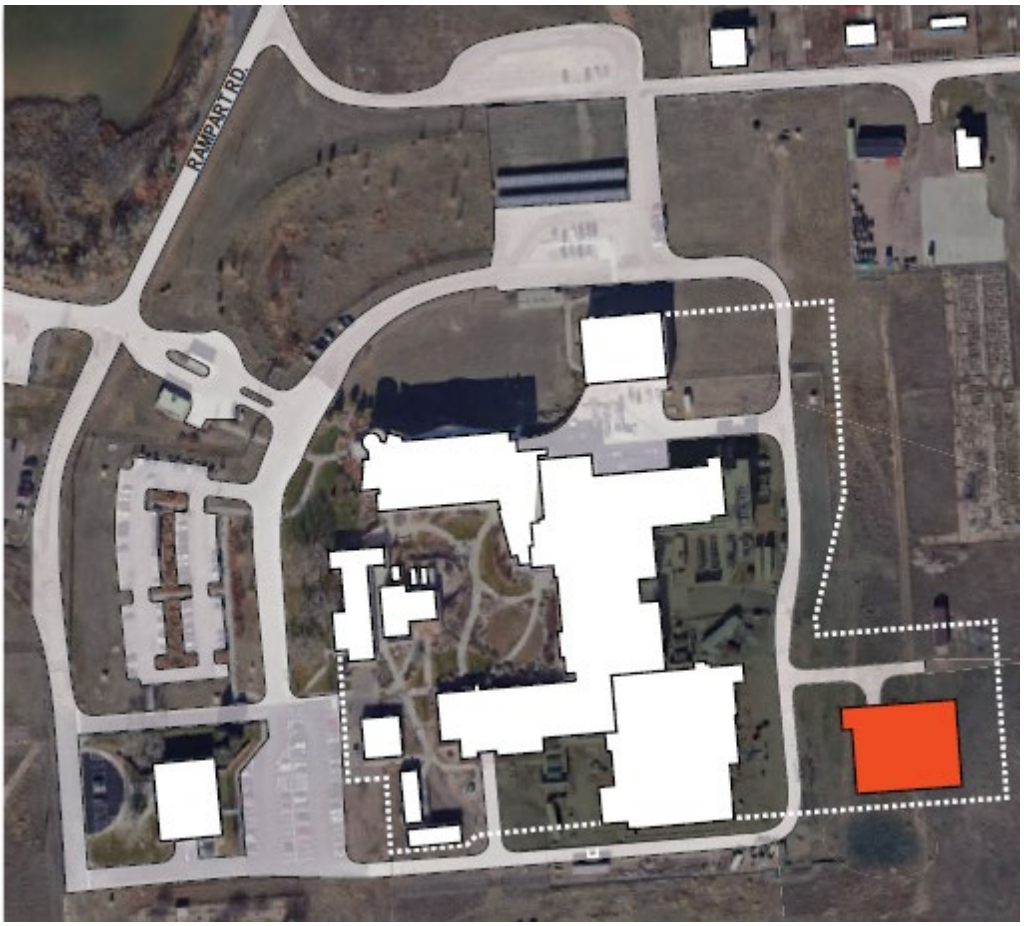

CHIROPTERAN RESEARCH FACILITY

October 2021

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Executive Summary

This project will construct an approximately 14,000 gsf stand-alone bat vivarium adjacent to the CVID building at Foothills Campus.

The estimated budget is $8.0 M. The university was recently awarded an NIH grant of $6.8M for this project and the Office of the VP for Research has committed the remaining $1.2M.

Once necessary approvals are in place it is estimated that the project will take approximately 3 years to complete. CSU anticipates a design-bid-build delivery method and occupancy is expected in Sept 2024.

Justification

Program mission and history

Pathogens transmitted by bat vectors continue to burden the health of humans around the world. A number of emerging zoonotic viruses that originate in bats cause high mortality in humans: SARS-CoV, MERS-CoV and SARS-CoV-2, Ebola virus, Marburg virus, Nipah virus and Hendra virus. While these viruses are highly pathogenic in humans and other animals, the bats that host them do not experience meaningful pathology. Further, there is increasing evidence that many other human viruses may have originated in bats, including measles, mumps and hepatitis C viruses. While the study of bats as reservoir hosts for these zoonotic agents has intensified over the last 10 years, our understanding of viral tolerance in bat reservoirs remains largely unknown. Improving our understanding of viral tolerance in bats can improve our understanding and outcomes of humans infected with bat-origin zoonoses. However, there is a lack of facilities capable of maintaining them in the laboratory setting to conduct these critical studies. In 1984, Colorado State University (CSU) established the Center for Vector-borne and Infectious Disease (CVID) as a visionary approach to counter these emerging threats. Since its creation, CVID has been an internationally recognized resource advancing science, practice and training on topics related to vector borne infectious disease. The goals of this proposal are to: 1) Construct a state-of-the-art bat vivarium with the necessary environmental and biosafety controls to promote successful breeding and rearing of bat for use as research models, and 2) Accommodate a growing research agenda and national need in emerging bat-borne and bat-associated diseases.

Physical Condition/functionality of Existing Space

CVID currently houses one of the only captive breeding colonies of bats (Jamacian fruit bats, *Artibeus jamaicensis*) for use in infectious disease research. The Bat Resource center will expand the breeding colony to house Indian flying fox (*Pteropus medius*), house horseshoe bats (*Rhinolophus affinis*) and future species of bats such as the big brown bat (*Eptesicus fuscus*) or Seba's short-tailed bat (*Carollia perspicillata*).

New Space Requirements

Space requirements and room design were based on the Association of Zoos and Aquariums space types for various species of bats (Table 1), as well as the need to meet species typical behaviors. Bat holding areas will contain areas for roosting. In our existing Jamaican fruit bat colony this is done by hanging a shade cloth from the ceiling with multiple folds in it. Roosting areas are also provided in the ceiling by inverting a wire mesh box. The shade cloths and roosting boxes are easily removed and sanitized in the cagewash facility. Feeding stations are placed throughout the holding room, and the fruit can be hung from various locations,

which facilitates flight. A similar housing situation can be used to maintain the Horseshoe bats by providing roosting areas with shade cloth and inverted mesh boxes, and locating insect feeding stations throughout the room. The Pteropus bats require additional materials to facilitate roosting. In addition to the wire mesh ceiling that they can hang from, additional materials can be introduced to provide variable hanging locations through the room. These include artificial tree branches, ropes and other materials that can be distributed throughout the room at various heights to accommodate their hierarchical structure, which can be easily replaced when soiled. Multiple feeding stations throughout the room and in the center of the room facilitate flight. There is a column located in the middle of each of the Pteropus rooms which can be used as a feeding station. The Pteropus are then encouraged to fly in a circular pattern during feeding times. The funding for these materials is not a component of this proposal and will be part of the initial operating costs (Institutional Letter of Support). We will work with our partners from the Lubee Bat Conservancy and the USGS to ensure the appropriate environment for the bats.

Table 1. Association of Zoos and Aquariums space requirements for bats

Species	Weight	Wingspan	Enclosure* (6 ft high)	Proposed space	Maximum capacity per room
Indian flying fox	1.6 kg	4-5 ft	15 ft x 30 ft[a]	1500 SF	21
Jamaican fruit bats	40-60 g	4-6 in	4 ft x 7.5 ft[b]	320 SF	171
Horseshoe bats	30-40 g	3-5 in	4 ft x 7.5 ft[b]	320 SF	212

*enclosure height is at least 6 feet. a- up to 6 bats, add 15% for each additional bat. b- up to 10 bats/30 SF for bats weighting up to 80 g. The density for the smaller bats is adjusted based on weight and wingspan such that Jamaican fruit bat density can be increased to 10 bats/18.75 SF and Horseshoe bats can be increased to 10 bats/15 SF.

Description	**asf**	**Number required**	**Total asf**
Large breeding rooms	**1500**	**3**	**4500**
Small breeding rooms	**315**	**7**	**2205**
Isolation/procedure suite	**625**	**4**	**2500**
Medical care	**315**	**1**	**315**
Kitchen/food prep	**315**	**1**	**315**
Ante rooms	**150**	**3**	**450**
Office block	**670**	**1**	**670**
Receiving	**280**	**1**	**280**
Mechanical	**1060**	**1**	**1060**
Total asf			**12295**
circulation			**1705**
Total bldg			**14000**

Equipment List
Equipment will include biosafety cabinets, procedure tables and enrichment items for the bat holding areas.

