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CAL POLY HUMBOLDT

SCIENCE COMPLEX ABCD

FEASIBILITY STUDY REPORT

21 JANUARY 2025

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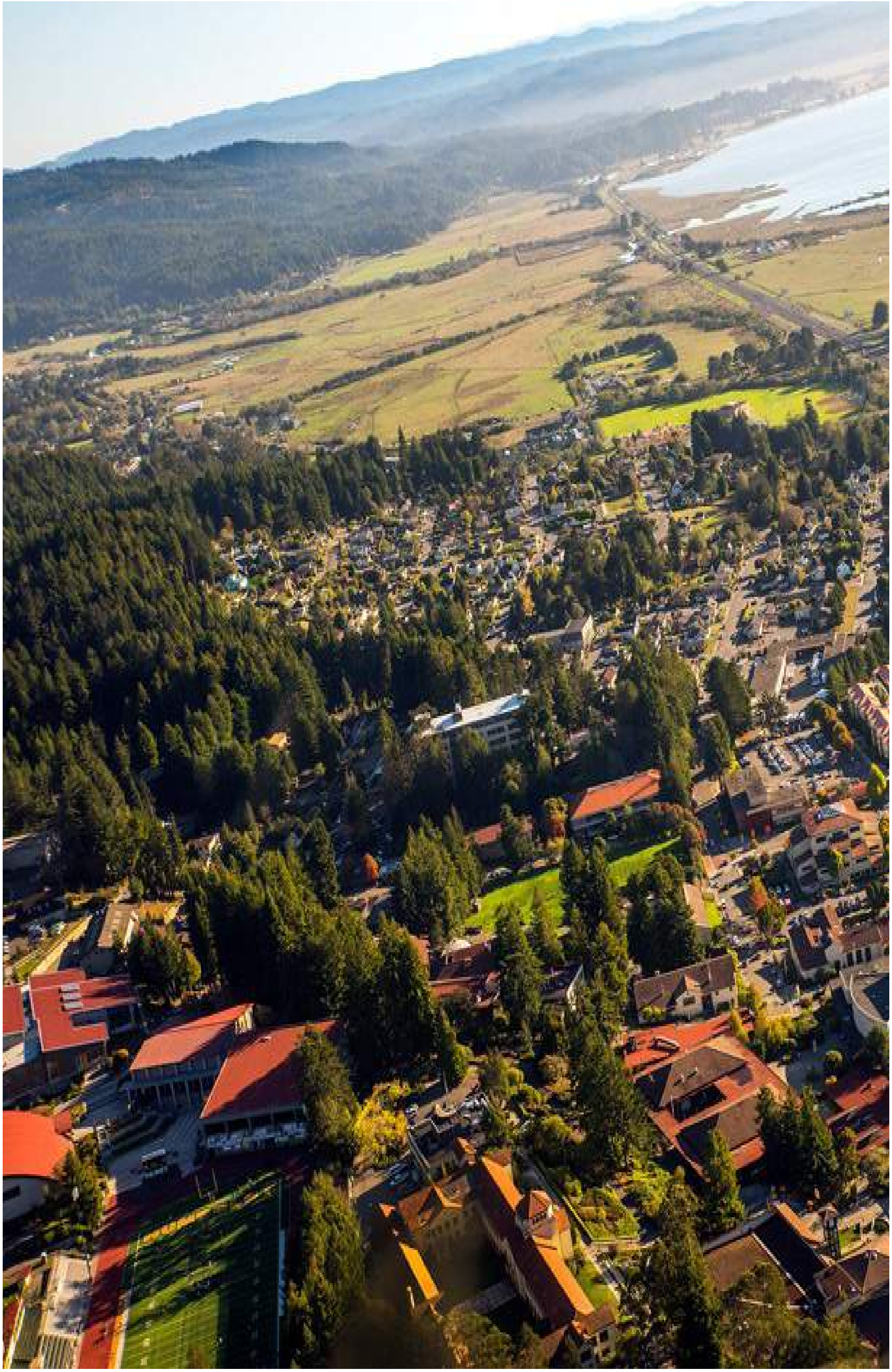


01

INTRODUCTION

1.1 EXECUTIVE SUMMARY

This feasibility study was commissioned by the Facilities Planning, Design and Construction at Cal Poly Humboldt (CPH) to develop Project goals while establishing a process for decision-making as well as measuring success. The contents of this document also include analyses of the four existing buildings that are focused primarily on Lab Planning, Architectural, Mechanical, Electrical, and Plumbing design disciplines.

