



IOWA STATE UNIVERSITY

VETERINARY FIELD SERVICES BUILDING EXPANSION STUDY

1712 SOUTH RIVERSIDE DRIVE | 10.23.2017

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EXECUTIVE SUMMARY

INTRODUCTION

The objective of this study is to accurately establish the overall scope and budget of a potential renovation/addition to the existing VFS facility. This report is the product of an intense effort involving the Office of the Dean of the College of Veterinary Medicine, the administration and staff of the Veterinary Field Services program and the facilities department of Iowa State University. This summary provides a brief overview of the programmatic scope, general plan arrangement, opinion of probable construction costs and schedule associated with a potential addition and renovation. Additional information regarding alternative options investigated and supported materials is available in a separate appendix.

HISTORY AND NEED

The existing VFS building is a stand-alone facility situated on the ISU College of Veterinary Medicine campus. Built in 2011, the current facility provides the opportunity for veterinary students to engage with agricultural animal producers throughout the state in a real-world environment that closely mimics an actual agricultural veterinary practice. The existing facility is a single-story, 9,420-gross-square-foot structure that houses laboratory/instructional space, offices, locker rooms and supply storage as well as a series of garages to house the program's vehicle fleet. The program has grown quickly. The caseload has increased 2.5 fold since 2011, and the number of veterinary students tracking mixed or food animal studies has markedly increased. In addition, VDPAM has substantially increased emphasis on faculty conducting field-based research. This translates into substantially more students and faculty utilizing the field services building for several of the required rotations, requiring additional space to accommodate expanded instructional and laboratory functions, additional offices and storage space.

As the volume of students and biological samples traversing through the facility continues to grow, an acute need to address lingering bio-security concerns has also become critical. The success of the program relies heavily on the training of future veterinarians in protocols that ensure proper biological containment and sterile practices inside the facility and in the field to guarantee that potential pathogens are not transferred from farm to farm.

STUDY GOALS

The primary goals of a proposed alteration to the Veterinary Field Services building will be aimed at creating additional program space and functionality, enhancing safety for students, faculty and staff, and improving operational bio-security. The bio-security goal is two-fold. First, it provides an environment where students are taught by example through working in a facility where readily apparent clean and soiled segregation is employed on a daily basis. Second, this feature will help ensure that the biological security of the program's clients is maintained and that veterinary students and staff do not become unintended vectors in disease transmission between area farms.

Specific room by room and programmatic features of the enhancements will include:

- An additional laboratory to relieve cramped working areas for field work operations, research and instruction
- A new thirty-person classroom to provide lecture space currently conducted in the existing laboratory
- A new Simulation Laboratory for clinical instruction and practice using life-sized large animal models and computer simulations
- A new isolated In Vitro-Fertilization Laboratory to accommodate a growing service need and research
- Five new offices for faculty and staff
- A new group housed office space for Veterinary Residents
- Additional storage space
- A new walk-in cooler and freezer for storing biological models used for instruction
- Relocation of sample storage freezers to an environmentally controlled space.
- Enhancements to the clean and dirty personnel and material workflow to increase bio-security and decrease the possibility of cross contamination
- Provision for the existing and new laboratory to meet BSL-2 standards with 100% outside air handling capability, hard cleanable surfaces, dedicated supply plumbing systems and proper laboratory safety equipment
- Upgraded and enlarged boot wash and laundry area
- A new hardened area that can be used as a storm shelter

EXECUTIVE SUMMARY

INFORMATION GATHERING AND DESIGN PROCESS

The work associated with the ISU Veterinary Field Services Study began in June of 2017 and continued through early September 2017. During that time, the design team spent several extended stays on campus to meet with administration, faculty, staff, post-doctoral candidates and students. The intent of this series of meetings was to gather information regarding facility and curriculum needs while simultaneously engaging all stakeholders in an iterative design process. Information gathering included interviews with individual stakeholders and faculty groups as well as on-site observation of instructional and field service operations. Regular reviews were conducted with the Dean's office, department heads and facilities department as Programmatic space needs and plan options were developed and the assumptions regarding the plan were continuously challenged in light of the program mission and budget.

