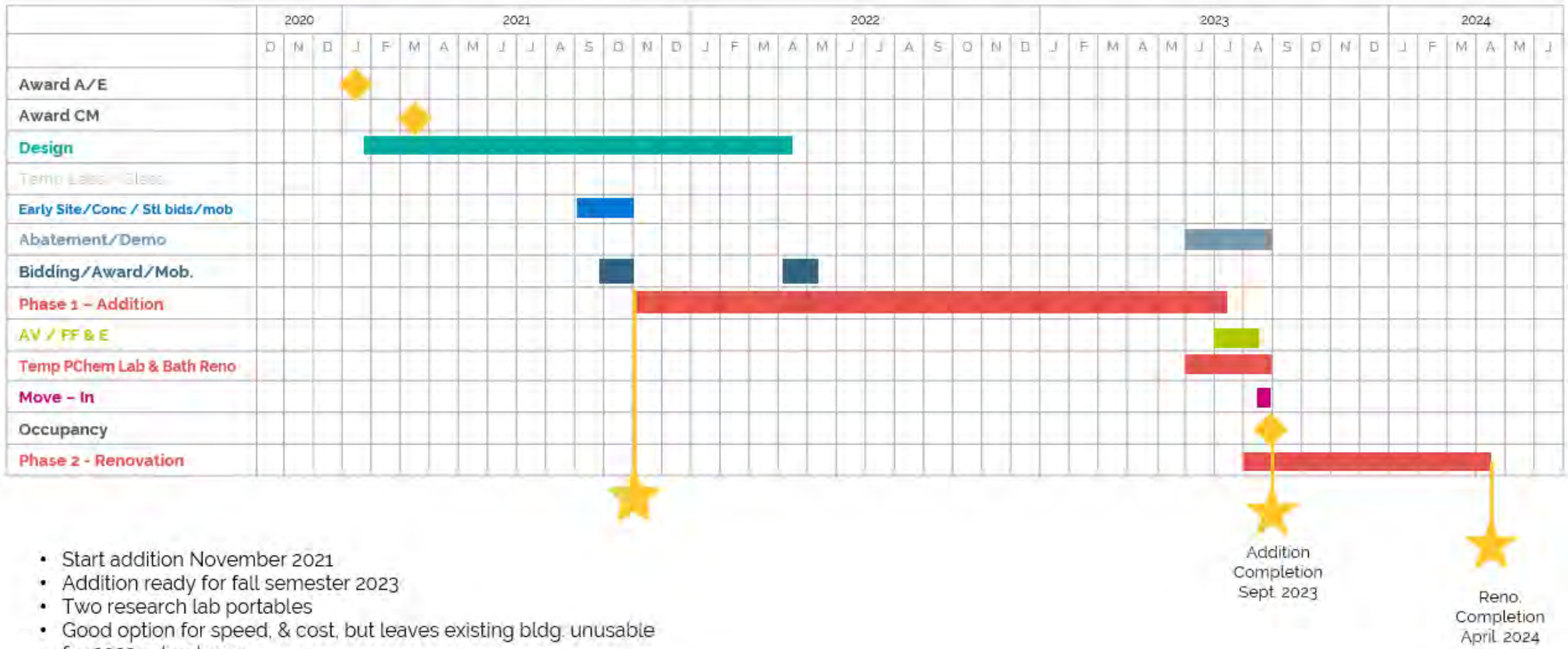
OPTION 2A—2 PHASES/GC DELIVERY: CONSTRUCT ADDITION FIRST, MOVE TEACHING LABS INTO ADDITION, VACATE ENTIRE EXISTING BUILIDNG, USE EXISTING BUILDINGS AS OFFICE AND CLASSROOM SWING SPACE, USE PORTABLE TEMPORARY BUILDINGS FOR RESEARCH LABS



- Start addition July 2022
- Addition ready for spring semester 2024
- Two research lab portables required
- Unable to use existing building for 2023 semester
- Good bidding window

VI. SCHEDULES AND COST ESTIMATES

OPTION 2B—2 PHASES/CM DELIVERY: CONSTRUCT ADDITION FIRST, MOVE TEACHING LABS INTO ADDITION, VACATE ENTIRE EXISTING BUILIDNG, USE EXISTING BUILDINGS AS OFFICE AND CLASSROOM SWING SPACE, USE PORTABLE TEMPORARY BUILDINGS FOR RESEARCH LABS

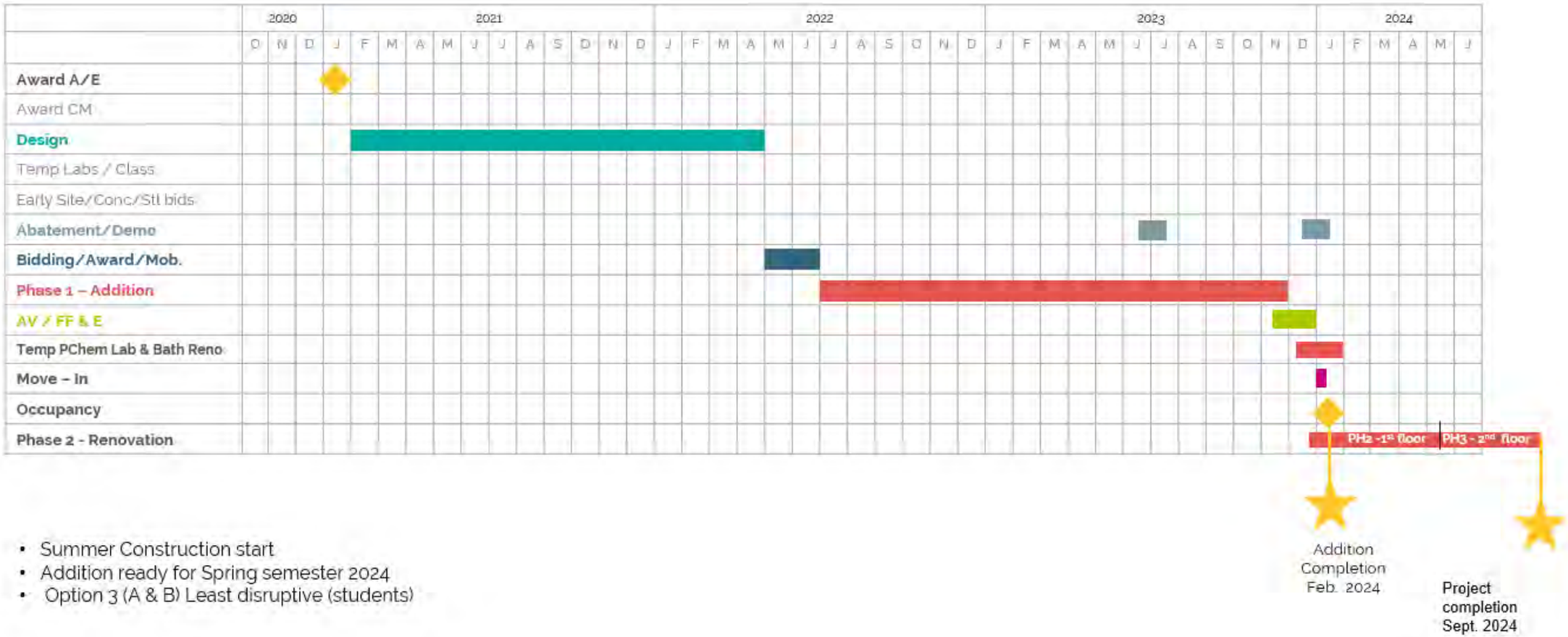


- Start addition November 2021
- Addition ready for fall semester 2023
- Two research lab portables
- Good option for speed, & cost, but leaves existing bldg. unusable for 2023 school year

FEASIBILITY STUDY

VI. SCHEDULES AND COST ESTIMATES

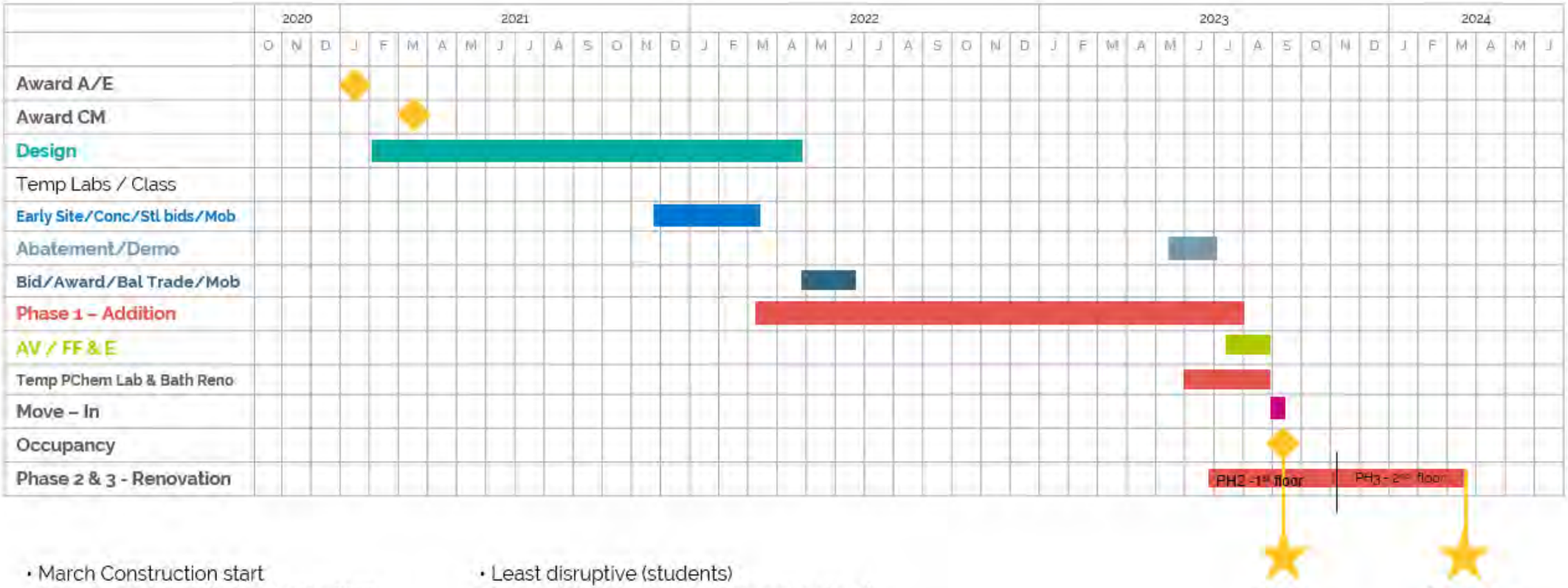
OPTION 3A—3 PHASES/GC DELIVERY: CONSTRUCT ADDITION FIRST, MOVE TEACHING LABS INTO ADDITION, VACATE EXISTING BUILIDNG BY FLOOR, USE EXISTING BUILDINGS AS OFFICE AND CLASSROOM SWING SPACE, RESEARCH LABS WILL SWING WITHIN EXISTING/RENOVATED BUILDING, NO PORTABLE TEMPORARY BUILDINGS REQUIRED



- Summer Construction start
- Addition ready for Spring semester 2024
- Option 3 (A & B) Least disruptive (students)

VI. SCHEDULES AND COST ESTIMATES

OPTION 3B—3 PHASES/CM DELIVERY: CONSTRUCT ADDITION FIRST, MOVE TEACHING LABS INTO ADDITION, VACATE EXISTING BUILIDNG BY FLOOR, USE EXISTING BUILDINGS AS OFFICE AND CLASSROOM SWING SPACE, RESEARCH LABS WILL SWING WITHIN EXISTING/RENOVATED BUILDING, NO PORTABLE TEMPORARY BUILDINGS REQUIRED



- March Construction start
- Addition ready for fall semester 2023
- No portables required
- Best bidding window

- Least disruptive (students)
- Start site & foundation during spring break 2022

VI. COST ESTIMATES

A conceptual cost estimate for each phasing and delivery option was developed based on:

- Site development costs
- Per square foot cost of built space, considering factors specific to laboratory buildings including the following:
    - ◊ Structural load (pounds per square foot)
    - ◊ Casework and services intensive spaces
    - ◊ Ventilation for removing heat produced by equipment and the need for 100% exhaust of air in spaces where chemicals are used
    - ◊ Plumbing including special water systems and emergency eyewashes and showers
    - ◊ Electrical power including stand-by and emergency
- Clarke Sciences would be built in multiple phases—the proposed building addition being Phase 1 in Options 2 and 3 to accommodate swing of existing space from Clarke, and subsequent phases for the renovation of Clarke. Refer to Section VII for Phasing approach.
- Soft-costs have been applied to reach an all-in Project Cost. This factor includes costs for:
    - Loose furniture—tables, chairs, soft seating
    - Minor equipment (not lab-specific equipment)
    - Design, Geo-Tech, Site Survey, Inspection, Material Testing, Commissioning fees
    - Owners Contingencies
    - Moving costs
    - Audio Visual and Security (Camera) Devices
    - Hazardous Material Abatement
    - Owners Project Representative, if applicable
    - Project contingencies
    - Unforeseen conditions expected for a renovation of a vintage building such as the Clarke Science Building
    - General Conditions multi-phase premium included
    - Winter Conditions Premium
    - TeleCom / IT Cableing
    - Building Permit cost
    - Escalation

The overall base Project Cost for each phasing and delivery option, exclusive of the add alternate to fit out the ground floor, is as follows:

OPTION 1—NO PHASING

- Option 1A —No Phasing / GC: **$41,444,760**
- Option 1B—No Phasing / CM: **$40,830,917**

OPTION 2—2 PHASES

- Option 2A —2 Phases / GC: **$38,947,456**
- Option 2B—2 Phases / CM **$38,856,250**

OPTION 3—3 PHASE RENOVATION

- Option 3A —3 Phases / GC **$38,019,905**
- Option 3B—3 Phases / CM **$37,582,121**

The cost estimates shown on the following facing pages are "concept level" cost estimates and will be further refined as the project is developed. However, the contingencies included provide sufficient confidence that the project can be constructed within the Overall Project Costs as shown.

Note that project costs are shown for Options 1A, 2B, and 3B. Options 1B, 2A, and 3A are not shown for clarify. However, Option 1B is similar to 1A, 2A is similar to 2B, and 3A is similar to 3B

PROJECT: Clarke Science Building

OPINION OF PROJECT COST SUMMARY

RHODE ISLAND COLLEGE

SLAM CONSTRUCTION SERVICES

SQ. FT. - 53,610

EXHIBIT rev 02

Cost Category	PROGRAMING BUDGET 8/26/20	PROGRAMING BUDGET 8/26/20	PROGRAMING BUDGET 8/26/20	Notes
New 22,708				
Reno 30,911				
I. CONSTRUCTION				
A. Addition/ Renovation	**Option 1A**	**Option 2B**	**Option 3B**	
Demolition	884,031	388,097	388,097	
Temp. classroom	3,484,026	351,799	-	
Sitework	712,348	712,348	712,348	
Landscaping	[illegible]	[illegible]	[illegible]	
Concrete	551,739	583,796	551,739	
Masonry	863,564	863,564	863,564	
Steel & misc.	1,807,157	1,807,157	1,807,157	
Carpentry	237,100	237,100	237,100	
Thermal/Moisture	1,416,570	1,416,570	1,416,570	
Glass & glazing/EIFS	2,065,215	2,065,215	2,065,215	
Finishes	2,146,085	2,146,085	2,146,085	
Specialties	316,080	316,080	316,080	
Equipment	386,130	386,130	386,130	
Furnishings	2,602,540	2,602,540	2,602,540	
Skyline	232,000	232,000	232,000	
Fire Protection	314,258	314,258	314,258	
Plumbing	1,288,440	1,288,440	1,288,440	
Heating/Ventilating	4,168,870	4,168,870	4,168,870	
Electrical	7,065,795	7,065,795	7,065,795	
Subtotal- Section 1A	*$ 31,257,803.00*	*$ 31,080,539.00*	*$ 31,228,776.00*	
B. GENERAL CONDITIONS	-	-	-	
General Conditions	2,243,001	2,529,080	1,965,699	
Insurance (GRNB)		85,185	216,790	
General Requirements	Included in GCs	Included in GCs	Included in GCs	
Subtotal- Section 1B	*$ 2,295,699.00*	*$ 2,615,155.00*	*$ 2,198,795.00*	
C. INDIRECT COST				
Building Permits	312,434	303,341	330,844	
Insurance	237,601	248,630	355,046	
Escalation	1,822,702	1,948,070	1,976,270	
Performance Surety Bid	Excluded	Excluded	Excluded	
Performance Bond	333,693	314,025	493,093	
Subtotal- Section 1C	*$ 3,152,432.00*	*$ 3,076,232.26*	*$ 3,153,265.34*	
D. OWNERS SCOPE ADDITIONS				
No. 1				
No. 2				
No. 3	-	-	-	
No. 4	-	-	-	
Subtotal- Section 1D	*$ -*	*$ -*	*$ -*	
E. CONTINGENCY				
Design Contingency	1,214,640	1,103,787	1,073,629	
Contractual Contingency	1,214,640	1,103,787	1,073,629	
Construction Contingency	1,214,640	1,103,787	1,073,629	
Subtotal- Section 1E	*$ 3,643,920.00*	*$ 3,311,362.00*	*$ 3,220,887.00*	
Subtotal- Section A - E	*$ 39,349,854.00*	*$ 38,083,288.26*	*$ 39,801,723.34*	
F. CONTRACTOR FEE				
CONTRACTOR fee 2.5%	891,323	733,170	704,296	
Subtotal Construction Cost	**$ 34,184,544**	**$ 31,716,555**	**$ 30,506,019**	

VI. COST ESTIMATE

PROJECT: Clarke Science Building

OPINION OF PROJECT COST SUMMARY

RHODE ISLAND COLLEGE

SLAM CONSTRUCTION SERVICES

SQ.FT. - 53,619

EXHIBIT rev 02

Cost Category	PROGRAMING BUDGET 8/20/20	PROGRAMING BUDGET 8/26/20	PROGRAMING BUDGET 8/26/20	Notes
new - 22,708				
I. FEES				
A. PROFESSIONAL SERVICES				
Arch / Engineering	2,395,916	2,395,916	2,395,916	
Mech / Plumbing / Elec				
Interior Design				
FF & E Design	100,000	100,000	100,000	
Leed Consultant	30,000	30,000	30,000	
Technology Consultant	35,000	35,000	35,000	
Civil Engineering	40,000	40,000	40,000	
Cost Administration	-	-	-	
Specialty Consultants				
Third party review (PM)	70,000	70,000	70,000	
Internal Fees	35,000	35,000	35,000	
Other	-	-	-	
Subtotal - Section 2A	$ 2,772,916.05	$ 2,772,916.05	$ 2,772,916.05	
B. REIMBURSABLE EXPENSES BUDGET				
Municipal Bldg Fees	-	-	-	
Arch / Eng. Reimbursable Expense	10,000	10,000	10,000	
Other	-	-	-	
Subtotal - Section 2B	$ 10,000	$ 10,000	$ 10,000	
C. MGMT - NOT INCLUDED IN SECTION A				
Preconstruction Services	65,000	65,000	65,000	
Commissioning				
Soft Cost Management	-			
Other	-			
Subtotal - Section 2C	$ 65,000	$ 65,000	$ 65,000	
D. 3RD PARTY INSPECTIONS				
Bldg Inspector				
Owners Insp	480,000	480,000	480,000	
Other	-			
Subtotal - Section 2D	$ 480,000	$ 480,000	$ 480,000	
Subtotal - Section 2A - 2D	**$ 3,277,916.05**	**$ 3,277,916.05**	**$ 3,277,916.05**	
II. SURVEYS / TESTING				
A. Surveys/Geotechnical				
Environmental Study - Phase 1	25,000	25,000	25,000	
Environmental Study - Phase 2	55,000	55,000	55,000	
Land Survey	7,500	7,500	7,500	
Wetlands Flagging				
Easement Surveys	-		-	
Geotechnical Consultant	25,000	25,000	25,000	
Traffic Study	-	-	-	
Test Borings	5,000	5,000	5,000	
Other	-		-	
Subtotal - Section 2A	$ 117,500	$ 117,500	$ 117,500	
B. CONSTRUCTION RELATED				
Special Inspector	30,000	30,000	30,000	
Structural Inspector				
Materials Testing	35,000	35,000	35,000	
Commissioning Consultant	100,000	100,000	100,000	
Subtotal - Section 2B	$ 165,000	$ 165,000	$ 165,000	
Subtotal - Section 2A - 2B	**$ 282,500.00**	**$ 282,500.00**	**$ 282,500.00**	

PROJECT: Clarke Science Building

OPINION OF PROJECT COST SUMMARY

RHODE ISLAND COLLEGE

SLAM CONSTRUCTION SERVICES

SQ. FT. - 53,615

EXHIBIT rev 02

Cost Category New 72,705	PROGRAMING BUDGET 8/26/20	PROGRAMING BUDGET 8/26/20	PROGRAMING BUDGET 8/26/20	Notes
4. EQUIPMENT / FURNISHINGS				
A. EQUIPMENT				
A/V Equipment	250,000	250,000	250,000	
A/V Wiring & Timeclocks	75,000	75,000	75,000	
A/V Infrastructure				
Security Cameras	50,000	50,000	50,000	
Communication Equipment				
Residential Appliances				
Instructional Tech & Equipment	150,000	150,000	150,000	
Other	50,000	50,000	50,000	
Subtotal- Section 4A	$ 575,000	$ 575,000	$ 575,000	
B. COMMUNICATIONS EQUIPMENT				
Door Entry				
Telephone system				
Security System	35,000	35,000	35,000	
Data Wiring	125,000	125,000	125,000	
Other				
Subtotal- Section 4B	$ 160,000	$ 160,000	$ 160,000	
C. FURNISHINGS / ACCESSORIES				
Furniture	400,000	400,000	400,000	
Work Stations				
Artwork	344,845	344,845	344,845	
Window Treatments				
Interior Signage	35,000	35,000	35,000	
Exterior Signage	15,000	15,000	15,000	
Other				
Subtotal- Section 4C	$ 794,845	$ 794,845	$ 794,845	
Subtotal- Equip- Section 4A - 4C	**$ 1,529,845**	**$ 1,529,845**	**$ 1,529,845**	
5. FINANCIAL / INSURANCE				
A. FINANCIAL				
Interim Financing				
Loan Interest				
Escalation				
Other				
Subtotal- Section 5A	$ -	$ -	$ -	
B. INSURANCE				
Builder's risk insurance	60,000	60,000	60,000	
Subtotal- Section 5B	$ 60,000	$ 60,000	$ 60,000	
Subtotal- Financial- Section 5A - 5B	**$ 60,000**	**$ 60,000**	**$ 60,000**	
6. OTHER EXPENSES				
A. Hazmat Abatement	250,000	250,000	250,000	
B. Utility Company charges	40,000	40,000	40,000	
C. Utility Company rebates	-	-	-	
D. Promotional Printing	-	-	-	
E. Telecommunications	-	-	-	
G. Cost to acquire towers (CMTA)				
H. Appraisals				
I. Personnel Expenses				
K. Storage cost	10,000	10,000	10,000	
L. Lost Revenue				
M. Moving Costs	15,000	15,000	15,000	
N. Other				
Subtotal- Expenses- Section 6	$ 315,000	$ 315,000	$ 315,000	
7. OWNER'S PROJECT CONTINGENCY				
A. Contingency	1,797,051	1,677,631	1,612,839	
Total Soft Cost- Section 2 - 7	7,269,210	7,199,095	7,076,101	
Project Cost Total	**$ 41,444,759**	**$ 38,856,249**	**$ 37,582,171**	
8. Alternates				
A. No. 1 lower level fit out	576,661	$562,898	$567,924	
No. 2				
Total	$576,661	$562,898	$567,924	
Total Project Cost w/ L.L. Alt.	**$42,021,420**	**$39,419,147**	**$38,150,045**	

FEASIBILITY STUDY

VII. COMPARISON OF OPTIONS

Chart 7.1 on this page shows a comprehensive comparison of options. It is includes a description, schedule, base cost, add alternate cost, and temporary relocations required as well as benefits and challenges of each option.

Earliest Construction Start:	**2B**
Earliest Project Completion:	**1B**
Shortest Duration:	**1B**
Lowest Base Cost:	**3A**
Most Temporary Relocation:	**1A, 1B**
Least Temporary Relocation:	**3A, 3B**
No Portables:	**3A, 3B**

Recommended Option

All implementation options and delivery approaches result in the identical final product. However, each approach has different impacts on schedule, cost, and operational disruptions as shown below in Chart 7.1: Comparison of Options.

The earliest project completion date of January 2024 is achieved by Options 1B—No Phasing/CM delivered.. Option 3B—3 Phases/CM delivered is slightly longer with a completion date of March 2024

.

The lowest base project cost of $37,582,121 is achieved by Option 3B—3 Phases/CM delivered.

The least disruption to ongoing departmental operations is achieved by Option 3B—3 Phases/CM delivered. This option does not require the use of portable buildings to house temporarily house teaching and research labs. Option 3A –3 Phases/GC delivered is similar but it would be recommended that Rhode Island College procure preconstruction services.

Option 3B is the recommended option because it provides an early completion date, the lowest cost, the least disruption to and relocation of ongoing departmental operations, and does not require the use of portable buildings.

RHODE ISLAND COLLEGE	Option 1		Option 2		Option 3	
	No phase option: Build Addition and renovate existing building concurrently. All existing operations are temporarily relocated elsewhere at the start of construction.		**Two Phase option:** Build Addition first and occupy; and then renovate the entire existing building in one phase.		**Three Phase option:** Build Addition first and occupy; and then renovate existing building in 2 additional phases - by floor.	
Clarke Science Building	**A - GC Del.**	**B - CM Del.**	**A - GC Del.**	**B - CM Del.**	**A - GC Del.**	**B - CM Del.**
Schedule						
Construction Start	August-22	March. -22	July-22	Nov.21	July.-22	Mar.-22
Addition Complete	Oct-24	Sept.-23	Jan-24	Sept.-23	Feb.-24	Sept.-23
Renovation Complete	Oct-24	Jan.-24	Oct-24	Apr-24	Sept.-24	March-24
Cost						
Construction Cost	29,909,622	29,347,680	30,704,207	30,630,828	30,943,803	30,506,019
Portables	4,274,922	4,223,022	1,103,555	1,085,728	N/A	N/A
Soft Cost	7,260,215	7,260,215	7,139,694	7,139,694	7,076,102	7,076,102
TOTAL Base Scope	**41,444,760**	**40,830,917**	**38,947,456**	**38,856,250**	**38,019,905**	**37,582,121**
Lower Level Fitout Alternate	576,661	569,015	575,132	562,898	573,892	567,924
TOTAL base scope with LL alt.	42,021,421	41,399,932	39,522,588	39,419,148	38,593,797	38,150,045
Temporary Relocations	Faculty offices and classrooms are relocated to other buildings on campus for entire duration of construction. Need 10 teaching and 2 research temporary portable labs for entire duration of construction. Build temp classrooms starting in March 2022 then start addition/reno in Sept.	Faculty offices and classrooms relocated to other buildings on campus until renovation of existing Clarke is completed. Need temporary portable buildings for teaching for entire duration of construction Need temporary portable research labs until renovation of existing Clarke is completed	Faculty offices and classrooms relocated to other buildings on campus for entire duration of Phase 2. Need 2 research temporary portable labs during Phase 2	Faculty offices and classrooms relocated to other buildings on campus for entire duration of Phase 2. Need temporary portable buildings for research labs during Phase 2	Faculty offices and classrooms are relocated to other buildings on campus during Phase 2; start to return during Phase 3. No temporary portable labs are required. Recommend RIC hire precon services	Faculty offices and classrooms are relocated to other buildings on campus during Phase 2; start to return during Phase 3. No temporary portable labs are required
Benefits		SLAM Option 1B- Shortest duration project requires the design start one month earlier	Teaching labs move from existing Clarke to new Addition at end of Phase 1 – no portables are required for teaching labs	Teaching labs move from existing Clarke to new Addition at end of Phase 1 – no portables are required for teaching labs	New research labs are built during Phase 2 on the 1st floor of the existing building while existing research labs remain operational on the 2nd floor of the existing building. New research labs are occupied on the 1st floor during Phase 3 while 2nd floor is renovated. Temporary portable buildings are NOT needed	New research labs are built during Phase 2 on the 1st floor of the existing building while existing research labs remain operational on the 2nd floor of the existing building. New research labs are occupied on the 1st floor during Phase 3 while 2nd floor is renovated. Temporary portable buildings are NOT needed
Challenges	Logistics and cost of temporary portable buildings for teaching and research labs	Logistics and cost of temporary portable buildings for teaching and research labs	Longest duration project. Logistics and cost of temporary portable buildings for research labs	Longest duration project. Logistics and cost of temporary portable buildings for research labs	Students/faculty/staff and construction workers in building at same time. Recommend CM be hired to perform precon services for phasing and scheduling	Students/faculty/staff and construction workers in building at same time

Chart 7.1: Comparison of Options

Appendix A - Detailed Phasing Options

APPENDIX A - DETAILED PHASING PLANS

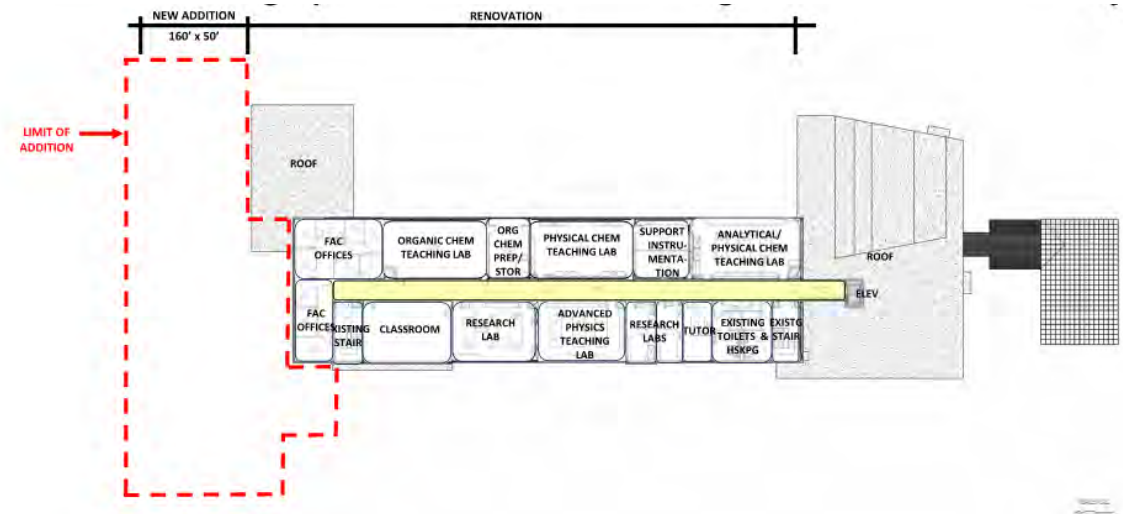
Detailed phasing plans for the three options are provided n the following pages. The phasing plan for each option is the same for GC or CM delivery method.

