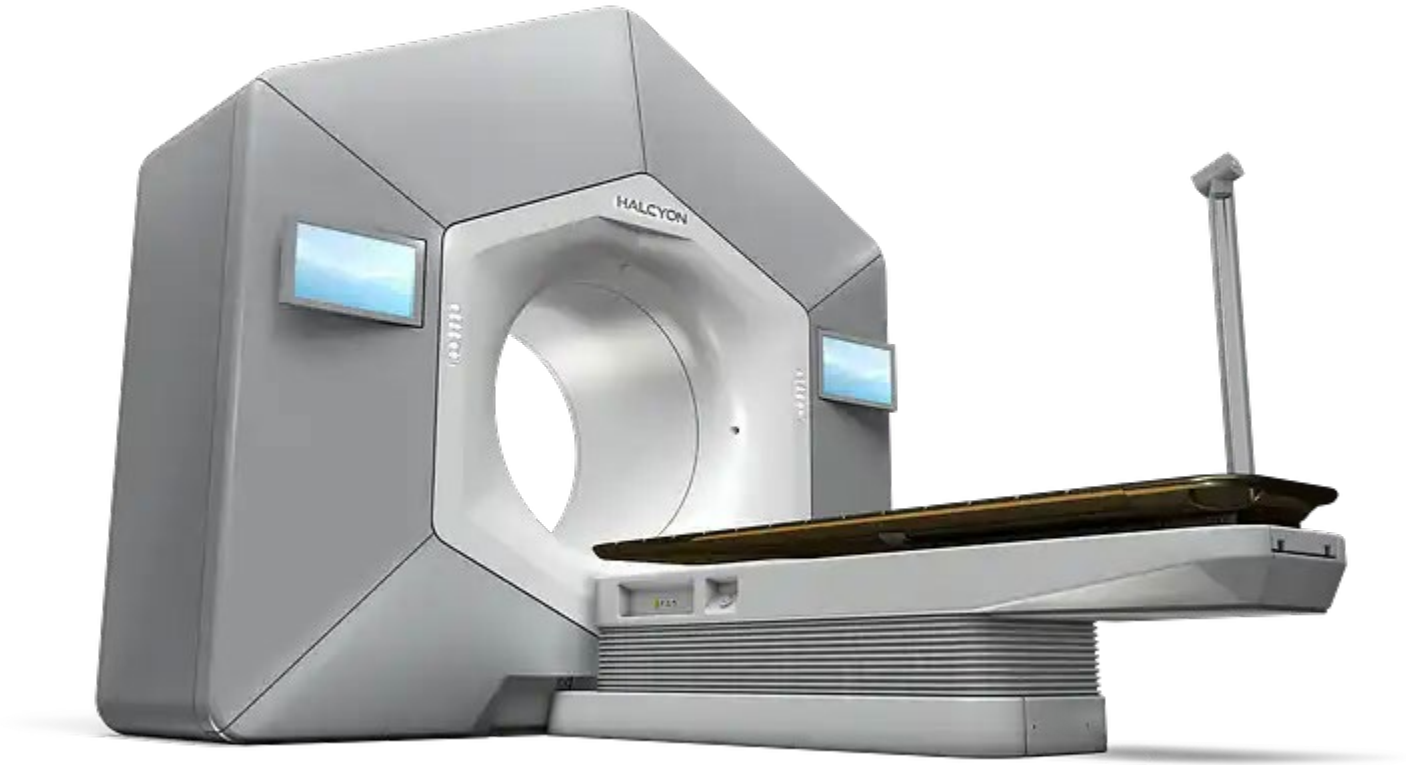

Veterinary Teaching Hospital Linear Accelerator Addition

Oct 2023

Table of contents

Executive Summary

The project will construct an approximately 1200 gsf linear accelerator vault on the west side of the existing Veterinary Teaching Hospital, to house a second linear accelerator. The current linear accelerator is nearing the end of life and lead time to replace this equipment is estimated at 3-5 years. Bringing a second accelerator on-line now will allow for additional capacity in the near term and for treatments to continue when the existing accelerator is replaced.

The estimated budget is $5M to be funded through donations.

Once approvals are in place the project is estimated to take 18 months to complete. CSU anticipates a design build with GMP delivery method for the vault construction. Equipment is being purchased separately.

Justification

Program Mission and History

The Flint Animal Cancer Center oncology service includes three radiation oncology faculty, four radiation oncology residents, and four radiation oncology technicians. They work with a team of medical and surgical oncologists and veterinary technicians to determine the best treatment plan for each pet cancer patient. Over the last four decades, Flint Animal Cancer Center radiation oncologists have pioneered several radiation protocols. They were the first veterinary oncology service in the U.S. to employ a linear accelerator for treatment of companion animals, the same technology used to treat people, and the first veterinary oncology service in the world to offer Stereotactic Radiation Therapy. With the help of clinical trials, today's faculty continue to develop innovative treatments for pets with cancer.

Radiation therapy is a common treatment modality for pet cancer. It uses ionizing radiation to damage the DNA in tumor cells, resulting in tumor cell death. Radiation therapy, like surgery, can offer local control of solid tumors such as carcinomas and sarcomas. Radiation therapy can also be used to provide relief of pain or improve function in patients with advanced cancers. Radiation therapy has been used for over 100 years, but technological advances in the last decade have vastly improved the ability to deliver dose specifically to the tumor while sparing normal tissue structures.