FINDINGS AND OPTIONS

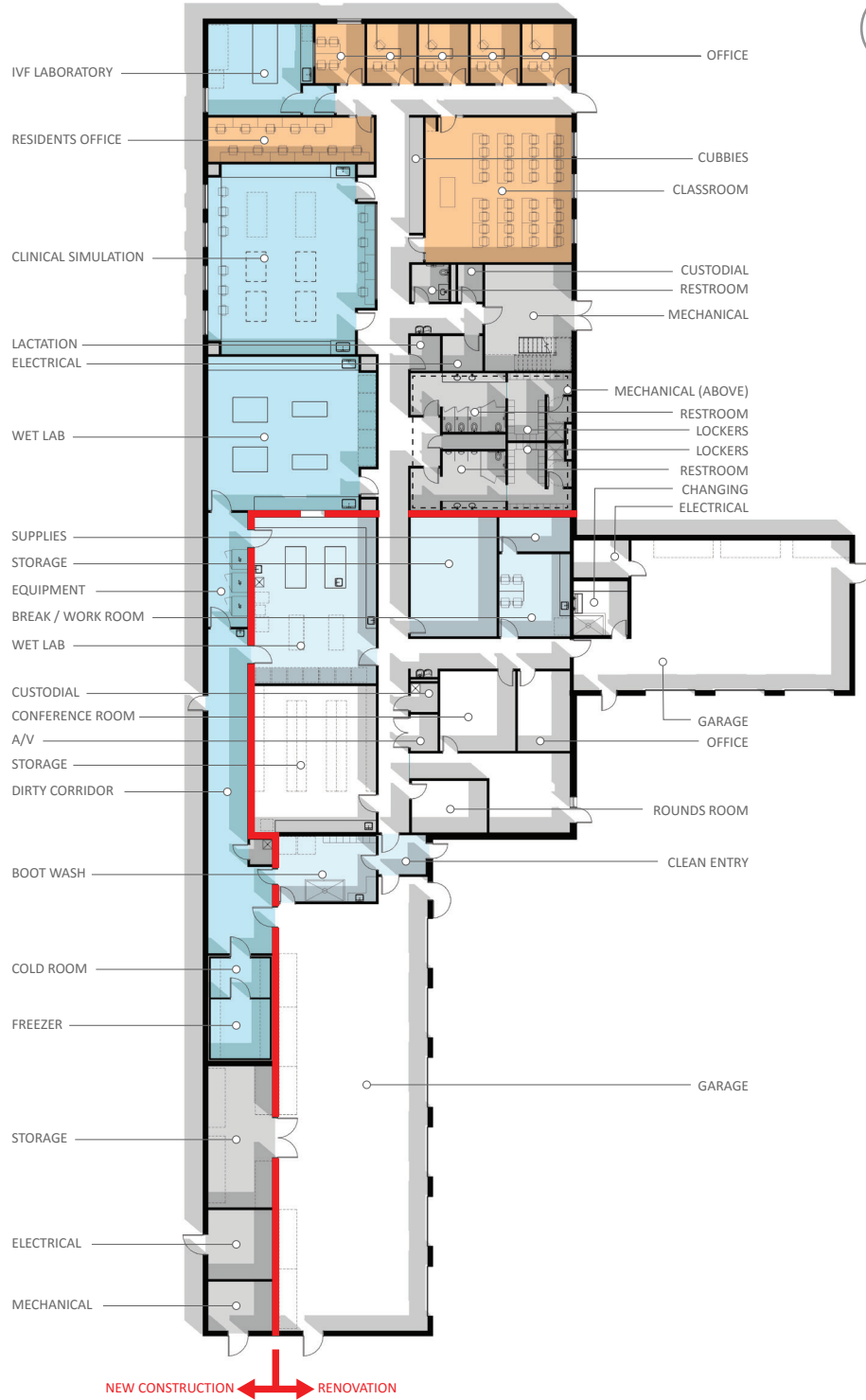
During the course of data gathering and design charrette meetings, multiple versions of the Program were formulated with varying scopes. At the same time, several organizational schemes were generated based on these potential programmatic elements and reviewed periodically as the meetings progressed. The design solutions considered included new additions that ranged from as little as 7,250 gross square feet to as much as 12,525 gross square feet with a total project cost range from \$2,675,000 to \$4,417,000. A two-story scheme using the grade drop-off to the north to create a walk-out basement was also investigated.

The option that was recommended in consultation with all stakeholders is presented as part of this executive summary and in greater detail later in this document. The recommended scheme is comprised of a single-story addition to the north and west that is approximately 9,445 gross square feet and includes additional renovations to areas within the existing facility totaling approximately 1,921 gross square feet. Our opinion of total project costs is based on historical data on a per square foot basis and expressed as a range that is plus or minus 5% from the calculated baseline. The projected project cost is between \$3,400,000 and \$3,750,000.

All other options that were considered, including the general layout and associated project and construction costs, are catalogued in the appendix.