Note that the sheets are arranged for each option so that the second floor is at the top of the page, the first floor is at the middle of the page, and the ground floor is at the bottom of the page. This enables the viewer to understand what is happening at each phase of the work on each floor, by turning pages and viewing eachi floor horizontally across several sheets.

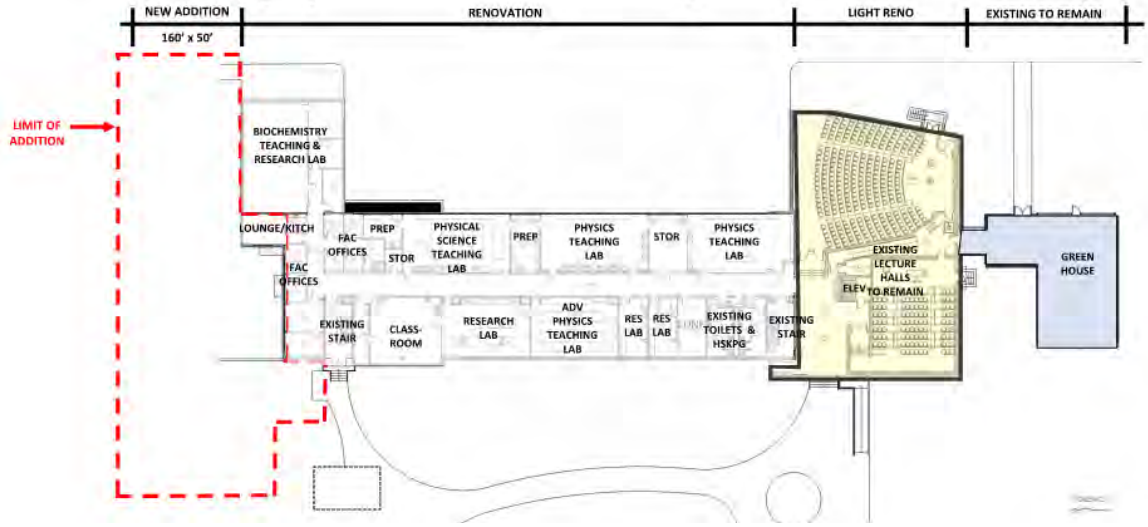
Option 1 — No Phasing

The No Phasing Option is based on completely vacating the existing building for the duration of construction.. This would include relocating 10 teaching labs to temporary portable buildings in Parking Lot B and relocating classrooms and faculty offices to available space on-campus. Research activity could either take place in teaching labs for the duration of construction or in an additional two temporary portable buildings in Parking Lot B. The constructor could then build the addition and renovate the existing building concurrently. The addition and renovated building would be occupied upon completion of all construction.

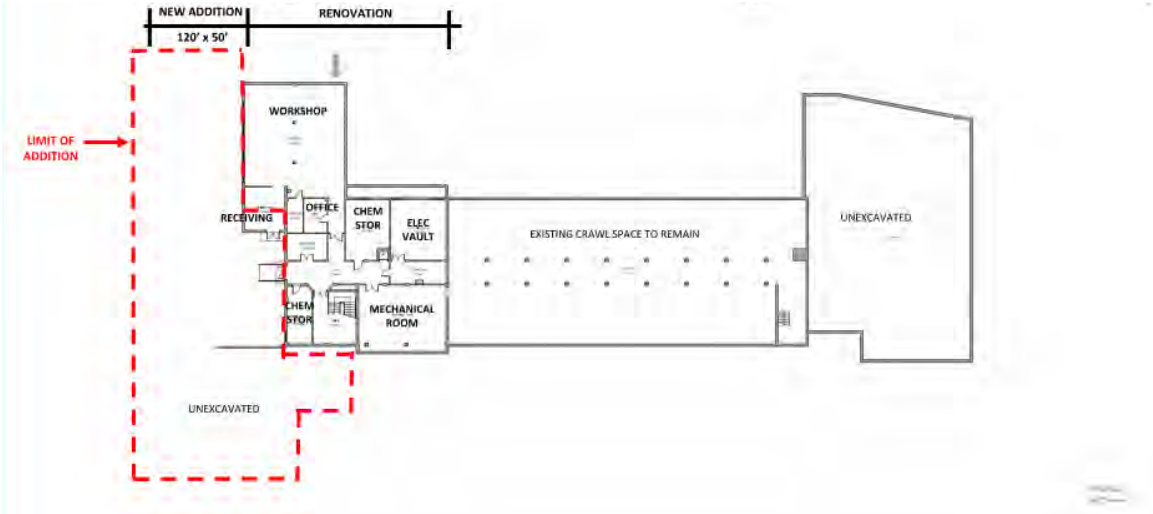
Option 1—No Phasing: Second Floor Existing Conditions at Start of Project



Option 1 - No Phasing: First Floor Existing Conditions at Start of Project

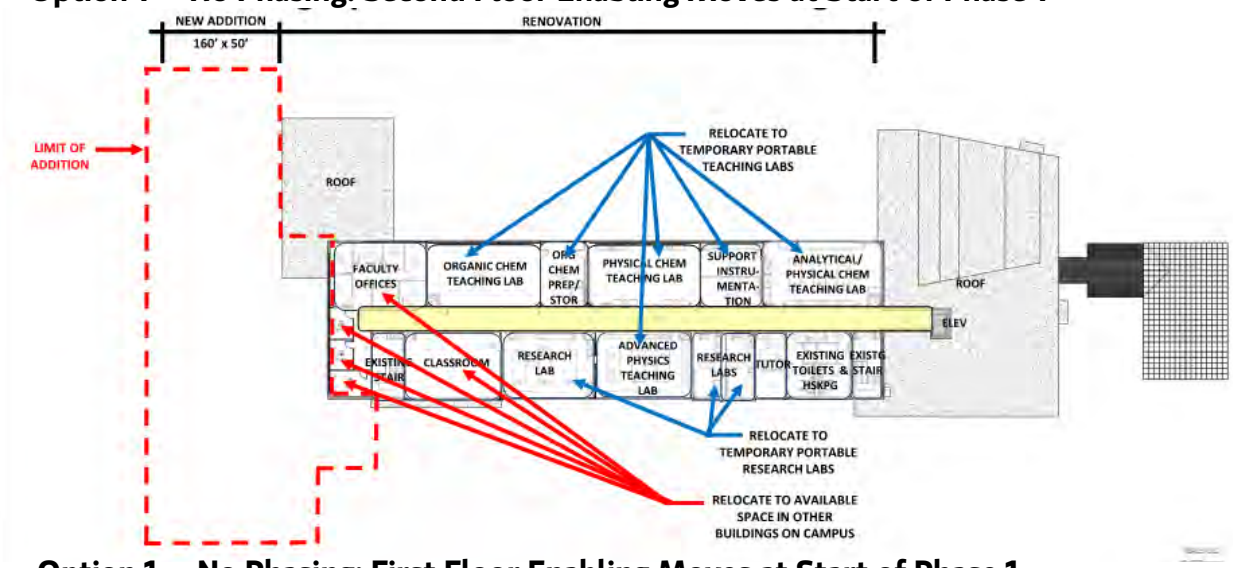


Option 1 - No Phasing: Ground Floor Existing Conditions at Start of Project

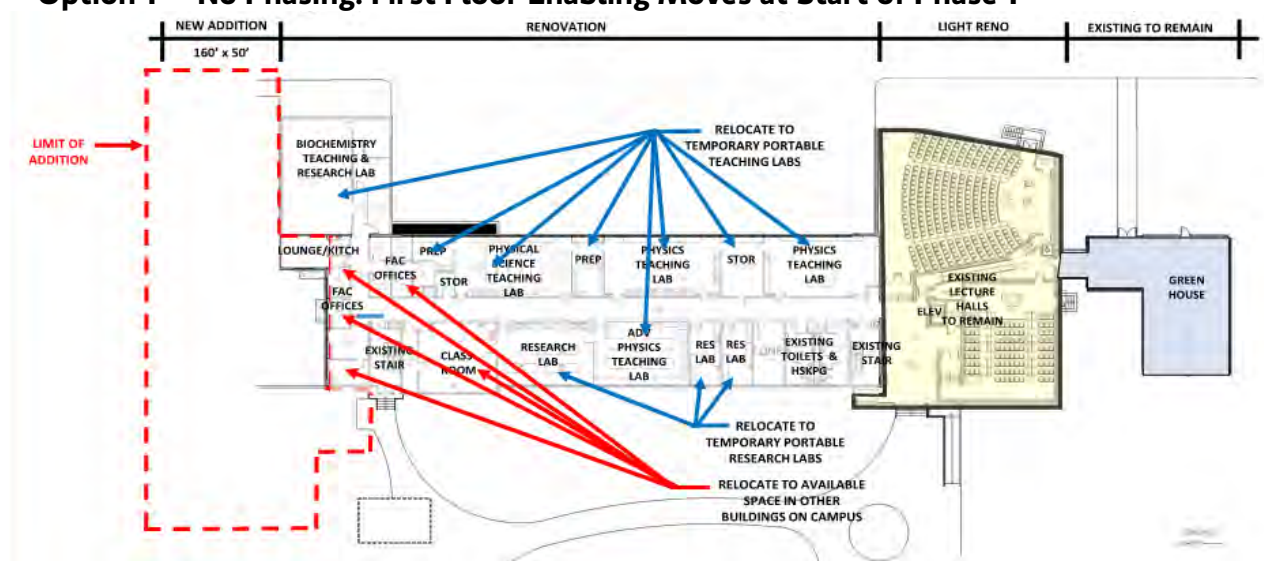


OPTION 1—NO PHASING

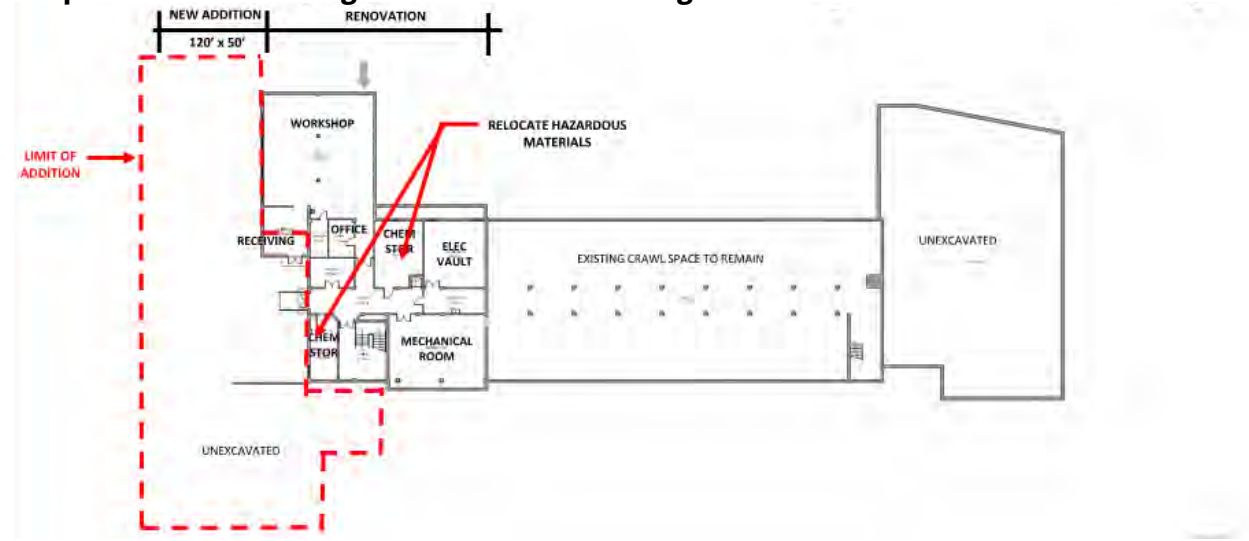
Option 1 - No Phasing: Second Floor Enabling Moves at Start of Phase 1



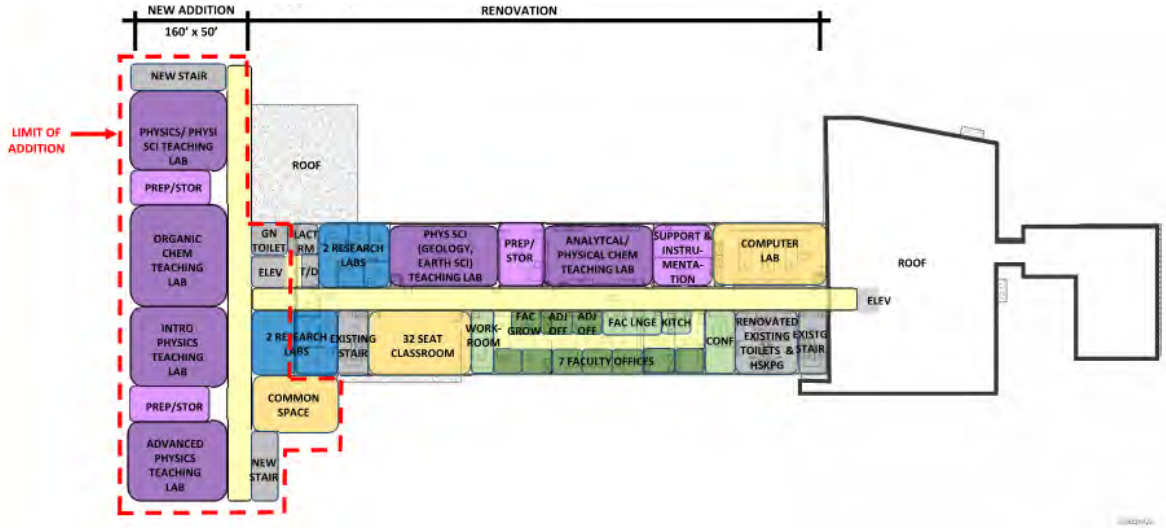
Option 1 - No Phasing: First Floor Enabling Moves at Start of Phase 1



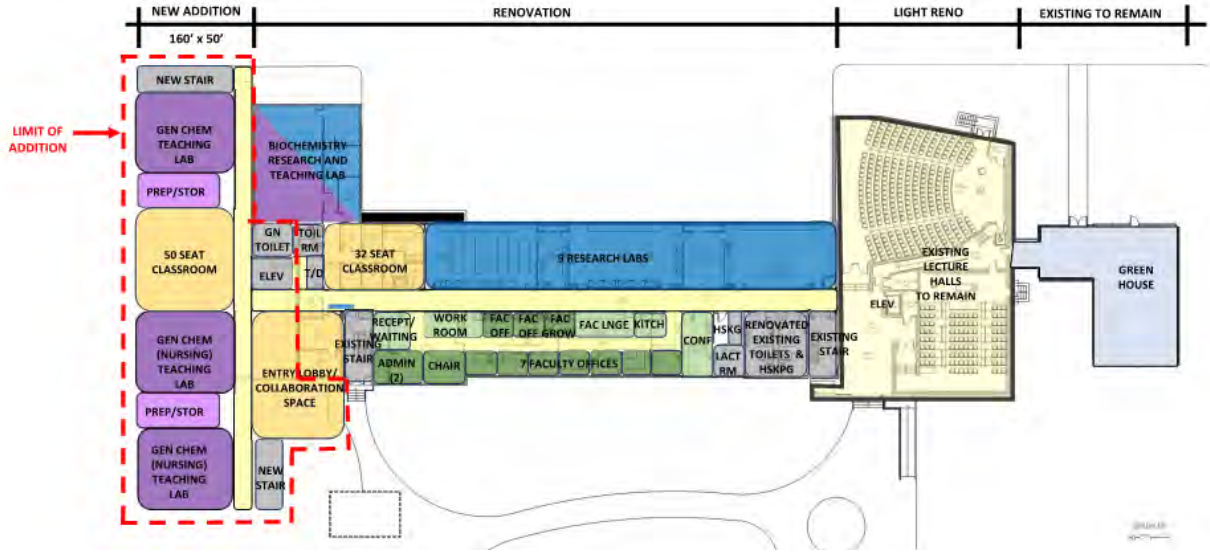
Option 1 - No Phasing: Ground Floor Enabling Moves at Start of Phase 1



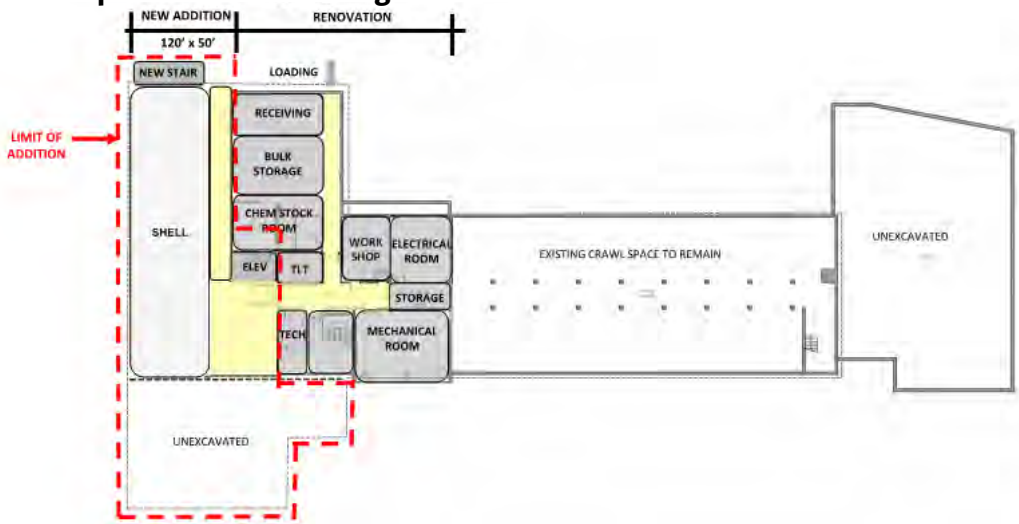
Option 1 - No Phasing: Second Floor at End of Construction



Option - No Phasing: First Floor at End of Construction



Option 1 - No Phasing: Ground Floor at End of Construction



OPTION 2—2 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIES, THEN ENTIRE EXISTING BUILDING IS VACATED AND RENOVATED IN ONE PHASE

Option 2—2 Phases

Option 2—2 Phases uses minimum sequential construction phasing. The Addition as well as some renovations to the west edge of the existing building would be constructed during Phase 1. All existing building operations, academic curriculum and on-going research in the existing Clarke Science Building can easily be maintained during Phase 1 with the exception of some existing faculty offices that would be required to be relocated to other available space on campus. At the end of Phase 1, 8 teaching labs and one 50 seat classroom will be located in the Addition.

At the start of Phase 2, all remaining faculty offices and classrooms would be relocated to other available space on campus. Research activity could either take place in teaching labs for the duration of Phase 2 or in two temporary portable buildings. Also at the start of Phase 2, the Biochemistry Teaching/Research Lab on the first floor and the Analytical/Physical Chemistry Teaching Lab on the second floor would be renovated in place and remain operational during the renovation of the existing building. The Addition would also remain fully operational during the renovation of the existing building.

OPTION 2 PHASE 1

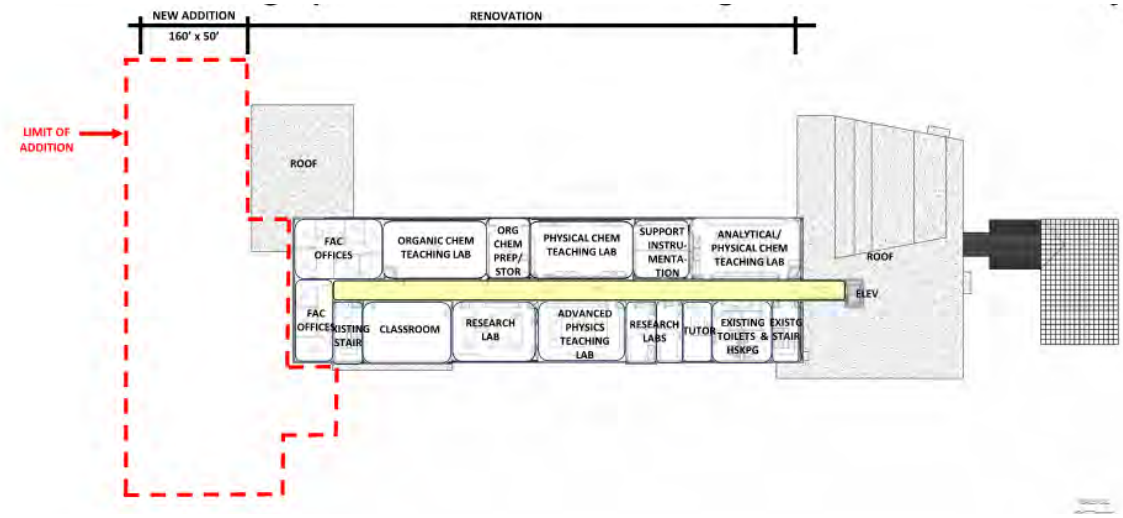
Construction of the new building addition that houses academic Teaching Labs, Classrooms and building lobby and Common Spaces. In order to begin this phase enabling work including modifications to existing site utilities and other sitework will need to be performed prior to start of the addition. This phase will also include all Ground Floor work to support the new addition and future phases of the project

OPTION 2 PHASE 2

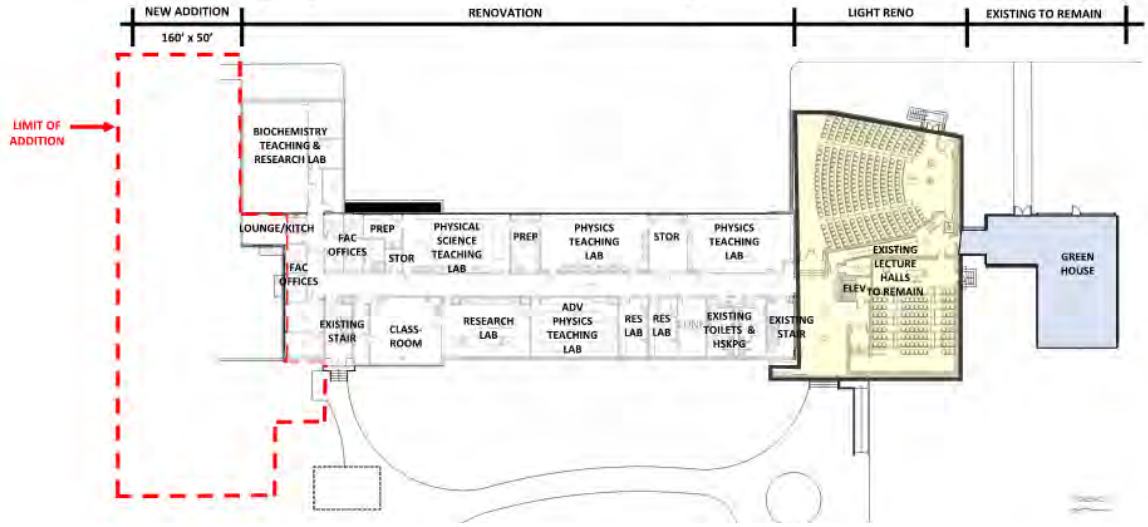
The existing building will be renovated in one phase. This phase will also include exterior envelope work that includes new windows, existing brick pointing and cleaning.

The timing of new roofing and hard and soft landscape work as well as light renovation of finishes and upgrades to the existing lecture hall wing is flexible. This work will occur on a schedule that is most convenient to the College, such as summer break. For example, plantings can be planted in the fall season with final punch-list and planting approvals taking place in the spring/summer season to assure the plants take. Lecture hall upgrades could occur during summer break.

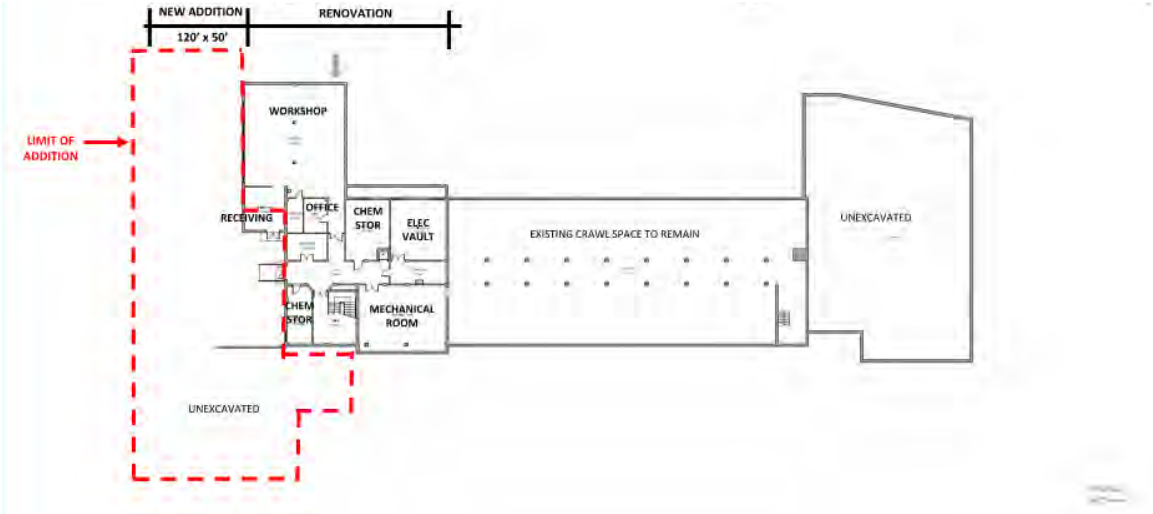
Option 2 - 2 Phases: Second Floor Existing Conditions at Start of Project



Option 2 - 2 Phases: First Floor Existing Conditions at Start of Project

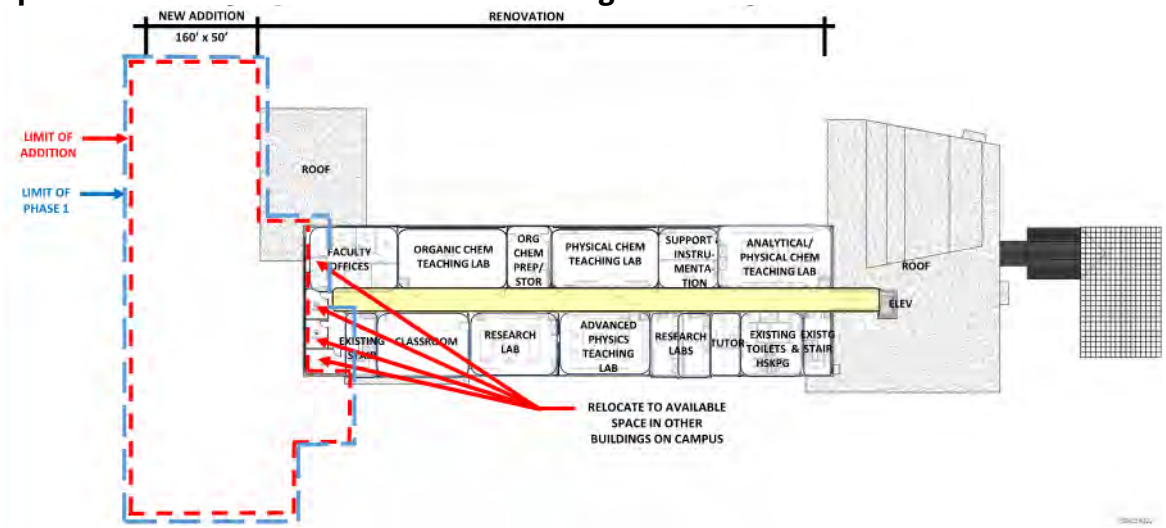


Option 2 - 2 Phases: Ground Floor Existing Conditions at Start of Project

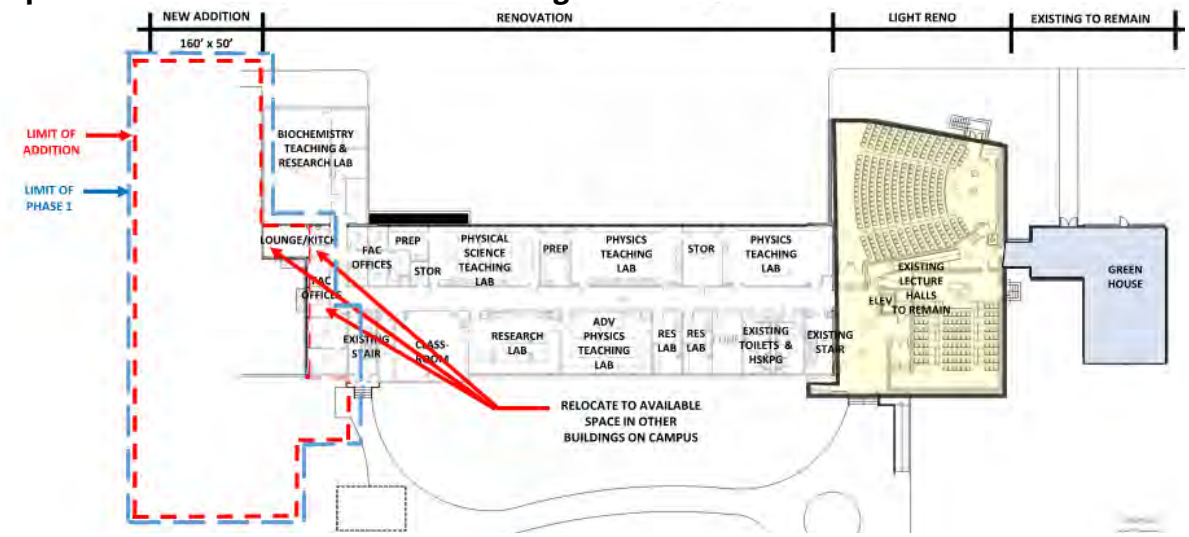


OPTION 2—2 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIES, THEN ENTIRE EXISTING BUILDING IS VACATED AND RENOVATED IN ONE PHASE