The most common type of radiation therapy is external beam radiation therapy, also known as teletherapy. Teletherapy is delivered by a radiation-producing machine like a linear accelerator, or from a machine housing a radioactive source, such as a cobalt machine. The patient is precisely positioned on a table, also called a couch, near the machine. Radiation travels from the machine to the patient, where the radiation "dose" is delivered to the tumor and surrounding normal tissues. While the patient remains in position, the machine revolves around the patient so that radiation is delivered from many different angles. Each treatment takes just a few minutes and does not cause any discomfort.

Typically, the aim of radiation therapy is long term tumor control called radiation therapy with curative intent. Depending on the tumor, most veterinary patients treated with curative intent protocols receive treatment over a 3-4-week period. A small "fraction" of radiation is delivered each day. Sometimes radiation is administered to relieve the patient of pain and compromising symptoms and/or improve quality of life. This is referred to as palliative radiation therapy. Palliative protocols are most commonly used when the patient has advanced cancer, metastasis, or some other critical condition that would limit life expectancy.

The most common veterinary tumors treated with radiation are brain tumors, pituitary tumors, tumors of the body and extremities (soft tissue sarcomas, mast cell tumors, vaccine-associated sarcomas), lymphoma, nasal tumors, oral tumors, bladder tumors, prostate tumors, perianal tumors, and bone tumors.

Physical Condition/functionality of Existing Space

There is one linear accelerator currently located in the Veterinary Teaching Hospital. This accelerator is approximately 17 years old and expected lifespan is 15 years. Plans will be made for replacement once the second accelerator is functional.

New Space Requirements

Room type	Number	Total GSF
Linear Accelerator equipment vault and control room	1	1200

Equipment List
Halycon Linear Accelerator with controls

Alternative analysis
A team representing all stakeholders worked on options for the project for more than a year. The team decided to separate this project from the larger VTH/VHC project because of timing, cost and the support of a generous donor who made it possible to move forward. Expediency is critical to continue to treat patients, train already enrolled veterinary radiation oncology specialists and medical physics students, and to maintain our best in the world status in radiation biology and comparative oncology research.

Benefits of the Project

A second linear accelerator will allow for additional caseload now and allow treatments to continue when the existing accelerator is replaced in 3-5 years.

Design Criteria

Building Site

The accelerator vault will be located on the west side of the Flint Cancer Center, in a delivery/utility area.

Flood Mitigation Analysis
Not applicable to anticipated building site. See flood plain map in appendix.

LEED Goal

The project is waived due to the size of the project and specialized program.

Architectural
The building addition is envisioned as a premanufactured vault with control room and equipment room. Facilities Management has approved the project through the Design Review Committee. South Campus master plan will be updated to include the building addition.

Mechanical, Electrical, Plumbing and Utility Narrative
The vault, control room, and equipment room shall be fully finished including all utilities to support the linear accelerator equipment. DB team will be responsible for designing vault to have utility connections that will be connected to by CSU. Vault, control room, and equipment room to be designed to have a watertight shell that is connected to VTH in a specified location. CSU is responsible for making final utility connections to "demark" point and any work interior to VTH, i.e., bringing the utilities to the vault and any work on the interior of the building where the vault, control room, and equipment room interface/connect to VTH.

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-not applicable to this project

LIST OF APPLICABLE CODES

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.

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The 2021 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 2021 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 December 2020.

The 2021 edition of the International Residential Code (IRC)

(As applicable)

The 2021 edition of the International Mechanical Code (IMC)

(As adopted by the Colorado State Buildings Program as follows: Chapters 2-15 and Appendix A)

The 2021 edition of the International Energy Conservation Code (IECC)

(As adopted by the Colorado State Buildings Program and Colorado Energy Office)

Colorado Model Electric Ready and Solar Ready Code

(Published by the Colorado Energy Office) Effective July 1, 2023

The 2023 edition of the National Electrical Code (NEC) (NFPA 70®)

(As adopted by the Colorado State Electrical Board) Effective July 1, 2023

The 2021 edition of the International Plumbing Code (IPC), first printing (March 2020) (As adopted by the Colorado Examining Board of Plumbers)

The 2021 edition of the International Fuel Gas Code (IFGC) first printing (August 2020) (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 2021 edition of the International Fire Code (IFC)

(As 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 2019 edition of ASME A17.1 Safety Code for Elevators and Escalators

(As adopted by the Department of Labor and Employment/Conveyance Section) Effective January 1, 2021.

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 Effective January 1, 2021.

The 2017 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 Retail Food Establishment Rules and Regulations

(As adopted by the Department of Public Health and Environment/Division of Environmental Health and Sustainability)

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.

The Secretary of the Interior's Standards for Rehabilitation
(As required by the Colorado State Historic Preservation Office for designated historic properties)

Note: Additional codes, standards and appendices may be adopted by the state agencies and institutions in addition to the minimum codes and standards herein adopted by State Buildings Programs.

1. The 2021 edition of the IBC became effective on July 1, 2022. Consult the state electrical and plumbing boards and the state boiler inspector and conveyance administrator and the Division of Fire Prevention and Control for adoption of current editions and amendments to their codes.
2. Projects should be designed and plans and specifications should be reviewed based upon the approved codes at the time of A/E contract execution. If an agency prefers to design to a different code such as a newer edition of a code that State Buildings Programs has not yet adopted, the agency must contact SBP for approval and then amend the A/E contract with a revised Exhibit C, Approved State Building Codes. Please note that the state plumbing and electrical boards enforce the editions of their codes that are in effect at the time of permitting not design.
3. The state's code review agents, or the State Buildings Programs approved agency building official, shall review all documents for compliance with the codes stipulated herein. Note: The Department of Public Health and Environment, Division of Consumer Protection will review drawings for food service related projects.
4. This policy does not prohibit the application of various life safety codes as established by each agency for specific building types and funding requirements. NFPA 101 and other standards notwithstanding, approved codes will supersede where their minimum requirements are the most

restrictive in specific situations. If a conflict arises, contact State Buildings Programs for resolution.