Alternative analysis
The proposed facility is ideally situated adjacent to the laboratory space of the CVID investigators. The location is also ideal for studies that require ABSL3 containment, because the IDRC and RMRBL have over 10 animal rooms for conducting studies at ABSL3. The IDRC has a centralized cagewash facility which will support the bat vivarium, with two bulk sterilizers, a rack washer and a tunnel washer. There is also a centralized dock to receive animals and supplies, as well as a centralized storage for equipment and feed.

Benefits of the Project
Construction of the proposed bat facility will help meet the immediate needs of the CSU research community and our national collaborators. Beyond investigators at CSU, this project will enhance regional and national efforts to understand the complex role of bats in virus emergence. Studies planned with collaborators at Rocky Mountain Laboratories in Hamilton MT will assess the susceptibility of bats to Nipah virus and ebolaviruses. The colony will also provide a valuable source of tissues and reagents for *in vitro* studies.

Design Criteria

See conceptual floor plans and building elevations in Appendix.

Site Constraints
Modification of existing security fence location and the water quality pond will be required.

Flood Mitigation Analysis
Not applicable to anticipated building site. See flood plain map in appendix. Storm water quality and associated management are anticipated in the scope of work.

LEED Goal
Senate Bill 07-051 directs that state buildings undergoing substantial renovation or new construction conform to the High Performance Certification Program. The Office of the State Architect has stated that USGBC LEED-NC Gold is the targeted standard of this program, or at a minimum, the highest obtainable LEED standard. The most current LEED publication at the time of design will be used. The inclusion of high performance standards is an integral part of the project, beginning at the program plan stage.

In the development of the design for this project all viable options will be evaluated to maximize the opportunities for sustainable design. Some key areas of focus will include:

- Utilize a third-party commissioning agent to review systems design and systems implementation.
- Design to minimize water usage within the facility.
- Design of mechanical and electrical systems to minimize energy usage.
- Selection of materials high in post-consumer recycled content.
- Use of paints, coatings, sealants and adhesives that have recommended low levels of volatile organic compounds.
- Where possible incorporate the use of natural daylight within human occupied spaces.
- Provide user controllability for lighting systems while still meeting specified requirements.

- Develop the construction schedule to allow for building flush out to minimize the chance of off-gassing within the building.

Architectural

The Bat Resource Center will be organized around the concept of dual, east-west running corridors. The south corridor will provide access to larger holding rooms for the Pteropus bat colony and the north corridor will access a series of smaller holding and support rooms to provide flexibility and opportunities for specialized isolation, research and breeding of the smaller species. Each of the animal holding rooms will be separated from the corridor by an anteroom that will serve as a procedure, preparation and gowning space. These anterooms will be dedicated for the larger holding rooms on the south side and will be shared for the smaller rooms on the north. Each anteroom will be equipped with a sink, counterspace, laboratory safety fixtures and some floor standing space for upright equipment and biosafety cabinets or procedure stations. The northwest quadrant of the facility will house all support spaces and provide a north-south running corridor to connect the animal holdings corridors. These support spaces will include the office, break room for animal care staff and visiting researchers as well as unisex bathrooms, custodial space, a loading dock and the mechanical, electrical and telecommunications infrastructure spaces. A centrally located food preparation and storage area will provide direct access to the two animal holding corridors. This kitchen will be equipped throughout with stainless steel casework, a dual basin sink and an 8'-0"x12'-0" built-in cold room with a recessed, insulated floor. All holding and procedure areas are designed around an 11'-0" modular concept for maximum flexibility with a minimum wall bench depth of 33" where they occur and a minimum of 5'-6" clearance between bench faces or benches and floor standing equipment. The main corridors will maintain a width of 7'-6.

All construction systems will be specified to meet NIH guidelines for both animal holding spaces and ABSL2 containment spaces. Partition wall construction will consist of minimum 20-gauge metal studs and 5/8" moisture resistant drywall throughout with a low-VOC epoxy paint finish in all corridors and support spaces and a fully sealed fiberglass reinforced panel system in all animal holding rooms. Ceilings will be drywall with epoxy paint in corridors and support spaces with the addition of the fully sealed FRP panels for the ceiling finish in the animal holding rooms. In addition, all animal holding rooms will be equipped with a ceiling mounted Unistrut frame to support a fine stainless-steel wire mesh system at 7'-0" above the floor in accordance with recommendations of the American Zoological Association. This mesh will provide a substrate for the bats to hang and will be at a height that will permit handling and restraint. Flooring in the holding rooms will either be sealed concrete or a built-up rubberized surface to alleviate injury to the larger species housed within the facility. The rubberized floor is based on the recommendation of the those that routinely house larger bats, and will provide that additional level of safety for the bats and facilitate proper sanitation. Flooring in the corridors and support spaces will be sealed concrete. The laboratory casework in the anterooms as well as the kitchen will be stainless steel with fully welded countertops with integral backsplashes and sinks.

New exterior construction will consist of a unit masonry wainscot with a metal panel veneer above on a continuously insulated structural stud frame with a spray applied vapor barrier. The roof structure will be comprised of steel beams with shallow open web steel joists spanning between to support corrugated roof

deck, insulation, protection board and an 80 mil, fully adhered EPDM roofing system that is sloped at ¼" per foot minimum to drain.

Structural

The structure will consist of concrete spread and strip footings, a reinforced concrete floor slab and structural steel frame above.

Mechanical, Electrical, Plumbing Narrative

Two new 100% outside air handling units (AHUs) will be provided to serve the facility. Each AHU will be sized to handle the entire load (100% redundancy) plus 20% additional capacity to handle future growth. The supply air ductwork downstream of the AHUs will be connected. The new AHUs will be located on the roof and will include service corridors for maintenance access. The AHUs will operate in a variable volume (VAV) mode.

The components of each new AHU will be as follows (listed in direction of airflow):

Component	Comments
▪ Outside air dampers	Low-leak dampers
▪ Prefilter bank	MERV 8, 2" plated filters
▪ Final filter bank	MERV 14, 12" cartridge filters
▪ Heat recovery coil bank	Runaround water coil, glycol for freeze protection
▪ Preheat coil bank	Heating water coil, pumped for freeze protection
▪ Steam humidifier	High-efficiency dispersion grid
▪ Cooling coil bank	Chilled water coil
▪ Supply fan(s)	Fan array controlled by VFDs
▪ Sound attenuator	Sound attenuator bank
▪ Discharge dampers	Low-leak dampers

Exhaust Systems. Two new centrifugal exhaust fans, sized for N+1 redundancy, will be provided on the roof on the heat recovery unit. The exhaust fans will use VFDs to maintain proper airflow and be controlled to maintain a system static pressure setpoint. Exhaust discharge from the building will be located as far as feasible from fresh air intakes and from other buildings to help prevent air recirculation into the building.

Heat Recovery System. A new glycol runaround loop heat recovery systems will be provided to transfer heat between the exhaust air and outside air streams. All heat recovery system components will be located in a new rooftop heat recovery unit consisting of MERV 8 filters, heat recovery coils, access space, and a service corridor to house a heat recovery pump, glycol feeders, and associated hydronic specialties.

Supply and Exhaust Air Distribution Systems. A variable volume (VAV) air distribution system will be utilized to maintain proper pressurization of spaces and temperature control. Each control zone will be served by a supply air valve with an integral reheat coil. The air valve will provide required airflow to maintain the room setpoint temperature while simultaneously maintaining proper pressurization relationships. As a general rule, the anterooms will serve as an airlock between the corridors and the holding rooms such that the anteroom air pressure will be positive to the corridor to prevent unwanted airborne contaminants from enter the room, and the bat holding rooms will be negative to the anteroom to contain airborne contaminates in the holding rooms. The ABSL2 rooms and isolation rooms will have negative air pressure relative to their adjacent rooms.

The exhaust system will operate in a VAV mode similar to the supply air system. Each control zone will be served by a corresponding exhaust air valve. The airflow of the exhaust air valve will "track" the airflow of the corresponding supply air valve to guarantee proper space pressurization is maintained.

Humidification. A new rooftop steam-to-steam humidifier will be provided to humidify the AHU supply airstream. Additional zone-level steam humidifiers will be provided to meet the higher humidity levels required in the animal holding areas.

Chilled Water System. New direct-buried chilled water will be extended to the new facility from the existing campus loop system north of the building. New chilled water pumps (N+1 redundancy), buffer tank, and accessories will be provided in the first-floor mechanical room to distribute chilled water to the new AHUs. VFDs will be provided to modulate pump speed as necessary to satisfy loads.