FLOOR PLAN: RECOMMENDED DESIGN OPTION

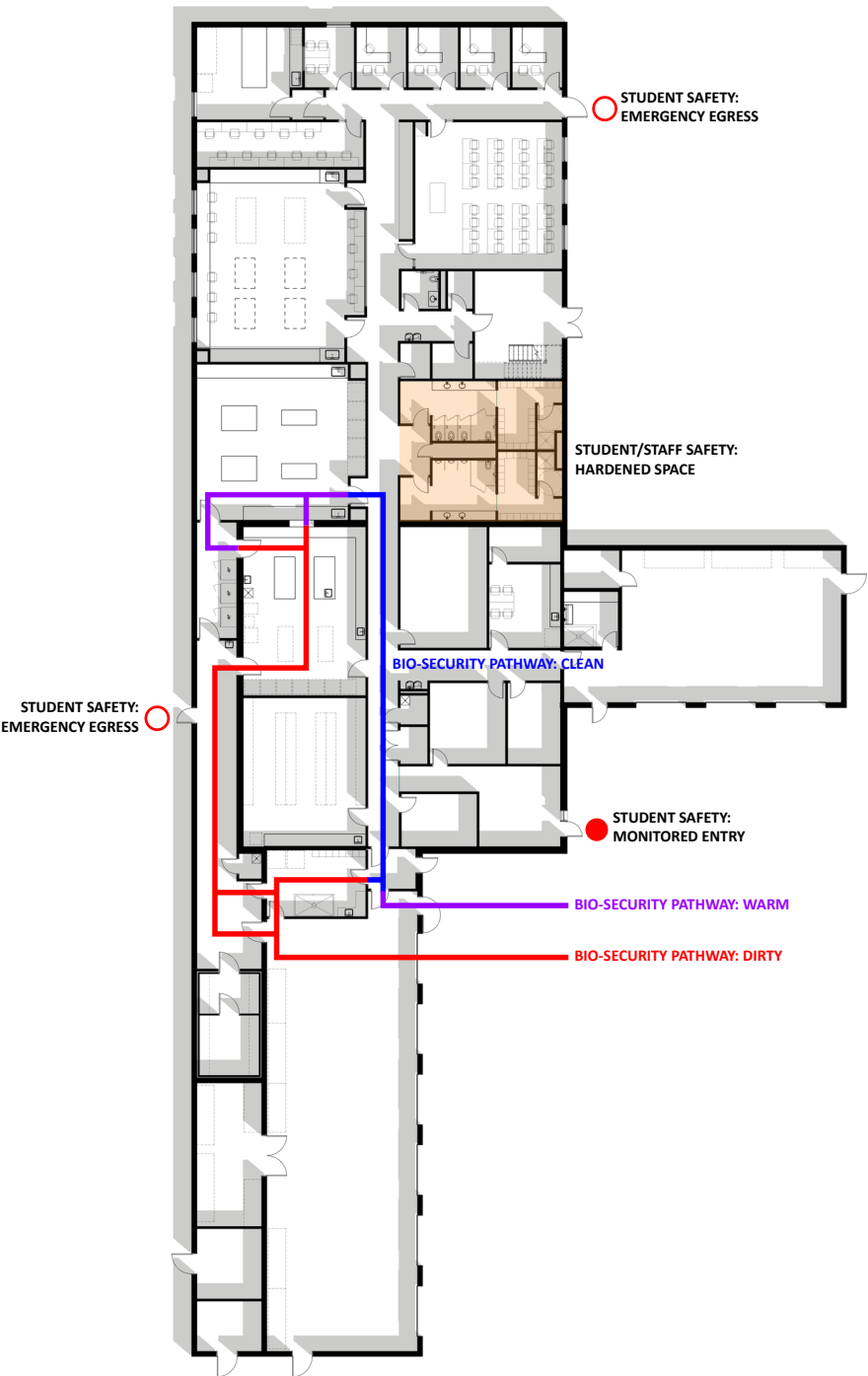
NORTH



1.4

EXECUTIVE SUMMARY

MATERIAL & PERSONNEL FLOW DIAGRAM



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ARCHITECTURE, STRUCTURES, AND SYSTEMS

The existing field services building is a pre-engineered metal structure constructed in 2011. It is situated on the east side of South Riverside Drive across from the ISU College of Veterinary Medicine complex. Its current layout includes approximately 9,240 gross square feet. It houses nine vehicle garage bays for program fleet vehicles, a multi-use wet laboratory/classroom space, storage, offices and a rounds room. The building is organized in an 'L' shape with the vehicle bays extending to the south and east from a central office/lab hub. The laboratory, storage and office areas are accessed by a double-loaded corridor that extends north out of the south vehicle bay and west out of the east vehicle bay to meet in the middle of the central hub. This creates a situation where segregation of clean and dirty operations is not possible requiring in-coming contaminated samples and equipment from the field to cross paths with outgoing sterilized equipment headed back out. The exterior is a simple corrugated metal siding and roof with a series of single slope roofs that flow to the west and north. Internal finishes include drywall walls, lay-in acoustical tile ceilings and a combination of floor finishes that include vinyl composite tile and troweled epoxy. Heating and cooling is provided by dual residential type furnaces and DX condensers on grade. The air handling system is a recirculating system that is not suitable for a BSL-2 laboratory environment. Electrical systems are served by a single phase 120/240V service with a dedicated electrical room in the east wing. A 24 kW generator is situated on the south end of the south wing.

DEFICIENCIES

The existing building is of a design that is compact and efficient and has served its purpose well over the last six years. Finishes and engineered systems are well maintained and in excellent condition. However, the rapid growth of the VFS program and changing emphasis on bio-security and student safety have brought to light certain specific deficiencies that need to be addressed. These deficiencies include:

- The VFS program has grown to a point that the existing size and array of spaces in the facility no longer serve the program adequately.
- Currently, a single laboratory space necessitates that it be used for both clean and biologically compromised equipment handling as well as sample preparation and classroom instruction.
- There is not a well-defined clean and dirty material and personnel flow in the current layout.
- The current boot wash and laundry is too small and its placement interrupts the clean and dirty path which leads to field samples and equipment entering the facility through the reception area.
- Existing air handling systems are not equipped to provide the 100% outside air requirement to meet BSL-2 protocols.

EXISTING BUILDING ASSESSMENT

- The building is far removed from any storm sheltered areas and provides no hardened area for occupants in the event of a tornado.



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ARCHITECTURE

The layout of the recommended floor plan is organized around the concept of creating an addition to the north while providing a secondary hallway along the west in an effort to create a personnel and material flow that can be designated as clean and dirty. In the preferred scheme, the existing laboratory will be renovated and a new laboratory built just north of it on the other side of what is now the exterior north wall. Providing an additional laboratory space and an additional corridor to reach the two laboratories will provide the opportunity to designate a progression of biologically clean and dirty areas that is vital to ensuring the rigid bio-secure protocols the program requires. In conjunction with this new designated clean laboratory space and corridor, the existing boot wash area will be enlarged and renovated so that the clean corridor traverses past this space rather than through it. A new, larger locker/shower room will be constructed in the new addition and the existing locker/shower rooms will be demolished during the second phase of construction. Removal of the existing locker rooms will allow the newly designated clean corridor to traverse through that area to close the clean/dirty loop and create a true circular path so that incoming and outgoing materials will never need to cross paths.