5. It is anticipated that compliance with the federal Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) and Colorado Revised Statutes Section 9-5-101 will be met by compliance with the 2015 International Building Code and ICC/ANSI A117.1. However, each project may have unique aspects that may require individual attention to these legislated mandates.
6. The 2018 edition of the International Building Code (IBC) is to be applied to factory-built nonresidential structures as established by the Division of Housing within the Department of Local Affairs.

A. Appendices

Appendices are provided to supplement the basic provisions of the codes. Approved IBC Appendices are as follows:

1. Mandatory

   IBC Appendix Chapter C - Agricultural Buildings IBC Appendix Chapter I - Patio Covers
2. Optional

   Any non-mandatory appendix published in the International Building Code may be utilized at the discretion of the agency. Use of an appendix shall be indicated in the project code approach.

B. Amendments

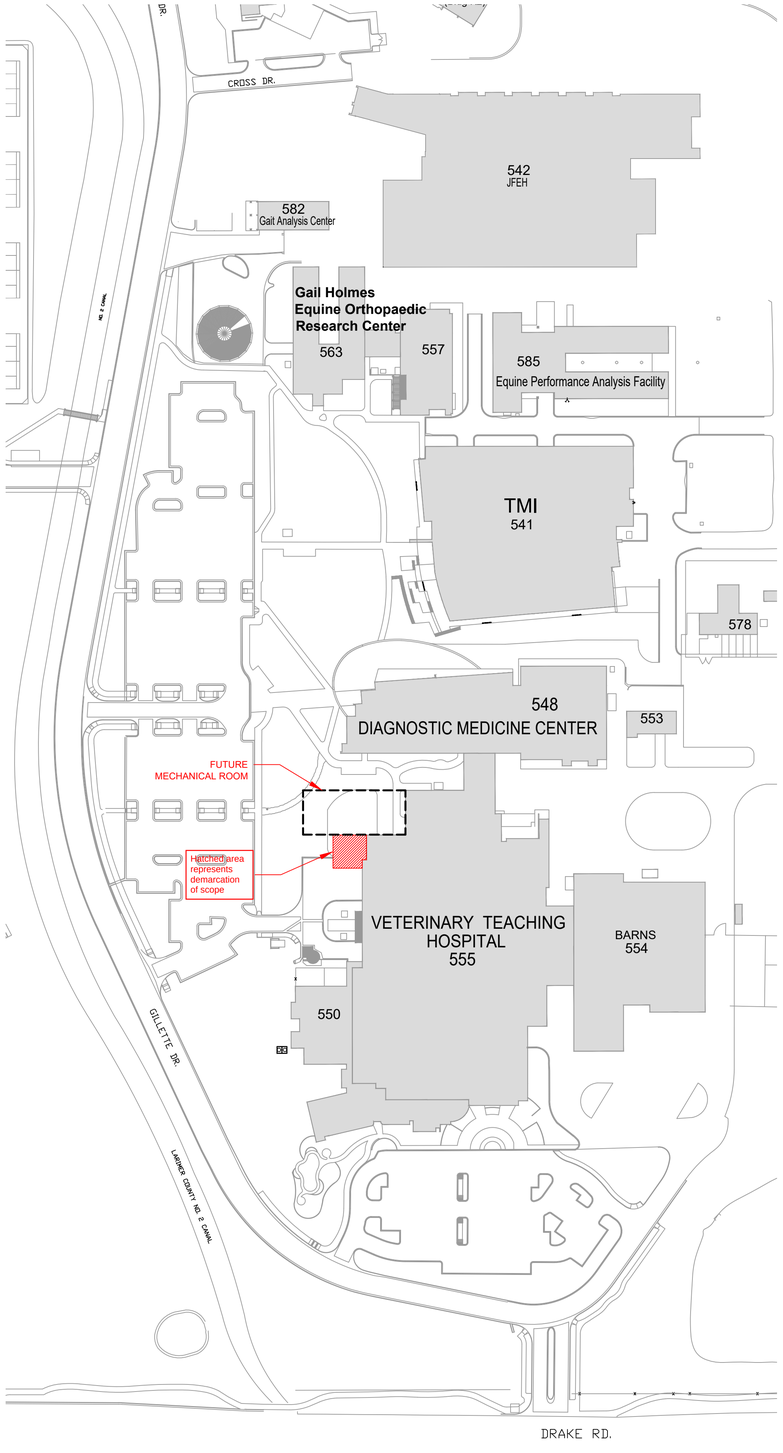
1. International Building Code, Chapter 1 as amended
2. International Building Code Chapter 29 as amended

Project schedule, cost estimates and financing

Schedule/phasing
After approvals are in place the project is estimated to take 18 months to complete. CSU anticipates a Design Build with GMP delivery method, with the linear accelerator purchased separately by CSU.