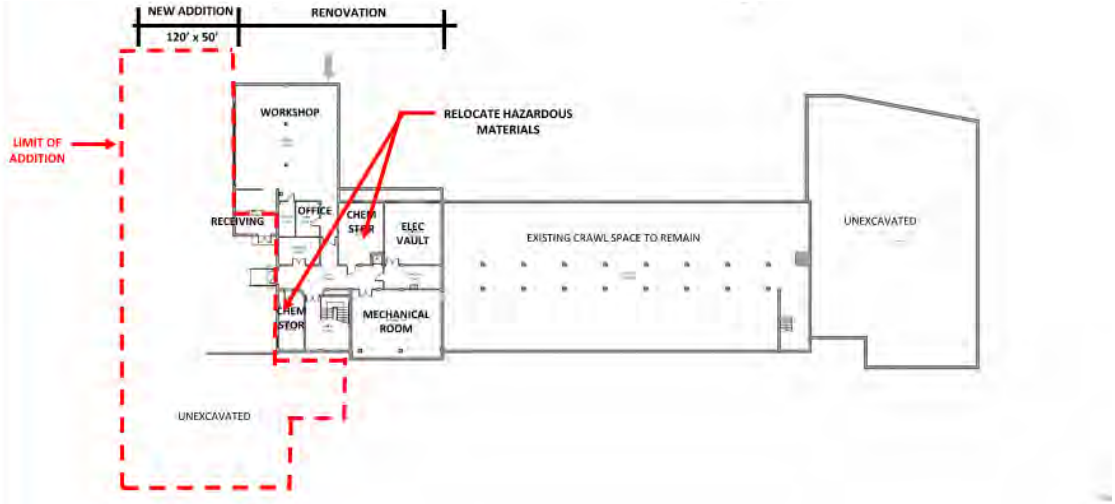
Option 2 - 2 Phases: Second Floor Enabling Moves at Start of Phase 1



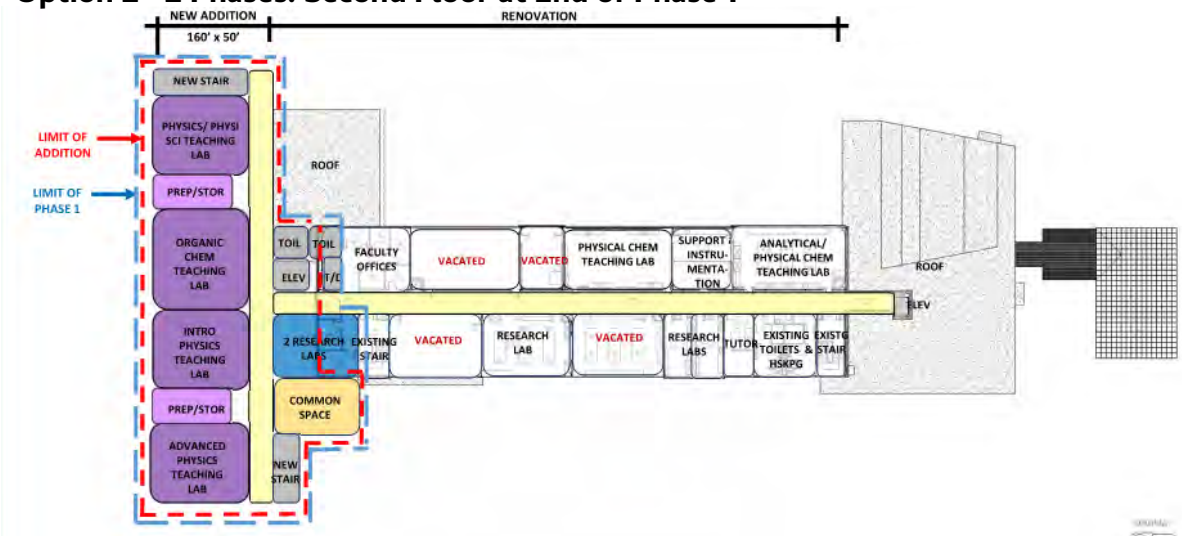
Option 2 - 2 Phases: First Floor Enabling Moves at Start of Phase 1



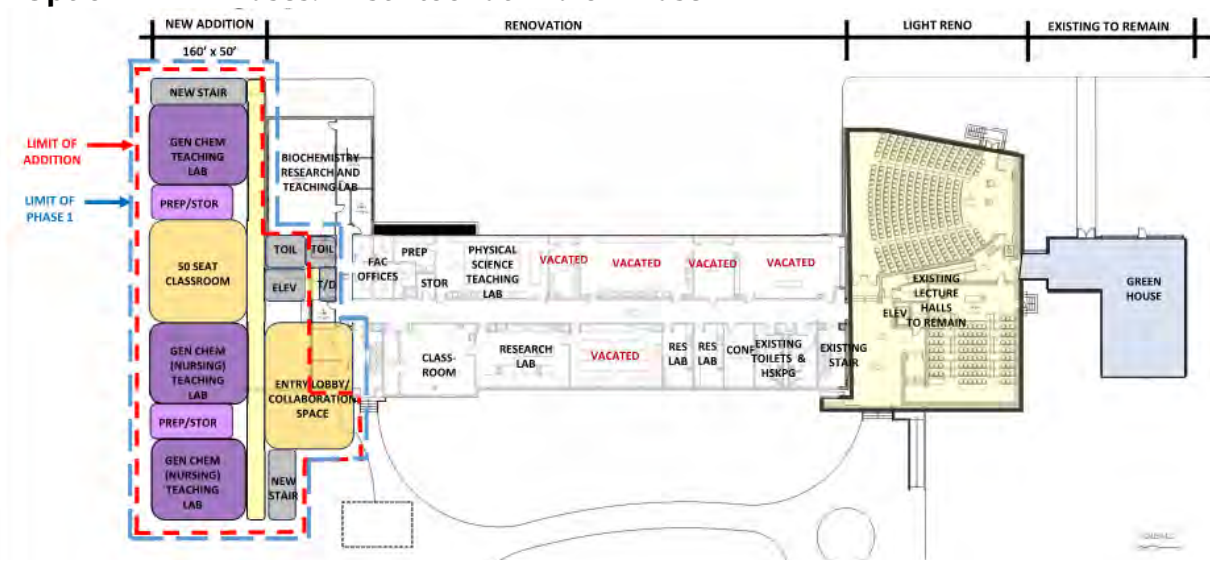
Option 2 - 2 Phases: Ground Floor Enabling Moves at Start of Phase 1



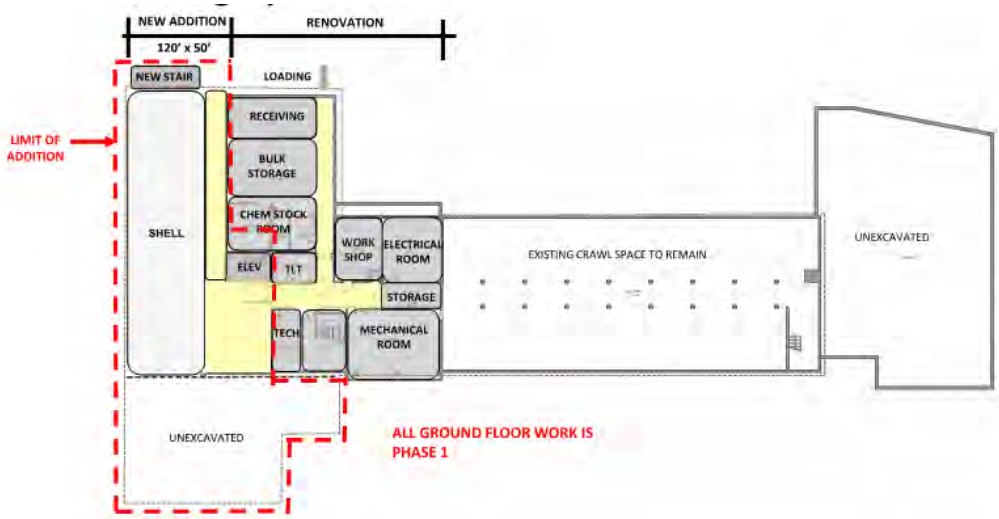
Option 2 - 2 Phases: Second Floor at End of Phase 1



Option 2 - 2 Phases: First Floor at End of Phase 1

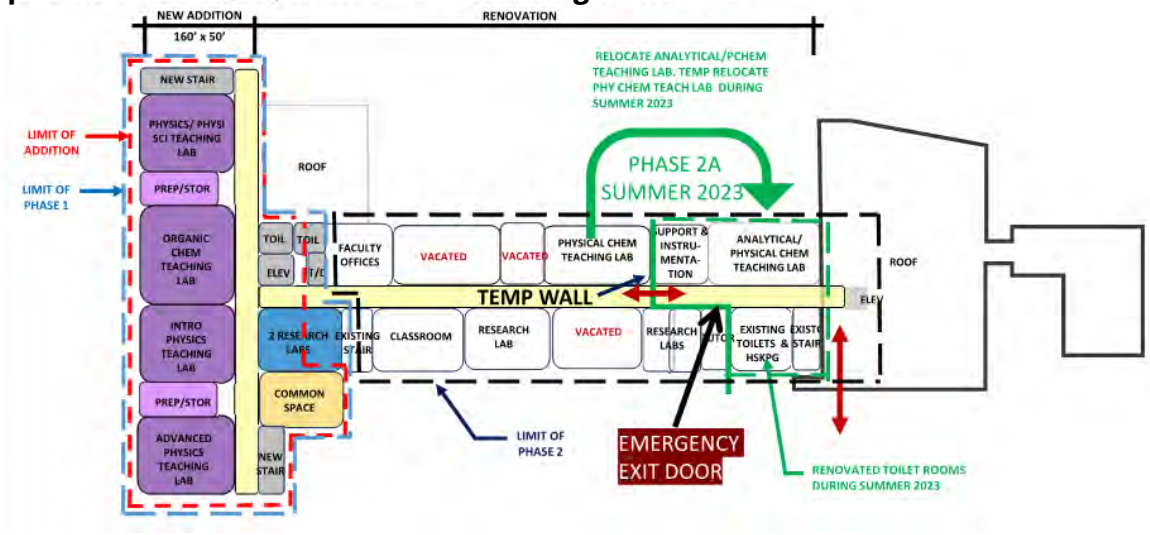


Option 2 - 2 Phases: Ground Floor at End of Phase 1

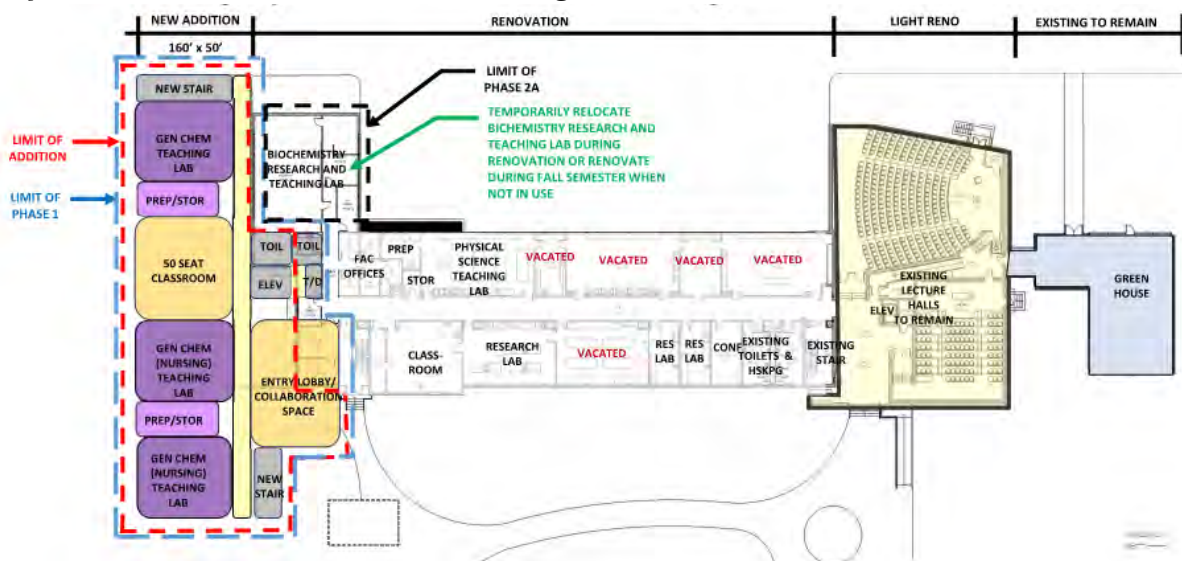


OPTION 2—2 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIES, THEN ENTIRE EXISTING BUILDING IS VACATED AND RENOVATED IN ONE PHASE

Option 2 - 2 Phases: Second Floor Enabling Moves at Start of Phase 2A



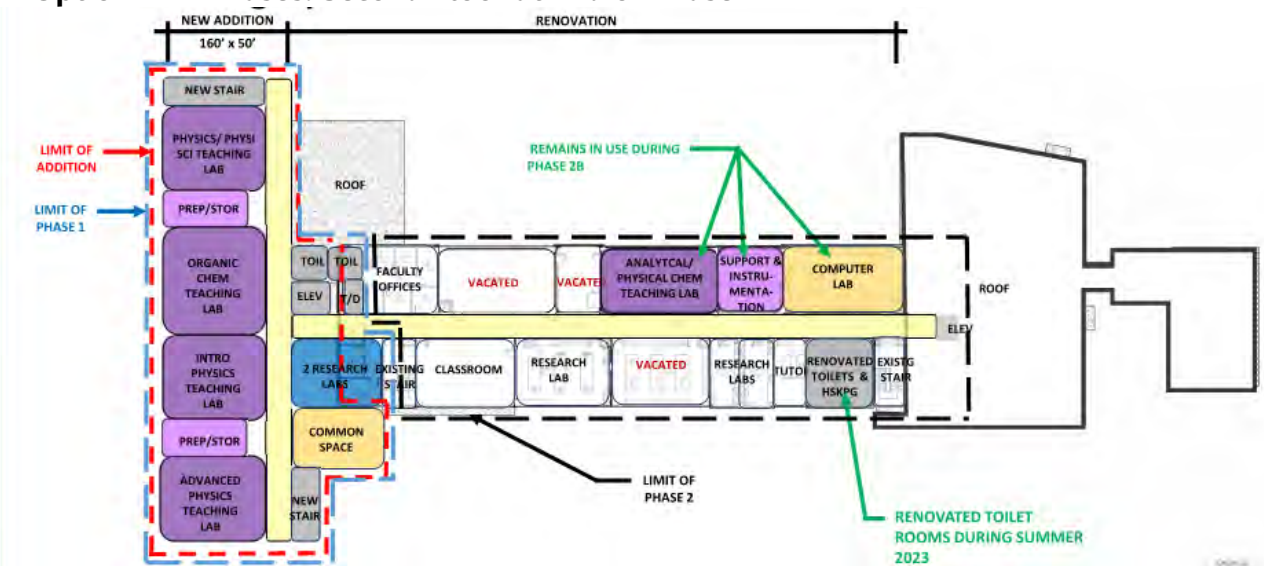
Option 2 - 2 Phases: First Floor Enabling Moves at Start of Phase 2A



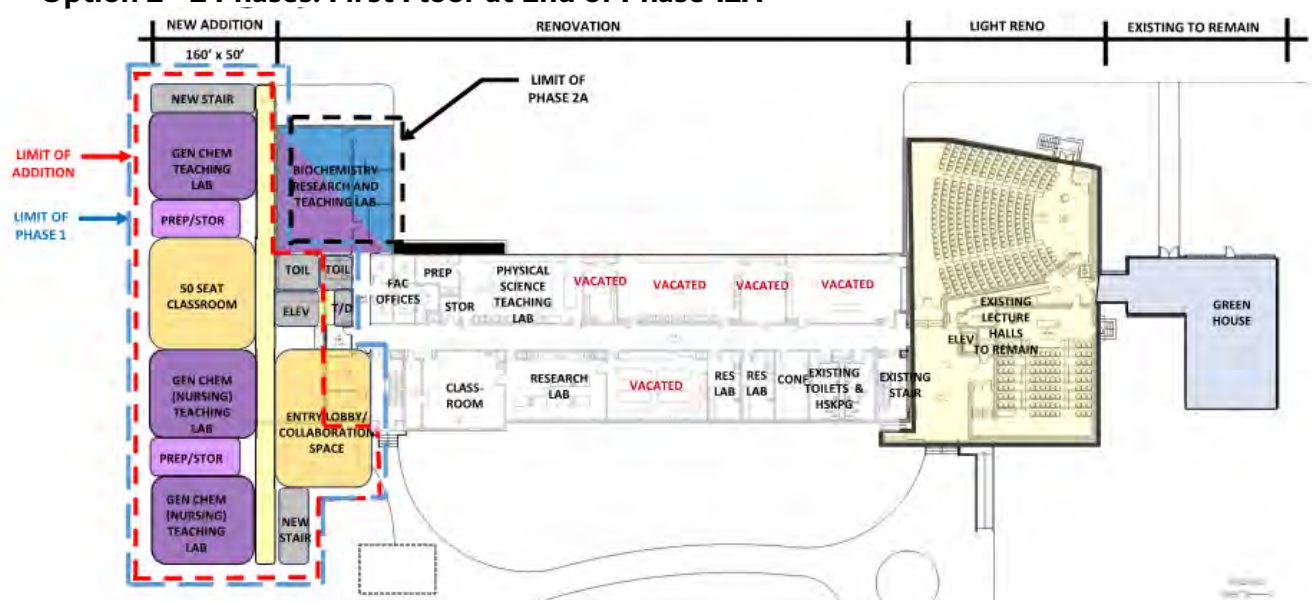
Option 2 - 2 Phases: Ground Floor Enaling Moves at Start of Phase 2A

No Work Required

Option 2 - 2 Phases: Second Floor at End of Phase 2A



Option 2 - 2 Phases: First Floor at End of Phase 12A

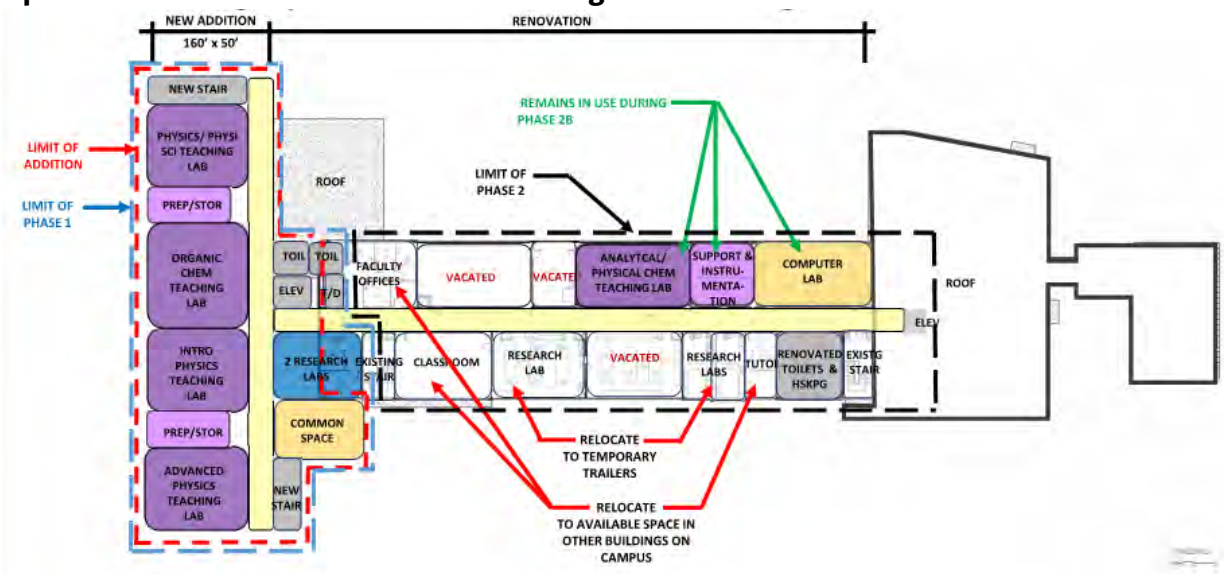


Option 2 - 2 Phases: Ground Floor at End of Phase 2A

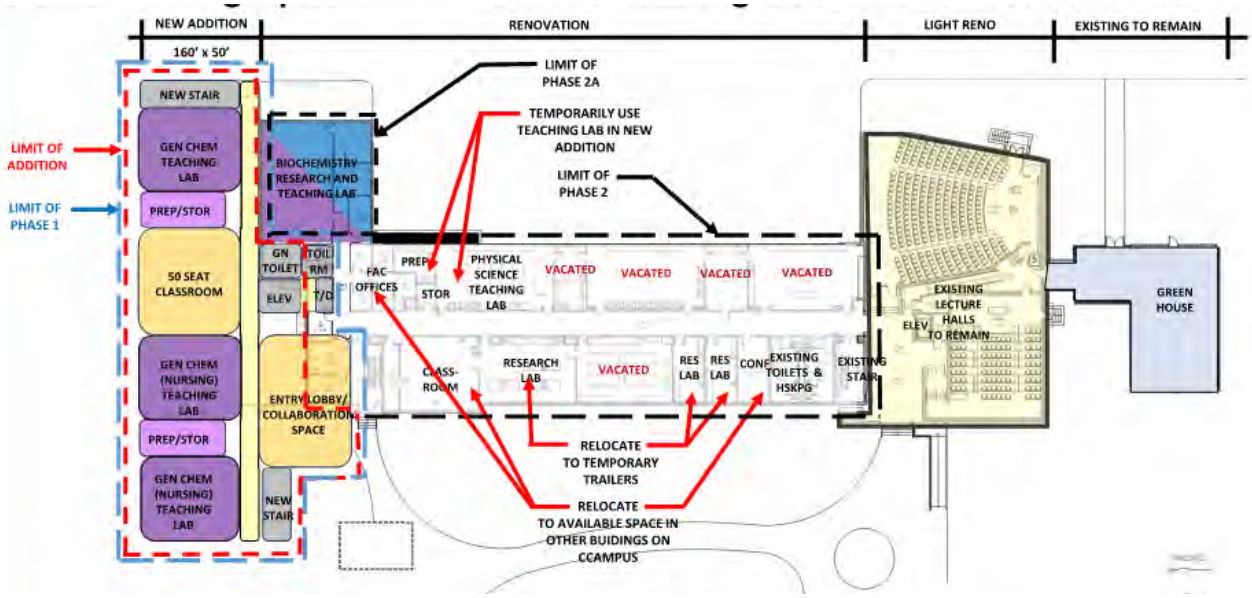
Same as at end of Phase 1

OPTION 2—2 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIES, THEN ENTIRE EXISTING BUILDING IS VACATED AND RENOVATED IN ONE PHASE

Option 2 - 2 Phases: Second Floor Enabling Moves at Start of Phase 2B



Option 2 - 2 Phases: First Floor Enabling Moves at Start of Phase 2B

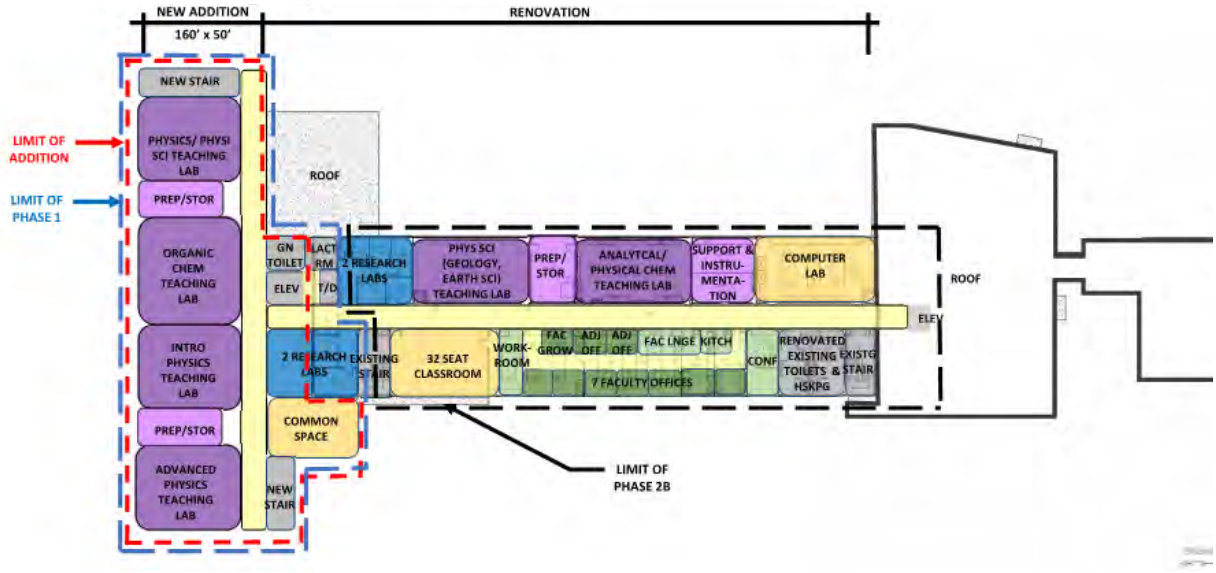


Option 2 - 2 Phases: Ground Floor Enabling Moves at Start of Phase 2B

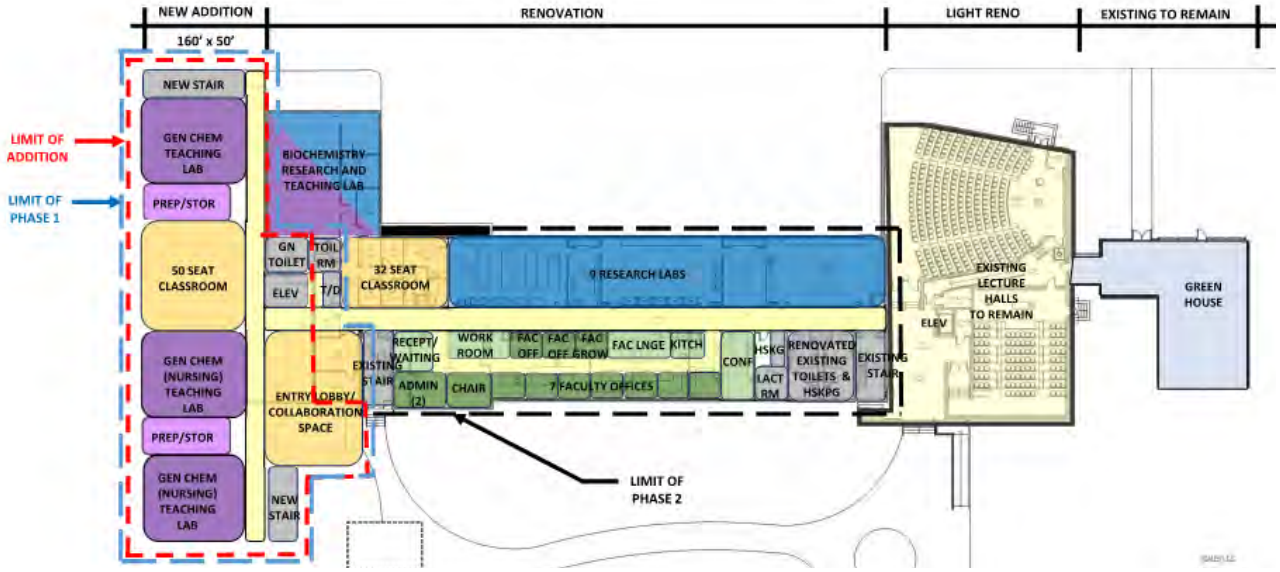
None

OPTION 2—2 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIES, THEN ENTIRE EXISTING BUILDING IS VACATED AND RENOVATED IN ONE PHASE

Option 2 - 2 Phases: Second Floor at End of Phase 2B



Option 2 - 2 Phases: First Floor at End of Phase 2B



Option 2 - 2 Phases: Ground Floor at End of Phase 2B

Same at end of Phase 1

OPTION 3—3 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIED, THEN EXISTING BUILDING IS RENOVATED BY FLOOR

Option 3—3 Phases

Option 3 uses sequential construction phasing. The Addition as well as some renovations to the west edge of the existing building would be constructed during Phase 1. All existing building operations, academic curriculum and on-going research in the existing Clarke Science Building can easily be maintained during Phase 1 with the exception of some existing faculty offices that would be required to be relocated to other available space on campus. At the end of Phase 1, 8 teaching labs and one 50 seat classroom will be located in the Addition.