Steam and Condensate System. New steam and condensate piping will be extended to the new facility from the existing campus system. A new vault will be constructed, and new lines will be extended to the first-floor mechanical room, where a pressure-reducing station will be installed. Low pressure steam will be routed to the heat exchangers and humidifiers. A new condensate pump will return condensate back to the campus loop.

Heating Water System. New shell-and-tube heat exchangers, new heating water pumps, all sized for N+1 redundancy, will be installed in the new first floor mechanical room. The heat exchangers and pumps will be used to generate and distribute heating water throughout the facility. VFDs will be provided for each pump to allow for pump speed modulation to satisfy building loads.

Building Automation System. A building automation system (BAS) will provided for the new facility.
All components will be provided in accordance with University standards to ensure proper control and monitoring, and compatible with the existing BAS used for other vivaria on campus. The BAS will have the capability to adjust setpoints and system operation to match changing facility functions. Control points tied into the BAS will include local and remote alarming. Animal holding rooms will be provided with room monitor displays to track temperature, humidity, and pressurization levels.

Temperature and Humidity Parameters. Table 5 provides the temperature, ventilation, and noise parameters that will be used as the basis for the design of the building HVAC systems.

Table 5. Temperature and Humidity Parameters.
DBT- dry bulb temperature; WBT- wet bulb temperature; ACH- air changes per hour; RH- relative humidity

Outdoor Design Conditions					
Winter DBT (^{O}F)	2.8				
Summer DBT (^{O}F)	95				
Summer Coincident WBT (^{O}F)	78				
Indoor Design Conditions					
	ACH	DBT (^{O}F)	RH (%)	DBT (^{O}F)	RH (%)
		Winter		Summer	
Animal holding areas	15	77	40-50	77	50-60
Animal support areas	12	72	25-35	75	50-60
Office/general areas	6	72	25-35	75	50-60
All other areas	6	72	25-35	75	50-60

Many of the bat species proposed for this facility are tropical bats requiring higher temperatures and ambient humidity levels compared to more traditional laboratory animals. As such the setpoint temperature for the bat rooms will be 77^{O}F with a relative humidity at 50%. These will be adjusted based on the species needs.

Plumbing Systems. New water and sanitary sewer services will be provided for the facility, with each connecting to the nearby existing campus mains. New steam-fired water heaters (N+1 redundancy) will be provided to generate hot water. Domestic cold and hot water will be extended to all potable water use points. Non-potable water will be created via reduced-pressure backflow preventers to serve all animal and laboratory needs. Hose bibs and floor drains with a minimum 4" drain will be provided for washdown in each animal holding room. A new reverse osmosis system will be provided to serve humidifier feedwater requirements. Sanitary waste and vent piping will be extended to all required fixtures and drains. Storm drains will be discharged to grade and drained to the existing detention pond adjacent to the facility.
Fire Protection. A new wet-pipe sprinkler system will be installed to provide full coverage for the facility. All work will comply with NFPA 13 and other local requirements.

Electrical Systems. The electrical design for this project will include the following:

- New 480Y/277V, 3 Phase, 4-Wire normal electrical service to the facility.
- Generator back up for code required life safety loads, in addition to critical standby loads, including mechanical equipment to maintain the integrity of the bat housing environments throughout the facility.
- LED lighting systems and associated controls throughout the facility.
- Receptacle layouts to support computer equipment, laboratory equipment and special and general-purpose needs the facility.
- Outlet boxes, raceway distribution systems, and installation of telecommunications cabling, provided by Colorado State University Telecom.
- Necessary redundant electrical feeds to critical HVAC equipment.
- A new addressable fire alarm system.
- Electrical rough-in and connections to support the installation of video surveillance, access control, low voltage environmental monitoring systems associated with the vivarium, and other critical equipment.

Additionally, the electrical design will include, but will not be limited to the following containment practices:

- Access to the facility addition will be restricted to authorized personnel through the use of a card access control system, compatible with the existing CSU card access system.
- A video surveillance system will be provided to monitor all access to the facility.
- Access to containment areas will be controlled by the use of electrically interlocked sets of doors. Similarly, door between the bat holding areas and the anterooms will be interlocked to prevent inadvertent escapes. This also meets the requirement for Pteropus species to have a double door enclosure.
- All electrical penetrations into containment areas will be adequately sealed to ensure containment within the space, and waterproof to allow for decontamination. Seals will be included around conduit penetrations and around cabling within raceway systems.
- Light fixtures in containment and bat holding areas will be triple sealed, gasketed, and a minimum of IP65 listed. Fixture lenses will be installed with the smooth surface out to provide an easily cleanable surface.
- The emergency generator system will serve all life safety loads (e.g. egress lighting, animal room lighting, fire alarm system), as well as supply and exhaust systems, pumps to support building heating and cooling systems, HVAC controls, devices in animal holding rooms, refrigerators and freezers in laboratory areas, and any other critical loads as required per the facility users/director.

Electrical Distribution System. The Colorado State University campus electrical utility system/plant is arranged for reliability and redundancy. The main power to IDRC complex is buried underground which minimizes power outages due to weather and fowl. A new diesel driven generator and its associated distribution system will be utilized to serve all new emergency/standby electrical distribution equipment. Both the generator and the normal power electrical service have more than adequate capacity to serve the facility while maintaining future flexibility.

New normal power and emergency/standby power 480Y/277-volt, 3 phase, 4 wire and 208Y/120-volt, 3 phase, 4 wire distribution panels, branch panelboards and dry-type transformers will be added under this project's scope. The new equipment will be located in dedicated electrical rooms. Separate panelboards will be provided for containment and non-containment areas. In general, HVAC equipment and large equipment loads will be served at 480 volts, 3-phase. Lighting throughout the facility will be served at 277 volts, single phase. Animal holding, laboratory, office, computer equipment, and general-purpose receptacle circuits will be served at 120 volts, single phase. All other equipment and devices will be served by the appropriate distribution system voltage.

Distribution panels and branch panelboards will make use of circuit breakers for overcurrent protection and will be fully rated to accommodate short circuit characteristics within the existing facility. Copper bussing will be provided for all electrical distribution system equipment. The electrical distribution system for the addition will allow for the following:

- System capacity to accommodate present and future loads
- Efficient service to building lighting, equipment and HVAC loads.

Electrical Service to HVAC Equipment. Normal and emergency electrical service to HVAC equipment will be provided as required to maintain life safety of humans and bats. All necessary starters, disconnect switches, control devices and VFD connections will be provided to ensure a complete and functional system installation.

Receptacle Layouts. Receptacle layouts and circuiting to animal holding rooms, laboratory equipment, office equipment, special purpose and general-purpose needs will be provided in accordance with direction from facility personnel. All electrical devices will be labeled with the panel source and circuit number. Dedicated receptacles will be provided as required to support specific equipment locations. All receptacle branch circuits will be provided with equipment ground conductors and dedicated neutral conductors. All branch circuit wiring will be copper and will be installed in concealed raceway systems. In animal holding areas, weatherproof, ground fault interrupting receptacles will be provided to support necessary equipment functions. Ground fault interrupting type receptacles will be provided in all other Code required locations, and in all designated "wet" locations throughout the facility.

Lighting. Lighting systems throughout the facility will be designed in accordance with NIH policies and guidelines, Colorado State University design guidelines, IESNA recommendations, and direction provided by the National Research Council's (NRC) *Guide for the Care and Use of Laboratory Animals*. Lighting power densities will be minimized by using highly efficient, LED fixtures throughout the facility. The LED lighting with balanced spectral energy, and high color rending indexes will be used in the holding rooms. Lighting control will utilize line voltage type toggle switches in non-animal holding rooms. Occupancy/vacancy sensors will be used throughout most non-animal holding spaces to provide automatic off of lighting loads during unoccupied times. In all animal holding rooms, time-based lighting controls coupled with momentary contact override switches will be utilized in order to maintain the animals' diurnal cycles, while allowing for maintenance override when necessary. This lighting system will in holding rooms will slowly dim on and off to simulate dawn and dusk conditions for the bats. These time frames are when they are typically most active, and the crepuscular cycle will enhance their environment.

Telecommunications. All telecommunications device rough-in, including outlet boxes and raceway distribution, will be provided as necessary to support the installation of Colorado State University installed, and provided cabling. Telecommunication outlet locations will be directed by facility personnel, but will include at minimum the office spaces and anterooms throughout the facility.

Security Systems. A video surveillance system will be provided for the facility addition. Cameras will be located to view all exterior doors and building access points. In addition, interior cameras will be provided at locations directed by University personnel. A card access or biometric type access control system will be provided for the facility. Systems will control and monitor access into the facility and may be used to restrict access to some locations within the facility. System details will be coordinated with University personnel.