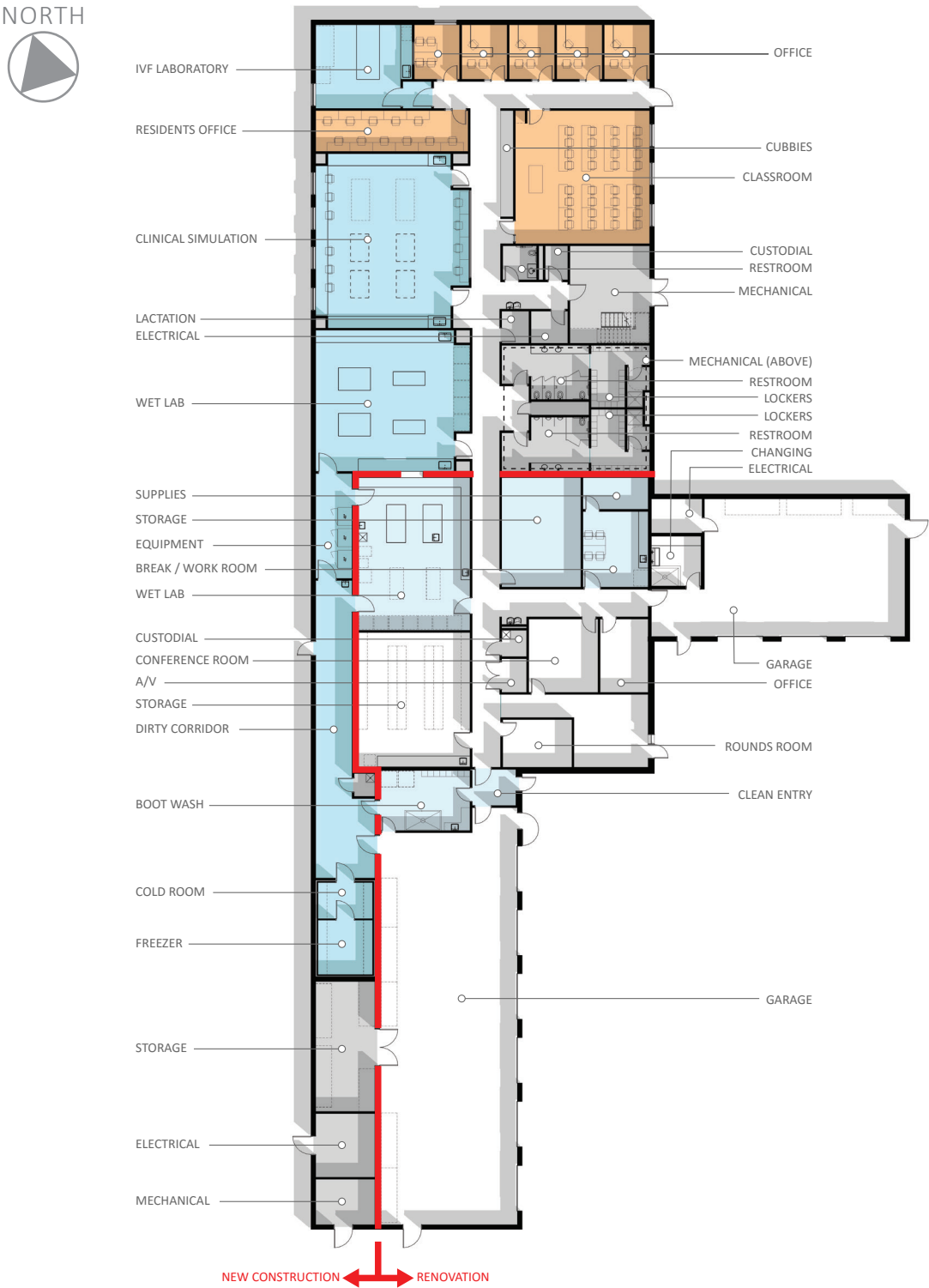
In addition to enhancing the bio-security of the VFS operation, the new addition will also provide increased program space for instruction, research and office space. New instructional spaces will include a new thirty-person classroom and a new simulation laboratory. A new walk-in cooler/freezer will be provided in support of the educational mission for the storage of biological samples used for instruction. New spaces to serve expanded research and field services needs will include a new isolated invitro-fertilization laboratory as well as office space for the expanding staff and compliment of veterinary residents.

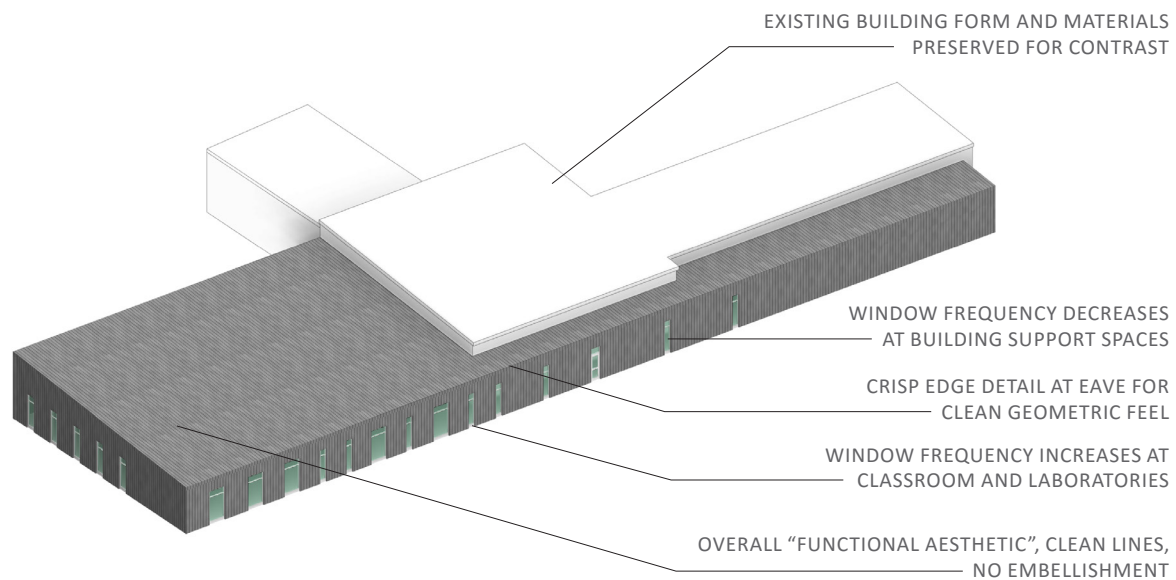
The new locker/shower room area will be constructed of reinforced concrete masonry with an internal poured concrete interstitial slab, creating a hardened space to be used as a storm shelter. The interstitial floor created for the shelter will provide plenum space above (under the upper roof of the new addition) so that it can be utilized to house a portion of the new mechanical equipment that will serve the new addition and back feed the existing building.