At the start of Phase 2, all remaining faculty offices and classrooms on the first floor would be relocated to other available space on campus. Research activity could either take place in teaching labs or be consolidated into the existing second floor research labs for the duration of Phase 2. The Addition and the existing second floor would remain fully operational during the renovation of the first floor of the existing building. At the start of Phase 2, the Biochemistry Teaching/Research Lab on the first floor and the Analytical/Physical Chemistry Teaching Lab on the second floor would be renovated in place and remain operational during the renovation of the existing building. The Addition would also remain fully operational during the renovation of the existing building..

At the start of Phase 3, all remaining faculty offices and classrooms on the second floor would be relocated to other available space on campus. Research activity would occupy new research labs on the first floor. The Addition and newly renovated first floor would remain fully operational during the renovation of the second floor of the existing building.

OPTION 3 PHASE 1

Construction of the new building addition that houses academic Teaching Labs, Classrooms and building lobby and Common Spaces. In order to begin this phase enabling work including the existing site utilities and other sitework will need to be performed prior to start of the addition. This phase will also include the entire Ground Floor work to support the new addition and future phases of the project

OPTION B PHASE 2

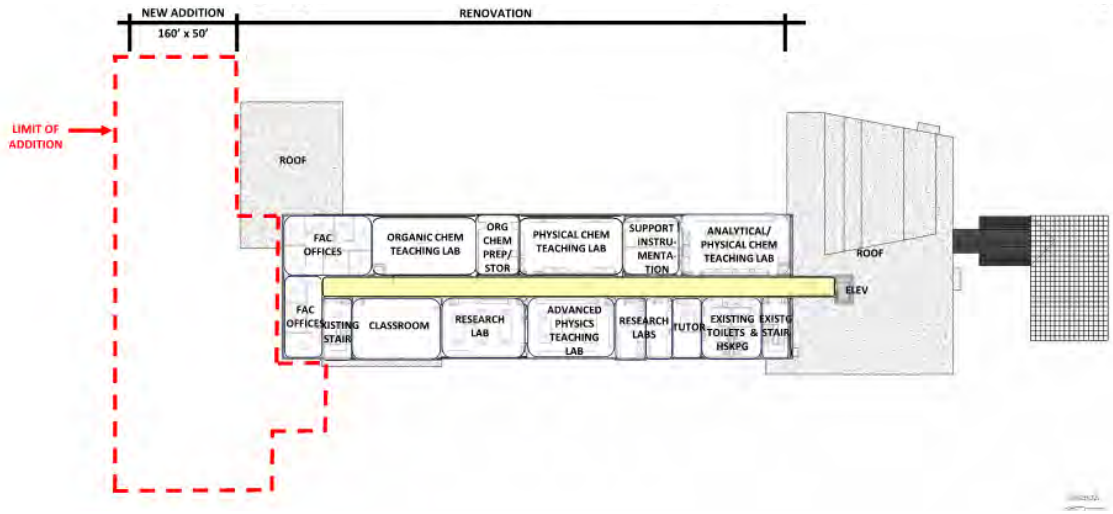
The existing building will be renovated in two phases in order to maintain on-going teaching and research operations. Phase 2 will included the renovation of the first floor. The proposed phasing accommodates vertical shafts, plumbing and electrical risers. Horizontal distribution of systems will likely be located in the main corridor ceiling. This phase will also include exterior envelope work including new windows, existing brick pointing and cleaning . At the end of Phase 2, research activity will occupy new research labs on the first floor.

OPTION B PHASE 3

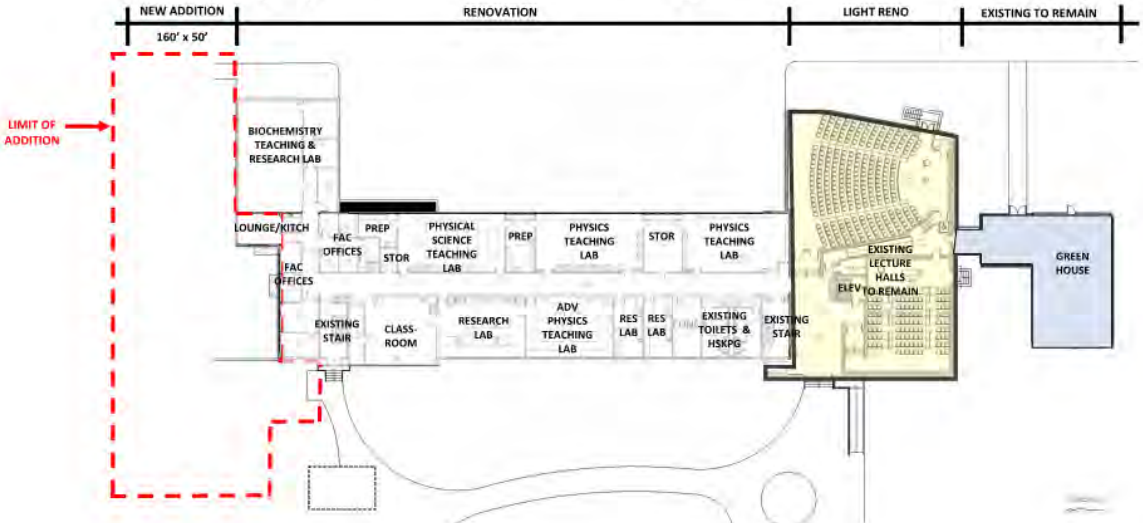
This phase will include the renovation of the second floor. This phase will also include exterior envelope work that includes new windows, existing brick pointing and cleaning. .

The timing of new roofing and hard and soft landscape work as well as light renovation of finishes and upgrades to the existing lecture hall wing is flexible. This work will occur on a schedule that is most convenient to the College, such as summer break. For example, plantings can be planted in the fall season with final punch-list and planting approvals taking place in the spring/summer season to assure the plants take. Lecture hall upgrades could occur during summer break.

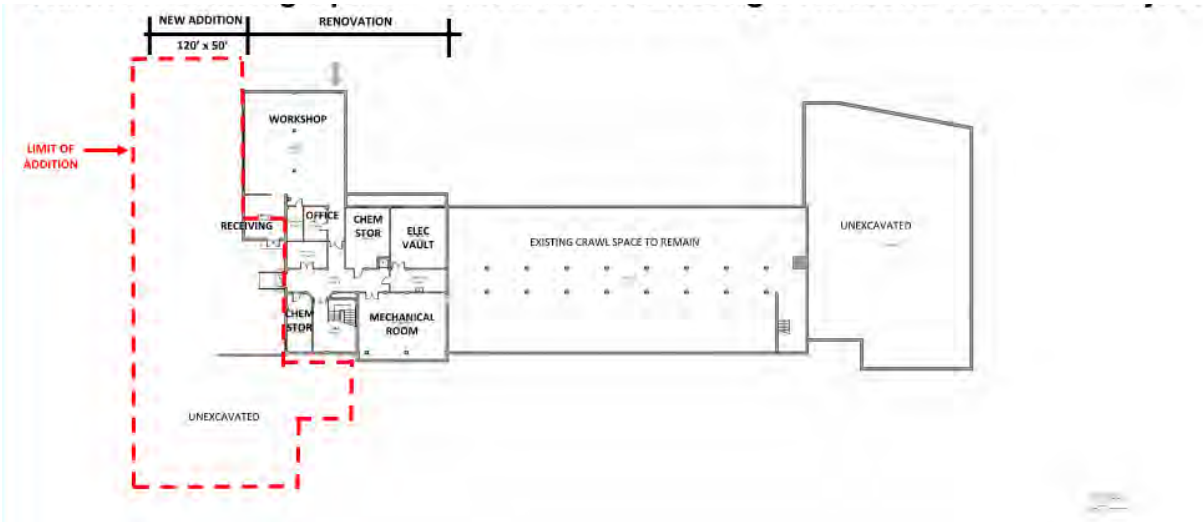
Option 3 - 3 Phases: Second Floor Existing Conditions at Start of Project



Option 3 - 3 Phases: First Floor Existing Conditions at Start of Project

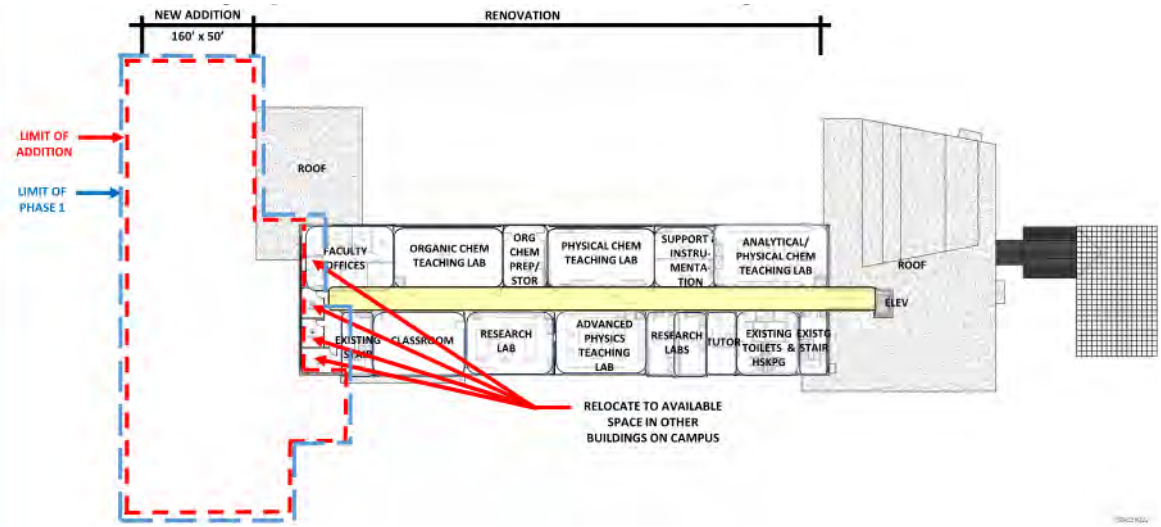


Option 3 - 3 Phases: Ground Floor Existing Conditions at Start of Project

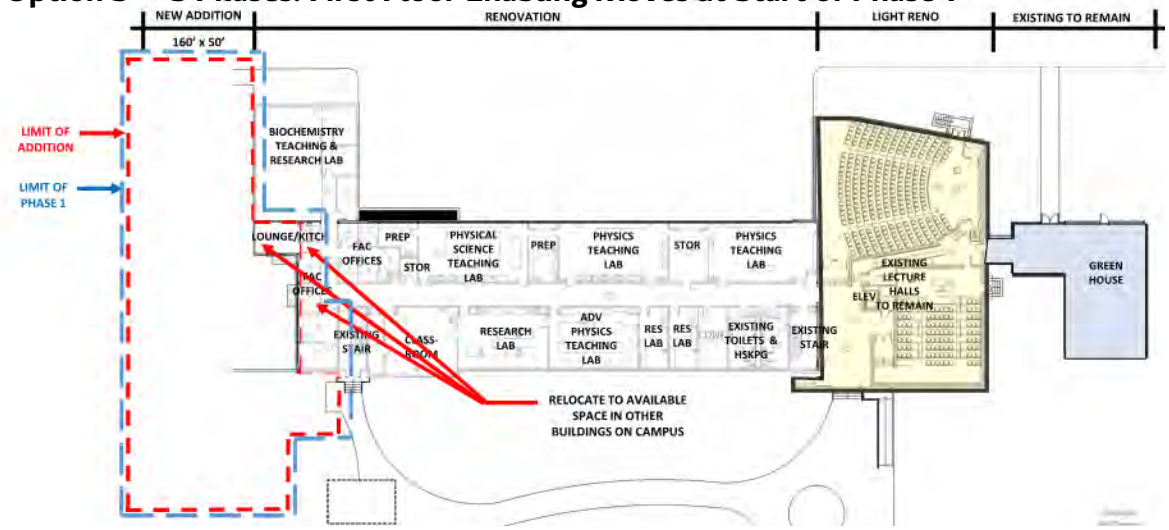


OPTION 3—3 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIED, THEN EXISTING BUILDING IS RENOVATED BY FLOOR

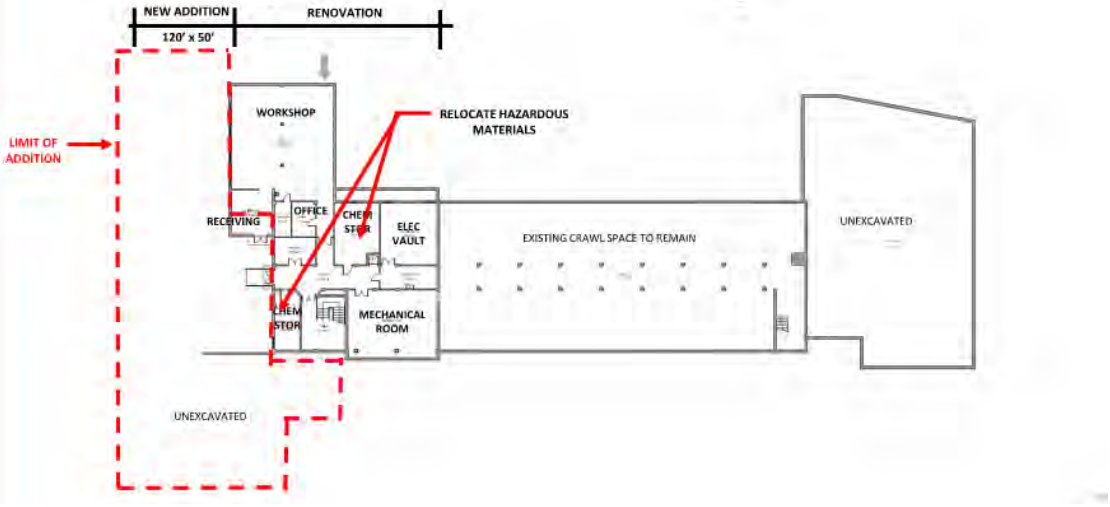
Option 3 - 3 Phases: Second Floor Enabling Moves at Start of Phase 1



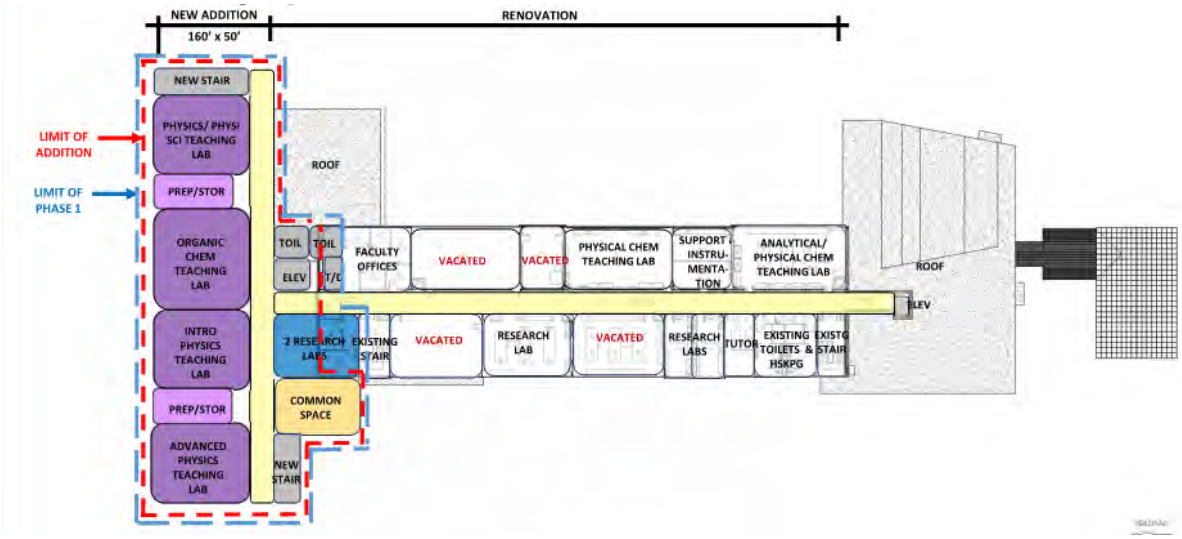
Option 3 - 3 Phases: First Floor Enabling Moves at Start of Phase 1



Option 3 - 3 Phases: Ground Floor Enabling Moves at Start of Phase 1



Option 3 - 3 Phase s: Second Floor at End of Phase 1



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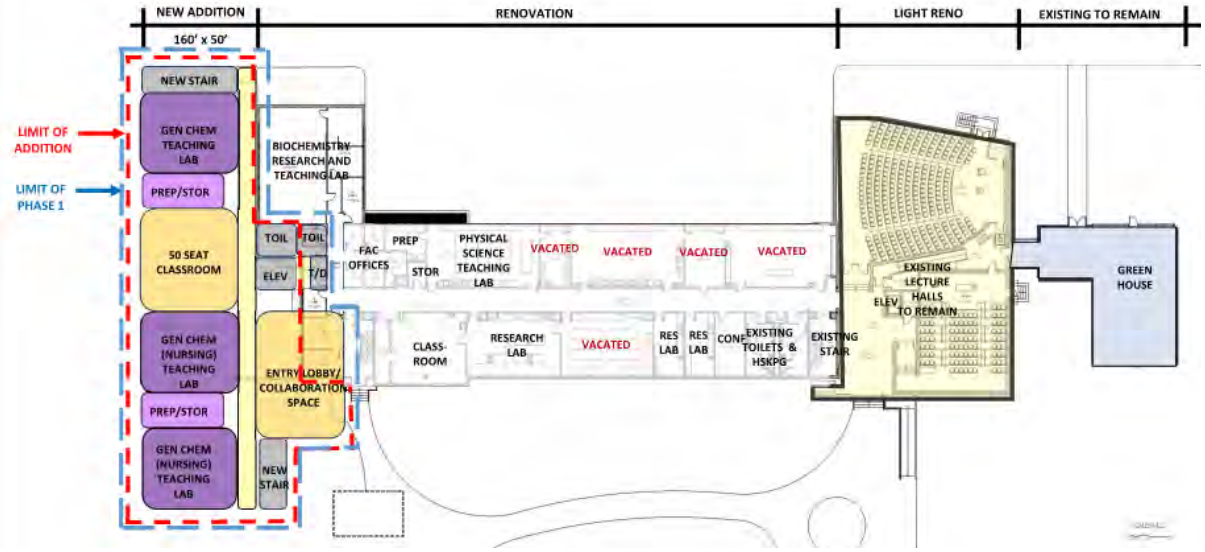
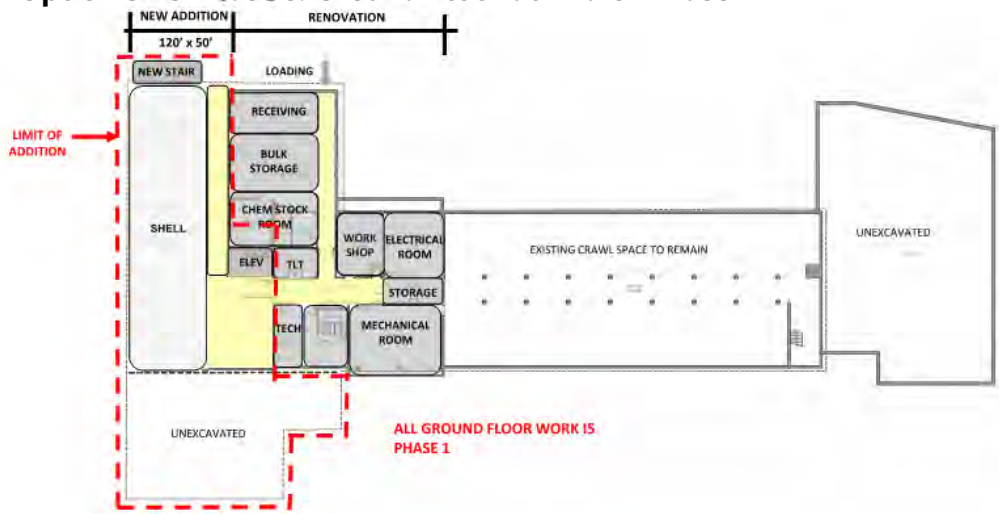


Option 3 - 3 Phase s: Ground Floor at End of Phase 1

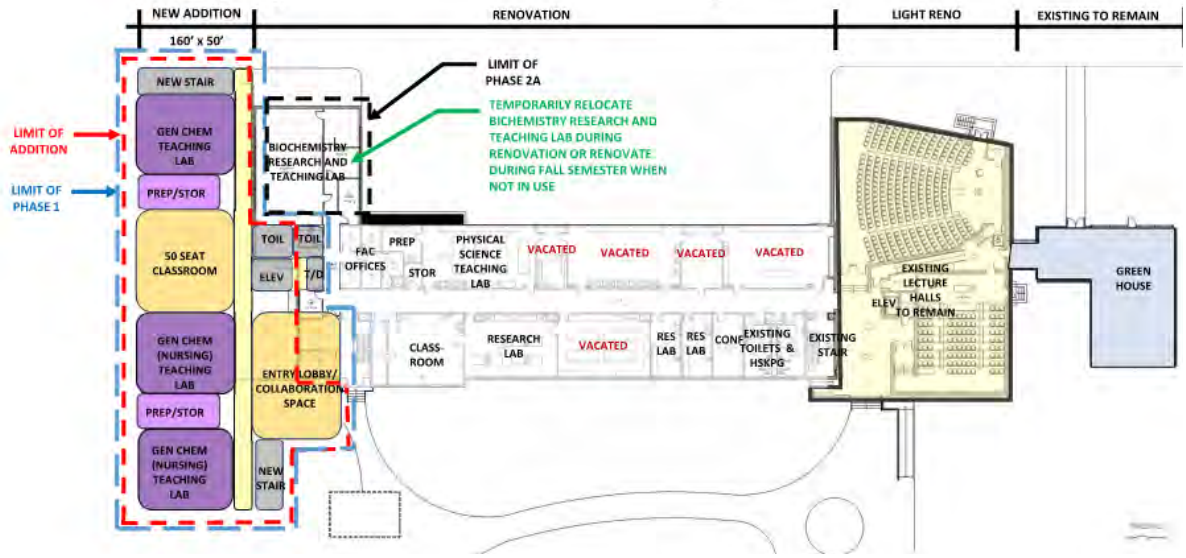


OPTION 3—3 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIED, THEN EXISTING BUILDING IS RENOVATED BY FLOOR

Option 3 - 3 Phases: Second Floor Enabling Moves at Start of Phase 2A

None Required

Option 3 - 3 Phases: First Floor Enabling Moves at Start of Phase 2A



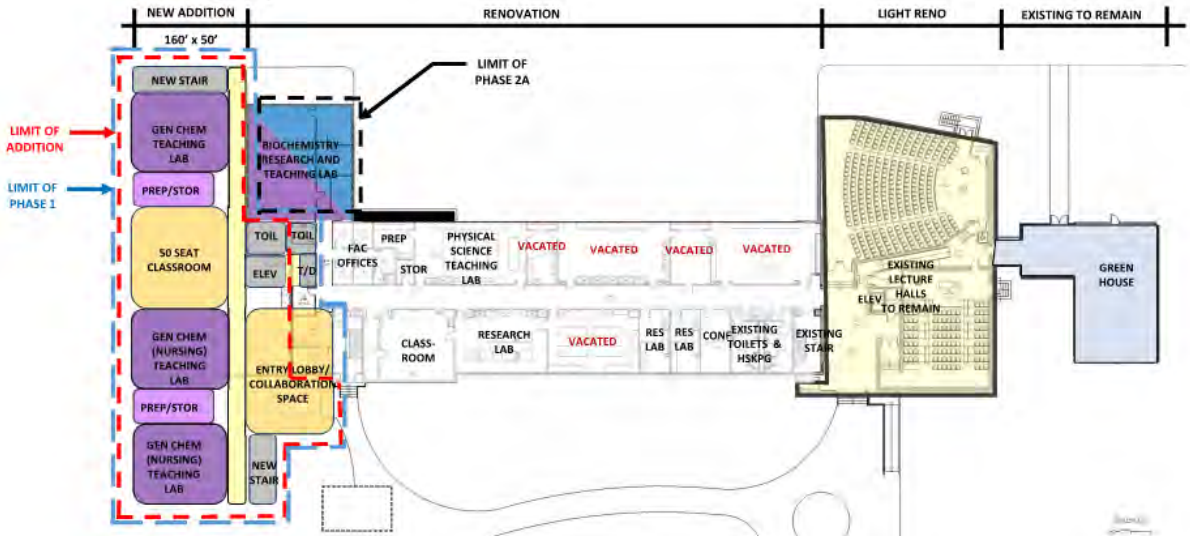
Option 3 - 3 Phases: Ground Floor Enabling Moves at Start of Phase 2A

None Required

Option 3 - 3 Phases: Second Floor at End of Phase 2A

Same as at End of Phase 1

Option 3 - 3 Phases: First Floor at End of Phase 2A



Option 3 - 3 Phases: Ground Floor at End of Phase 2A

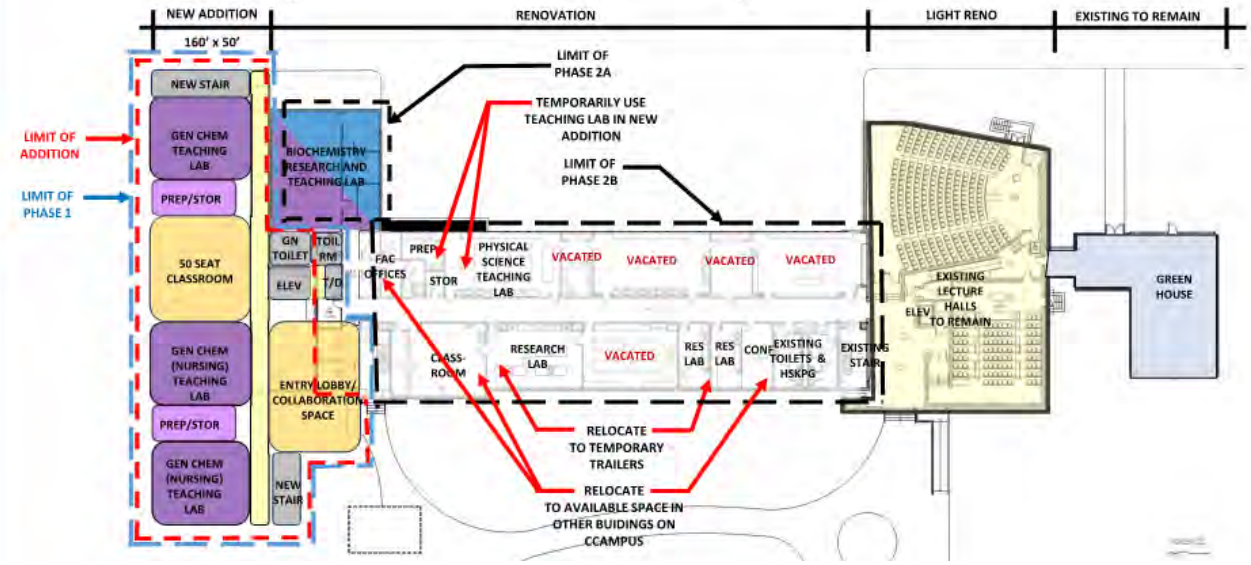
Same as at end of Phase 1

OPTION 3—3 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIED, THEN EXISTING BUILDING IS RENOVATED BY FLOOR

Option 3 - 3 Phases: Second Floor Enabling Moves at Start of Phase 2B

None Required

Option 3 - 3 Phases: First Floor Enabling Moves at Start of Phase 2B



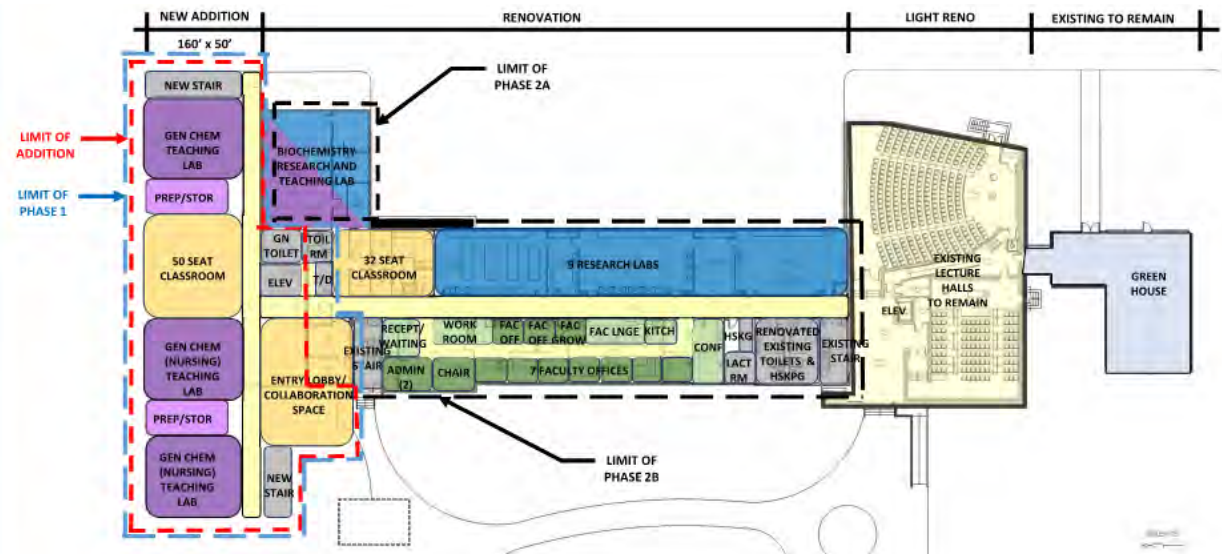
Option 3 - 3 Phases: Ground Floor Enabling Moves at Start of Phase 2B