Equipment Monitoring System. The cold room will be equipped with monitoring systems that notify appropriate personnel upon failure.

Fire Alarm System. A new addressable fire alarm system will be provided for the facility. The system will be designed in accordance with all current Codes and standards and will also satisfy all current accessibility guidelines. Careful attention will be necessary when selecting the fire alarm annunciation strategy in and around the animal holding rooms. Certain animals can be greatly affected by the tones and visual effects from these fire alarm devices, particularly bats capable of hearing ultrasounds. Further details will be coordinated with the owner.

Fixed Equipment. The fixed equipment includes 4 class II type A2 biological safety cabinets for the anterooms. These will be used for handing and manipulation of the smaller bats, particularly when they are used for studies in the ABSL2. This will provide protection to both personnel and the bats during the manipulations. The cold room is necessary to store fruit for the bats. Our current colony of Jamaican fruit bats consumes approximately 750 pounds of fruit each week, and the larger Pteropus bats will require approximately 450 pounds of fruit each week for 30 bats. This will require weekly deliveries from the supplier and proper storage is critical to prevent the fruit from spoiling and to maintain its quality.

Utility Narrative

General

Letters in parentheses ( ) are utility map references included in appendix.

Electrical

- (a) Install new above-grade, six-way high voltage switch in existing conduit run and feed the new facility from this switch.
- Refeed CVID through existing conduit bank from new switch.

Water

- (b) Connect to 10” water main indicated.
- Combined service for both domestic and fire.
- Maintain 10 feet of horizontal separation between the water, sanitary, and chilled water services. Encase sanitary joints at crossings.

Sanitary Sewer

- (c) Connect building sanitary service to either manhole shown.

Stormwater

- (d) There are no existing storm mains. All stormwater collected and piped shall daylight into the existing water quality pond.
- Existing water quality pond shall be expanded as necessary within the shaded area to accommodate the additional volume.

Natural Gas

- (e) Natural gas is provided by Xcel Energy. Coordinate with Utility Services for any necessary natural gas service.

District Heating

- The existing RBL steam plant shall be utilized for all heating and process needs.
- (f) Connect to existing steam and condensate main lines with new vault and route into building mechanical space.
- Coordinate steam distribution design through Utility Services.

District Cooling

- The existing IDRC chilled water plant shall be utilized for all space and process cooling needs.
- (g) Connect to chilled water distribution at point shown.
- Coordinate dehumidification loads with Utility Services. The chilled utility may not be appropriate for dehumidification processes necessary for humidity control due to supply water temperature.

CSU Standards

The CSU Building Construction Standards Manual is available at:
http://www.fm.colostate.edu/constr_standards

The CSU Standards are to be used as guidelines for design. They are divided into 3 parts for use by Architects and Engineers: the first part is administrative; the second part discusses requirements for design and deliverables at each stage of the design process; the third part consists of the technical standards arranged by CSI division. The Standards are a work in progress, and as such, any question about the applicability of a standard should be discussed with the project manager. The Standards should never be referenced or copied in Contract Documents – the design is expected to embody and conform to the Standards. Contractors are not to be directed to review the Standards as a contract requirement.

CSU INCLUSIVITY STANDARDS-as applicable to Foothills Campus

Colorado State University requires all capital construction projects to provide inclusive facilities. These facilities are consistent with CSU Strategic Plan, Climate Action Plan (CAP) and Principles of Community that

"create and nurture inclusive environments," and "welcome, value and affirm members of our community, including their various identities, skills, ideas, talents, and contributions." Standards for each room type are located at: https://www.fm.colostate.edu/sites/default/files/standards/II-Chapter-34.Requirements_By_Space_Type.pdf.

CSU Accessibility Standards outline additional ADA requirements. In addition, **Lactation rooms, Commuter Showers and Reflection spaces** should be considered as applicable to the Foothills Campus.

List of applicable codes –

Approved building codes and standards have been adopted by the Office of the State Architect (herein referred to as State Buildings Program (SBP)) and other state authorities, and are identified below as the minimum requirements to be applied to all construction projects at state agencies and institutions of higher education owned facilities.

The 2018 edition of the International Building Code (IBC)
(As adopted by the Colorado State Buildings Program as follows: Chapter 1 as amended, Chapters 2-35 and Appendices C and I)

The 2018 edition of the International Existing Building Code (IEBC)
(As adopted by the Colorado State Buildings Program as follows: Chapters 2-16, Appendices A-C and Resource A) Effective July 1, 2016.

The 2018 edition of the International Mechanical Code (IMC)
(As adopted by the Colorado State Buildings Program as follows: Chapters 2-15 and Appendix A)

The 2018 edition of the International Energy Conservation Code (IECC)
(As adopted by the Colorado State Buildings Program)

The 2020 edition of the National Electrical Code (NEC) (NFPA 70®)
(As adopted by the Colorado State Electrical Board) Effective August 1, 2020

The 2018 edition of the International Plumbing Code (IPC), first printing (August 2017) (As adopted by the Colorado Examining Board of Plumbers)

The 2018 edition of the International Fuel Gas Code (IFGC) first printing (August 2017) (As adopted by the Colorado Examining Board of Plumbers)

The National Fire Protection Association Standards (NFPA)
(As adopted by the Department of Public Safety/Division of Fire Prevention and Control)

The 2018 edition of the International Fire Code (IFC)
(The 2015 edition continues to be adopted by the Department of Public Safety/Division of Fire Prevention and Control (DFPC). Projects requiring DFPC review should be designed with the most restrictive requirements)

The 2015 edition of the ASME Boiler and Pressure Vessel Code
(As adopted by the Department of Labor and Employment/Boiler Inspection Section) Effective July 1, 2017.

The 2017 edition of the National Boiler Inspection Code (NBIC)
(As adopted by the Department of Labor and Employment/Boiler Inspection Section) Effective July 1, 2017.

The 2015 edition of the Controls and Safety Devices for Automatically Fired Boilers CSD-1 (As adopted by the Department of Labor and Employment/Boiler Inspection Section) Effective July 1, 2017.

The 2015 edition of the Boiler and Combustion Systems Hazards Code, NFPA 85
(As adopted by the Department of Labor and Employment/Boiler Inspection Section) Effective July 1, 2017.

The 2013 edition of ASME A17.1 Safety Code for Elevators and Escalators
(As adopted by the Department of Labor and Employment/Conveyance Section) Effective April 1, 2017

The 2005 edition of ASME A17.3 Safety Code for Existing Elevators and Escalators
(As adopted by the Department of Labor and Employment/Conveyance Section
The 2011 edition of ASME A18.1 Safety Standard for Platform Lifts and Stairway Chairlifts
(As adopted by the Department of Labor and Employment/Conveyance

The current edition of the Rules and Regulations Governing the Sanitation of Food Service Establishments
(As adopted by the Department of Public Health and Environment/Colorado State Board of Health)

The Current edition of ICC/ANSI A117.1, Accessible and Usable Buildings and Facilities
As referenced in the adopted edition of the International Building Code.

Project schedule, cost estimates and financing

Schedule/phasing

Once necessary approvals are in place it is estimated that the project will take approximately 3 years to complete. CSU anticipates a design-bid-build delivery method and occupancy is expected in Sept 2024.

Financing

The estimated budget is $8.0 M. The university was recently awarded an NIH grant of approximately $6.8M for this project and the Office of the VP for Research has committed the remaining $1.2M.

Cost estimate/methodology
Cost estimates were developed by third party consultant informed by costs of recently constructed Bay Facility. CSU standards specify that the A/E document 20% of the construction budget in bid alternates, to cover potential volatility in the construction market as the project progresses.