OVERVIEW

With the State of California's historic $458 million investment in designating Cal Poly Humboldt as the third polytechnic institution within the California State University system, 27 new academic and experiential programs are expected to be added by 2029, beginning with 12 launching in 2023. This will be the catalyst for greater investments over the coming decade to fuel a vitally relevant polytechnic education in Northern California.

Beginning with a foundational core that combines the liberal arts with creative interdisciplinary approaches to solving real world problems facing our society, Cal Poly Humboldt will prepare a new generation of resilient thinkers and doers to lead a restorative future centered on environmental and social justice.

In this context, Cal Poly Humboldt has begun looking at the anticipated increase in students that will be added to the current student body size due to expected enrollment projections . The core curriculum for core Biology, Chemistry, and Physics are currently housed in the Science quadrant buildings Science A, Science B, Science C, and Alistair McCrone Hall (Science D).

PROJECT SCOPE OVERVIEW

The goal of this study was to look at the buildings holistically and identify high level needs so that the university can have a more tactical approach identifying potential large scale projects and or either select renovations that can then be planned and implemented with minimal interruption to academic programs and student life at the University.

During the feasibility process, it was identified that Science A Level 5 was an important part of the Chemistry department with a large amount of infrastructure needs and was the focus of efforts at the Science A building. Any renovation efforts of the lower floors at Science A would be re-worked as part of a future state to be determined.

Science A Level 5 was identified as a priority early in the feasibility study

There are however various scope at differing scales at Science B, C, and D as well. This study intends to identify various scopes at various scales.

For example, the Mechanical discipline may identify aged equipment operating beyond expected life expectancies, but may also identify adjacent items that would be of benefit to the University, and then may also identify lower tier items that are not required, but perhaps recommend to meet current practice standards.

PROJECT SCOPE OVERVIEW (CONTINUED)

Once potential scopes are identified, the University can select from various tiered scopes within the buildings to target for either fund-raising and or application of specific / selective budgets. The analyses provided here are intended to aid the University to be able to identify issues at the buildings at various scales and systems.

A few challenge to the projects were identified during the feasibility study. These are at least budget, swing space, and fixed monuments. Fixed monuments in this context can be defined as 'projects that have been recently inserted into these aged spaces that would be difficult to replicate else where or pull offline for any extended period of time.

PRIORITIES

Based on strategic stakeholder engagement workshops conducted at the beginning of the Feasibility Study process, the following priorities were defined for this project. In the Visioning phase of feasibility, stakeholders were asked to consider these framework areas in determining outcomes for the 4-Grid Matrice Exercise, consisting of these four areas: Hidden Gems, Power Labs, Make (Me) Overs, and (My) Favorite Tools. These priorities are in alignment with the Cal Poly Humboldt Prospectus and Implementation strategic plans.