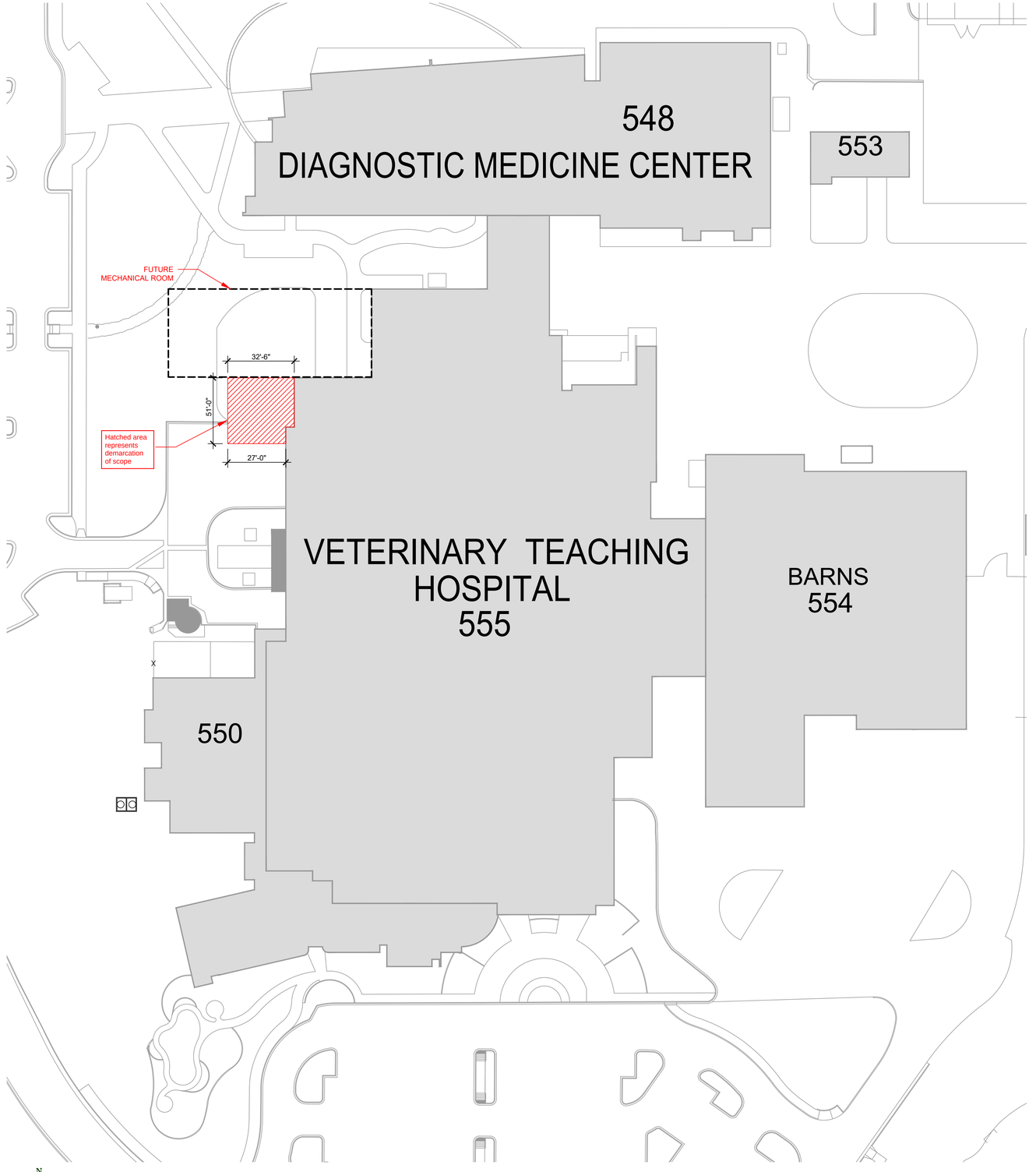
Financing
The estimated budget is $5.0M, to be funded by donations.

Cost estimate/methodology
Cost estimates were developed by Facilities Management staff. 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.



OVERALL SITE PLAN

SCALE: NTS



IMMEDIATE SITE PLAN

SCALE: NTS

PRELIMINARY NOT FOR CONSTRUCTION

Remodel & Construction Services
FACILITIES MANAGEMENT

EXPERTS • CARING • STEWARDS
PROGRESSIVE • COLLABORATIVE
We get things done and drive results

FACILITIES MANAGEMENT
Colorado State University
Facilities Services North
Fort Collins, CO 80523

Stamp

Project Information

VTH
BUILDING NUMBER: 555
LINAC EQUIPMENT INSTALLATION
CONCEPTUAL PLANS

Rev. No.	Date	By	Checked By
R0	4-10-23	KP	BC

Sheet Information

Sheet Title:

SITE PLAN

Sheet Number:

A1.0

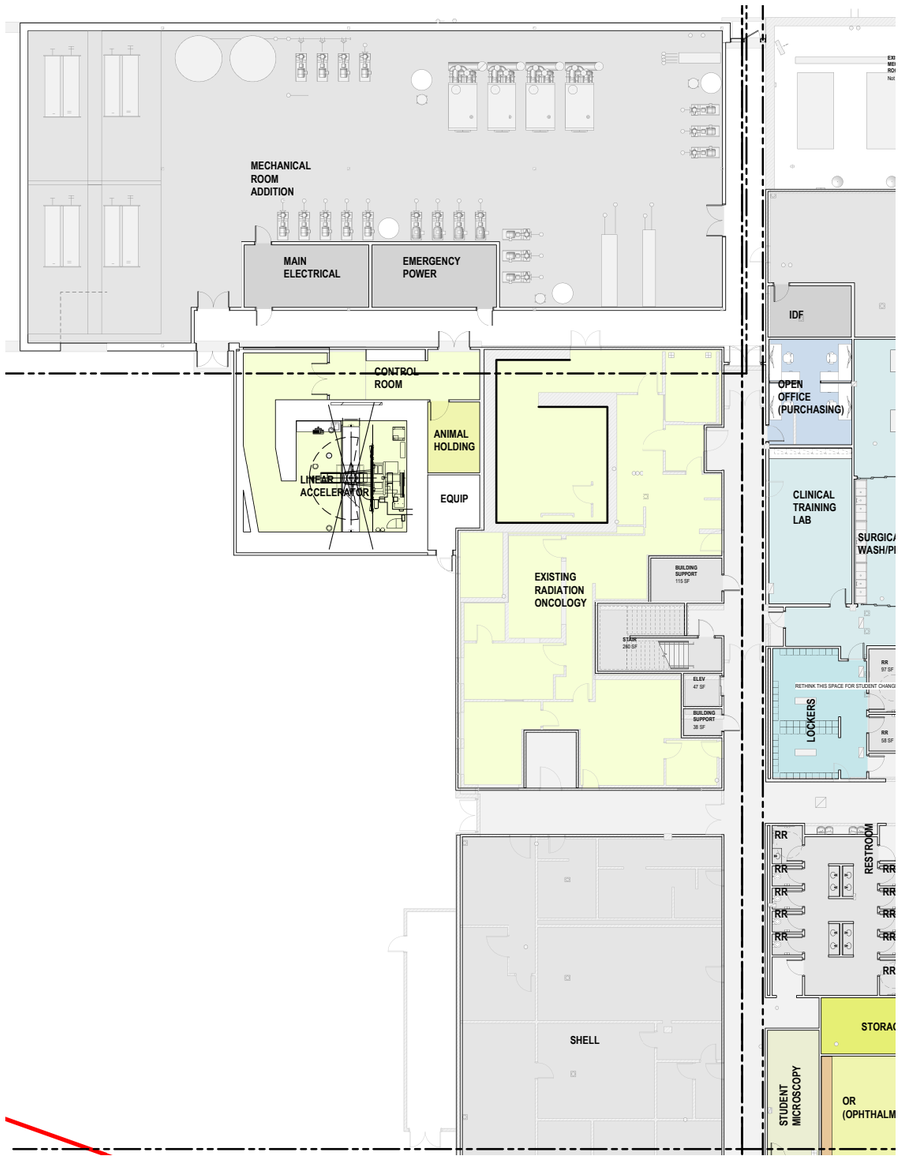
N

REMODEL AND CONSTRUCTION SERVICES

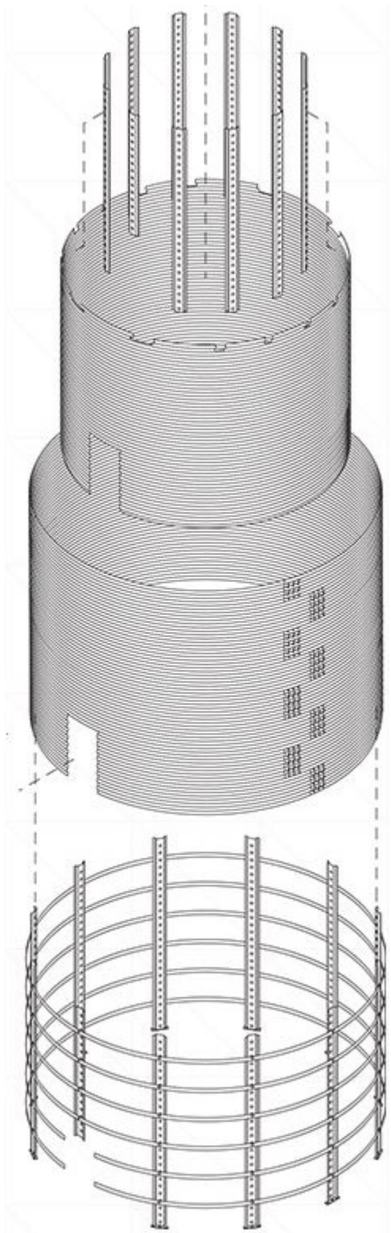
LINEAR ACCELERATOR - SOUTH CAMPUS

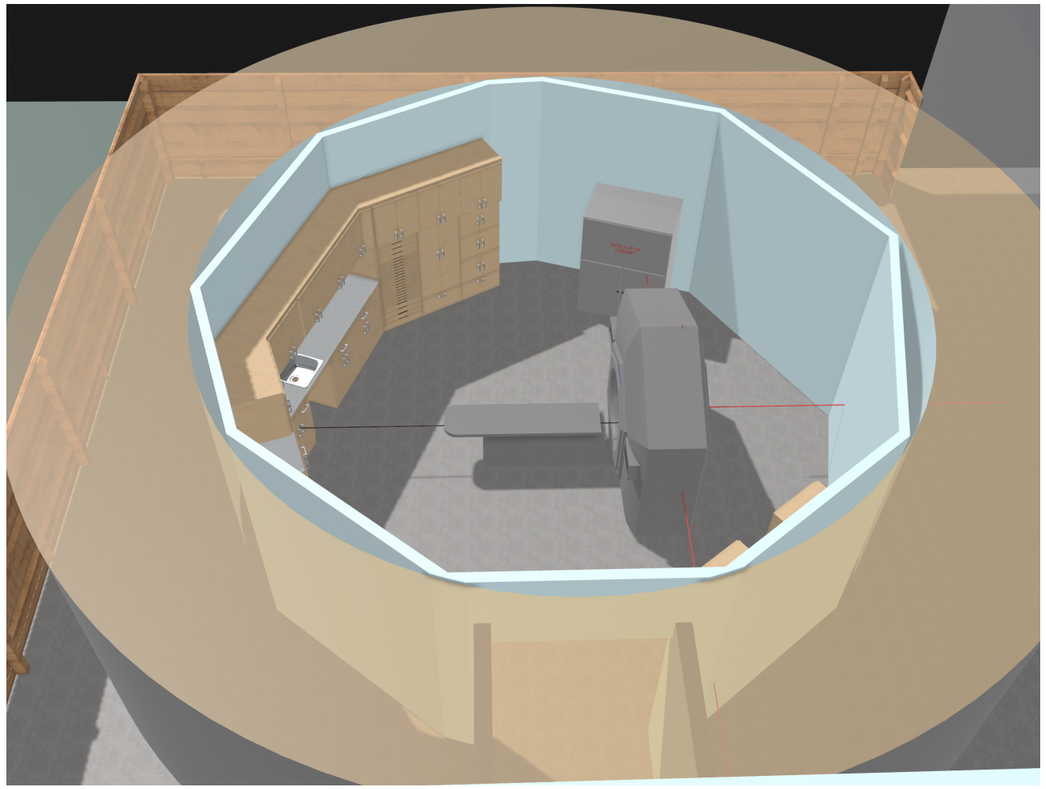
(VTH ADDITION)