Appendices

A. Site map
B. Utility map
C. Floor plans
D. Elevations
E. Foothills Campus Flood Plain
F. Budget Estimate

APPENDIX

N

FIG. 1: Overview Site Plan (Colorado State University Foothills Campus)

NOT TO SCALE

N

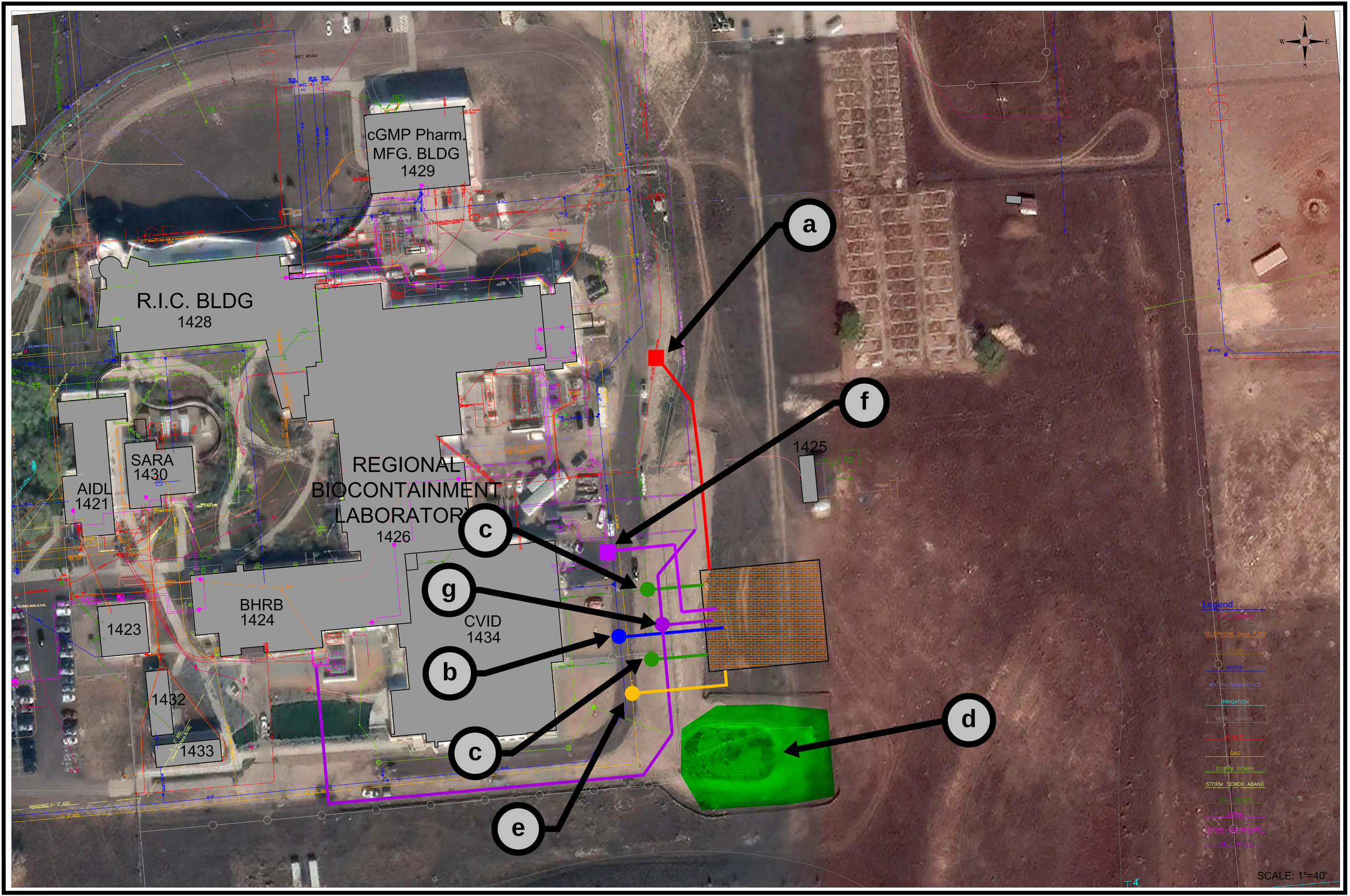
FIG. 2: Site Plan

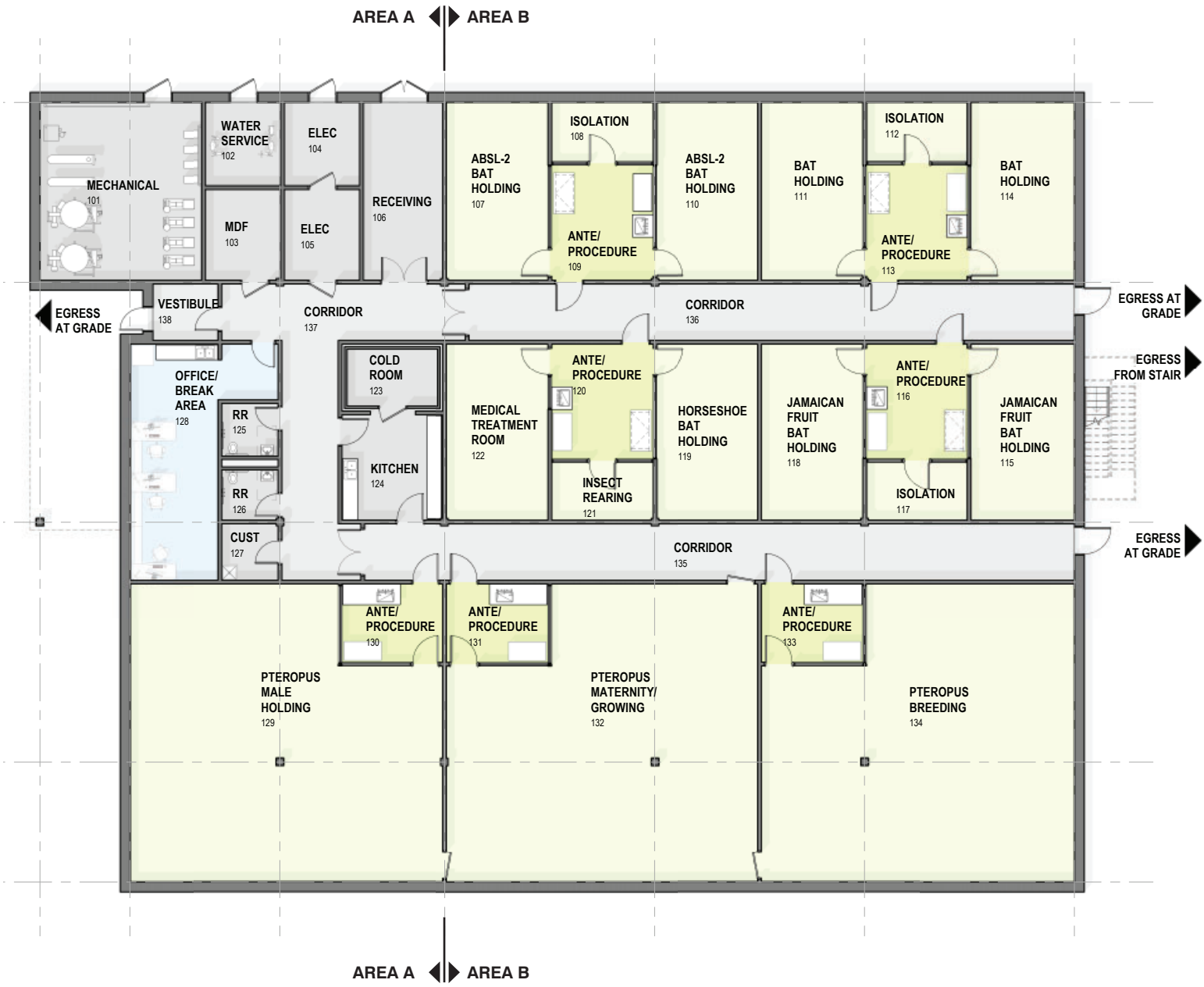
NOT TO SCALE

N

FIG. 3: Enlarged Site Plan

NOT TO SCALE


cGMP Pharm.
MFG. BLDG
1429
R.I.C. BLDG
1428
SARA
1430
AIDL
1421
REGIONAL
BIOCONTAINMENT
LABORATORY
1426
BHRB
1424
CVID
1434
1423
1432
1433
1425
DIRT ROAD
DIRT ROAD
a
b
c
c
d
e
f
g
Legend
ELEC. LIGHTING
TELEPHONE (and F/O)
FIRE
WATER
WATER- ABANDONED
IRRIGATION
IRRIG. ABAND.
POWER
GAS
STORM SEWER
STORM SEWER ABAND
SAN. SEWER
STEAM
STEAM - CONDENSATE
CHILL WATER
SCALE: 1"=40'