- Learning Ecosystems: Create environments that cultivate interdisciplinary learning, cross pollination and foster trusted learning communities that are integrated with the Polytechnic curriculum.
- Design for Belonging/Justice: Spaces that support sense of Belonging - people coming as their true authentic selves - with intentional and abundant resources that support the whole person (addressing basic/psychological needs)
- Science Identity: Spaces that embody and celebrate the creative legacy and the future of science education that enriches the Polytechnic education.
- Future Ready Resilience: Create spaces that are flexible and promote shared/multiple uses in the near terms while also providing sustainable/adaptability over time to best serve the evolution of science curriculum and pedagogy (how you teach, present or perform)

1.2 PROCESS + FRAMEWORK

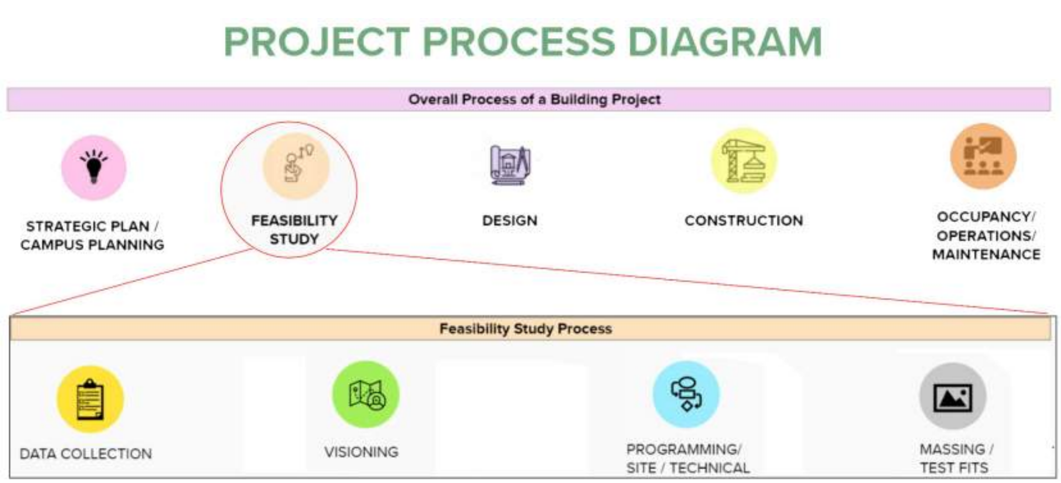
The Science ABCD Feasibility Study summarizes the results of the visioning, programming and assessment, and Phasing Strategy efforts for Cal Poly Humboldt. The process of this study also introduces a new framework of stakeholder engagement that embodies the values and culture while also supporting the goals identified in Cal Poly Humboldt Future Forward Strategic Plan 2021-2026, Cal Poly Humboldt Prospectus, and Cal Poly Humboldt Implementation Plan.

The Feasibility Study scope includes the following sections:

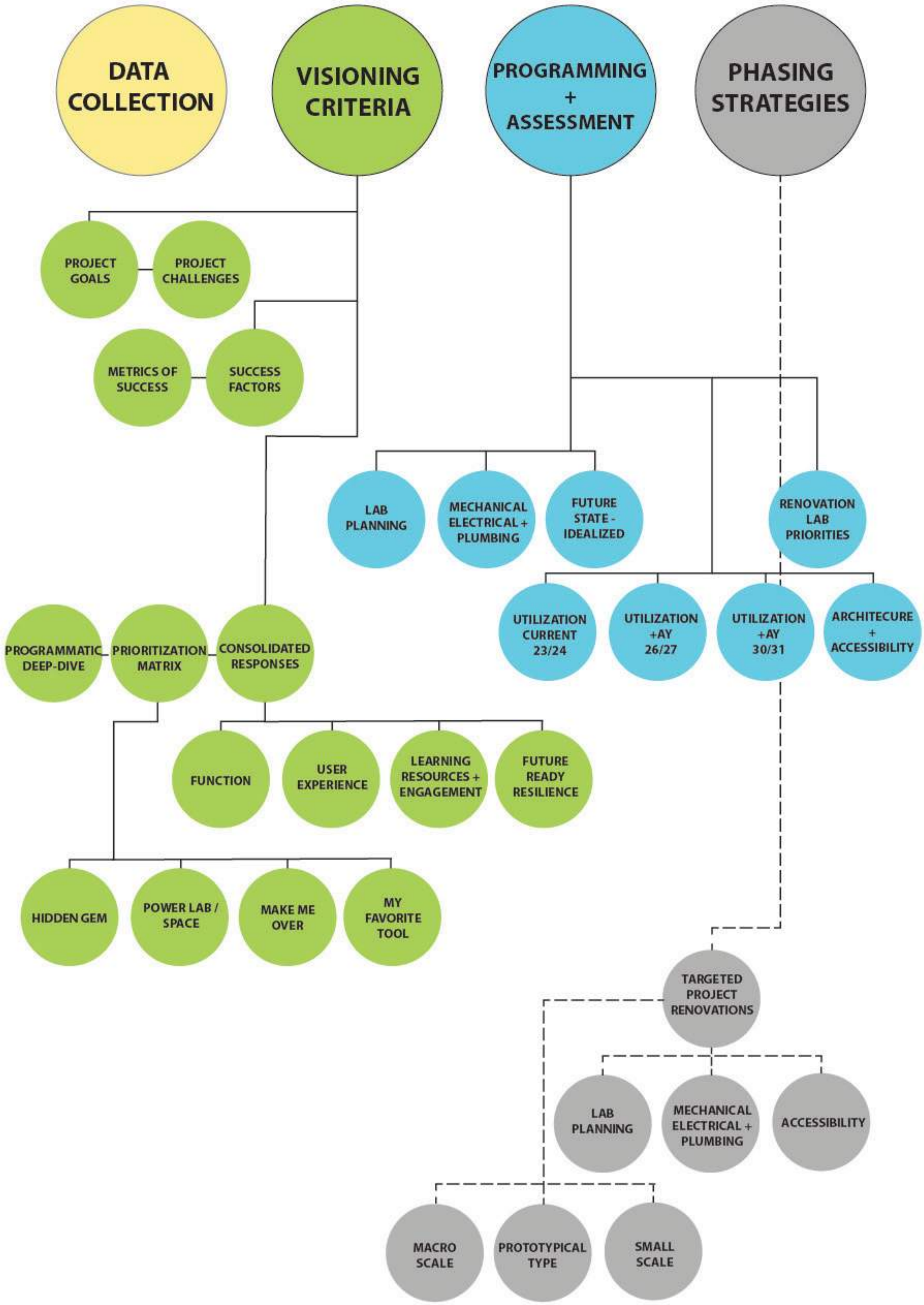
- Project Vision Criteria
- Programming and Assessment
- Site Analytics
- Phasing Strategies, Targeted Project Renovations

The feasibility study process for this project started with a comprehensive strategic visioning framework in alignment with Cal Poly Humboldt newly adopted Future Forward Strategic Plan 2021-2026, Cal Poly Humboldt Polytechnic Prospectus, and Implementation plans. The feasibility consultant team hosted several workshops to define project specific vision criteria, understand the program's goals and challenges, site related issues, success factors, metrics of success, and empathy building. The goal of these workshops was to strengthen stakeholder engagement, trust and understanding while also defining project priorities and for building consensus. The Cal Poly Science and Facilities working group members collectively determined a clear set of programming priorities based on the declared vision criteria, and programming and assessment. Subsequently, these priorities are leveraged to streamline decision making during the Phasing Strategies and ultimately, targeted project renovations.

In agreement with the stakeholders, the Phasing Strategies communicate a basis position for future upcoming capital outlay programs. This is achieved through Laboratory Planning, MEP upgrades and Accessibility renovation narratives, culminating in targeted project renovations. These phasing strategies would provide a macro, a prototypical, and a targeted smaller scale renovation project that the University can use as a basis for potential future renovations at these buildings.