None Required

Option 3 - 3 Phases: Second Floor at End of Phase 2B

Same as at end of Phase 1

Option 3 - 3 Phases: First Floor at End of Phase 2B



Option 3 - 3 Phases : Ground Floor at End of Phase 2B

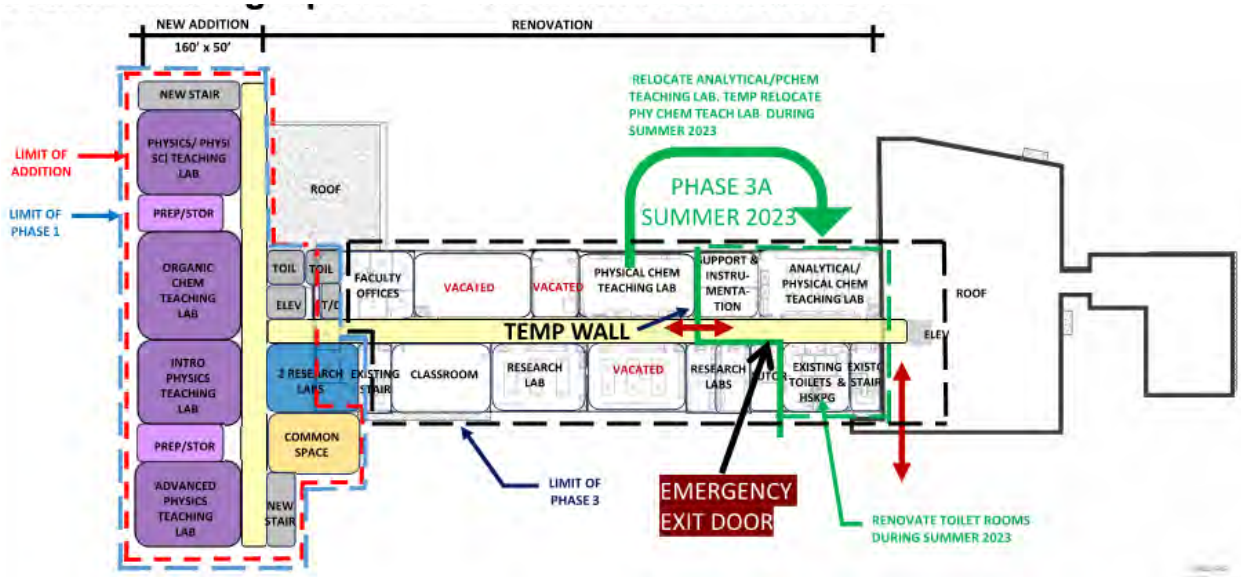
Same at at end of Phase 1

OPTION 3—3 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIED, THEN EXISTING BUILDING IS RENOVATED BY FLOOR

Option 3 - 3 Phases: Second Floor Enabling Moves at Start of Phase 3A

None Required

Option 3 - 3 Phases: First Floor Enabling Moves at Start of Phase 3A



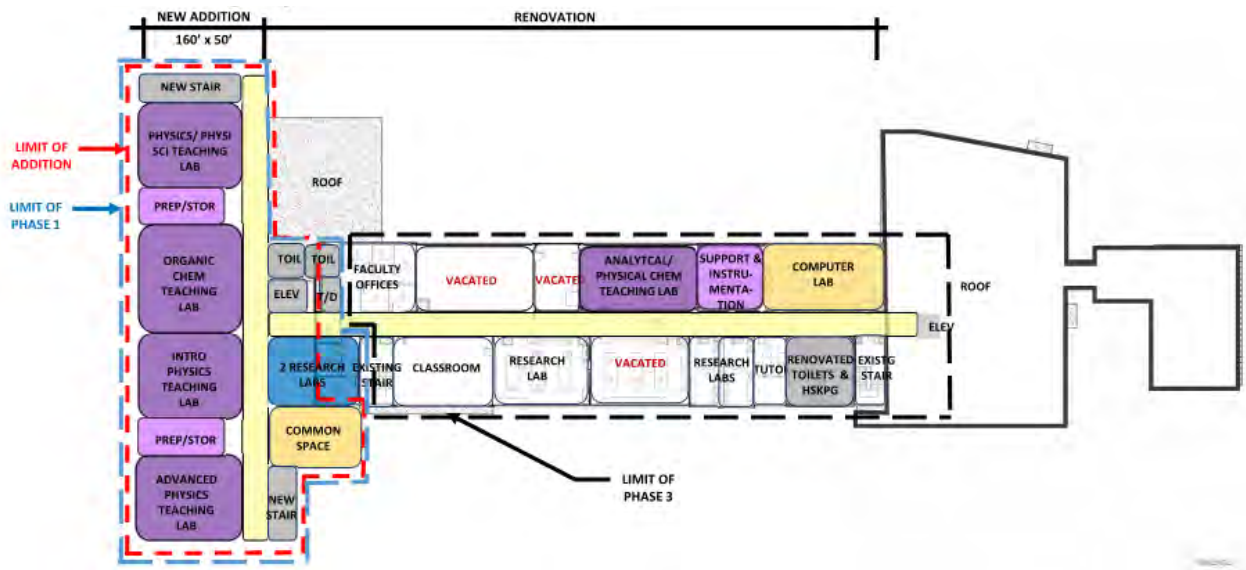
Option 3 - 3 Phases: Ground Floor Enabling Moves at Start of Phase 3A

None Required

Option 3 - 3 Phases: Second Floor at End of Phase 3A

Same as at End of Phase 1

Option 3 - 3 Phases: First Floor at End of Phase 3A

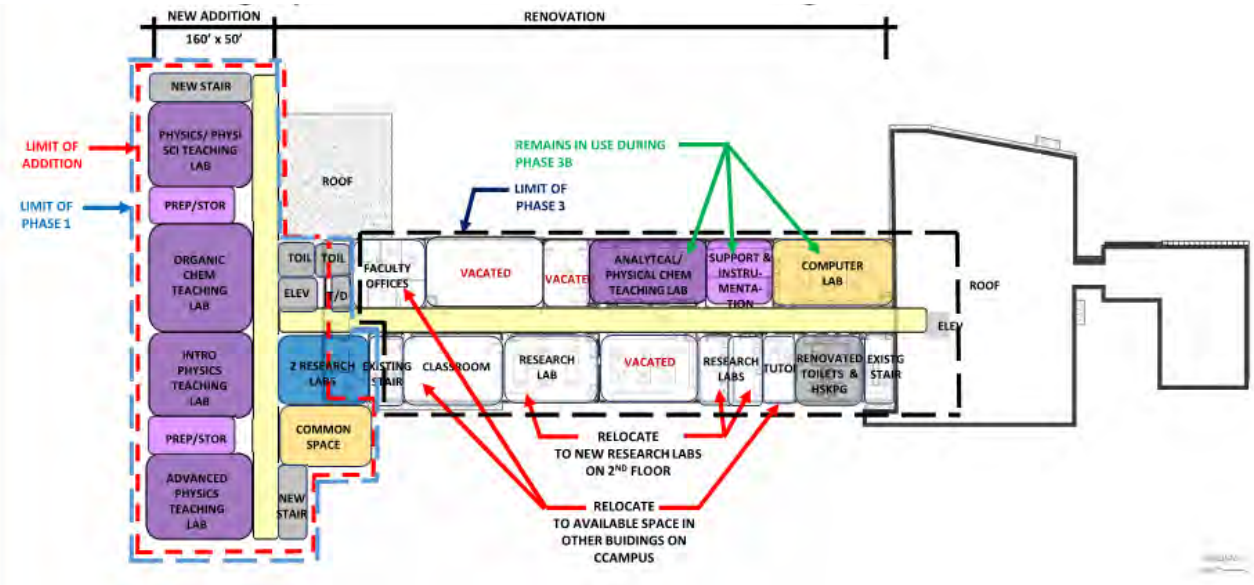


Option 3 - 3 Phases: Ground Floor at End of Phase 3A

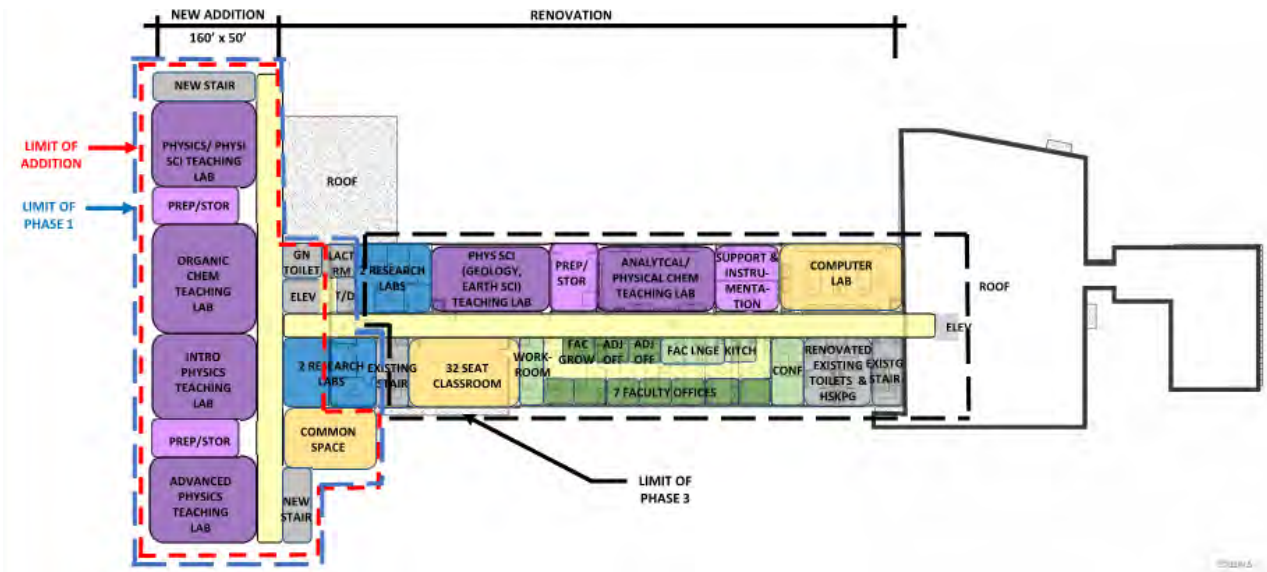
Same as at end of Phase 1

OPTION 3—3 PHASE RENOVATION DETAILED IMPLEMENTATION: ADDITION IS BUILT FIRST WHILE EXISTING BUILDING REMAINS OCCUPIED, THEN EXISTING BUILDING IS RENOVATED BY FLOOR

Option 3 - 3 Phases: Second Floor Enabling Moves at Start of Phase 3B



Option 3 - 3 Phases: Second Floor at End of Phase 3B



CLARKE SCIENCE BUILDING AT RHODE ISLAND COLLEGE

FEASIBILITY STUDY

Appendix C - Detailed Existing Mechanical, Electrical, Plumbing and Fire Protection Systems Conditions

August 2020

SLAM

APPENDIX A. MEP FP SYSTEMS REPORT

W I L K I N S O N A S S O C I A T E S I N C
CONSULTING ENGINEERS

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telephone (401) 737-6386 fax (401) 738-2167
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December 4, 2017

SYSTEMS DESCRIPTION

Plumbing, Fire Protection, Heating, Ventilation & Air Conditioning and Electrical Power and Lighting Systems

Project: #17053

CLARKE SCIENCE

Physical Sciences Department
Rhode Island College

600 Mount Pleasant Avenue
Providence, Rhode Island

Prepared for:

Kite Architects
Albert Garcia AIA, LEED AP

INTRODUCTION:

Under the scope of this Engineering Study, a focused analysis of the Plumbing, Fire Protection, HVAC and Electrical Power, Lighting and Fire Alarm Systems serving the existing Clarke Science Building on the campus of Rhode Island College has been performed. The noted systems have been reviewed relative to Code compliance, existing condition and configuration.

Also included as a part of this assessment are recommendations for systems replacement for the building's continued use and occupancy as lecture, laboratory and office space the College's Physical Sciences Department.

PROJECT AREA BREAK DOWN:

The following area break down of spaces is provided for general reference only. These areas have been based upon information as compiled by Kite Architects as part of the schematic design effort.

Basement:	6,703 sf
First Floor:	20,416 sf
Second Floor:	13,499 sf
Total:	40,618 sf

APPLICABLE CODES AND STANDARDS:

The following Codes and Standards have been considered in the preparation of this analysis and report and must be considered in any building renovations:

RISBC-1	International Building Code, 2012 Edition, with State of Rhode Island Amendments
RISBC-3	International Plumbing Code, 2012 Edition, with State of Rhode Island Amendments
RISBC-4	International Mechanical Code, 2012 Edition, with State of Rhode Island Amendments
RISBC-8	International Energy Conservation Code, 2012 Edition, with State of Rhode Island Amendments

International Green Construction Code, 2012 Edition, with State of Rhode Island Amendments

Rhode Island Fire Laws and Rules, Annotated, 2016 Edition

NFPA 13	Standard for the Installation of Sprinkler Systems; 2010 Edition
NFPA 54; ANSI Z223.1-2012	National Fuel Gas Code, 2012 Edition
NFPA 101;	Life Safety Code; 2012 Edition
ASHRAE Standard 55	Thermal Environmental Conditions for Human Occupancy

ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality
ASHRAE Standard 90.1 - 2007	Energy Standard for Buildings Except Low Rise Residential

SUMMARY OF EXISTING CONDITIONS:

GENERAL:

The John Clarke Science Building was constructed in 1963 as The campus's primary physical science lecture and lab facility. The building continues to function under its original purpose, housing lab, lecture and office spaces.

There has been some building upgrades since the building's original construction with upgrades of the large lecture spaces at the building's east end, (completed in 2011), and with improvements to two interior lab spaces, FLS103B and 242, (completed in 2012). The building's chilled water plant, terminal unit ventilators and temperature control systems were replaced following the 2010 Facilities Assessment and Master Plan. The building was also fit with a fire protection sprinkler system following the 2010 Facilities Assessment and Master Plan.

Other than the modifications associated with the 2012 improvements to lab spaces FLS103B and 242, there has been little in the way of modifications to the building's original plumbing systems. The work related to the upgrade of lab spaces FLS103B and 242 included a replacement of the chemical waste neutralization system.

PLUMBING SYSTEMS:

Existing Conditions:

General:

The property is configured with toilet rooms for faculty and staff at the first and second floor levels. Janitor's closets, with service sinks are also provided at the first and second floor levels, adjacent to the common toilet rooms. The fixtures and fittings at these spaces appear to be original to the building's 1963 construction.

Specialty fixtures for lab use are provided at the first and second floors. As noted previously, there has been some upgrade of the fixtures and fittings within labs FLS103B and 242. The lab fixtures and fittings at all other spaces are original to the building's 1963 construction.

The fixtures and irrigation connections at the greenhouse and greenhouse work room that comprise and addition to the north end of the buildings were not reviewed during our field visit.

Domestic Water Piping Systems:

As noted, the interior elements of the domestic water service are original to the building's 1963 construction with little modification.

Presently, the facility is provided with a 4" domestic water service that enters the building below the first floor within a basement crawl space. This domestic water supply is drawn from the campus's central water distribution system. Backflow prevention for domestic water service is provided at the locations where the campus's central distribution system is fed from the Providence Water Supply's municipal water system.

The pressure of the incoming water service is unknown as no pressure gauges were discovered during our visit.

Sanitary Waste and Vent Piping Systems:

The building is provided with dedicated sanitary and laboratory waste piping systems. As noted, the laboratory waste system has been recently upgraded. Observation of the existing conditions indicate that the waste and vent piping systems that serve the common toilet facility remain as originally installed and are constructed of cast iron, bell and spigot type piping.

Roof Drainage:

Field observations indicated that storm water drainage from the building's roof surfaces was managed by a system of internal drains with discharge routed through the building to connections at the campus's storm water sewer system. It appears that there has been some failure of the interior storm water piping elements, as the roof drain outlets have been retro-fit at some areas with PVC piping. This retro-fit piping has been routed along the building exterior at the building's north side.

Natural Gas Piping Systems:

The bulding is provided with a natural gas service, via the campus's central gas distribution system. This service is arranged to provide service for lab connections only and does not serve any space or domestic water heating systems.

Domestic Hot Water Generation:

Hot water is provided by a single hot water storage tank fit with a steam heat exchanger.

Plumbing Fixtures:

In general, the plumbing fixtures at the building are in fair condition. Noted during our observations was that none of the fixtures are the water conserving type as required by current code standards. Also noted was that only a portion of the fixtures at the first-floor level are configured to conform to ADA standards.

Plumbing Fixture Allotment – Existing Condition: (Analysis Based upon Business Occupancy)

OCCUPANCY	**B**		**Business**		
FIXTURE TYPE:	NUMBER REQUIRED (Per table 403.1 International Plumbing Code, 2009 Edition)		MAXIMUM POPULATION SUPPORTED (Considering Total Fixtures Existing at All Floor Levels)		
	M	F	M	F	Total
Water Closets	1 per 25 persons for the first 50 and 1 per 50 for the remainder exceeding 50	1 per 25 persons for the first 50 and 1 per 50 for the remainder exceeding 50	5 provided 200 males supported	5 provided 200 females supported	400 persons
Urinals	May be substituted for up to 50% of required water closets	0	6 provided 300 males supported	0 0	
Lavatories	1 per 40 persons for the first 80 and 1 per 80 for the remainder exceeding 80	1 per 40 persons for the first 80 and 1 per 80 for the remainder exceeding 80	6 provided 400 persons supported	5 provided 320 persons supported	
Drinking Fountains	1 per 100 persons		2 provided	200 persons	200 persons*
Service Sinks	1		2 provided	-	

*Plumbing fixture count is based upon the fixtures provided all floor levels, in total. All floors have been considered to be of "business" type occupancy. Based upon this classification, plumbing fixture counts as summarized above are sufficient numbers to support a total population of 200 persons. (Maximum population supported has been based upon the number of drinking fountains provided.

System Deficiencies, Recommended Improvements:

General:

The existing plumbing systems, except for the recently replaced lab waste neutralization systems at the basement level, are of advanced age and should be replaced.

New Plumbing Systems:

Review of the floor plans for the proposed building rehabilitation indicates significant improvement to the arrangement of the lab spaces and common toilet room facilities. This being the case, it is proposed that the existing plumbing systems be removed back to their sources and that they be replaced in their entirety. This includes domestic hot and cold water, sanitary waste and vent, acid resistant waste and vent, roof drainage systems, natural gas piping systems, plumbing fixtures and laboratory fixtures.

As a part of any renovation work, it is recommended that restroom facilities, conforming with ADA standards be provided at all floor levels. It is also recommended that plumbing fixture replacement be included as a part of any renovation of the existing restrooms. All proposed new and replacement fixtures be the water conserving type as required by current Code standards.

Under the scope of the rehabilitation work, it is recommended that the existing water heater be removed and replaced. Some consideration to providing a standalone, gas fired, or electric water heater should be provided, thus limiting the demand on the campus's central steam plant during the periods outside of the normal heating season.

In keeping with current design standards, the replacement domestic water heating system should be fit with an expansion tank, hot water tempering valve and a system to allow hot water recirculation to allow the timely delivery of hot water to the building's remote plumbing and laboratory fixtures.

Based upon the domestic water demand of the building following renovation, limited work at the domestic water service will likely be required. It is recommended that the existing 4" domestic water service be fit with a new isolation valve.

Plumbing Fixture Allotment – Proposed Condition: (Analysis Based upon Business Occupancy)

OCCUPANCY	**B**		**Business**		
FIXTURE TYPE:	NUMBER REQUIRED (Per table 403.1 International Plumbing Code, 2009 Edition)		MAXIMUM POPULATION SUPPORTED (Considering Total Fixtures Existing at All Floor Levels)		
	M	F	M	F	Total
Water Closets	1 per 25 persons for the first 50 and 1 per 50 for the remainder exceeding 50	1 per 25 persons for the first 50 and 1 per 50 for the remainder exceeding 50	4 provided 150 males supported	6 provided 250 females supported	500 persons
Urinals	May be substituted for up to 50% of required water closets	0	2 provided 100 males supported	0 0	
Lavatories	1 per 40 persons for the first 80 and 1 per 80 for the remainder exceeding 80	1 per 40 persons for the first 80 and 1 per 80 for the remainder exceeding 80	4 provided 240 persons supported	4 provided 240 persons supported	480 persons
Drinking Fountains	1 per 100 persons		4 provided	400	400 persons*
Service Sinks	1		2 provided		

*Plumbing fixture count is based upon the fixtures provided all floor levels, in total. All floors have been considered to be of "business" type occupancy. Based upon this classification, plumbing fixture counts as summarized above are sufficient numbers to support a total population of 400 persons. (Maximum population supported has been based upon the number of drinking fountains provided.

New Plumbing Systems - General:

As noted by the schematic floor plans, it is intended that all existing plumbing and laboratory fixtures be removed. All new plumbing fixtures and laboratory will be provided at new locations, placed with respect to the programmatic re-use of the building. Also noted is that the fixture arrangement will be suitable for the requirements of ADA standards.

As a part of any upgrade to the plumbing systems, it is proposed that the following features be incorporated:

All new fixtures provided would be the water conserving type, as required by current code standards.

New water closets will be the wall hung, flushometer type. All flushometers will be the water conserving, touchless type. It will be required that a sufficient number of the fixtures provided be configured in accordance with ADA standards.

New urinals can be specified as the wall hung, flushometer type. It will be required that a sufficient number of the fixtures provided be configured in accordance with ADA standards.

New lavatories should be fit with water conserving, touchless type faucets. It will be required that a sufficient number of the fixtures provided be configured in accordance with ADA standards.

New, refrigerated type, drinking fountains / bottle fillers will be provided at each floor level within the proposed building addition. It is proposed that these be configured in accordance with ADA standards.

New mop receptors for housekeeping use should be provided at each floor level.

All laboratory spaces and lab prep spaces should be fit with combination safety shower / eye wash stations.

All toilet rooms will be fit with floor drains.

All mechanical rooms will be fit with floor drains.

Floor drains will be provided at the location of each safety shower / eye wash station.

All floor drains will be fit with trap seals.

The plumbing contractor will provide all piping connections to the laboratory fixtures. (Laboratory fixtures will be provided by the General Contractor as a part of the laboratory casework package.)

The waste and vent streams from all laboratory fixtures will be routed via dedicated, acid resistant systems. All chemical waste will be routed through the existing acid neutralization system at the basement level, prior to discharge to the municipal sewer system.

Design Parameters:

The interior plumbing systems will be designed and specified to perform to the standards as defined by RISBC-1, the Rhode Island State Building Code, RISBC-3 the International Plumbing Code, 2012 Edition, (with State of Rhode Island Amendments), RISBC-8, the International Energy Code, (with Rhode Island amendments) and with respect to the standards of the International Green Construction Code, 2012 Edition.

Based upon this information, the following target ranges for system design and operation will be applied:

Domestic Hot Water System:

Supply Water Temperature 120 deg F

Tempered Water System, Lab Safety Fixtures:

Supply Water Temperature 60-100 deg F

Electrical Power:

Components of the plumbing systems are to be selected for operation with 208 volt, three-phase electrical service.

Natural Gas:

All appliances and devices for firing with natural gas are to be selected to operate with a minimum inlet gas pressure of 4" w.c.

Domestic Water Piping Systems:

Other than the existing water service entries, all domestic water piping within the building will be provided as new under the proposed scope of work.

The piping material for the domestic water system piping will be Type "L" copper with soldered or "press-fit" type fittings.

All domestic water system piping, except for exposed fixture connections, will be insulated with fiberglass piping insulation in accordance with the requirements of the International Energy Code, and to prevent condensation that can lead to the occurrence of unwanted mold growth.

All hot, cold and hot water recirculating lines serving piping branches and fixture connections shall be provided with ball-type shut off valves.

Domestic Hot Water Heating:

As noted previously, it is recommended that the existing water heater be removed and replaced.

In keeping with current design standards, the replacement domestic water heating system should be fit with an expansion tank, hot water tempering valve and a system to allow hot water recirculation to allow the timely delivery of hot water to the building's remote plumbing and laboratory fixtures.

It is proposed that domestic hot water for service to the new plumbing fixtures at the building be drawn from a new, condensing type, natural gas fired, water heater.

Specific sizing and model selection of the water heating system has yet to be developed.

Given the expected piping lengths between the fixtures and water heater at each building and to allow proper operation of the proposed condensing type heaters, a system for hot water recirculation will be provided for all branches of the hot water system per the requirements of the International Plumbing Code. Control of the domestic hot water recirculation system should be in conformance with the requirements of the International Green Construction Code.

The domestic hot water supply from the heating and storage system will be fit with a hot water tempering valve per the requirements of the International Plumbing Code.

Sanitary Waste and Vent Piping Connections:

Like the domestic water piping systems, the sanitary waste and vent piping systems will be replaced in their entirety as a part of the project scope.

Given the proposed fixture arrangement for the building, it is anticipated that there will be several waste and vent risers, placed at various locations, to service plumbing fixtures at toilet rooms and janitor closets and to service classroom sinks and drinking fountains.

In order to maintain acoustic control, it is recommended that all new above grade sanitary waste and vent piping systems be installed as service weight cast iron. All above grade elements of the sanitary waste system should be installed as the “no-hub” piping system.

Specialty Plumbing Systems:

Specialty plumbing systems will be required as a part of the reconfiguration of Clarke Science. These systems will likely include compressed air, vacuum, DI water and acid resistant waste piping in the laboratory classrooms.

The piping material for the compressed air and vacuum and will be Type “L” copper with soldered type fittings.

The piping material for DI (deionized) water systems shall be high purity PVDF type.

Acid resistant waste and vent piping will be required to serve the laboratory spaces.

The piping material for the acid resistant waste piping system will be Polypropylene or PVDF with a mechanical or fused type joints. The acid waste and vent material shall be suitable for installation within return air plenum spaces.

Roof Drains and Storm Drainage Piping Connections:

Given the current “retro-fit” condition of the existing storm drainage piping and given the scope of interior renovations proposed for the building, it is anticipated that the existing storm drainage piping systems will be removed. It is assumed that the existing roof drains will remain for re-connection.

All new roof surfaces will be provided with new, internal drainage systems.

To maintain acoustic control, it is recommended that all new, above storm drainage piping systems be installed as service weight cast iron. All above grade elements of the sanitary waste system should be installed as the “no-hub” piping system.

In addition, all drain pans and horizontal elements of the storm drainage system within the buildings will be insulated to prevent condensation.

All new storm drainage piping will be routed to new connections to the existing storm sewer outlet piping serving the building.

Natural Gas Piping Systems:

Natural gas piping shall be extended and modified as required to connect to proposed domestic hot water heaters and to lab equipment. Natural gas piping shall be Schedule 40 black steel.

Natural gas piping will also be provided to support connections within the various fume hoods and at bench top jets within the laboratory and lab prep room spaces.

Compressed Air Piping Systems:

Like the natural gas piping systems, it is anticipated that connections for compressed air will be required within the laboratory spaces.

It is anticipated that these connections will be required at the fume hoods and at bench top jets within the lab and prep room spaces.

Generation of compressed air for service to the labs will be provided by a centralized system, with compressor and compressed air dryer located within the basement level mechanical space.

Specialty Gas and Vacuum Piping Systems: (Lab Gasses)

The full scope of specialty gas and vacuum piping systems required within the various lab spaces has yet to be developed.

It is anticipated that there will be no central system for specialty gasses such as nitrogen, or carbon dioxide, and that these systems will be provided locally within the lab suites as may be required by the teaching program and research demands.

Similarly, it is anticipated that lab vacuum will be handled on a local basis, again depending upon the requirements of the teaching and research programs.

FIRE PROTECTION SYSTEMS:

Existing Conditions:

At present, Clarke Science is provided with a wet system type fire protection sprinkler system. This system was installed following the Facilities Assessment and was constructed to conform to the requirements of NFPA-13.

The building is not fit with standpipes for fire fighter use due to the limited height of the second floor does not exceed 30'-0" above grade.

System Deficiencies, Recommended Improvements:

General:

Given the scope of renovations proposed for Clarke Science the scope of removal of the existing sprinkler and standpipe systems will be fairly significant.

It is anticipated that the existing fire service entrance, backflow preventor, alarm valve assembly and fire department connection will remain for re-use.

It is anticipated that all sprinkler heads be removed and replaced. Current Code standards prohibit the re-installation and re-use of the existing sprinkler heads.

New Fire Protection Systems:

It is proposed that all spaces within the existing building and proposed additions will be fit with new system risers, sprinkler piping and sprinkler heads.

New, up to date flow tests will be required to support the new fire protection system designs.

Design Parameters:

The fire protection sprinkler system will be designed and specified to perform to the standards as defined by RISBC-1, the Rhode Island State Building Code; Rhode Island Fire Laws and Rules, Annotated, 2016 Edition; NFPA 101, Fire Code; 2012 Edition and NFPA 13.