Finally, the form of the building addition will follow the slopes of the existing roof lines. Detailing will be simple and monolithic, allowing clean lines and a simple aesthetic to relate to the facility's functional use. Exterior materials of dark gray vertical metal panels will complement the white metal panel of the existing building. Floor-to-ceiling fenestration will be incorporated in program-based rhythm, increasing in size and frequency toward the north end of the addition.

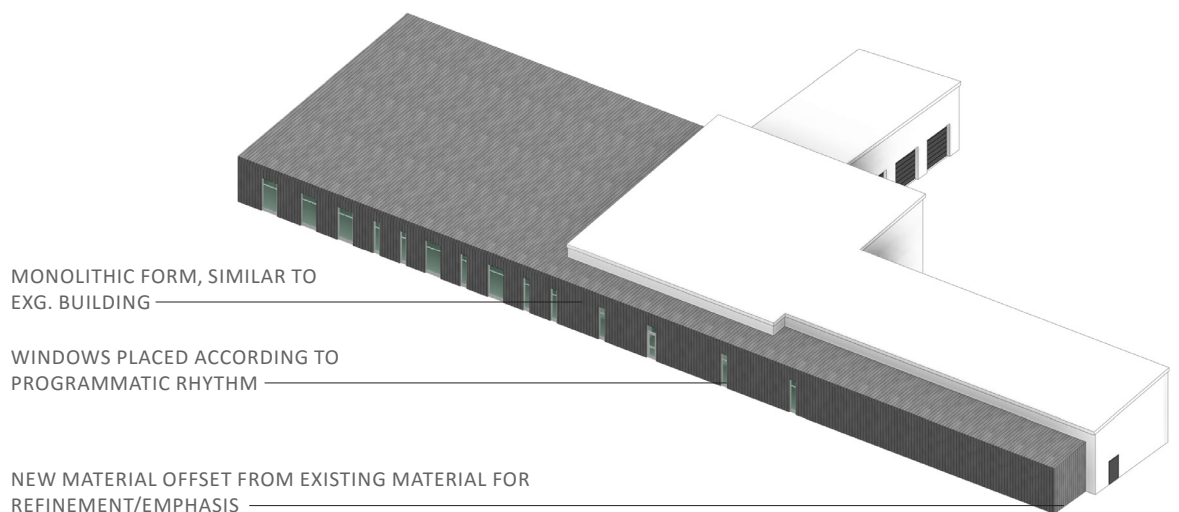
Veterinary Field Services Building Expansion Study

RECOMMENDED DESIGN OPTION





NORTHWEST PERSPECTIVE



SOUTHWEST PERSPECTIVE

RECOMMENDED DESIGN OPTION

LABORATORY DESIGN

A key goal for the project is to provide adequate facilities for the safe handling of potentially pathogenic biological samples. The design of all areas used for laboratory functions will adhere strictly to the minimum requirements for a BSL-2 facility, in accordance with the federal standards published by the NIH and CDC. In addition to specific protocols employed in a BSL-2 laboratory, the facility itself plays a crucial role in providing a suitable working environment. These features include hard, durable surfaces that will stand up to potent disinfectants, non-recirculating air handling systems, casework and furnishings that meet or exceed the requirements of SEFA, dedicated non-potable laboratory plumbing systems, proper containment devices and specific laboratory safety equipment such as eye washes and safety showers.

In addition to specific finishes and engineered systems, the architectural layout of a well-designed laboratory plays a critical role in providing safety and flexibility. Laboratory benches will be adequately sized to provide work space that can be used for multiple functions, such as organizing and labeling large amounts of biological samples, preparing materials for centrifuging, pipetting and storage as well as cleaning field equipment. These bench areas will also allow for the placement of a host of laboratory bench top equipment such as centrifuges, sterilizers, water baths, hot plates and microscopes. Similarly, adequate, flexible floor space will be provided for the placement of refrigerators, freezers, incubators, and, when called for, containment devices such as biological safety cabinets and glove boxes.

The laboratory will be organized around the concept of modular laboratory planning where benches are generally 5'-6" wide and spaced apart on 11'-0" centers to provide a minimum of 5'-0" clear between countertops. Finish materials in the laboratory will include steel laboratory casework, epoxy or phenolic resin countertops, seamless flooring, cleanable ceiling tile and semi-gloss epoxy paint systems.