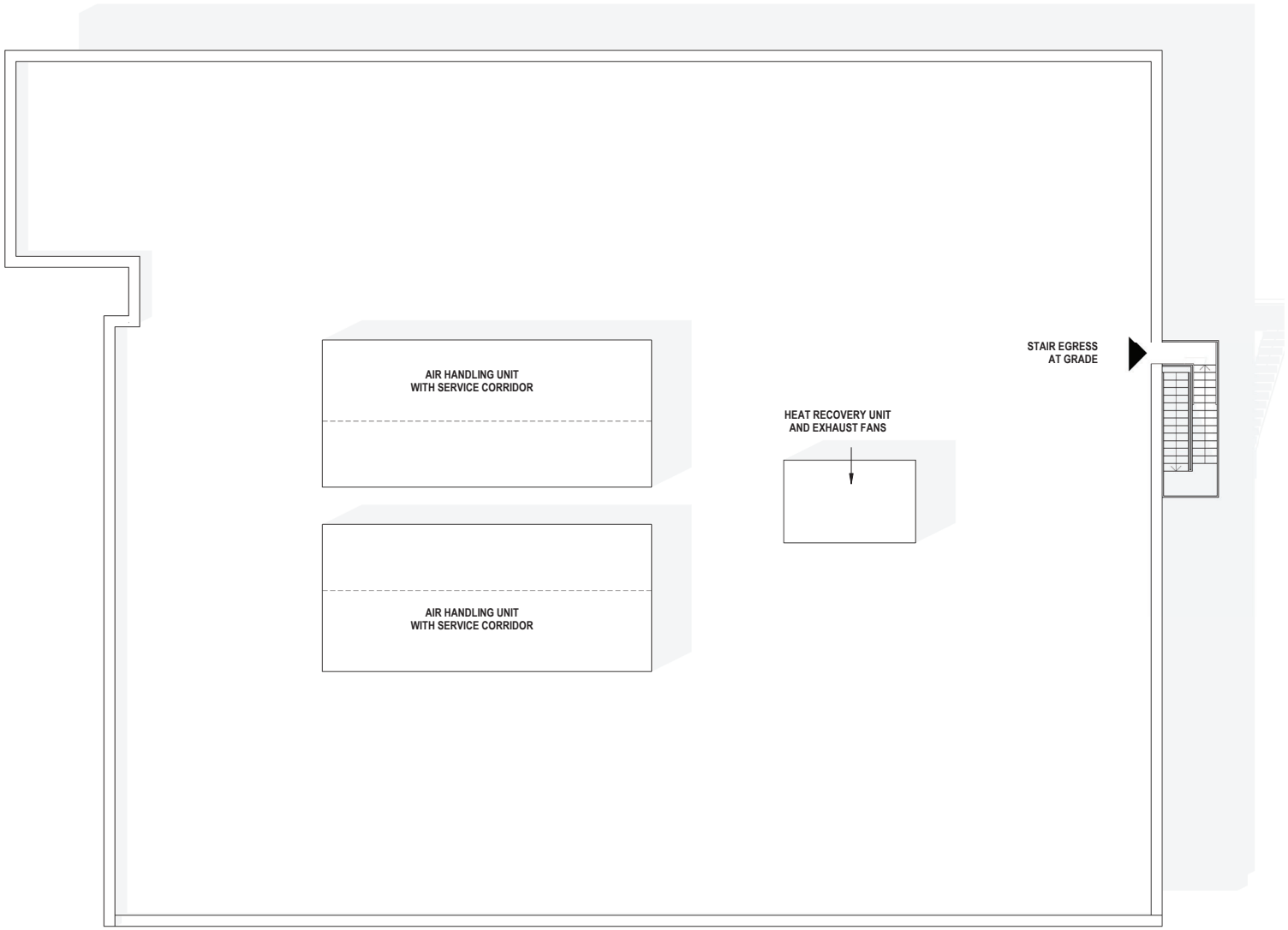


N

FIG. 4: First Floor Overview Plan and Egress Plan

SCALE: 1"=20'-0"

0 10' 20'

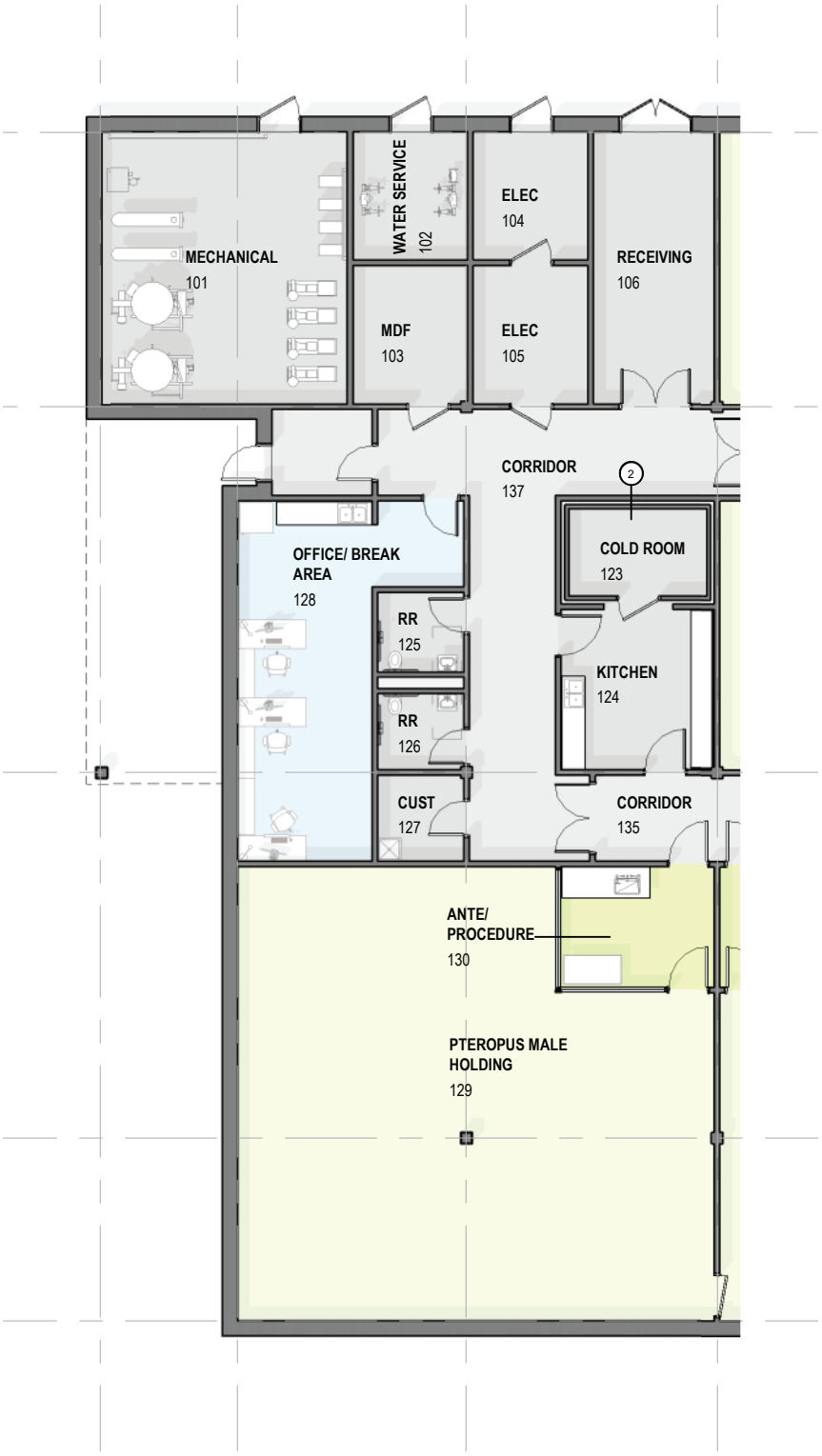


N

FIG. 5: Roof Plan and Egress Plan

SCALE: 1”=20’-0”

0 10’ 20’



Equipment Key	
1	Class II A2 Biosafety Cabinet (5 FT)
2	Cold Room

N

FIG. 6: First Floor Enlarged Plan (Area A)

SCALE: 1/16"=1'-0"

0 4' 8' 16'