FEASIBILITY STUDY STRUCTURE



1.3 FEASIBILITY STUDY TEAM

Campus Teams

Science Team

- Eric Riggs - College of Natural Resources and Sciences Dean
- Erik Jules - Biology Chair
- Monty M. Mola - Physics Chair
- Joshua Smith - Chemistry Chair
- Amy Sprowles - Biology Faculty - Stem Cell Biology
- Alexandru Tomescu - Biology Faculty - Plant Physics
- Christopher Harmon - Chemistry - Biology Core Faculty
- Charles Hoyle - C.D. Gravity Lab - Physics Faculty
- Claire Till - Eviro Chemistry - Chemistry Faculty
- Cristina Tusei - Chemistry Stock Room Tech
- Jenny Cappuccio - Chemistry Faculty - Biology Chem
- Jorge Monteiro - Chemistry Faculty
- Brandon Wilcox - Organic Chemistry Stock Room Tech
- Jeffrey Schineller - Organic Chem Faculty
- Kjirsten Wayman - Chemistry Faculty
- Matthew Hurst - Chemistry Faculty - instrument Lab
- Tamara Barriquand - Joint Physics - Oceanography
- Wesley Bliven - Physics Faculty

Facilities

- Michael Fisher
- Kassidy Banducci
- Jason Baugh

Project Team

Architecture - Suarez-Kuehne Architecture

- John Suarez

Architectural Consultant - SmithGroup

- Rosa Sheng
- Rich Kirr
- Diane Kase
- Andrew Thurlow
- Rishika Gokhale

Mechanical - SmithGroup

- John McDonald

Plumbing - SmithGroup

- Jennifer Ma

Electrical - SmithGroup

- Harold Pintes

Lab Planning - SmithGroup

- Diane Kase
- Nhu Le

AV / I T / Telecommunications - SmithGroup

- David Glenn
- Paul Bruckman

Lighting - SmithGroup

- Nathan Sharnas

Fire and Life Safety - SmithGroup

- Rachel Eckley

02
VISIONING & PRIORITIZATION

2.1 VISIONING SUMMARY

The feasibility study process for this project started with a comprehensive strategic visioning process in alignment with Cal Poly Humboldt Future Forward Strategic Plan 2021-2026, the Cal Poly Humboldt Prospectus and Cal Poly Humboldt Implementation. The feasibility consultant team hosted several workshops to define a project specific prioritization matrix, understand the program's goals and challenges, site related issues, success factors and metrics of success. The goal of these workshops was to strengthen stakeholder engagement, trust and understanding while also defining project priorities and building consensus. From these early workshop sessions, the Cal Poly Humboldt Science working group members collectively determined a clear set of evaluation criteria based on the declared prioritization matrix categories, including:

- Function: Health and Safety
- User Experience: Learning, Research and Teaching
- Learning Resource and Engagement: Students, faculty, and Community
- Future Ready Resilience: Advancement of Academic Excellence and Future Flexibility

2.2 ALIGNMENT OF PURPOSE

In defining the work and alignment of vision and goals for this project, it is important to understand and combine the purpose and vision of the prime project stakeholders at various levels – Cal Poly Humboldt at the institutional campus level, the College of Natural Resources and Sciences holistic needs, and the project specific needs of the building's core users.

2.2.1 CAL POLY HUMBOLDT – A POLYTECHNIC VISION

The purpose of Cal Poly Humboldt is: To provide the highest quality and affordable college education built on the contributions of diverse students, staff, and faculty who are committed to a just and sustainable world.

**The Diversity, Equity & Inclusion Council recommended a change of Humboldt's "Mission" to "Purpose" to acknowledge that Humboldt sits on unceded land initially occupied by the first people of this area. The word "Mission" for many connotes colonial language."*