CIVIL/LANDSCAPE DESIGN

The construction of an addition to the west will provide the opportunity to address several storm drainage issues that are present around the existing facility. The existing roof drainage is currently accomplished through the use of gutter and downspouts along the north and west. The downspouts currently drain onto the adjacent grade at an elevation several feet above the adjacent surroundings and cascade down toward the west. The hillside on the west side of the building shows significant signs of scouring, making it difficult to maintain the natural grasses and landscaping that have been

planted there. By completely enclosing the west façade, this issue can be efficiently corrected by piping the outlets of the new and existing downspout locations to a proposed rain garden area to the northwest and several feet below the finished floor of the facility. The design of the landscape materials including the rain garden will be provided by Iowa State University. The addition of a short retaining wall along the west façade of the new addition may be required as the new footprint of the building approaches the crest of the west grade drop-off. A more complete analysis of the grading strategy should be undertaken during the design phase to determine if this will be necessary.

Utility work will include relocation of the gas and water service entrances. Determination on the need for upsizing these utilities will be undertaken during the design phase. Relocation and/or extension of the sanitary sewer connection will also be investigated. It is not anticipated that any other campus provided utilities will be routed to serve the building, such as chilled water or steam.

RECOMMENDED DESIGN OPTION



INTERIOR FINISHES

Interior finishes employed in the north and west addition will meet the minimum requirements, in accordance with university guidelines and should provide durable, cleanable finishes throughout. Walls in most areas can be drywall with a painted surface. Offices and low traffic areas can utilize standard latex paints, but any rooms that may be used for handling biological and chemical materials should receive an epoxy based primer and paint with gloss or semi-gloss finish. Walls in the new locker rooms will be concrete masonry to create the hardened storm shelter and will be finished with block filler and paint or a tile finish if desired.

Flooring in laboratories and corridors serving laboratory areas should be of seamless construction. This can be provided by a seamless vinyl system with heat welded joints, but a troweled or broadcast epoxy will be more suitable and require less maintenance. Floors elsewhere in the new addition such as offices and the classroom can be provided with vinyl composition tile and rubber base, but an epoxy finish could be considered for these areas as well.

Ceilings throughout laboratory, office and corridor areas will be constructed of lay-in tile to aid in maintenance and help with acoustical concerns. Ceiling systems in non-laboratory areas will be a conventional acoustical system, while the ceilings in the laboratory and support areas will be a lab grade system with a non-porous washable vinyl finish.

MECHANICAL DESIGN

All mechanical, plumbing, and fire suppression systems will be designed in accordance with ISU Design Guidelines and all applicable codes.

A new 100% outside air (OA) air handling unit (AHU) will be provided in the enclosed attic space of the new addition. The AHU will utilize direct expansion (DX) cooling for cooling, heating water for heating, and will include variable-speed fans for airflow modulation. A new roof-mounted exhaust fan will be installed to provide exhaust air capacity for laboratory areas and other similar areas. A new runaround heat recovery system, including coils, pump, and controls, will be used to transfer heat between the outside air and exhaust air streams. A variable air volume (VAV) supply air distribution system will be utilized for all areas. Each temperature control zone will be served by a supply VAV box with an integral hot water reheat coil. The VAV box will modulate its damper position to maintain the required airflow as system pressure fluctuates. A heating water 2-way control valve will modulate

RECOMMENDED DESIGN OPTION

water flow to the reheat coil to maintain desired zone temperature conditions. The exhaust system will operate in a VAV mode similar to the supply air system. Each temperature control zone will be served by a return/exhaust VAV box. The airflow of the return/exhaust VAV box will “track” the airflow of the corresponding zone supply VAV box to guarantee proper space pressurization is maintained. Supply air ductwork will generally be galvanized steel construction, as well as the exhaust air ductwork. However, all ductwork serving fume hoods, canopy hoods, or other specialized equipment will be stainless steel construction. The existing Johnson Controls building automation system will be used to provide control and monitoring for all new areas and systems. Room occupancy sensors will be used to reduce the airflow to the spaces during unoccupied hours. In laboratory areas, the airflow will be reduced, but will still be sufficient to maintain minimum code-required ventilation rates.

A new water service will be provided in the mechanical room in the southwest corner of the addition. New backflow preventers, meter, and valves will be provided, and the incoming water line will also be used to serve the building’s fire suppression system. A new gas service (meter and regulator) will be provided on the west side of the building and the existing service removed. New sanitary sewer piping will be routed to the existing sanitary main southeast of the building. External gutters and downspouts will be used to drain storm water from the facility and piped below grade to a daylight location as described in the Civil/Landscape section. A new gas-fired boiler, variable-speed heating water pump, and variable frequency drive (VFD) will be used to circulate heating water to the new AHU and VAV box reheat coils.

A new wet-pipe sprinkler system will be installed to provide full coverage for the facility. All work will comply with NFPA 13, NFPA 14, and other local requirements. Code-required fire dampers, smoke dampers, and fire/smoke dampers will be installed throughout the building as necessary.

ELECTRICAL DESIGN

All electrical and low voltage systems will be designed in accordance with ISU Design Guidelines and all applicable codes. The existing electrical service is 240/120V. The service is provided by the City of Ames with secondary service equipment located within a main electrical room in the north garage bay of the facility. The existing service will be upgraded as necessary to support the additional load associated with the proposed addition. At this time, it is anticipated that the service voltage will remain 240/120V. Based on additional load, the existing 24kW natural gas generator will likely be replaced with a larger unit to support additional emergency/standby loads associated with the new addition. New automatic transfer switch(es) and panelboards will be provided and new electrical room(s) will be constructed to house new distribution equipment to support the addition.