Based upon the proposed occupancy of the facility, the Occupancy Classifications and required sprinkler flow densities are as follows:

Building Area Break Down:

Basement:	6,703 sf
First Floor:	20,416 sf
Second Floor:	13,499 sf
Total:	40,618 sf

Office, Classroom, Auditorium and Egress Spaces:

Occupancy Classification:	Light
Sprinkler Flow Density:	0.10 / 1500 sf (less credit for quick response heads)
Hose Allowance:	100 gpm, inside and outside hose streams
Maximum Head Spacing:	225 sf
System Type:	Wet Pipe

Laboratory and Research Spaces:

Occupancy Classification:	Ordinary Group I
Sprinkler Flow Density:	0.20 / 1500 sf (less credit for quick response heads)
Hose Allowance:	250 gpm, inside and outside hose streams
Maximum Head Spacing:	130 sf

Mechanical, Electrical and Storage Spaces:

Occupancy Classification:	Ordinary Group I
Sprinkler Flow Density:	0.15 / 1500 sf (less credit for quick response heads)
Hose Allowance:	250 gpm, inside and outside hose streams
Maximum Head Spacing:	130 sf
System Type:	Wet Pipe

Utility Demand:

Based upon Code required sprinkler flow densities and hose stream allowances, utility demands posed by the fire protection sprinkler systems have been computed as follows:

Building Sprinkler Protection:

Peak Sprinkler Flow:	225.0 gpm
Hose Stream Allowance:	250.0 gpm
Total Fire Protection Flow:	475.0 gpm
Duration at Specified Flowrate:	60 minutes

Fire Service Entrances:

As noted previously, it is proposed that the existing fire service entrance, backflow preventor and fire department connection remain for re-use.

Interior Sprinkler Systems:

All new piping systems will be installed such that it is concealed above dropped ceilings and exposed in all non-ceilinged areas. It is understood that exposed combustible materials will not exist within the

concealed spaces above new ceilings. As this is the case, above ceiling sprinkler protection will not be provided.

All sprinkler heads for below ceiling protection will be the concealed or the sidewall type, in keeping with the desired aesthetic standard. All sprinkler heads will be the "quick response" type as required by current Code Standards.

As the highest occupied floor level being less than 30'-0" above grade, standpipes for firefighter use will not be required.

Fire Protection Piping Systems:

For the wet pipe sprinkler systems, it is proposed that all piping be installed as Schedule 40, black steel pipe and fittings. Piping 1-1/2" and less in diameter will be installed with screwed joints and fittings. All piping 2" and larger in diameter will be installed with grooved type joints and fittings.

The use of CPVC piping for elements of the fire protection sprinkler systems is not proposed at this time.

Piping will be sized by the Fire Protection Contractor based upon current flow test data and upon hydraulic design parameters as defined by the construction documents.

Zone isolation valves will be provided at the sprinkler zone connections to the wet pipe system risers along with zone flow switches and inspectors test and drain assemblies. Discharge from the various inspector's test and drain stations will be directed to discharge to splash blocks at the building exterior. Existing standpipe connections and control valve assemblies will be re-used whenever possible.

Seismic Restraint:

The fire protection piping systems will be restrained against seismic forces in accordance with the requirements of RISBC-1, The International Building Code, 2012 Edition, with State of Rhode Island Amendments and in accordance with the hanging requirements as defined by NFPA 13, The Standard for the Installation of Sprinkler Systems; 2010 Edition.

HVAC SYSTEMS:

General:

Given the age of the terminal systems, and given the scope of building improvements planned, all existing HVAC systems, including piping and ductwork within the building will be removed and replaced. Systems removal will include the removal of the existing steam and condensate piping connections to the campus's central distribution systems.

The building is served by a mechanical room is located at its basement level. Connections to the campus’s central steam and condensate return piping systems are provided within this basement mechanical space.

The systems within the basement mechanical room have been upgraded since the 2010 facilities assessment. The original chiller and pumping systems have been removed and replaced along with the

original temperature control systems. The automated temperature controls have been upgraded to the campus standard Siemens DDC (direct digital control) type system.

The new chiller is the packaged air cooled type, and is located at grade, at the west end of the building. Specific information relative to the new chiller is as follows:

PACKAGED AIR COOLED CHILLER:	
Manufacturer:	Trane
Model:	CGAM-110F AX02 A1A1 BIAX ZA1C 1AXA XAXX XAIA 5X10
Nominal Cooling Capacity:	110.0 tons
Cooling Capacity at Design:	107.1 tons (95 deg F ambient, 44 deg F LWT)
EER:	10.0
kW Input:	128.0

Given the recent replacement date, most of the equipment within the basement level mechanical room was noted to be in good condition. It should be expected that some of the original piping systems will require replacement to support the buildings energy demands that may increase due to Code specified requirements for increased ventilation.

Hot and chilled water distribution for the building is currently configured as a “2-pipe” system, providing hot water to the terminal heating and cooling systems during the heating season and chilled water to the terminal systems during the cooling season.

Classroom and lab spaces at the first and second floors are conditioned via classroom type unit ventilators. The perimeter office spaces at the first and third floor are conditioned via fan coil units with through wall type, minimum fresh air connections. These terminal systems and their related control systems were recently replaced, following the 2010 Facilities Assessment.

The limited modifications at interior lab spaces, FLS103B and 242, (completed in 2012), included the upgrade of the fume hood and makeup air systems. The makeup air for these lab spaces is now provided by a makeup air unit, located at the building roof.

The 2011 renovations of the lecture spaces at the east end of the first floor included the removal and replacement of the original HVAC unit. These spaces are currently conditioned with a packaged rooftop HVAC unit.

System Deficiencies, Recommended Improvements:

General:

Given the age of the terminal systems, and given the scope of building improvements planned, all existing HVAC systems, with the exception of some newly installed components within the basement level mechanical room, will be removed and replaced.

Systems removal will include the removal of elements of the existing steam and condensate piping and steam convertors, condensate pumps and appurtenances within the basement level mechanical room. The connections to the campus's central distribution systems will remain for re-connection. The existing air cooled chiller will also be retained for re-use.

New HVAC Systems:

It is proposed that all occupied spaces within the building be provided with controlled heating, air conditioning and Code compliant levels of fresh air ventilation. It is also proposed that these new systems be configured with energy conservation in mind as required to conform to the design standards outlined by both the International Energy Code and the International Green Construction Code.

For the rehabilitated Clarke Science Building, it is the intent to provide conditioning to the various classroom, office and service spaces through the application of chilled beam systems. It is proposed that the lecture / auditorium spaces at the east end of the first floor be conditioned by displacement ventilation systems, with heating provided by hot water radiant systems. Given the relatively high level of ventilation required for the research and teaching lab spaces and the chemical prep and storage facilities, a variable air volume, (VAV), system is proposed.

The VAV systems serving the lab spaces will be fit with terminal hot water heating coils, sized to meet the space heating demand and to control space humidity while preventing overcooling of the lab spaces during the cooling season.

Fume hoods for application within the reconfigured laboratory and lab prep spaces will be configured as the variable air volume type, in order to maintain compliance with International Green Construction Code Standards. These fume hoods will be connected to a laboratory exhaust air valve and dedicated laboratory exhaust fan and stainless-steel exhaust ductwork system. Exhaust airflow from the fume hood will modulate via the exhaust air valve based on the fume hood sash height position and the building's "occupied – unoccupied" schedule.

The proposed Laboratory Exhaust Fan(s) will be the roof mounted, inline, mixed flow type; designed to reduce fan energy in demand-based laboratory exhaust applications. The fans will be equipped with discharge nozzles to propel fumes up and away from the building to avoid recirculation into the building HVAC systems.

All new distribution ductwork will be provided. Given the proposed application of chilled beam and displacement ventilation type systems at the lab, office and lecture spaces, this new distribution ductwork will be smaller in size than that required by conventional constant or variable volume systems.

Conditioned air for the chilled beam systems will be provided by dedicated outdoor air systems, (DOAS), specifically configured with hot water heating coils, direct expansion (DX) cooling coils, heat recovery coils, water cooled condensers, 85% MERV-13 filtration and hot gas re-heat coils. The temperature and

humidity content of the air delivered by these DOAS units will be regulated as required to offset latent cooling loads within the spaces served by the chilled beam systems. It is proposed that these units will be roof mounted. All roof mounted HVAC units will be mounted on seismically rated, vibration isolating curb systems.

For the displacement ventilation systems for service to the auditorium / lecture spaces at east end of the first floor, the unit configurations will be similar to those proposed for the chilled beam systems. In the case of these units, the demands posed by the dehumidification of the incoming air stream is not as rigorous. For service to the displacement ventilation systems, it is proposed that the air handling systems be installed at the roof of the auditorium wing. These roof mounted HVAC systems will be mounted on a seismically rated, vibration isolating curb system.

Heating energy will be provided via new connections to the campus's central steam supply and condensate return systems. It is proposed that these connections will be made at the distribution mains within the basement mechanical space. These proposed connections would serve a new, steam to hot water converter, sized to meet the revised heating demand of the building.

To provide cooling energy, it is proposed that the existing packaged type air cooled chiller be re-applied, along with packaged DX type rooftop systems. While this chiller is not large enough to meet the estimated cooling demand of the entire facility, given the Code required increase in fresh air demand, it should be able to meet the cooling demand of the classroom spaces, lab spaces, office spaces and the service / utility spaces; while the remainder of the cooling demand posed by the conditioning of the primary air for the chilled beam systems and the auditorium / lecture spaces being met via packaged DX rooftop systems.

Design Parameters:

Systems will be designed and specified to perform to the standards as defined by the Rhode Island State Building Code and the International Energy Code, (with Rhode Island amendments).

Based upon this information, the following target ranges for system design and operation will be applied:

Space Temperatures:

Winter Design:	70 deg F dry bulb, (no space humidity requirement)
Summer Design:	75 deg F dry bulb, 60 deg F wet bulb, 50% rh

Design Outdoor Air Temperatures:

Winter Design:	5 deg F dry bulb, 3.1 deg F wet bulb
Summer Design:	89 deg F dry bulb, 73 deg F wet bulb

Leaving Air Temperature: Chilled Beam Systems:

Winter Design:	55 deg F dry bulb, 51.63 gr/lb humidity ratio
Summer Design:	55 deg F dry bulb, 51.63 gr/lb humidity ratio

Leaving Air Temperature: Displacement Ventilation Systems:

Winter Design:	63-68 deg F dry bulb, 64.62 gr/lb humidity ratio
Summer Design:	63-68 deg F dry bulb, 64.62 gr/lb humidity ratio

Leaving Air Temperature: VAV Systems:

Winter Design:	65 deg F dry bulb,
Summer Design:	55 deg F dry bulb, 66.00 gr/lb humidity ratio

Condenser Water System:

Winter Design:	45 deg F Supply / 55 deg F Return *(setpoint variable to meet economizer setpoint for chilled water cooling)*
Summer Design:	85 deg F Supply / 95 deg F Return

Anti-Freeze Content: 0% solution, Propylene Glycol

Chilled Water System: Primary Loop:

Supply Water Temperature:	45 deg F
Return Water Temperature:	55 deg F

Anti-Freeze Content: 0% solution, Propylene Glycol

Chilled Water System: Chilled Beams:

Supply Water Temperature:	57 deg F (minimum)
Return Water Temperature:	67 deg F

Anti-Freeze Content: 0% solution, Propylene Glycol

Hot Water System:

Supply Water Temperature 160 deg F (maximum)

Return Water Temperature 130 deg F (minimum)

Anti-Freeze Content: 0% solution, Propylene Glycol

Electrical Power Levels:

Lighting Systems: 1.0 w/sf
Miscellaneous Loads: 1.0 w/sf

Electrical Power:

HVAC systems are to be selected for operation at 208 volt, 3 phase.

Estimated Heating and Cooling Demand:

Based upon the schematic design drawings as produced by Kite Architects, the expected heating and cooling demands for the building have been computed as follows: (Areas noted are approximate only)

CLASSROOM SPACES:	
Gross Area:	2,421 sf
Estimated Heating Demand:	30.0 btu/sf; 72.63 mbh total
Estimated Cooling Demand:	300.0 sf/ton; 8.07 tons

LAB SPACES:	
Gross Area:	17,109 sf
Estimated Heating Demand:	60.0 btu/sf; 1,026.54 mbh total
Estimated Cooling Demand:	200.0 sf/ton; 85.55 tons

OFFICE SPACES:	
Gross Area:	14,836 sf
Estimated Heating Demand:	20.0 btu/sf; 296.72 mbh total
Estimated Cooling Demand:	400.0 sf/ton; 37.09 tons

AUDITORIUM / LECTURE SPACES:	
Gross Area:	4,630 sf
Estimated Heating Demand:	30.0 btu/sf; 138.9 mbh total
Estimated Cooling Demand:	250.0 sf/ton; 18.52 tons

SERVICE / UTILITY SPACES:	
Gross Area:	1,671 sf
Estimated Heating Demand:	20.0 btu/sf; 33.42 mbh total
Estimated Cooling Demand:	400.0 sf/ton; 4.17 tons

Heating Plant:

A new steam to hot water converter will be applied within the basement mechanical room, sized to meet the gross heating demand plus an allowance for “uptake”.

The hot water flowrate through the converter will be based upon a 30 deg F differential between supply and return water temperature. The converter system will be provided with a “reset water” control sequence set to vary the leaving water temperature between 160 deg F and 100 Deg F depending upon the outdoor air temperature level.

The temperature levels selected will allow the for the future installation of stand-alone, condensing type gas fired boiler plant, should the campus's central heating plant be phased out of service.

Hot water would be circulated from building heating plant to the various terminal heating components and air handling systems via a circulating hot water system, with hot water pumping systems located within

the basement level mechanical space. There will be a dedicated "heating only" piping loop for service to the heating coils serving the lab spaces to allow year-round heating and humidity control.

Chiller Plant:

Based upon the schematic design documents, the total cooling demand of the Clarke Science Building, with a minimum safety factor, has been estimated at 168.7 tons.

Given the fairly young age of the existing packaged air-cooled chiller, it is proposed that it be re-applied to meet a portion of the building's cooling demand. As it has been proposed that packaged type DX rooftop systems be applied to meet both the tempering demands of the primary airflow provided to the chilled beams at the classroom, office and service / utility elements of the building and the full cooling demand of the auditorium / lecture spaces; the total cooling demand on the chiller posed by the remainder of the building's terminal cooling systems should be reduced to a level that can be met by the existing chiller.

Given the proposed location of the addition, at the west side of the building, it is proposed that the existing chiller be relocated and reconnected at the building's roof level. A rooftop location for the chiller is proposed for both acoustic and aesthetic reasons.

Chilled water would be circulated from this roof mounted chiller to the air handling systems via a circulating chilled water system, with the existing chilled water pumping systems at the existing basement mechanical room re-used in as much as is possible.

Hot Water Piping / Circulating Systems:

In keeping with current design standards with energy conservation in mind, it is proposed that the circulating hot water system be configured for variable flow in response to the connected heating demand. It is proposed that two pumps be provided, for primary and standby service and that these hot water pumps be installed within the basement level, along with the converter. (At this time, the possibility of re-use of the existing hot water circulators is not believed to be feasible as changes in the building's heating demand are anticipated.)

It is recommended that the hot water pumps be the "vertical in-line" type, provided with premium efficiency, inverter duty motors. The hot water pumping system will be controlled such that pump speed is varied as required to maintain a specified differential pressure level under varying flow conditions.

In addition to the installation of new pumping systems, the hot water circulating water system will also include the following:

- Dedicated variable speed drives, complete with service bypasses, will be provided for each of the two hot water pumps.
- A new hot water supply and return riser set will be installed between the basement level and the second floor for service to piping loops on a floor by floor basis.
- New hot water supply and return branch piping systems will be provided for service to the new terminal heating devices to be installed at floors B though 2.

- All piping 3" in diameter and larger shall be Schedule 40 steel, with welded joints and fittings. All piping 2-1/2" in diameter and smaller shall be Type L Copper with sweat type, or press type joints and fittings.

- All connections between the system risers and the piping loops on the individual floors will be fit with isolation valves, balancing valves, drain valves and flow measurement stations.

- All terminal heating system components will be fit with isolation valves, balancing valves, drain valves and 2-way control valves.

- All hot water system piping shall be covered with fiberglass piping insulation with an all service jacket. Insulation thickness shall conform to the requirements of the 2012 International Energy Code, with Rhode Island Amendments.

Chilled Water Distribution System:

Currently, it is the intent to preserve the existing chilled water pumping systems within the basement level mechanical room. These existing pumping systems, plate and frame heat exchanger and related air control and expansion systems will be re-applied for service to the replacement terminal cooling systems. Additional "secondary" chilled water pumps will be added for service to the chilled beams.

The chilled water distribution system will remain configured for variable speed pumping, with a "primary-secondary" configuration to maintain proper flow rate through the chiller's evaporator while the flow rate to the connected terminal cooling systems is controlled to provided variable flow in response to cooling demand.

It is proposed that the two "primary" pumps and the two "secondary" pumps remain for flow to the terminal cooling systems, other than the chilled beams. These pumps will be controlled for primary and standby service.

Like the hot water pumps, the "secondary" chilled water pumping system will be controlled such that pump speed is varied as required to maintain a specified differential pressure level under varying flow conditions.

In addition to the re-application of the existing pumping systems, the chilled water distribution system will also include the following:

- Dedicated variable speed drives, complete with service bypasses, will be provided for each of the two secondary chilled water pumps serving the lab area HVAC unit(s).

- An additional chilled water distribution system to allow tempered chilled water service to the chilled beam systems proposed for service to the Classroom, Office and Service / Utility Spaces will be provided. This additional chilled water circulating system will be served by two pumps, for primary and standby service. These chilled water pumps be installed within the basement level mechanical room.

- It is recommended that the additional chilled water pumps for flow to the chilled beams be the "vertical in-line" type, provided with premium efficiency, inverter duty motors. The hot water pumping system will be controlled such that pump speed is varied as required to maintain a specified differential pressure level under varying flow conditions.

- All piping 3" in diameter and larger shall be Schedule 40 steel, with welded joints and fittings. All piping 2-1/2" in diameter and smaller shall be Type L Copper with sweat type, or press type joints and fittings.

- All terminal cooling system components will be fit with isolation valves, balancing valves, drain valves and 2-way control valves.

- All chilled water system piping shall be covered with fiberglass piping insulation with an all service jacket. Insulation thickness shall conform to the requirements of the 2012 International Energy Code, with Rhode Island Amendments.

Chilled Beam Systems:

In an effort to maximize system efficiency and occupant comfort while minimizing system maintenance and space requirements, a system of chilled beams is proposed to condition the reconfigured classroom, office, circulation and service spaces within the building.

The chilled beams to be applied will be the "active" type, employing hydronic and primary air connections. The primary air supply will be controlled to offset both the latent cooling demand of the spaces, as well as to provide the Code specified, minimum fresh air ventilation levels.

The hydronic connections will be arranged to provide the beam coils with either chilled water to meet space cooling demands, or hot water to meet space-heating demands. The supply of either chilled or hot water to each beam, or group of beams, will be managed by "6-way" control valves with inlet connections arranged to draw either from the chilled or hot water systems.

The chilled beams will be selected to operate with a chilled water supply temperature that is slightly above the dew point temperature, or approximately 57 deg F. The chilled water supply line to the chilled beams will be monitored at each zone for the accumulation of condensation. Should condensation be sensed, the chilled water flow to the beams will be stopped to prevent damage to the building elements due to condensate build-up and an alarm will post to the automatic temperature control system.

Displacement Ventilation Systems:

To maintain optimum occupant comfort, both thermally and acoustically, at the auditorium / lecture spaces at the east end of the first floor, space cooling and ventilation is proposed to be provided by displacement ventilation systems.

At auditorium / lecture spaces, air will be delivered from diffusers at the floor level and from diffusers located low on the walls at the perimeter of the seating and stage areas. Return air will be drawn from the space from the ceiling level, above the "occupied zone" of the space. The reconstruction of the auditorium floor will create an under floor void space that will be used as a supply air plenum for the displacement ventilation system.

Heating of the auditorium / lecture spaces will be provided by hot water radiant systems.

Cabinet and Unit Heaters:

To offset heat loss during the winter months, entry vestibules will be fit with fan forced cabinet heaters with hydronic heating coils.

Basement level service, storage and mechanical spaces will be provided with space heating through the application of fan forced unit heaters with hydronic heating coils.

Dedicated Outdoor Air, (DOAS), Systems - Primary Air Service to Chilled Beams:

The primary airflow to the chilled beam systems will be provided by dedicated outdoor air systems, (DOAS). The units that condition the air for these systems are specialized in nature as it is required that the units provide conditioned air with very low humidity content to offset the latent heat gain of the conditioned spaces.

It is proposed that these units be configured with supply fans, exhaust fans, DX cooling coils, hot water heating coils, hot gas re-heat coils, air cooled condensers and heat recovery wheels. These units will also be fit with filter sections for both the supply and return air streams. Filtration of the fresh air stream will be accomplished with 85% efficient, MERV-13 filters and the exhaust air stream will be served by 30% efficient, MERV-8 filters.

For application at Clarke Science, the DOAS units will be roof mounted and will require only ducted connections for supply and return air. It is proposed that these units be mounted on seismically rated, vibration isolating roof curbs.

HVAC Units for Service to Displacement Ventilation Systems:

The HVAC units that provide airflow to the displacement ventilation systems for the auditorium / lecture spaces will be configured in similar fashion to the DOAS units for service to the chilled beams. The difference is that the air does not require conditioning to the same humidity content level.

Like the DOAS units, it is proposed that these units be configured with supply fans, exhaust fans, DX cooling coils, hot water heating coils, hot gas re-heat coils, air cooled condensers and heat recovery wheels. These units will also be fit with filter sections for both the supply and return air streams. Filtration of the fresh air stream will be accomplished with 85% efficient, MERV-13 filters and the exhaust air stream will be served by 30% efficient, MERV-8 filters.

The air handler(s) for service to the displacement ventilation systems for the auditorium / lecture spaces will be installed at the roof level, above the auditorium lobby space on a seismically rated, vibration isolating roof curb.

HVAC Units for Service to the Laboratory Spaces - VAV:

Given the varying makeup air and environmental requirements within the various lab spaces proposed as a part of the building reconfiguration, it is proposed that a variable air volume, VAV, system be applied.

The proposed air handling units will be configured with return/exhaust fans, exhaust air sections, economizer fresh air intake sections, pre-filter sections, high performance (85%) cartridge filter sections, hot water heating coils, chilled water coils and supply fans.

The air handler(s) for service to the laboratory VAV systems will be installed at the roof level, on a seismically rated, vibration isolating roof curb.

Toilet Room Exhaust Systems:

To maximize the effects of the energy recovery systems, toilet room exhaust will be incorporated into the energy recovery DOAS systems exhausting the spaces served by the chilled beam systems.

Laboratory Exhaust Systems:

Laboratory and lab prep spaces will be equipped with variable air volume type fume hoods that will be connected to a laboratory exhaust system. The exhaust fans will be the mixed flow, in line type, equipped with nozzles to propel fume up and away from the building. The fan will be mounted on the roof.

For lab spaces located at the building's first floor level, shafts will be required to house ductwork which will transport exhaust air from lab hoods up to the roof-mounted exhaust fan.

Pressure Independent Critical Space Supply Air Valves and Exhaust Air Valves:

The ductwork distribution system to laboratories will include pressure independent, variable air volume supply and exhaust air valves. Operation of the valves will be interlocked with fume hood operation and controlled by the building's Direct Digital Control, (DDC) system. The ductwork distribution systems will be configured with concealed ductwork.

Chemical Storage Room Exhaust Systems:

Chemical Storage Rooms will be equipped with dedicated exhaust fan systems. Fans will be rated for chemical exhaust (including explosion resistance rating) and exhaust ductwork will be welded stainless steel. The exhaust rate for chemical storage rooms shall be 0.5 cfm/sq.ft (ASHRAE 62.1-2007).

Copy, Janitor, Trash and Recycle Room Exhaust Systems:

Copy, Janitor, Trash and Recycle Rooms will be equipped with dedicated exhaust systems so that air from these rooms is not recirculated throughout the building. The exhaust rate for Copy Rooms shall be 0.5 cfm/sq.ft. and the exhaust rate for Janitor, Trash and Recycle Rooms shall be 1.0 cfm/sq.ft (ASHRAE 62.1-2007).

Air Distribution Ductwork Systems:

The ductwork distribution system will be arranged to serve the primary air component of the active chilled beam systems, the displacement ventilation systems, the VAV distribution systems and the return and

exhaust systems. It is anticipated that the system will be configured with both exposed and concealed ductwork, depending upon ceiling configuration.

Ductwork provided as a part of the HVAC systems shall be constructed to meet all functional criteria defined in Section 7 of the 1995 SMACNA "HVAC Duct Construction Standards, Metal and Flexible", Second Edition, except as noted: All ductwork will not exceed the deflection limits established in The Uniform Mechanical Code Standard 6-1: Standard for Metal Ducts, 1997 Edition.

All ductwork shall be insulated in accordance with the requirements of the International Energy Code. Supply, return and exhaust ductwork at all floor levels will be served by connections to main system risers. Per the requirements of NFPA-90a and the International Mechanical Code, these risers will be housed within shafts constructed with a 1-hour fire rating. Connections to the duct risers will be fit with fire dampers at the locations where the fire rated shafts are penetrated.

Fume Hood Exhaust Ductwork Systems:

Exhaust from fume hoods will be via stainless steel ductwork to the laboratory exhaust fan located on the roof. Stainless steel ductwork will be fit with welded seams. Laboratory exhaust ductwork will not be insulated.

Insulation and Sealant for Distribution Ductwork:

Any ductwork located outside of conditioned spaces will be wrapped with a minimum of R-12 insulation. Insulation all supply ductwork located within conditioned spaces will have a minimum of R-8 insulation. All ductwork insulation shall be on the exterior of the duct. Outside air intake ducts and primary equipment supply ducts shall also be insulated with a minimum of R-12 insulation.

All duct joints and connections shall be secured using mechanical fasteners and shall be sealed using duct sealing mastic with UL label181A-M or 181B-M.

Space Dehumidification:

Dedicated systems for controlled space de-humidification or humidification are not proposed to be a part of the HVAC system.

Dedicated Process Air Conditioning:

Should specialized spaces, such as network rooms or elevator machine rooms, require dedicated systems for environmental control, or process cooling, dedicated cooling, packaged type, ductless split system air conditioning units will be applied. These systems would be configured with evaporators located within the condition spaces and their related compressor/condenser units located at the building's roof level.

The dedicated process air conditioning systems will be specified as units manufactured by Mitsubishi, Panasonic or Sanyo.

System Performance Acceptance Testing:

Acceptance testing shall be performed by the installing contractor(s), engineer of record or owner's agent to deliver a building that meets or exceed the requirements of the owner. The following equipment shall be tested per the requirements of the International Green Construction Code:

- Outdoor Air Systems
- Packaged Rooftop Units
- Air Distribution Systems
- Economizers
- Demand Controlled Ventilation Systems
- VAV And VFD Systems
- Hydronic System Controls
- Chilled Water Systems
- Fans and Circulating Pumps
- Daylighting Controls
- Occupancy Controls
- Automatic Time Of Day Controls
- Building Controls

Automatic Temperature Control Systems:

The facility is to be fit with a direct digital type temperature control system to serve all elements of the HVAC system.

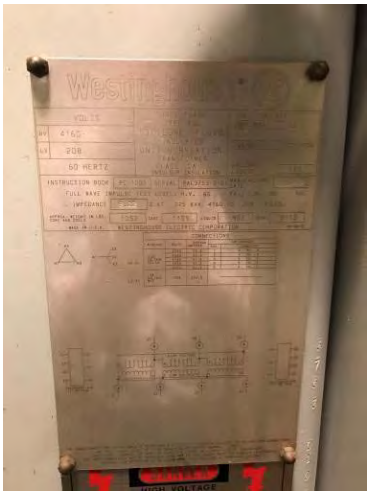
It is intended that the system will be suitable for interface with the campus's existing Siemens Systems.

ELECTRICAL POWER AND LIGHTING SYSTEMS:

1. Existing Facility Evaluation

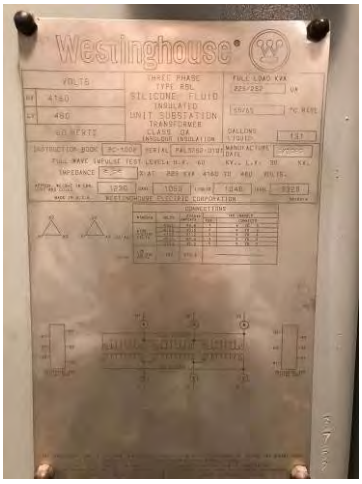
    a. Electrical
        1) Power Distribution System:
            a) The entire building is served from a single (1) 225kVA pad mounted transformer located in the basement. The primary voltage is 4160V, with the primary switches replaced in early 2010 per the building records. The secondary side of the transformer feeds a 120/208 volts, 3-phase, 4-wire, 800A main panelboard. This panel serves all branch circuit panels and elevator. There are no spares and four (4) 150A spaces.

Primary Feeders


Transformer Nameplate

Main Switchboard

b) There is a second 225kVA pad mounted transformer located in the basement. The primary voltage is also 4160V. The secondary side of the transformer feeds a 480 volt, 3-phase, 3-wire, 400A main switchboard, also located in the basement. This panel serves the AON Chiller unit.



Second Transformer

Second Switchboard

c) Each lab is powered by flush mounted Westinghouse panelboards.

Lab Panelboard (1)

Lab Panelboard (2)

d) All lab electrical panels are Westinghouse equipment, installed at a minimum of 30 years ago. Panels are very old and should be replaced. There are limited spaces and spare breakers available within these panels.

2) Emergency Power:
   a) The entire 208V electrical service is backed up by a 250kVA 208Y/120V 3phase 4wire Kohler Generator with Kohler ATS. There is no life safety separation.

Generator

Automatic Transfer Switch

Generator Control Panel

3) Lighting & Controls:
   a) General lighting in the labs are single, fluorescent surface wrap arounds. They are 8ft on center in continuous rows. All light controls are wall mounted toggle switches.

   b) General lighting in the corridors are lensed 2x4 2-lamp fixtures.