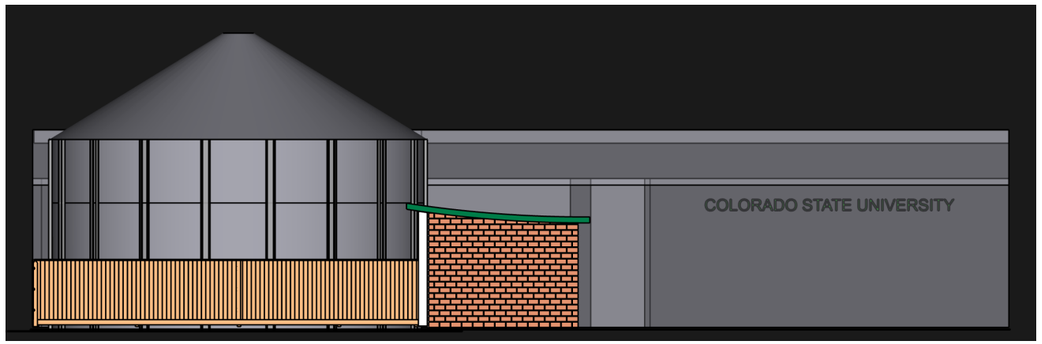
DRC PRESENTATION - FEBRUARY 2023



CLARK & ENERSEN - FUTURE



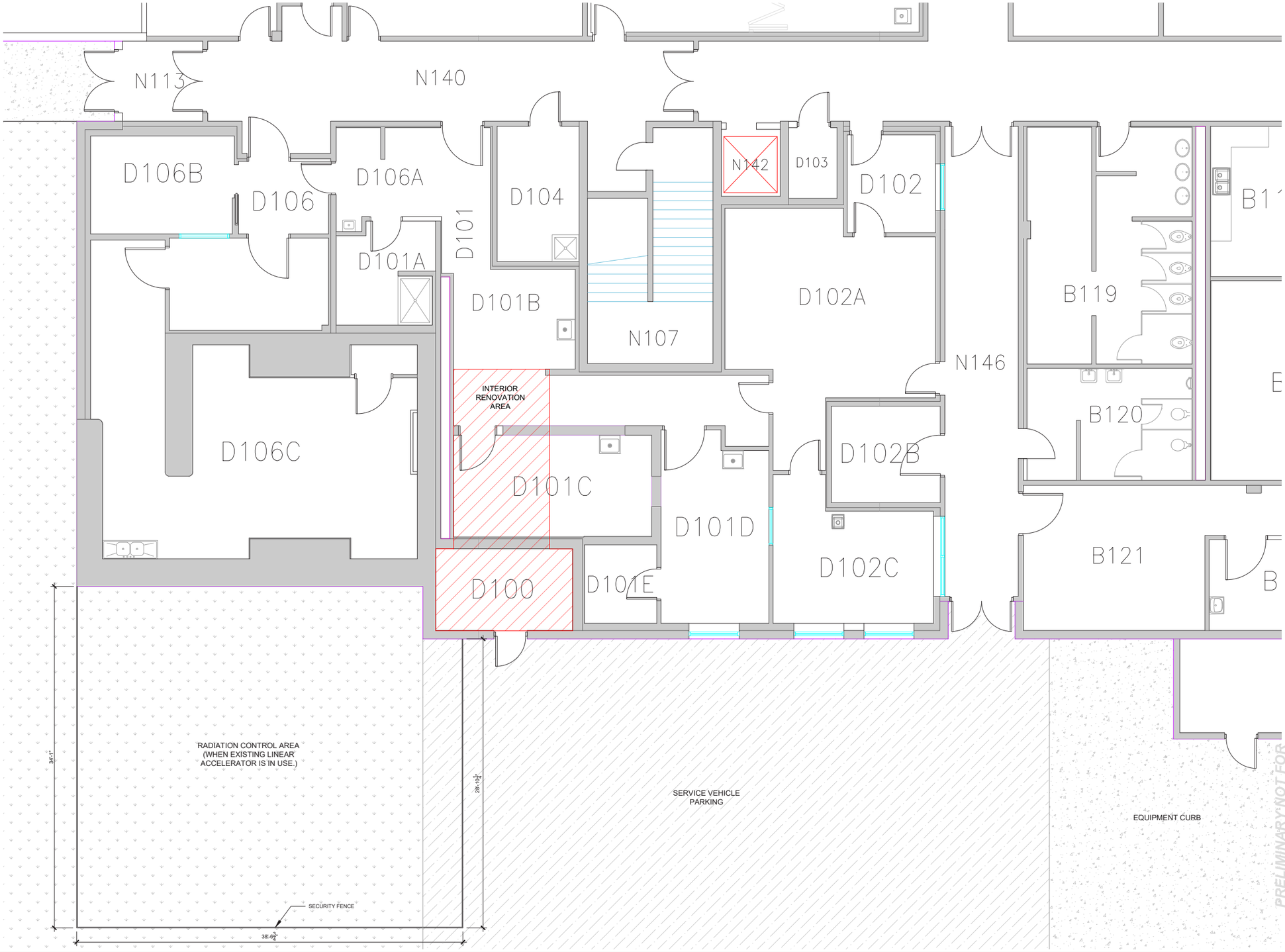




MATTERFABS - CONCEPT