A combination of normal and standby power will be distributed to general receptacles, laboratory equipment and mechanical loads in the new addition. Dual-channel surface mounted raceway, pedestals or overhead service carriers/panels may be provided in laboratory areas. All power connection requirements will be coordinated with specific equipment and building users. The existing Simplex 4100U fire alarm system will be expanded with additional initiation and notification devices to serve the new addition. New power supply units and relays will be located in electrical rooms whenever possible.

Lighting systems will be circuited at 120V and make use of LED type fixtures. Fixture types will follow ISU standards. In general, lighting controls will be accomplished with a combination of non-networked occupancy/vacancy sensors, digital timer switches and momentary contact switches. The entire lighting system will be designed to meet all adopted energy code requirements.

Data and telecommunication requirements will be fully coordinated with ISU standards. Conduit, boxes and pathways will be provided to support ISU provided and installed cabling and terminations. The existing access control system will be expanded to serve the addition. New exterior doors and entrances to laboratories and other secure areas will be provided with card access. Conduit, boxes, and pathways will be provided to support the low voltage equipment with cabling and readers provided and installed by ISU.

STRUCTURAL DESIGN

The structure of the new addition will be of a pre-engineered type and detailed similarly to the existing building. It will be designed to allow the existing shell of the building to remain largely intact until the new addition is constructed, roofed and dry before removal of existing exterior siding in areas that will become interior partitions. The new roof will meet the existing construction slightly below the existing roof line and be detailed to allow for expansion where existing and new construction meet.

A sub-surface geotechnical investigation was initiated by FP&M as part of this study. The findings of the investigation indicate that soil bearing capacity is suitable for shallow grade beam and spread footings and that there will likely be little need for remediation of unsuitable soils. A copy of the soils report is included in the appendix accompanying this document.

RECOMMENDED DESIGN OPTION

PHASING DIAGRAMS

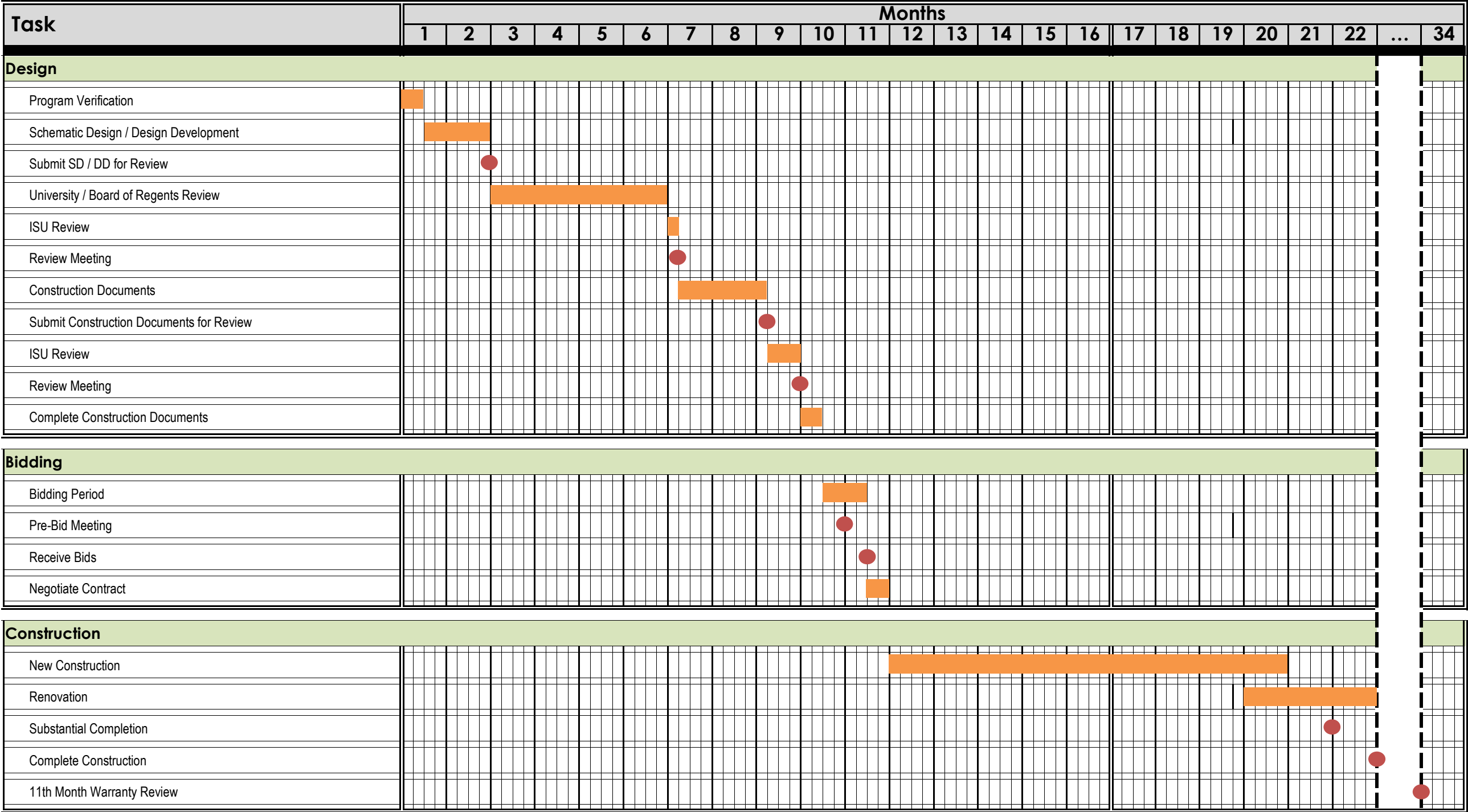
The proposed addition has been designed to allow the new construction to proceed without disturbing ongoing activities. The exterior shell of the existing building will remain intact during the construction of the new addition and the new openings will not be cut in until the addition is operational and ready for use. The interior renovations in the existing structure will include the demolition and renovation of the existing locker room/restroom, renovation and enlargement of the boot wash/laundry and the re-feeding of the mechanical system to convert the existing laboratory over to the new 100% outside air handler.