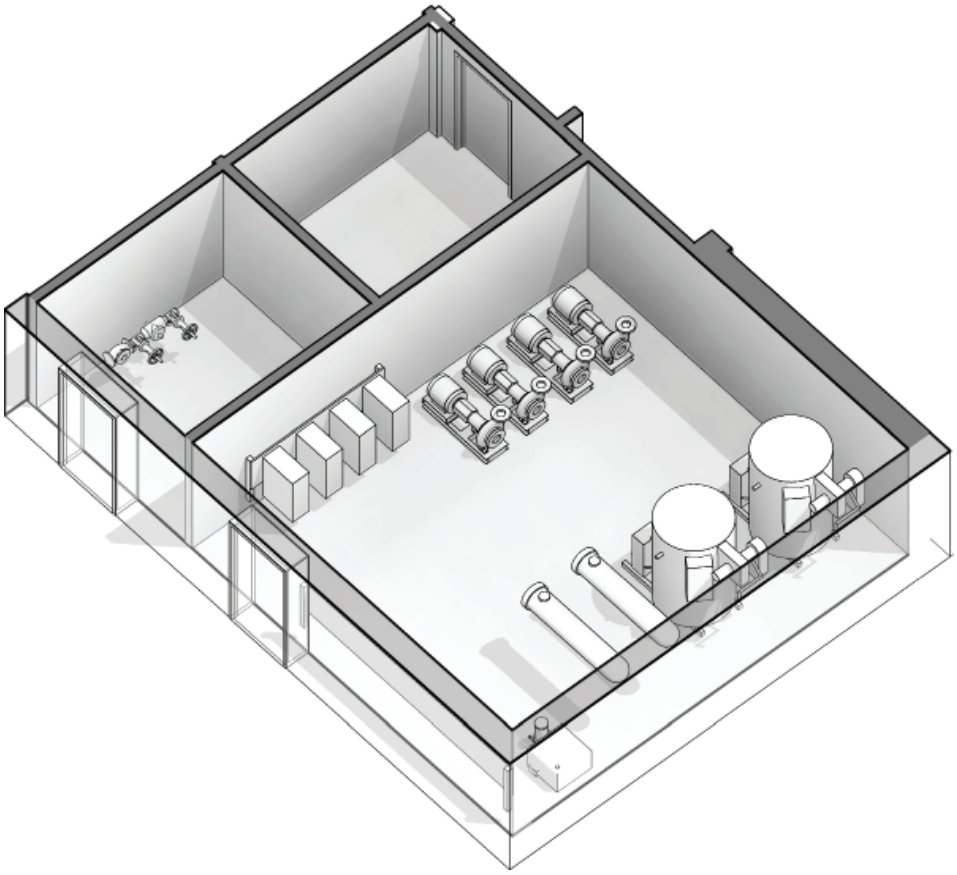
Equipment Key	
1	Class II A2 Biosafety Cabinet (5 FT)
2	Cold Room

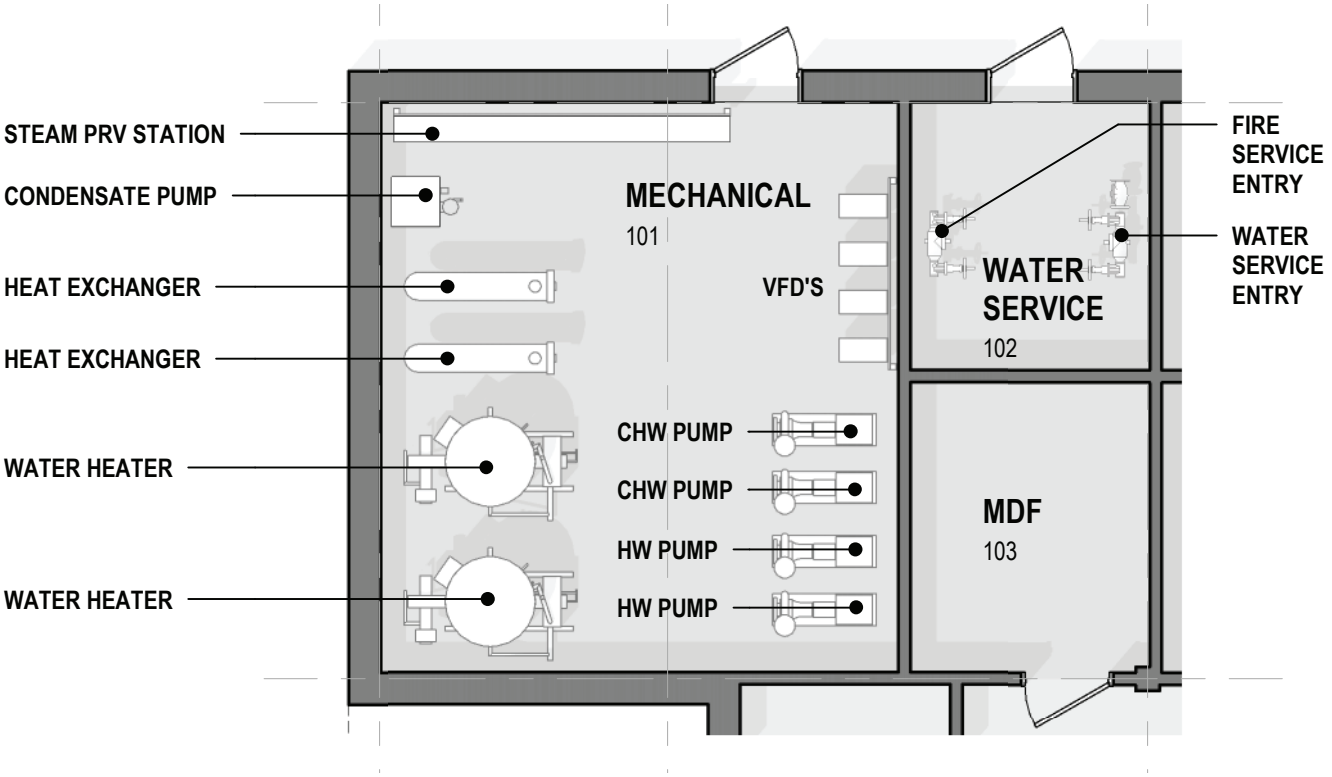
N

FIG. 7: First Floor Enlarged Plan (Area B)

SCALE: 1/16"=1'-0"

0 4' 8' 16'



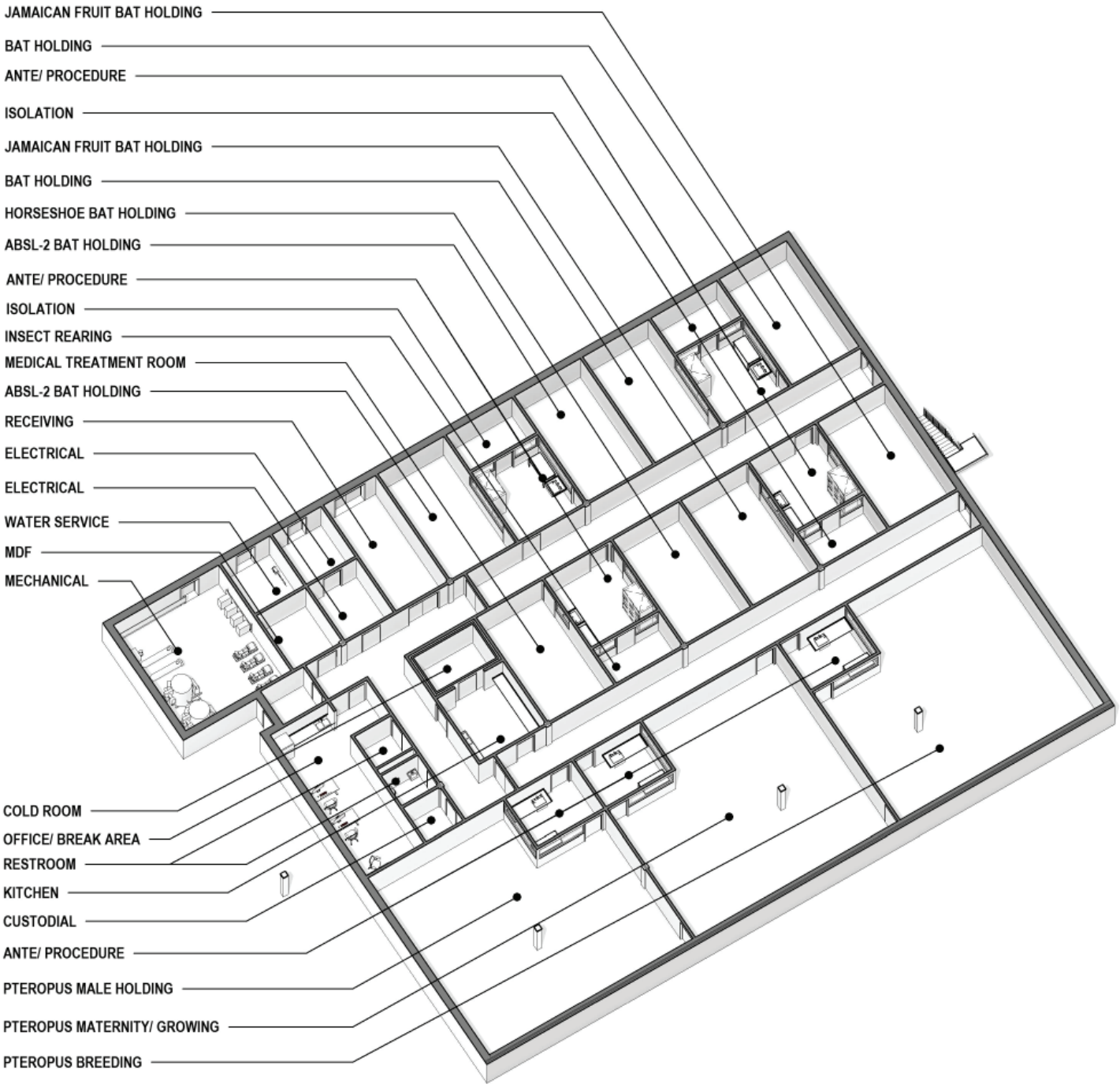


N

FIG. 8: Enlarged Mechanical Room Floor Plan

SCALE: 1/8"=1'-0"