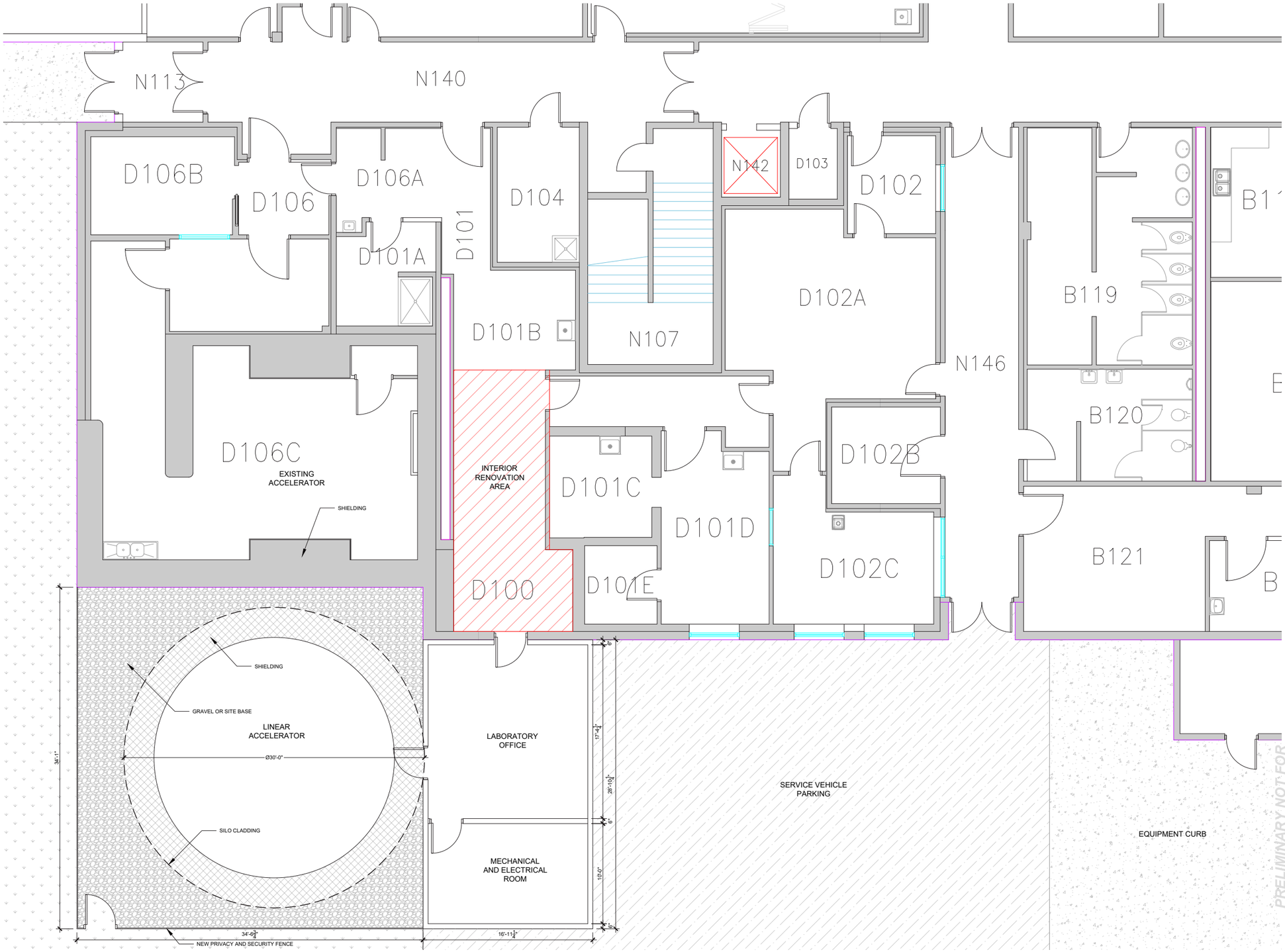
PREVIOUS CONCEPTUAL DRAWINGS

CSU REMODEL AND CONSTRUCTION SERVICES



VTH - SITE AND BUILDING PLAN
(EXISTING)