Typical Interior Lighting Fixtures

Typical Corridor Lighting Fixtures

c) General lighting in the corridors are lensed 2x4 2-lamp fixtures.

d) Lighting is being retrofitted with new LEDs per the building supervisor.

e) Emergency Central battery unit is in the corridors believed to power the exit signs.

Emergency Central Battery Unit

f) Lab 211 has all new LED light fixtures with occupancy sensors.

New LED Lighting Fixtures in Lab 211

4) Devices and Branch Circuit Wiring:
   a) In general, there are duplex outlets in all areas with no GFI receptacles.

   b) There are no Emergency power off (EPO) switches in the labs.

   c) The lab counters have surface mounted raceways with outlets.

   d) Lab 211 has GFCI per the label on the receptacles.

GFCI Breakers

5) HVAC Power:
   a) Chiller is an AON unit fed directly out of the 480V switchboard.

   b) All other mechanical equipment is fed out of the 208V switchboard.

6) Fire Alarm System:
   a) The main panel is an addressable hardwired FCI system. Masterbox number is 1944. It was last tested June 2017. All head end equipment appears to be updated within the past several years.

Fire Alarm Control Panel

   b) Ceiling mounted A/V units provide coverage in each lab. Wall mounted A/V provide coverage in each corridor.

   c) Smoke detection is at each classroom, in the corridors, and top/bottom of stairwells.

   d) Magnetic door hold opens on egress doors.

7) Tel/Communication:
   a) The telephone and communication services are provided from the local cable company (assumed to be Cox Cable).

2. Summary of Recommendations
   a. Electrical
      1) Update all interior lighting with LED fixtures.
      2) Provide GFI receptacles in the labs as required by code.
      3) Add new receptacles to meet code.
      4) Provide new FA devices as required by code.
      5) Replace all branch circuit panelboards with updated equipment with more available spaces and readily available parts and breakers.
      6) Provide EPO buttons for all lab power panels.
      7) Separate the emergency distribution for Life Safety and Optional emergency power per the NEC.

CLARKE SCIENCE BUILDING AT RHODE ISLAND COLLEGE

FEASIBILITY STUDY

Appendix D - Existing Photos

August 2020

SLAM

APPENDIX E. EXISTING CONDITIONS PHOTOGRAPHS

LAB 217
Analytical Chemistry

- 1960's era lab casework
- Three center island configuration
- Improvements under consideration by the college
- May be converted to General Chemistry Lab pending renovation of Lab 213

LAB 212
General Organic Chemistry / Nursing
- 1960's era lab casework
- Three center island configuration
- Non ADA accessible

LAB 214
General Organic Chemistry / Nursing
- 1960's era lab casework
- Three center island configuration
- Non ADA accessible
- Fume Hood
- Front of class at end of long rectangle space not ideal for teaching

LAB 211
Organic Chemistry

- Recently Renovated
- Old Fume Hoods and Fans remain. (Containing Asbestos Materials)
- Used for small group student work. More independent study.
- Corridor wall lined with (5) fume hoods. (2) students share (1) hood

LAB 213
Physical Chemistry

- Improvements under consideration by the college
- Room may be subdivided. 1/3 for Analytical Chemistry. 2/3 for Computer Lab.

Classroom 210

- Size of Classroom (approx 24 x 30) is adequate for class size.
- Desk Seating does not accommodate group work

LAB 106
Biochemistry

- Recently Renovated
- Upper Level Lab Space
- Fall Semester – Research Only
- Summer – Undergraduate Study
- Shared by 2 Faculty

Classroom 116

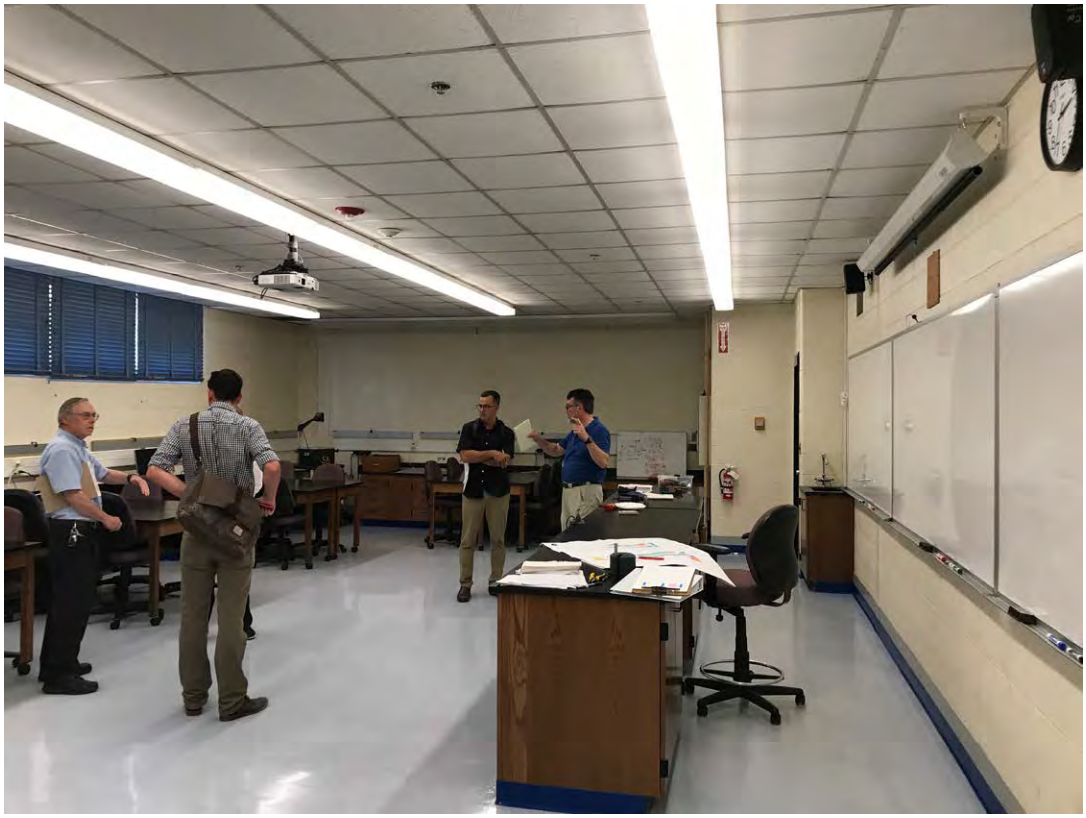
- Long table and chairs re-purposed from other campus renovations.
- Computers around perimeter of room.

LAB 115
Physical Science and Physics

- Used for Geology, Oceanography, Meteorology
- 1960's era lab casework
- Four center island configuration with 8 students per island.
- Non ADA accessible

LAB 119
Physics

- Flexible Space.
- 3-4 student center tables on casters.
- Power located on perimeter built-in cabinets – difficult to get power to center tables.



LAB 123
Physics & Mechanics

- Flexible Space.
- Set up with peninsula tables perpendicular to perimeter built-in cabinets.
- Computers located at perimeter.
- Long rectangle space not ideal for teaching

LAB 120
Upper Level Physics and Astronomy

- 1960's era lab casework
- (4) six-student center island configuration
- Used for longer terms, semester long project storage

Basement Room B1
Storage (Former Auto Shop)

CLARKE SCIENCE BUILDING AT RHODE ISLAND COLLEGE

FEASIBILITY STUDY

Appendix E - Hazardous Materials Analysis

August 2020

SLAM

October 24, 2018

KITE Architects
Attn: Mr. Albert Garcia
1 Central Street
Providence, RI 02907

Re: Asbestos and Lead Assessment for Clarke Science Building.

Mr. Garcia:

During the month of September 2018 ECM Inc inspector Joseph M. Lepore conducted lead paint and asbestos sampling from the Clarke Science Building located on the campus of Rhode Island College. The sampling was performed to identify potential hazardous materials present within the building. The building was occupied at the time of the inspection. Efforts were made to identify hidden and concealed materials, however destructive sampling was not performed at this time.

Asbestos Report:

The inspection consisted of identifying and collecting suspect asbestos containing building materials (ACBM) within the building. These materials are then analyzed utilizing Polarized Light Microscopy (PLM) in accordance with Environmental Protection Agency (EPA) method 600/R-93/116. In addition to collection, quantity and location of ACBM has also been denoted within this report. Please refer to **Attachment 1** for the analytical results. As part of the inspection ECM included results from previous inspections of the building. These results have been included in **Attachment 2**.

Below is a chart of the samples collected.

Clarke Science Building – Asbestos Results

Sample #	Material	Location	Asbestos %	Quantity
01A-C	**Black Glue Dabs**	**Behind Chalk Board/Bulletin Boards**	**2% Chrysotile**	**500sf**
02A-C	Tarpaper above ceilings	2nd floor underside of roof deck	None Detected	NA
03A-E	2x4 Ceiling tiles	Throuhgout Building	None Detected	NA
04A-C	**9x9 Floor Tile**	**Classrooms, stair landings and hallways**	**5% Chrysotile**	**20,000sf**
05A-C	Black Mastic	Mastic associated with 9x9 Floor Tiles	None Detected	NA
06A	Black 12x12 Floor Tile	Hallways and Rooms	None Detected	NA

Sample #	Material	Location	Asbestos %	Quantity
07A	Mastic	Hallways and Rooms	None Detected	NA
08A	**Fume Hoods and Vent Stacks**	**Classrooms-Vents exit on Roof top**	**20% Chrysotile**	**12 Hoods 6 Stacks**
09A-C	**Interior Window Caulk**	**Interior Side of Windows**	**2% Chrysotile**	**Included in 13A-C**
010A-C	Skimcoat	Skim on Plaster Walls	None Detected	NA
011A-C	Plaster walls	Walls throughout	None Detected	NA
012A	**Thermal System Insulation Pipe Insulation**	**Above ceilings, hidden in walls**	**60% Chrysotile**	**Included in 17A-B**
013A-C	**Exterior door and window caulk**	**Exterior doors and windows**	**3% Chrysotile**	**3,200sf of Window and Door Surface**
014A-B	**Expansion caulk**	**Exterior caulk at expansion seams**	**3% Chrysotile**	**400lf of caulking**
015A-C	Skimcoat on Ceilings	Ceilings throughout	None Detected	NA
016A-C	Plaster Ceilings	Ceilings throughout	None Detected	NA
017A-B	**Fittings/Elbows on fiberglass lines**	**Throughout building. Above ceilings in walls. Basement mechanical room**	**15% Chrysotile 20% Amosite**	**Approx 2000lf**
018A-C, 019A-C	**Boiler room ceiling and sprayon**	**Basement boiler room-fixed ceiling with sprayon above**	**25% Chrysotile**	**Approx 1000sf**
020A	Duct seam/mudded	Seams of duct in basement	None Detected	NA
021A-E	**Flashing on roof**	**Edge, penetration, and seam flashing on room**	**10% Chrysotile**	**Approx 1500sf**
Previous Sample Results				
01A-2A	**9x9 Floor Tile**	**Room 116**	**Throughout 1st and 2nd Floor**	**4% Chrysotile**
01A-2A	Mastic	Room 116		Negative
03A-B	2x4 Ceiling Tiles	Room 116 and Hallway	All Rooms and Hallway 1st Floor	Negative
04A	Covebase Adhesive	Room 116	Throughout Building	Negative
05A-B	**Fittings and Elbows on Heating and Water Lines**	**Room 116 Above Ceiling**	**Throughout Building Above Ceilings and in Wet Walls**	**10% Chrysotile 15% Amosite**
06A-D 07A-D	Plaster and Skimcoat	Room 116 Walls	First Floor Classrooms over Block Walls	Negative
08A	2x4 Ceiling Tiles	2nd Floor Hallways	Throughout 2nd Floor	Negative

Sample #	Material	Location	Asbestos %	Quantity
Clarke Science Greenhouse				
G-1A	**Transite Raised Beds**	**Raised Bed Planters**	**Throughout None**	**20% Chrysotile**
G-2A	**Transite Kneewall**	**Around Entire Greenhouse and Separator Walls Inside**		
G-3A	**Table**	**Side Area of Greenhouse**		
G-4A	12x12 White Floor Tile	Greenhouse Office	None	Negative
G-5A	Roof Shingles	Over Side Area of Greenhouse	None	Negative

Conclusion:

Flooring:

ECM estimates approximately 20,000 sf of asbestos containing 9x9 floor tile located throughout the building. Mastic to flooring is non asbestos.

Thermal System Insulation:

Asbestos containing fittings and insulation were identified above the ceilings in the basement, first floor and second floor of the building. Approximately 500lf was identified during the inspection. ECM believes that hidden and concealed pipe insulation is present in walls and chases. ECM estimates 2000lf of this material.

Transite Fume Hoods and Vent Stacks:

Twelve transite fume hoods with vent stacks were identified in the building. Vent stacks can be observed venting out on the roof top. Hoods are located on the first and second floors of the building. ECM estimates six vent stacks running vertically to the roof.

Glue Dabs:

Black glue dabs were observed behind chalk boards in classrooms. ECM estimates this material to be present behind all bulletin boards and chalk boards.

Mechanical Room (Basement):

Asbestos containing pipe insulation was identified in the basement mechanical room. The pipe quantity is included in the TSI count for the building. Spray on fire proofing was identified above the plaster ceiling in this areas. Plaster ceiling in this area should be considered as Asbestos Contaminated. Fire proofing is asbestos containing. There is approximately 1000sf of spray on fire proofing and 1000sf of contaminated plaster ceiling in this area.

Roof:

All edges, penetrations and seams are asbestos containing.

Greenhouse:

Transite knee-wall surrounding the greenhouse, raised planter beads and tables were all identified to be asbestos containing items. There is approximately **700sf** of asbestos containing transite knee-wall surrounding the exterior and interior of the structure. There is approximately **600sf** of transite raised beds and table space.

Estimated Abatement Cost

Material	Estimated Cost
Flooring	$100,000
Glue Dabs	$5,000
Fume Hoods and Vent Stacks	$10,000
Window Caulking, Door Caulking, Expansion Caulk	$36,000
Spray on and ceiling	$20,000
Roofing	$15,000
Greenhouse-Transite	$20,000
Total Estimated Cost	**$206,000 +/- 10%**

Lead Report:

Lead paint was collected from the painted building components to establish the lead concentration. The samples were analyzed utilizing EPA test method SW846/3050B/7000B.

Lead Based Paint Sample Chart:

Material	Location	Lead Results (ppm)	Lead Results (%)
Structural Steel	**Above ceilings and behind walls**	**12230**	**1.223**
1st Floor Walls	CMU Walls	196	0.02
Black Door Frames	**Throughout Interior**	**9758**	**0.976**
Black Stair Railing	Stairwells	689.5	0.069
2nd Floor Walls	CMU Walls	96	0.01

Conclusions:

The majority of wall and ceiling paint has minimal lead content and should not pose and issue for demolition and or disposal.

Structural steel (Red Beams) and Black Paint on door frames displayed elevated lead counts. If these items are to be impacted in any way OSHA Lead in Construction Regulations would apply. If any of these items are to be disposed of a TCLP should be performed to accurately categorize waste.

The disposal of lead tainted materials is regulated by the EPA (40 CFR 261.24). EPA regulations require that a Toxicity Characteristic Leaching Procedure (TCLP) be utilized to classify the waste stream prior to having the waste enter a specified landfill. Waste streams whose TCLP yield results of 5.0 mg/l of lead or greater would need to be disposed of as lead tainted waste. Concentrations under 5.0 mg/l could be disposed of as general construction waste provided that no additional hazards exist.

Limitations:

Though attempts were made to search for hidden and/or concealed materials, Environmental Consulting and Management cannot be held responsible for the identification of materials that are hidden, concealed or otherwise inaccessible. The building was occupied at the time of this building inspection. Additional evaluation of occupied areas may be necessitated prior to start of work.

This report was prepared under the request of KITE Architects. This report should not be represented, reproduced, or disseminated without the written approval of Environmental Consulting and Management or KITE Architects. No warranties other than those expressed in the contract for this project are expressed or implied.

A hard copy of this report can be provided for your records via mail upon request. If you have any further questions feel free to contact myself at 401-304-6614.

Sincerely,
Environmental Consulting & Management

Joseph M. Lepore
Project Manager
Asbestos Insp. Lic. #AAC-0661

Attachment 1
Asbestos Bulk Sample Results

SanAir Technologies Laboratory

The Identification Specialists

Analysis Report
prepared for
Environmental Consulting & Management Inc

Report Date: 10/5/2018

Project Name: RIC Clarke Science

Project #: 180697

SanAir ID#: 18044193

NVLAP TESTING

NVLAP LAB CODE 200870-0

1551 Oakbridge Dr. Suite B | Powhatan, Virginia 23139-8061
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com

SanAir ID Number
18044193
FINAL REPORT
10/5/2018 4:36:57 PM

Name: Environmental Consulting & Management Inc
Address: 50 Kickemuit Ave
Bristol, RI 02809
Phone: 401-438-1360

Project Number: 180697
P.O. Number:
Project Name: RIC Clarke Science
Collected Date: 9/26/2018
Received Date: 9/28/2018 10:40:00 AM

Dear Joseph M. Lepore,

We at SanAir would like to thank you for the work you recently submitted. The 55 sample(s) were received on Friday, September 28, 2018 via FedEx. The final report(s) is enclosed for the following sample(s): 01A, 01B, 01C, 02A, 02B, 02C, 03A, 03B, 03C, 03D, 03E, 04A, 04B, 04C, 05A, 05B, 05C, 06A, 07A, 08A, 09A, 09B, 09C, 010A, 010B, 010C, 011A, 011B, 011C, 012A, 013A, 013B, 013C, 014A, 014B, 015A, 015B, 015C, 016A, 016B, 016C, 017A, 017B, 018A, 018B, 018C, 019A, 019B, 019C, 020A, 021A, 021B, 021C, 021D, 021E.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

Sandra Sobrino

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

Sample conditions:
- 1 samples in Discrepancy w/ COC condition. (#23)
- 54 samples in Good condition.

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10/5/2018 4:36:57 PM

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Project Number: 180697
P.O. Number:
Project Name: RIC Clarke Science
Collected Date: 9/26/2018
Received Date: 9/28/2018 10:40:00 AM

Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

	Stereoscopic	Components		
SanAir ID / Description	Appearance	% Fibrous	% Non-fibrous	Asbestos Fibers
01A / 18044193-001 Glue Daubs Behind Boards	Black Non-Fibrous Homogeneous		98% Other	2% Chrysotile
01B / 18044193-002 Glue Daubs Behind Boards	Black Non-Fibrous Homogeneous		98% Other	2% Chrysotile
01C / 18044193-003 Glue Daubs Behind Boards	Black Non-Fibrous Homogeneous		98% Other	2% Chrysotile
02A / 18044193-004 Tar Paper Above Ceiling 2nd	Various Fibrous Homogeneous	80% Cellulose	20% Other	None Detected
02B / 18044193-005 Tar Paper Above Ceiling 2nd	Various Fibrous Homogeneous	80% Cellulose	20% Other	None Detected
02C / 18044193-006 Tar Paper Above Ceiling 2nd	Various Fibrous Homogeneous	80% Cellulose	20% Other	None Detected
03A / 18044193-007 2X4 CT	White Fibrous Homogeneous	60% Cellulose 20% Glass	20% Other	None Detected
03B / 18044193-008 2X4 CT	White Fibrous Homogeneous	60% Cellulose 20% Glass	20% Other	None Detected
03C / 18044193-009 2X4 CT	White Fibrous Homogeneous	60% Cellulose 20% Glass	20% Other	None Detected
03D / 18044193-010 2X4 CT	White Fibrous Homogeneous	60% Cellulose 20% Glass	20% Other	None Detected

Analyst: Susan L. Childress Approved Signatory:

Analysis Date: 10/5/2018 Date: 10/5/2018

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Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

	Stereoscopic	Components		
SanAir ID / Description	Appearance	% Fibrous	% Non-fibrous	Asbestos Fibers
03E / 18044193-011 2X4 CT	White Fibrous Homogeneous	60% Cellulose 20% Glass	20% Other	None Detected
04A / 18044193-012 9X9 FT	Brown Non-Fibrous Homogeneous		95% Other	5% Chrysotile
04B / 18044193-013 9X9 FT	Brown Non-Fibrous Homogeneous		95% Other	5% Chrysotile
04C / 18044193-014 9X9 FT	Grey Non-Fibrous Homogeneous		95% Other	5% Chrysotile
05A / 18044193-015 Mastic	Black Non-Fibrous Homogeneous		100% Other	None Detected
05B / 18044193-016 Mastic	Black Non-Fibrous Homogeneous		100% Other	None Detected
05C / 18044193-017 Mastic	Black Non-Fibrous Homogeneous		100% Other	None Detected
06A / 18044193-018 12X12 FT	Black Non-Fibrous Homogeneous		100% Other	None Detected
07A / 18044193-019 Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
08A / 18044193-020 Fume Hoods & Ducts	Grey Non-Fibrous Homogeneous		80% Other	20% Chrysotile

Analyst: Susan L. Childress Approved Signatory:

Analysis Date: 10/5/2018 Date: 10/5/2018

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Received Date: 9/28/2018 10:40:00 AM

Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

	Stereoscopic	Components		
SanAir ID / Description	Appearance	% Fibrous	% Non-fibrous	Asbestos Fibers
09A / 18044193-021 Interior Window Caulk	Beige Non-Fibrous Homogeneous		98% Other	2% Chrysotile
09B / 18044193-022 Interior Window Caulk	Beige Non-Fibrous Homogeneous		98% Other	2% Chrysotile
09C / 18044193-023 Interior Window Caulk, Plaster	Beige Non-Fibrous Homogeneous		100% Other	None Detected
010A / 18044193-024 Skim Coat - Stairs	White Non-Fibrous Homogeneous		100% Other	None Detected
010B / 18044193-025 Skim Coat - Stairs	White Non-Fibrous Homogeneous		100% Other	None Detected
010C / 18044193-026 Skim Coat - Stairs	White Non-Fibrous Homogeneous		100% Other	None Detected
011A / 18044193-027 Plaster - Stairs	Grey Non-Fibrous Homogeneous		100% Other	None Detected
011B / 18044193-028 Plaster - Stairs	Grey Non-Fibrous Homogeneous		100% Other	None Detected
011C / 18044193-029 Plaster - Stairs	Grey Non-Fibrous Homogeneous		100% Other	None Detected
012A / 18044193-030 Pipe Ins. / Fittings	Grey Fibrous Homogeneous		40% Other	60% Chrysotile

Analyst: Susan L. Childress Approved Signatory:

Analysis Date: 10/5/2018 Date: 10/5/2018

SanAir ID Number
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Received Date: 9/28/2018 10:40:00 AM

Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

	Stereoscopic	Components		
SanAir ID / Description	Appearance	% Fibrous	% Non-fibrous	Asbestos Fibers
013A / 18044193-031 Door / Window Caulk	Beige Non-Fibrous Homogeneous		97% Other	3% Chrysotile
013B / 18044193-032 Door / Window Caulk	Beige Non-Fibrous Homogeneous		97% Other	3% Chrysotile
013C / 18044193-033 Door / Window Caulk	Beige Non-Fibrous Homogeneous		97% Other	3% Chrysotile
014A / 18044193-034 Expansion Caulk - Exterior	Beige Non-Fibrous Homogeneous		97% Other	3% Chrysotile
014B / 18044193-035 Expansion Caulk - Exterior	Beige Non-Fibrous Homogeneous		97% Other	3% Chrysotile
015A / 18044193-036 Skimcoat - Ceilings	White Non-Fibrous Homogeneous		100% Other	None Detected
015B / 18044193-037 Skimcoat - Ceilings	White Non-Fibrous Homogeneous		100% Other	None Detected
015C / 18044193-038 Skimcoat - Ceilings	White Non-Fibrous Homogeneous		100% Other	None Detected
016A / 18044193-039 Plaster - Ceilings	Grey Non-Fibrous Homogeneous		100% Other	None Detected
016B / 18044193-040 Plaster - Ceilings	Grey Non-Fibrous Homogeneous		100% Other	None Detected

Analyst: Susan L. Childress Approved Signatory:

Analysis Date: 10/5/2018 Date: 10/5/2018

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Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

	Stereoscopic	Components		
SanAir ID / Description	Appearance	% Fibrous	% Non-fibrous	Asbestos Fibers
016C / 18044193-041 Plaster - Ceilings	Grey Non-Fibrous Homogeneous		100% Other	None Detected
017A / 18044193-042 Fittings / Elbows	White Non-Fibrous Homogeneous		65% Other	15% Chrysotile 20% Amosite
017B / 18044193-043 Fittings / Elbows	White Non-Fibrous Homogeneous		65% Other	15% Chrysotile 20% Amosite
018A / 18044193-044 Boiler Room Ceiling	Grey Non-Fibrous Homogeneous		100% Other	None Detected
018B / 18044193-045 Boiler Room Ceiling, Plaster	Grey Non-Fibrous Homogeneous		100% Other	None Detected
018B / 18044193-045 Boiler Room Ceiling, Spray-On	White Fibrous Homogeneous	35% Glass	50% Other	15% Chrysotile
018C / 18044193-046 Boiler Room Ceiling	Grey Non-Fibrous Homogeneous		100% Other	None Detected
019A / 18044193-047 Spray-On Above BR Ceiling	White Fibrous Homogeneous	30% Glass	45% Other	25% Chrysotile
019B / 18044193-048 Spray-On Above BR Ceiling	White Fibrous Homogeneous	30% Glass	45% Other	25% Chrysotile
019C / 18044193-049 Spray-On Above BR Ceiling	White Fibrous Homogeneous	30% Glass	45% Other	25% Chrysotile

Analyst: Susan L. Childress Approved Signatory:

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Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

	Stereoscopic	Components		
SanAir ID / Description	Appearance	% Fibrous	% Non-fibrous	Asbestos Fibers
020A / 18044193-050 Duct - Seams Of FG, Insulation	Gold Fibrous Homogeneous	98% Glass	2% Other	None Detected
020A / 18044193-050 Duct - Seams Of FG, Mud	Grey Non-Fibrous Homogeneous	30% Glass	70% Other	None Detected
021A / 18044193-051 Roof Flashing	Black Non-Fibrous Homogeneous		92% Other	8% Chrysotile
021B / 18044193-052 Roof Flashing	Black Non-Fibrous Homogeneous		100% Other	None Detected
021C / 18044193-053 Roof Flashing	Various Non-Fibrous Heterogeneous	10% Cellulose	90% Other	None Detected
021D / 18044193-054 Roof Flashing	Black Non-Fibrous Homogeneous		90% Other	10% Chrysotile
021E / 18044193-055 Roof Flashing	Various Non-Fibrous Heterogeneous		90% Other	10% Chrysotile

Analyst: Susan L. Childress Approved Signatory:

Analysis Date: 10/5/2018 Date: 10/5/2018

SanAir Technologies Laboratory

1551 Oakbridge Dr. STE B
Powhatan, VA 23139
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Asbestos Chain of Custody

Form 140, Rev 1, 1/20/2017

SanAir ID Number: 18044193

Company: Environmental Consulting & Management Inc	Project #: 180697	Collect by: Joe Lepre	
Address: 50 Kickemuit Ave	Project Name: RIC Clarke Science	Phone #: 401-438-1360	
City, St., Zip: Bristol, RI 02809	Date Collected: 9/26/18	Fax #: 401-438-1316	
State of Collection: RI Account#: 2667	P.O. Number:	Email: JLepre@ECMNE.com	

Bulk

ABB	PLM EPA 600/R-93 116	☒
	Positive Stop ☐	
ABEPA	PLM EPA 400 Point Count	☐
ABB1K	PLM EPA 1000 Point Count	☐
ABBEN	PLM EPA NOB**	☐
ABBCH	TEM Chatfield**	☐
ABBTM	TEM EPA NOB**	☐
ABQ	PLM Qualitative	☐

** Available on 24-hr. to 5-day TAT

Water

ABHE	EPA 100.2	☐

Air

ABA	PCM NIOSH 7400	☐
ABA-2	OSHA w/ TWA*	☐
ABTEM	TEM AHERA	☐
ABATN	TEM NIOSH 7402	☐
ABT2	TEM Level II	☐
Other:		☐

New York ELAP

PLM NY	PLM EPA 600/M4-82-020	☐
ABEPA2	NY ELAP 198.1	☐
ABENY	NY ELAP 198.6 PLM NOB	☐
ABBNY	NY ELAP 198.4 TEM NOB	☐

Soil

ABSE	PLM EPA 600/R-93/116 (Qual.)	☐

Vermiculite & Soil

ABSP	PLM CARB 435 (LOD <1%)	☐
ABSP1	PLM CARB 435 (LOD 0.25%)	☐
ABSP2	PLM CARB 435 (LOD 0.1%)	☐

Dust

ABWA	TEM Wipe ASTM D-6480	☐
ABDMV	TEM Microvac ASTM D-5755	☐

Other

Matrix		
		☐

Turn Around Times	3 HR (4 HR TEM) ☐	6 HR (8HR TEM) ☐	12 HR ☐	24 HR ☐
	☐ 2 Days	☐ 3 Days	☐ 4 Days	☒ 5 Days

Special Instructions

Sample #	Sample Identification/Location	Volume or Area	Sample Date	Flow Rate*	Start – Stop Time*	
01A	Black Glue dabs Behind Boards					
01B	↓					
01C	↓					
02A	Tar paper above ceiling 2nd fl					
02B	↓					
02C	↓					
03A	2x4 CT					
03B	↓					
03C	↓					
03D	↓					
03E	↓					
04A	9x9 CT					

Relinquished by	Date	Time	Received by	Date	Time
[signature]	9/27/18	3pm	[signature]	SEP 28 2018	10:40 am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST Friday will begin at 8 am Monday morning. Weekend or holiday work must be scheduled ahead of time and is charged for rush turnaround time. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page___of _____