0 2' 4' 8'



N

FIG. 9: First Floor Axonometric Plan

NOT TO SCALE

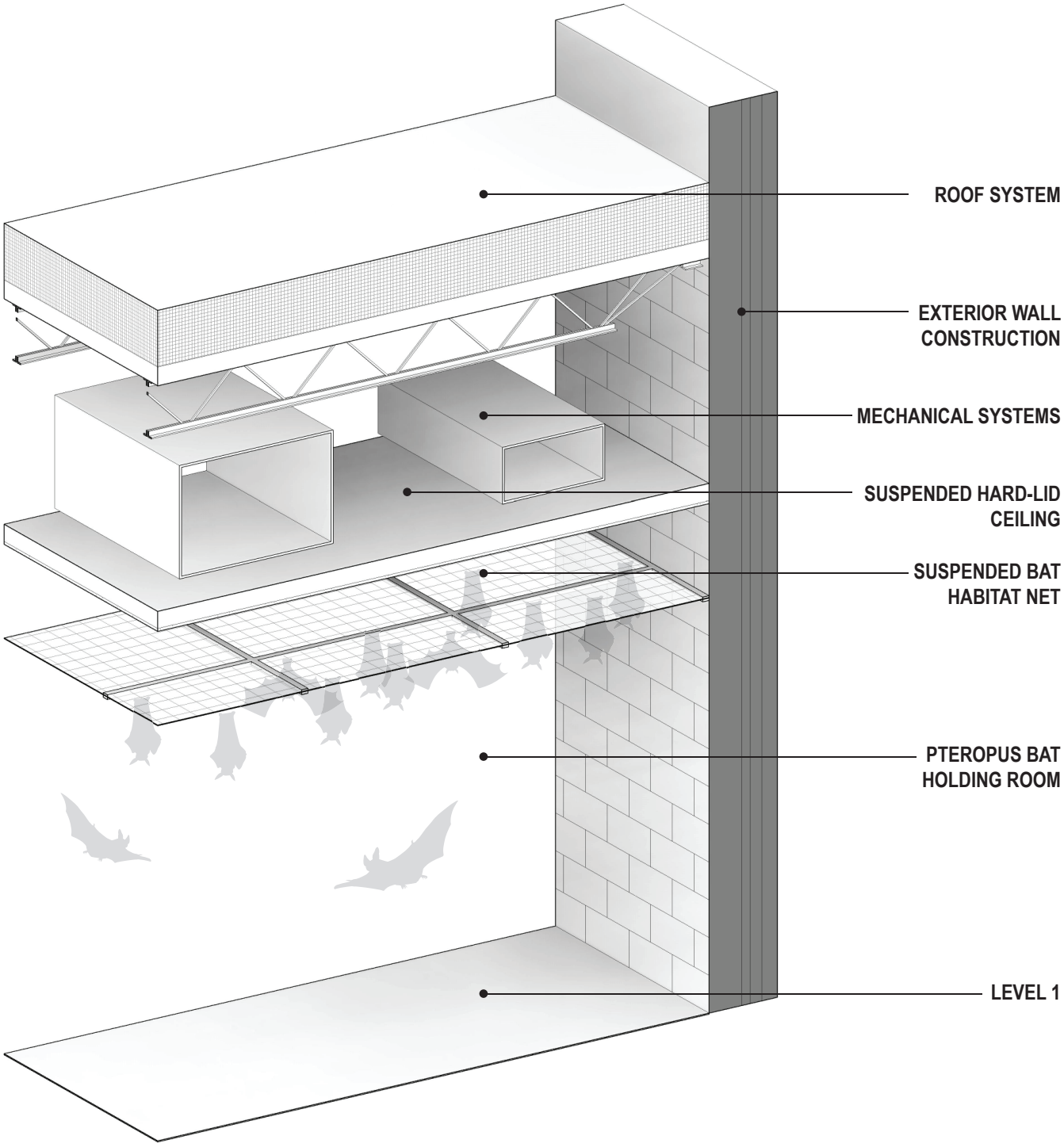


FIG. 10: Diagrammatic Wall Section

NOT TO SCALE

FCMaps

Legend

FEMA Floodplain

- FEMA High Risk - Floodway
- FEMA High Risk - 100 Year
- FEMA Moderate Risk - 100 / 500 Y

FEMA Map Panel

City Floodplains

- City High Risk - Floodway
- City High Risk - 100 Year
- City Moderate Risk - 100 Year

City Limits

Notes

1,143.0 0 571.50 1,143.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
City of Fort Collins - GIS

Budget Justification Form

Details of the costs summarized in SF 424C are provided below:

		Unit Costs	Cost Sharing NIH
1.	**Administrative and Legal Expense**		
	• Advertising, Reproduction and Archiving	$ 22,500	$ 22,500
		Subtotal	
2.	**Land, Structures, Rights of Way, Appraisals, Etc.**		
	• Land, Structures, Rights of Way, Appraisals. NEPA	$ 22,500	$ 22,500
		Subtotal	
3.	**Relocation Expenses and Payments**		
	• Relocations and Moving Costs	$ 30,000	$ 30,000
		Subtotal	
4.	**Architectural and Engineering Fees**		
	• Basic Services and Additional Services	$ 541,753	$ -
	• Grant Preparation	$ 20,000	$ -
	• Commissioning	$ 90,292	$ -
	• Reimbursables	$ 10,000	$ -
		Subtotal	
5.	**Other Architectural and Engineering Fees**		
	(All Fees Indicated Above in Item 4.)	*Subtotal*	
6.	**Project Inspection Fees**		
	• Campus Project Management and Inspection	$ 310,000	$ -
		Subtotal	
7.	**Site Work**		
	(Included in Construction Costs Below in Item 9.)	*Subtotal*	
8.	**Demolition and Removal**		
	(Included in Construction Costs Below in Item 9.)	*Subtotal*	
9.	**Construction**		
	Contractor Items		
	• General Conditions	$ 368,300	$ 368,300
	• Demolition	$ -	$ -
	• Foundations and Substructure	$ 189,200	$ 189,200
	• Superstructure	$ 464,724	$ 464,724
	• Exterior Closure	$ 381,420	$ 381,420
	• Roofing	$ 252,150	$ 252,150
	• Interior Construction	$ 845,750	$ 845,750
	• Conveying	$ -	$ -
	• Casework	$ 43,550	$ 43,550
	• Specialties	$ 176,016	$ 176,016
	• Site Work	$ 172,120	$ 172,120
	• Mechanical	$ 2,065,110	$ 2,065,110
	• Electrical	$ 610,740	$ 610,740
	• Contractor Overhead and Profit	$ 450,400	$ 450,400
		$ 6,019,480	**$ 6,019,480**
	Owner Items		
	• HVAC Testing & Controls	$ 53,547	$ 53,547
	• Materials Testing	$ 26,774	$ 26,774
	• Utility Infrastructure	$ 75,000	$ 75,000
	• Keys, Locks, Card Access, Signs, Fire Extinguishers, Telecom	$ 126,988	$ 126,988
		$ 282,309	**$ 282,309**
		Subtotal	**$ 6,301,789**
10.	**Equipment**		
	• Equipment Total Per Vendor Quote	$ 232,966	$ 232,966
		Subtotal	
11.	**Miscellaneous**		
	• Start up Costs	$ 36,000	$ 36,000
	• Computerized Controls		
		Subtotal	
12.	**SUBTOTAL (Items 1 thru 11)**		**$ 6,645,755**
13.	**Contingencies (Items 1 thru 11)**		**$ 102,786**
14.	**SUBTOTAL (Items 12 and 13)**		**$ 6,748,541**
15.	**Project (Program) Income**		**$0**
16.	**TOTAL PROJECT COSTS (subtract # 15 from #14)**		**$ 6,748,541**