ROOM LIST AND COSTS

The table below includes the room list, both new and renovated for the preferred option. All costs shown are based on historical data and are expressed on per gross square foot basis.

August 18th, 2017	Programmed Plan			Concept Plan			Cost Profile			
	Qty	NSF Each	NSF	Qty	NSF Each	NSF	Grossing Factor	GSF	Cost/GSF	Cost
NEW ADDITION										
1.1 Instructional and Laboratory Spaces										
1.1.1 Classroom (30)	1	900	900	1	862	862	1.530	1,318	\$ 175	\$ 230,733
1.1.2 Wet Laboratory (Clean)	1	1,000	1,000	1	1,006	1,006	1.530	1,539	\$ 250	\$ 384,683
1.1.3 Simulation Laboratory	1	1,600	1,600	1	1,206	1,206	1.530	1,845	\$ 225	\$ 415,045
1.1.4 IVF Laboratory	1	192	192	1	414	414	1.530	633	\$ 300	\$ 189,971
Subtotal – Laboratory Spaces			3,692			3,488		5,335		\$ 1,220,432
1.2 Administrative and Office Spaces										
1.2.1 Offices	3	120	360	5	120	600	1.530	918	\$ 175	\$ 160,603
1.2.2 Residents	1	280	280	1	301	301	1.530	460	\$ 175	\$ 80,569
Subtotal – Office Spaces			640			901		1,378		\$ 241,173
1.3 Support Spaces										
1.3.1 Cold Room / Freezer Room	1	240	240	1	240	240	1.530	367	\$ 275	\$ 100,951
1.3.2 Soiled Access Hallway	1	485	485	1	613	613	1.530	938	\$ 150	\$ 140,643
1.3.3 Storage Room	1	660	660	1	371	371	1.530	567	\$ 150	\$ 85,120
1.3.4 Locker Room/ Shower	2	200	400	2	167	334	1.530	511	\$ 225	\$ 114,946
1.3.5 Equipment Room	1	340	340	1	185	185	1.530	283	\$ 175	\$ 49,519
1.3.6 Mother's Room	1	40	40	1	43	43	1.530	66	\$ 150	\$ 9,866
1.3.7 Wash Bay	1	600	600	0	600	0	1.530	0	\$ 100	\$ -
Subtotal – Support Spaces			2,765			1,786		2,732		\$ 501,044
SPACE SUMMARY OF NEW CONSTRUCTION										
Total Net Assignable SF			7,097			6,175				
Net-to Gross Ratio			70.0%			65.4%				
Total Gross SF			10,139			9,445				
NEW CONSTRUCTION COST SUMMARY										
Building Cost Subtotal									\$	1,962,648
Total Gross SF										9,445
Building Cost / GSF									\$	208
RENOVATION										
1.4 Renovated Spaces										
1.4.1 Wet Laboratory	1	823	823	1	823	823	1.000	823	\$ 125	\$ 102,875
1.4.2 Storage Room	1	419	419	1	419	419	1.000	419	\$ 100	\$ 41,900
1.4.3 Break / Work Room	1	239	239	1	239	239	1.000	239	\$ 100	\$ 23,900
1.4.4 Supplies	1	100	100	1	100	100	1.000	100	\$ 100	\$ 10,000
1.4.5 Clean Entry	1	214	214	1	340	340	1.000	340	\$ 150	\$ 51,000
Subtotal – Support Spaces			1,795			1,921		1,921		\$ 229,675
CONSTRUCTION COST SUMMARY										
Building Cost (New Construction)									\$	1,962,648
Building Cost (Renovation)									\$	229,675
Sitework Cost									\$	100,000
Site Utility Cost									\$	100,000
Design Contingency (5%)									\$	119,616
Subtotal Construction Costs									\$	2,511,939
Project Associated Costs									\$	1,067,574
Total Project Costs										\$ 3,579,513



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RECOMMENDED DESIGN OPTION**ALTERNATIVE DESIGN OPTIONS**

Over the course of the study, multiple building layouts were considered. These layouts were analyzed for financial, programmatic, and future phasing viability. Based upon this information, one design option was recommended for the conclusion of the study. A summary of each remaining option is included below. Floor plans, room lists, and cost profiles for each alternative design option are included in the Appendix.

- Scheme A: This design limited the total program to that outlined in the original CPAC document – wet lab, classroom, offices, storage, and related support functions. This option was also designed to allow for future expansion to the north and to the east.
- Scheme B: This design (and subsequent design options) incorporated the added program of Clinical Simulation, IVF Lab, cold room/freezer, a Residents workspace, and two additional offices. In this option, support functions of the restrooms and mechanical/electrical rooms were on opposite sides of the corridor, limiting the use of the area above the hardened restrooms for mechanical equipment. Future expansion may be accommodated to the east.
- Scheme C: This design made use of the grade change occurring to the north of the existing building. By placing the programmatic functions of Clinical Simulation, classroom, and related support functions on a lower-level with walk-out entry, it shortened the north-south length of the addition. This option required the addition of a staircase, elevator, and the division of support functions, resulting in higher cost and greater square footage.
- Scheme D: This design incorporated the new program along the entire length of the north façade, minimizing the north-south length of the addition. This option resulted in greater corridor length, greater square footage, and reduced visibility from the building entry.