18044193

Form 140, Revision 1, 1/20/2017

Sample #	Sample Identification/Location	Volume or Area	Sample Date	Flow Rate*	Start – Stop Time*	
04B	9x9 FT					
04C	" "					
05A	Black mastic					
05B	↓					
05C	↓					
06A	12x12 FT Black					
07A	Mastic					
08A	Fume hoods + Ducts					
09A	Interior window Caulk					
09B	↓					
09C	↓					
010A	Skim coat - Stairs					
010B	↓					
010C	↓					
011A	Plaster - Stairs					
011B	↓					
011C	↓					
012A	Pipe ins. / Fittings					
013A	Door/window Caulk					
013B	↓					
013C	↓					
014A	Expansion Caulk - Exterior					
014B	" "					
015A	Skimcoat - Ceilings					
015B	↓					
015C	↓					
016A	Plaster - Ceilings					
016B	↓					
016C	↓					
017A	Fittings / Elbows					
017B	" "					

Special Instructions	

Relinquished by	Date	Time	Received by	Date	Time
[illegible]	9/27/18	3pm	[illegible]	SEP 28 2018	10:40 am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST Friday will begin at 8 am Monday morning. Weekend or holiday work must be scheduled ahead of time and is charged for rush turnaround time. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page __of ____

18044193

Form 140, Revision 1, 1/20/2017

Sample #	Sample Identification/Location	Volume or Area	Sample Date	Flow Rate*	Start – Stop Time*	
018A	Boiler Room Ceiling					
018B	↓					
018C	↓					
019A	Spray-on above BR Ceiling					
019B	↓					
019C	↓					
020A	Duct – Seams of FG					
021A	Roof Flashing					
021B	↓					
021C	↓					
021D	↓					
021E	↓					

Special Instructions	

Relinquished by	Date	Time	Received by	Date	Time
[illegible]	9/27/18	3pm	[illegible]	SEP 28 2018	10:40 am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST Friday will begin at 8 am Monday morning. Weekend or holiday work must be scheduled ahead of time and is charged for rush turnaround time. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page ___of _____

Attachment 2
Previous Sampling Report (Greenhouse)

SanAir Technologies Laboratory

Analysis Report

prepared for

Environmental Consulting & Management Inc

Report Date: 5/22/2017
Project Name: Clarke Science
Project #: 170301
SanAir ID#: 17017826

NVLAP LAB CODE 200870-0

Virginia SBE
Certification # 652931

Texas Licensed Mold Analysis Laboratory
License # LAB0166

SanAir Technologies Laboratory

804.897.1177 www.sanair.com

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

Environmental Consulting & Management Inc
50 Kickemuit Ave
Bristol, RI 02809

May 22, 2017

SanAir ID # 17017826
Project Name: Clarke Science
Project Number: 170301

Dear Joseph M. Lepore,

We at SanAir would like to thank you for the work you recently submitted. The 21 sample(s) were received on Tuesday, May 16, 2017 via FedEx. The final report(s) is enclosed for the following sample(s): 01A, 02A, 03A, 03B, 04A, 05A, 05B, 06A, 06B, 06C, 06D, 07A, 07B, 07C, 07D, 08A, G-1A, G-2A, G-3A, G-4A, G-5A.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

Sandra Sobrino

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

sample conditions:
21 sample(s) in Good condition

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

17017826

FINAL REPORT

Name: Environmental Consulting & Management Inc
Address: 50 Kickemuit Ave
Bristol, RI 02809

Project Number: 170301
P.O. Number:
Project Name: Clarke Science

Collected Date: 5/15/2017
Received Date: 5/16/2017 10:25:00 AM
Report Date: 5/22/2017 3:36:33 PM
Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
01A / 17017826-001 9x9 FT W/ Mastic, Floor Tile	Brown Non-Fibrous Homogeneous		96% Other	4% Chrysotile
01A / 17017826-001 9x9 FT W/ Mastic, Mastic	Black Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
02A / 17017826-002 9x9 FT W/ Mastic, Floor Tile	Brown Non-Fibrous Homogeneous		98% Other	2% Chrysotile
02A / 17017826-002 9x9 FT W/ Mastic, Mastic	Black Non-Fibrous Homogeneous		100% Other	< 1% Chrysotile

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
03A / 17017826-003 2x4 CT	White Fibrous Homogeneous	55% Cellulose 25% Glass 10% Min. Wool	10% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
03B / 17017826-004 2x4 CT	White Fibrous Homogeneous	55% Cellulose 25% Glass 10% Min. Wool	10% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
04A / 17017826-005 Covebase Adhesive	Beige Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
05A / 17017826-006 Fittings	Various Non-Fibrous Heterogeneous	10% Cellulose	65% Other	10% Chrysotile 15% Amosite

Certification

Analyst: Susan L. Childress
Analysis Date: 5/22/2017

Approved Signatory:
Date: 5/22/2017

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

17017826

FINAL REPORT

Name: Environmental Consulting & Management Inc
Address: 50 Kickemuit Ave
Bristol, RI 02809

Project Number: 170301
P.O. Number:
Project Name: Clarke Science

Collected Date: 5/15/2017
Received Date: 5/16/2017 10:25:00 AM
Report Date: 5/22/2017 3:36:33 PM
Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
05B / 17017826-007 Fittings	White Non-Fibrous Heterogeneous		75% Other	10% Chrysotile 15% Amosite

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
06A / 17017826-008 Plaster	Grey Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
06B / 17017826-009 Plaster	Grey Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
06C / 17017826-010 Plaster	Grey Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
06D / 17017826-011 Plaster	Grey Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
07A / 17017826-012 Skimcoat	White Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
07B / 17017826-013 Skimcoat	White Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Susan L. Childress
Analysis Date: 5/22/2017

Approved Signatory:
Date: 5/22/2017

SanAir Technologies Laboratory, Inc.

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804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

17017826

FINAL REPORT

Name: Environmental Consulting & Management Inc
Address: 50 Kickemuit Ave
Bristol, RI 02809

Project Number: 170301
P.O. Number:
Project Name: Clarke Science

Collected Date: 5/15/2017
Received Date: 5/16/2017 10:25:00 AM
Report Date: 5/22/2017 3:36:33 PM
Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
07C / 17017826-014 Skimcoat	White Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
07D / 17017826-015 Skimcoat	White Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
08A / 17017826-016 Hallway CT 2x4	White Fibrous Homogeneous	60% Cellulose 20% Glass	20% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
G-1A / 17017826-017 Transite Raised Beds	Grey Non-Fibrous Homogeneous		80% Other	20% Chrysotile

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
G-2A / 17017826-018 Transite Greenhouse Kneewall	Grey Non-Fibrous Homogeneous		80% Other	20% Chrysotile

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
G-3A / 17017826-019 Transite Table	Grey Non-Fibrous Homogeneous		80% Other	20% Chrysotile

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
G-4A / 17017826-020 12x12 FT Office Greenhouse	Grey Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Susan L. Childress
Analysis Date: 5/22/2017

Approved Signatory:
Date: 5/22/2017

SanAir Technologies Laboratory, Inc.

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804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

17017826

FINAL REPORT

Name: Environmental Consulting & Management Inc
Address: 50 Kickemuit Ave
Bristol, RI 02809

Project Number: 170301
P.O. Number:
Project Name: Clarke Science

Collected Date: 5/15/2017
Received Date: 5/16/2017 10:25:00 AM
Report Date: 5/22/2017 3:36:33 PM
Analyst: Childress, Susan

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
G-5A / 17017826-021 Shingles Greenhouse Roof	Beige Non-Fibrous Homogeneous	20% Cellulose	80% Other	None Detected

Certification

Analyst: Susan L. Childress
Analysis Date: 5/22/2017

Approved Signatory:
Date: 5/22/2017

Attachment 3
Lead Results

SanAir Technologies Laboratory

The Identification Specialists

Analysis Report
prepared for
Environmental Consulting & Management Inc

Report Date: 10/5/2018

Project Name: RIC Clarke Science

Project #: 180697

SanAir ID#: 18044751

1551 Oakbridge Dr. Suite B | Powhatan, Virginia 23139-8061
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com

SanAir ID Number
18044751
FINAL REPORT
10/5/2018 9:30:29 AM

Name: Environmental Consulting & Management Inc
Address: 50 Kickemuit Ave
Bristol, RI 02809
Phone: 401-438-1360

Project Number: 180697
P.O. Number:
Project Name: RIC Clarke Science
Collected Date: 10/1/2018
Received Date: 10/2/2018 10:05:00 AM

Dear Joseph M. Lepore,

We at SanAir would like to thank you for the work you recently submitted. The 5 sample(s) were received on Tuesday, October 02, 2018 via FedEx. The final report(s) is enclosed for the following sample(s): 01, 02, 03, 04, 05.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

Abisola Kasali
Metals Laboratory Director
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis on Test Family AA
- Disclaimers and Additional Information

Sample conditions:
- 5 samples in Good condition.

SanAir ID Number
18044751
FINAL REPORT
10/5/2018 9:30:29 AM

Name: Environmental Consulting & Management Inc
Address: 50 Kickemuit Ave
Bristol, RI 02809
Phone: 401-438-1360

Project Number: 180697
P.O. Number:
Project Name: RIC Clarke Science
Collected Date: 10/1/2018
Received Date: 10/2/2018 10:05:00 AM

Analyst: Laverty, Jaynie
Test Method: SW846/M3050B/7000B

Lead Paint Analysis

PAINT Sample	Description	µg Pb In Sample	Sample Size (grams)	Calculated RL	Sample Results	Sample Results
18044751 - 1	01 Structural Steel	1243	0.1017	98.3	12230 µg/g (ppm)	1.223 % By Weight
18044751 - 2	02 1st 0 Wall - CMU	21	0.1073	93.2	196 µg/g (ppm)	0.020 % By Weight
18044751 - 3	03 Black Door Frames	785	0.0804	124.4	9758 µg/g (ppm)	0.976 % By Weight
18044751 - 4	04 Stair Rails	78	0.1127	88.7	689.5 µg/g (ppm)	0.069 % By Weight
18044751 - 5	05 2nd 0 Walls	10	0.1042	96	96 µg/g (ppm)	<0.010 % By Weight

Method Reporting Limit <10 µg/0.1 g paint

Signature:
Date: 10/3/2018

Reviewed:
Date: 10/3/2018

SanAir Technologies Laboratory
1551 Oakbridge Dr STE B
Powhatan, VA 23139
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Metals & Lead Chain of Custody

Form 70, Revision 9, 01/19/2017

SanAir ID Number: 18044751

Company:	Environmental Consulting & Management Inc	Project #: 180697	Phone #: 401-438-1360
Address:	50 Kickemuit Ave	Project Name: RIC Clarke Science	Phone #:
City, St., Zip:	Bristol, RI 02809	Date Collected: 10-1-18	Fax #: 401-438-1316
Samples Collected By:	Joe Lepore	P.O. Number:	Email:
Account #:	2667	U.S. State Collected in: RI	Email: JLepore@ECMINC.com

Matrix Types

- ☐ **Air** (ug/m³)
- ☐ **Wipe** (ug/ft²)
- ☒ **Paint** ☐**Soil** ☐**Bulk** (ug/g or ppm)
- ☐ **Other:**

Metals Analysis Types

- Total Concentration of Lead ☒
- Total Concentration of RCRA 8 Metals ☐
- TCLP for Lead ☐
- TCLP for RCRA 8 Metals ☐
- ☐ ICP-total concentration of metals (please list metals):

Turn Around Time	Same Day ☐	1 Day ☐	2 days ☐	3 Days ☒
	☐ Standard (5 day)	☐ Full TCLP (10d)		

Sample #	Collection Date & Time	Sample Identification/Location	Flow Rate	Start Time	Stop Time	Volume (L) Area (Sq ft)
01	10-1-18	Structural Steel				
02		1st Ø Wall - CMU				
03		Black Door Frames				
04		Stair Rails				
05		2nd Ø Walls				

Special Instructions

Relinquished by	Date	Time	Received by	Date	Time
	10-1-18	1PM		OCT 02 2018	10:05 am

If no technician is provided, then the primary contact of your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm will begin at 8 am the next business morning. Weekend or holiday work must be scheduled ahead of time and is charged at 150% of the Rush TAT rate. There is a minimum charge of $100 for weekend work. A courier charge will be applied for same day and one-day turnaround times for offsite work. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page ___ of ____

CLARKE SCIENCE BUILDING AT RHODE ISLAND COLLEGE

FEASIBILITY STUDY

Appendix F - Meeting Minutes

August 2020

SLAM

Physical Sciences

Project:	Rhode Island College – Science and Applied Technology Feasibility Study	**Issue Date:**	September 04, 2019
		Meeting Date:	August 28, 2019
Project No.:	19107.00	**Meeting Time:**	3:00 PM

Present:

Sara Knowlton, RIC
Elaine Magyar, RIC
Medini Padmanabhan, RIC
Kevin Fitta, RIC
Jarred Jackson, RIC
Neil Martin, SLAM
Rick Polvino, SLAM
Lois Rosenblum, SLAM

Distribution: Attendees

To All Present:

The following is believed to be an accurate representation of discussions and decisions made at this meeting on August 28, 2019. If any of the items are incorrect or fail to record discussions at the meeting, please notify the writer of these minutes, in writing, within 5 days of the issue date. Failing such notification, these minutes will be considered a matter of record.

Item	Summary of Meeting, August 28, 2019	Response	Due Date
1.	Project Goals / General a. Physical Sciences are comprised of Chemistry, Physics, and Earth and Space Sciences. b. Chemistry includes Physical Chemistry, Environmental Chemistry, and Biochemistry. a. Biochemistry track is the biggest c. Physics includes theoretical and applied physics	Info	

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Boston, MA 02210-1135
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	d. Want a building that supports student-centric experiences e. Want to attract students, want appealing facilities but not like a high school f. Comments about college-wide enrollment a. Expanded healthcare would impact Chemistry and Physics b. Rhode Island is pushing STEM c. Looking to attract the 'right' students to the Sciences at RIC g. Looking for more Community Engagement h. Looking for more Student break-out and Common-type spaces i. How does this Feasibility Study relate to the Strategic Plan of the College?		
2.	Existing Building Condition a. Aging building with associated issues. b. Clarke has a lot of water related issues including flooding and mold c. There are cracks and too much vibration (unable to accommodate specialized equipment). d. Occupants perceive that building is slowly sinking. e. HVAC does not work properly for freezer heat loads, fume hood exhaust, and humidity control in general	Info	
3.	Safety a. Lack emergency eyewash/showers where chemicals are used. b. Department wants hazardous materials storage removed from building and located elsewhere.	Info	
4.	Research a. Inadequate quantity and quality of space. b. Council for Undergraduate Research recommends 400 square feet of research space per faculty c. Every faculty needs to do research to get tenure. Significant change from 1978 when 4 out of 7 chemists and 2 out of 7 physicists did research d. Each faculty has 2 to 4 students participating in research, more during the summer. If there	Info	

	was more research space, then more students would be able to participate. e. Would like interdisciplinary and flexible research lab space. f. For Chemistry labs, would like house vacuum instead of water aspirators, house nitrogen rather than tanks/dewars for Organic Chem, and centralized distilled water.		
2.	Teaching Labs a. Inadequate quantity and quality of space. b. Teaching labs are long and narrow which is not ideal c. Largest course loads are service courses for Nursing but do have a substantial number of research majors d. Want cutting edge teaching labs. e. Teaching labs are typically for 24 students. Sometimes have up to 26-27 students. Advanced labs typically have 3 to 12 students. o Biochemistry teaching lab is larger – needs more net square feet per station f. Physics labs combine lab and lecture. Need a desktop computer at each station. g. For Chemistry labs, would like house vacuum instead of water aspirators, house nitrogen rather than tanks/dewars for Organic Chem, and centralized distilled water. h. Need a Computer Lab with proprietary software (Mathmatica, etc.) that students can use outside of class time i. Want dedicated space for coats and backpacks	Info	
3.	Special Shared Resources a. Instrument Room b. Storage	Info	
4.	Classrooms a. Nursing classes are large lecture format. b. Upper level classrooms should have 32 seats	Info	
6.	Personnel a. Not likely to expand. b. Need adjunct office space, especially so students can meet with lab instructors.	Info	

Respectfully submitted,

The S / L / A / M Collaborative

Rick Polvino, AIA, LEED AP

Steering Committee

Project:	Rhode Island College – Science and Applied Technology Feasibility Study	**Issue Date:**	September 09, 2019
		Meeting Date:	September 05, 2019
Project No.:	19107.00	**Meeting Time:**	1:00 PM

Present:

Sara Knowlton, RIC
Jeffrey Martin, RIC
Sue Pearlmutter, RIC
Eric Roberts, RIC
Earl Simson, RIC
Kevin Fitta, RIC
Jarred Jackson, RIC
Neil Martin, SLAM
Rick Polvino, SLAM
Lois Rosenblum, SLAM

Distribution: Attendees

To All Present:

The following is believed to be an accurate representation of discussions and decisions made at this meeting on September 05, 2019. If any of the items are incorrect or fail to record discussions at the meeting, please notify the writer of these minutes, in writing, within 5 days of the issue date. Failing such notification, these minutes will be considered a matter of record.

Item	Summary of Meeting, September 05, 2019	Response	Due Date
1.	General Comments a. A third-party Programmatic needs assessment currently being conducted – preliminary results to be available in next couple of months. b. RIC is considering a Department of Public Health that would eventually grow into a	Info	

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	School of Public Health. Public Health would result in an increase in STEM service courses. RIC would be first among the public institutions in Rhode Island to offer this. c. College looking to promote undergrad student research opportunities, e.g. opportunity to work with faculty in research and to open doors to jobs. Possible public relations campaign to promote. d. Specialized spaces such as simulation unlikely since already on campus or at downtown facility e. How will this Study account for Growth – a. Looking to track and target non-traditional students, e.g. adult ed/continuing ed. b. Both Bio and Chem anticipating moderate growth, also as 2nd Degrees f. STEM will remain onsite courses of study, not suitable for online learning. g. Issue regarding colocation of teaching lab, research labs, offices, and student space needs to be resolved h. Certain functions can be shared between the two departments including polished water, autoclaves, icemakers, and freezers i. RIC to confirm definition of 'Applied Technology' if to be used to label building		
2.	Peer institutions as identified are accurate – RIC to provide aspirant institutions, e.g. Frostburg State was mentioned.	RIC	
3.	Options Discussion a. Existing Net Square Feet of Bio and Physical Science programs in both buildings is 59,000 Net Square Feet. b. Option 1 – Renovation / Addition o Initial Program for renovation/ addition identifies 78,800 Net Square Feet (NSF)/157,600 Gross Square Feet (GSF) to ONLY accommodate existing teaching programs and spaces BUT right-sizing to 21st Century pedagogies, e.g. square foot/seat. No growth has been identified in these numbers. o Option 1 will require a Building Addition of approximately 20,000 GSF	Info	

	to accommodate program right-sizing and will provide 'some' swing space during the comprehensive renovation of Clarke and Fogarty Halls o Rerouting of road to north of Fogarty will not be considered per previous discussion with City. o Bridge connecting Fogarty/Clarke an option o The School of Nursing building will not be part of this scope of work and will remain. o Due to footprint restrictions around the existing Clarke/Fogarty Halls – the ideal Program of 157,600 GSF may not be achieved. Approximately 14,700 NSF, or 29,400 GSF, may need to be cut to accommodate to site constraints. o Consider an increase of 'Project' Contingency costs for 'unknowns', e.g. Clarke currently prone to wet floors/'flooding' o Option 1B was discussed that increases the building addition square footage(s) to Clarke to accommodate the entire proposed sciences Program square footage and decant Fogarty altogether. c. Option 2 – New Construction o Initial Program identifies 83,700 NSF / 146,400 GSF – reduced square footage from Option 1 required due to ingrained efficiencies with designing with no physical constraints of the existing buildings. o Several footprint options (A thru E) were discussed ▪ Site E was taken off table since did not adhere to the Master Plan (MP) and potentially sits on wetland/environmentally sensitive site ▪ Site D was taken off table since the loss of parking		

	spaces would be too detrimental to the campus at this time ▪ Site C was taken off the table due to its remoteness from the academic core of the campus ▪ Site A was taken off table due to its remoteness from the main academic core, e.g. as defined by The Murray Center, Gaige Hall, Adams Library, Craig-Lee, and the Student Union/Dining buildings. This site also disrupts current sports activities as well as having adverse effects to existing parking spaces. ▪ Site B to be further investigated. This site was identified as ideal due to its proximity to the academic core, parking to the west, quad enhancement to the east (with the current implementation of Horace Mann improvements). Close proximity to where other current science related classes are taught. d. Parking space loss to be investigated with either option. e. If New Construction, the option to maintain, and not re-build, the existing Lecture Halls could remain. The one downside was identified for Chem Lecture set-up would be a challenge if remote, especially in inclement weather. If Lecture Halls to be 're-built' in either case, minimum size would accommodate 150 seats. f. What becomes of existing Fogarty / Clarke buildings when new construction complete and occupied, possibilities discussed – o Expansion of School of Nursing o Department/School of Public Health		

	o Maintain for the Sciences but for office/research space specific/classrooms o Film Studies could use CS128 o Possibly 'Student Success Center' in Clarke g. Preliminary Opinions of Cost were presented for each Option, however it was noted that RIC and the Design team should be prepared to accommodate flexible design options in case a lesser than anticipated amount is approved for Bond.		
4.	Student Common space(s) to be in proximity to Faculty offices	Info	
5.	All offices to be Programmed to 100-110 nsf	Info	

Respectfully submitted,

The S / L / A / M Collaborative

Rick Polvino, AIA, LEED AP

Physical Sciences

Project:	Rhode Island College – Science and Applied Technology Feasibility Study	**Issue Date:**	September 19, 2019
		Meeting Date:	September 13, 2019
Project No.:	19107.00	**Meeting Time:**	1:00 PM

Present: Sara Knowlton, RIC
Elaine Magyar, RIC
Medini Padmanabhan, RIC (PT)
Jarred Jackson, RIC
Rick Polvino, SLAM
Lois Rosenblum, SLAM

Distribution: Attendees
Kevin Fitta, RIC
Neil Martin, SLAM

To All Present:

The following is believed to be an accurate representation of discussions and decisions made at this meeting on September 13, 2019. If any of the items are incorrect or fail to record discussions at the meeting, please notify the writer of these minutes, in writing, within 5 days of the issue date. Failing such notification, these minutes will be considered a matter of record.

Item	Summary of Meeting, September 13, 2019 :Purpose of meeting was to review ideal Space Program assuming new construction	Response	Due Date
1.	Offices and Support a. Reception/Waiting is actually the Department Main Office b. The Department Main Office and Chair Office should be linked c. Mailroom – need two, consider access	Info	

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4th Floor
Boston, MA 02210-1135
617.357.1800
www.slamcoll.com

	a. One mail room for faculty and adjuncts b. One mail room for student workers d. Conference Room should accommodate the entire department. e. Would like a personal office for the Chair in addition to the Chair's Office for privacy and ability to do work undisturbed. f. Provide two (2) Adjunct Offices to support six (6) workstations. Adjunct counts vary from semester to semester. On average eight (8) per semester, however this current semester is supporting 12. g. Tech offices should be located near each other and perhaps near Receiving		
2.	Classrooms a. Need 3 classrooms; 1 @ 48 to 50 seats and 2 @ 32 seats	Info	
3.	Shared Collaboration a. Shared Conference/Study Rooms should accommodate 12 to 16 seats	Info	
4.	Teaching Labs a. One (1) Organic/Inorganic Teaching Lab: 12 fume hoods plus one (1) prep hood, look at ACS for requirements b. Two (2) Nursing/General Chem: one (1) fume hood in each c. One (1) Gen Chem d. One (1) Analytical/Enviro/PChem: one (1) fume hood e. One (1) Biochemistry: can Biology and Physical Sciences share a Biochemistry Lab if they are in same building? Need distilled water, autoclave, and 8' fume hood f. One (1) Physical Science: should be full-size 1,200 NSF lab g. One (1) Advanced Physics: should be full-size 1,200 NSF lab for now; no fume hood required h. One (1) Geology/Earth Science, no fume hood required i. One (1) Intro Physics: need computers in lab, no fume hood required	Info	

	j. One (1) lab for either Physics or Physical Sciences, including Astronomy, no fume hood required k. One (1) Computer Lab with Mathmatica software: 12 computers with two (2) students per computer i. Serves three purposes: 1. Lecture of lab section comes into Computer Lab to use specific program 2. Students have access to use outside of class time 3. Student research		
5.	Prep / Storage a. One (1) for Biochem o Pair one (1) for Organic & Analytical/Enviro/PChem Prep – needs one (1) fume hood o One (1) for Nursing and Gen Chem o Two (2) for Physics Labs @ 300 NSF each o One (1) for Physical Sciences: Geology Prep/Storage most accommodate rock samples, benchtop wave tank, and sieves	Info	
6.	Research Labs a. 400 net square feet of research lab per faculty is a good goal b. Chem research labs need a hood c. Physics research labs might need a fume hood	Info	
7.	Teaching and Research Support a. Instrumentation Lab b. Vented chemical stockroom c. Cylinder Storage d. Workshop e. Darkroom not required	Info	
8.	Building Support a. Move hazardous material storage out of building b. Bulk Storage	Info	

Respectfully submitted,

The S/L/A/M Collaborative

Rick Polvino, AIA, LEED AP

Steering Committee

Project:	Rhode Island College – Science and Applied Technology Feasibility Study	**Issue Date:**	September 25, 2019
		Meeting Date:	September 19, 2019
Project No.:	19107.00	**Meeting Time:**	12:00 PM

Present:

Sara Knowlton, RIC
Jeffrey Martin, RIC
Sue Pearlmutter, RIC
Eric Roberts, RIC
Earl Simson, RIC
Kevin Fitta, RIC
Jarred Jackson, RIC
Neil Martin, SLAM
Rick Polvino, SLAM
Lois Rosenblum, SLAM

Distribution: Attendees

To All Present:

The following is believed to be an accurate representation of discussions and decisions made at this meeting on September 19, 2019. If any of the items are incorrect or fail to record discussions at the meeting, please notify the writer of these minutes, in writing, within 5 days of the issue date. Failing such notification, these minutes will be considered a matter of record.

Item	Summary of Meeting, September 19, 2019 :Purpose of the meeting was to report on the status of the Space Program, Review Initial Building Assessment Findings, Review Planning Options, Review Opinion of Probable Cost and Discuss next Steps	Response	Due Date
1.	General Comments:	SLAM / Info	

SLAM
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	a. SLAM will begin to develop a storyboard/outline of preliminary Executive Summary of Report for November 1 (on or about) deliverable. 1. Summary to be about 8-12 pages 2. Planning 'Plan' diagrams to be hardlined (computer generated / renderings to be softer as watercolors)		
2.	Status of Space Program a. It was confirmed that some Classes occur on Fridays b. Human Anatomy classes were confirmed to only occur on the RIC campus – not downtown c. It was confirmed that Phy Sci Teaching Lab count will be 10 in lieu of 11 as presented d. House water purification would be preferred to be centralized and polished at each lab depending on level of purity required. e. Classrooms – RIC to evaluate overall classroom utilization that confirms need of classrooms being proposed. f. SLAM to take an initial stab at prioritizing the Space Program in case all Funding being requested does not come to fruition.	SLAM / RIC	
3.	Existing Building Assessment – initial architectural observations of both Clarke and Fogarty were presented.	Info	
4.	Planning Options – a. Option One Renovation/Addition 1. Bridge connecting Clarke/Fogarty will be considered. SLAM to confirm if program space (student/faculty common space) can occupy the bridge 2. Planning needs to consider the real estate taken by Disability Services and Nursing spaces within Fogarty 3. Green House and existing Lecture Halls remain 4. Preliminary planning components and adjacencies were presented – generally confirmed approach b. Option Two – New Construction 1. Proposed sites have been short-listed to 2a – west of Horrace Mann and Southeast of the	SLAM / RIC	

	Murray Center and 2b south of the track and field - in proximity to the existing Tennis Courts 2. Preliminary planning components and adjacencies were presented – generally confirmed approach 3. What becomes of Clarke and Fogarty if the College elects to move forward with either Options 2a or 2b? (RIC) 4. New Lecture Halls to be proposed 5. Green House location needs further consideration, e.g. location, orientation, etc. Will be difficult to transport plants, especially during the winter/freezing months. Stand - alone, at grade OR attached to new building at First Floor facing south, on roof? c. Both options to consider a minimum of two (2) elevators – one Passenger / one Freight/Passenger for redundancy. d. Option Evaluation Criteria was voted on. Energy Conservation/Efficiency and Ability to Expand in the Future were added. Of the three options - New Construction at Site 2a prevailed. e. Teaching Labs should maximize ability for borrowed or direct daylight f. SLAM to test-fit proposed program for both Options 1 and 2. Test-fit will be based on all-in desired/requested program and the identification of a 'reduced program' contingent on funding options.		
5.	Opinion of Cost – preliminary Project costs are within 5-percent of each other. New Construction being a bit higher. The Project Cost target to be $95mil.	Info	
6.	Next Steps a. SLAM and consultants to complete existing building assessments b. A draft Project Justification was discussed. RIC to further review and comment – general comments were identified –	SLAM / RIC	

	i. "…Student driven…" *ii. "…better educate Nursing Students…"* *iii. "…student culture and financial diversity…"* c. A meeting with both Phy Sci and Bio may be required to identify any program redundancy and to prioritize spaces, e.g. Classrooms, etc. d. An all-faculty/student Workshop to be scheduled for the next 2-3 weeks. e. RIC to provide SLAM the latest Horrace Mann design approach.		

Respectfully submitted,

The S / L / A / M Collaborative

Rick Polvino, AIA, LEED AP