CSU REMODEL AND CONSTRUCTION SERVICES



VTH - SITE AND BUILDING PLAN

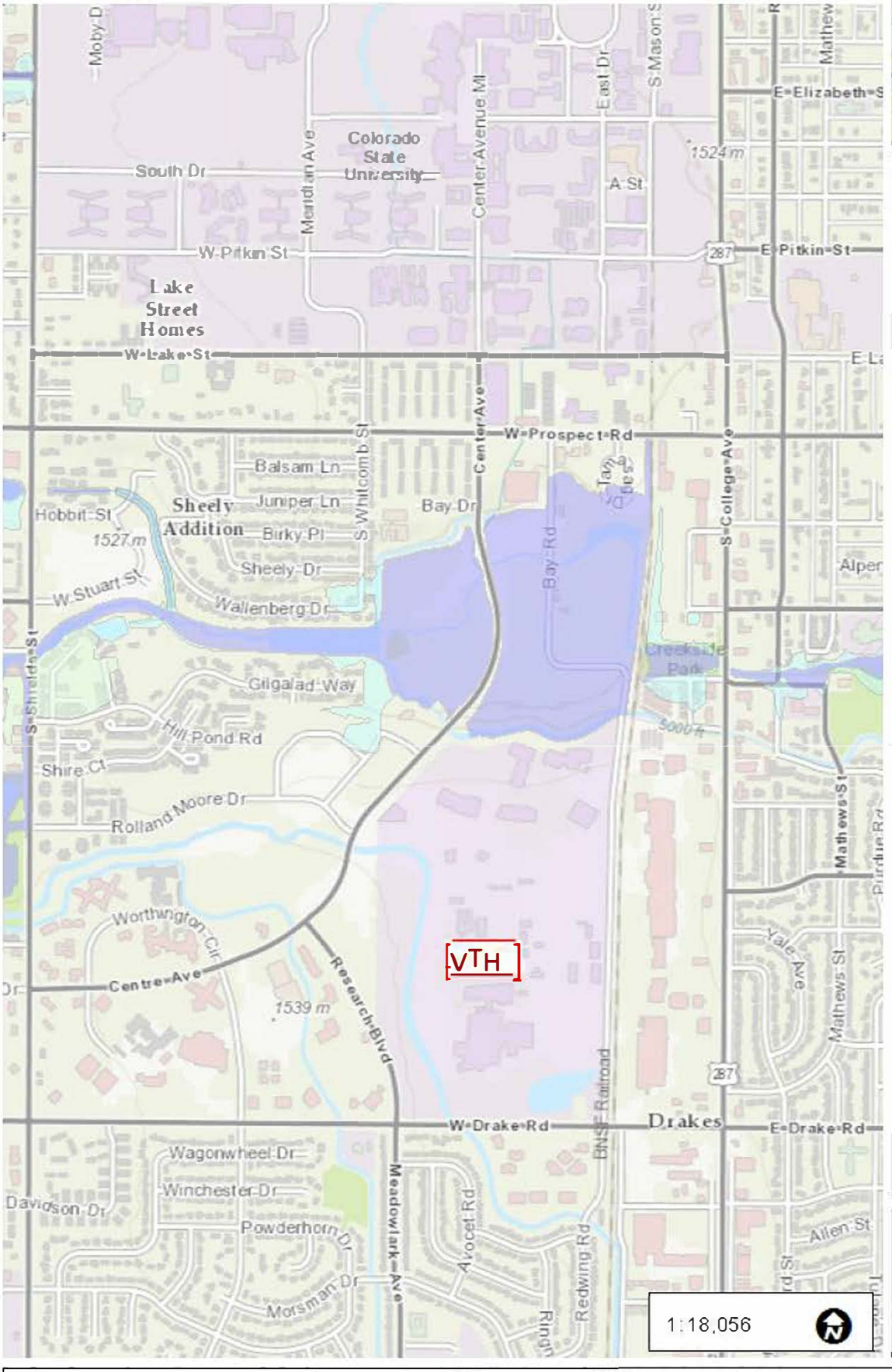
(WITH NEW LINEAR ACCELERATOR)

CSU REMODEL AND CONSTRUCTION SERVICES

VTH - EXISTING PROJECT LOCATION
(RENDERS AND PHOTOS)

CSU REMODEL AND CONSTRUCTION SERVICES

FCMaps



Legend

FEMA Floodplain

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

City Floodplains

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

City Limits

Notes

0.6 0 0.28 0.6 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere
City of Fort Collins - GIS

VTH Linear Accelerator

10.12.2023

Project Budget			Remarks
Professional Services			
	Site Survey, Geotechnical	8,000	
	Consultants - Architects, Engineers, Vibration, Acoustics	226,700	
	Commissioning and Advertisements	1,500	
	Project development fee	70,266	
	Independent Code Review, code insp, material tests	7,520	
	PFA plan review	1,500	
	Total Professional Services	**315,486**	
Construction			
	New Space - 1200 gsf	1,890,000	modular vault
	Connection to existing VTH	169,000	
	Site Work Service/Utilities	136,500	chilled water, electric service
	Site Improvements/Landscaping	4,000	
	Subtotal Construction Costs	**2,199,500**	
Equipment & Furnishings			
	Fixed Equipment	2,000,000	Linear accelerator
	Moveable Equipment	15,000	
	CSU Communications/AV	1,000	
	CSU Notifyer system	17,500	
	Total Equipment and Furnishings Costs	**2,033,500**	
Miscellaneous			
	Total Miscellaneous Costs	**0**	
Subtotal Project Cost		**4,548,486**	
Project Contingency			
	Project Contingency10%	454,849	
	Total Contingency	454,849	
Budget- Occupancy in Aug 2024		**$ 5,003,335**	

This opinion of probable cost is made on the basis of experience, qualifications and best judgement of a professional cost consultant familiar with the construction industry, combined with the professional experience of Facilities Management. FM cannot guarantee that proposals, bids or actual construction costs will not vary from this cost estimate due to market conditions at the time of the bid.

COLORADO STATE UNIVERSITY

Facilities Planning Design and Construction