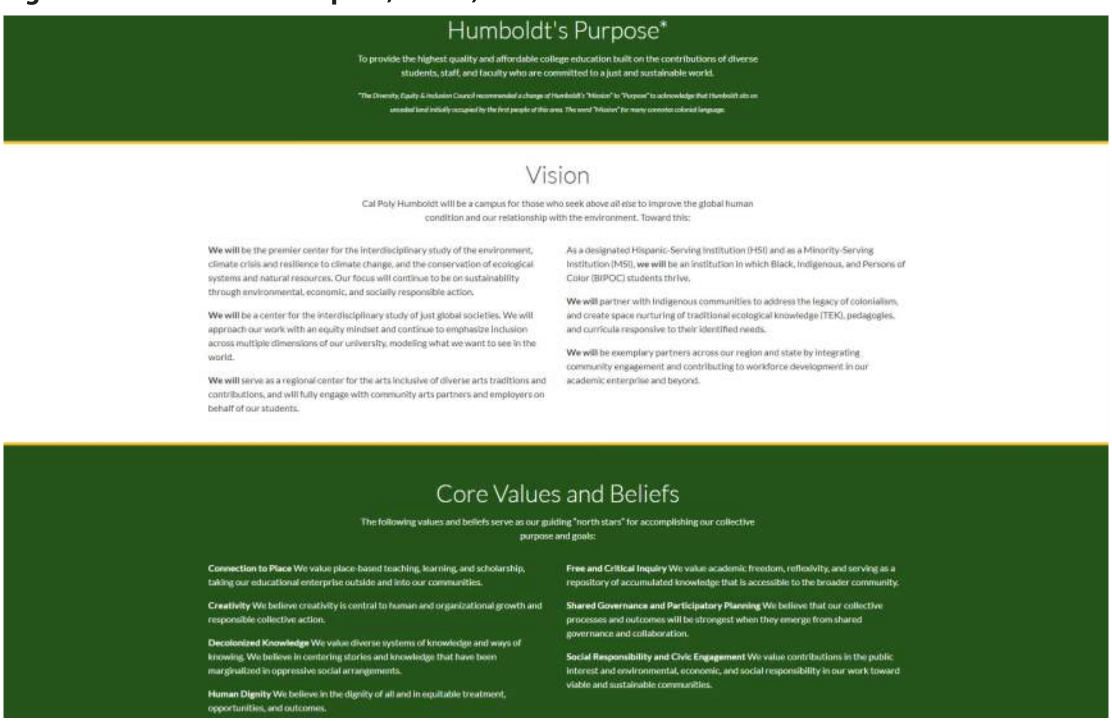
Since its beginning in 1913, California State Polytechnic University, Humboldt (referred to as Cal Poly Humboldt) has provided generations of students with unique educational experiences built upon the motto, Discere Faciendo or Learning by Doing in a place-based, inclusive learning community of faculty, staff, and students who live, work, and study within a residential Northern California setting. Today, Cal Poly Humboldt is a comprehensive university serving not only the local region, but also the state, the nation, and the world, through instruction, research, and public service.

Cal Poly Humboldt's "Future Forward: 2021-2026 Strategic Plan," outlines the University's purpose, values, and goals, as well as the University's vision "to be a campus for those who seek, above all else, to improve the global human condition and our relationship with the environment."

To support that vision, the University has established six key themes:

- **Academic Roadmap**: Providing recommendations for advancing academic excellence and access. The Humboldt Academic Roadmap promotes distinctive, innovative academic programs and ways of instruction centered on the curricular needs for well-prepared students, including our support and development of programs that assist Humboldt in achieving the polytechnic designation.
- **Community Collaboration & Shared Success**: Working together, sharing resources, communicating openly, and creating an inclusive and welcoming environment.
- **Employee Engagement & Success**: Ensuring all Humboldt employees—faculty, stateside and auxiliary staff, administrators, and student employees—have what they need to be involved in, enthusiastic about, and committed to their work and to Humboldt.
- **Future Proofing Humboldt**: Creating the type of university that can adapt and thrive in the future and respond effectively to internal and external challenges and opportunities.
- **Resources Stewardship & Sustainability**: Promoting goals that appropriately generate, manage, and invest resources toward the purpose of the University and its adopted guiding plans, through the common lens of "student first," equity, inclusivity, and sustainability.
- **Student Experience & Success**: Identifying and building strategies that promote positive and meaningful student engagement experiences and success.

Figure 2.2.1 - Humboldt Purpose, Vision, and Core Values and Beliefs

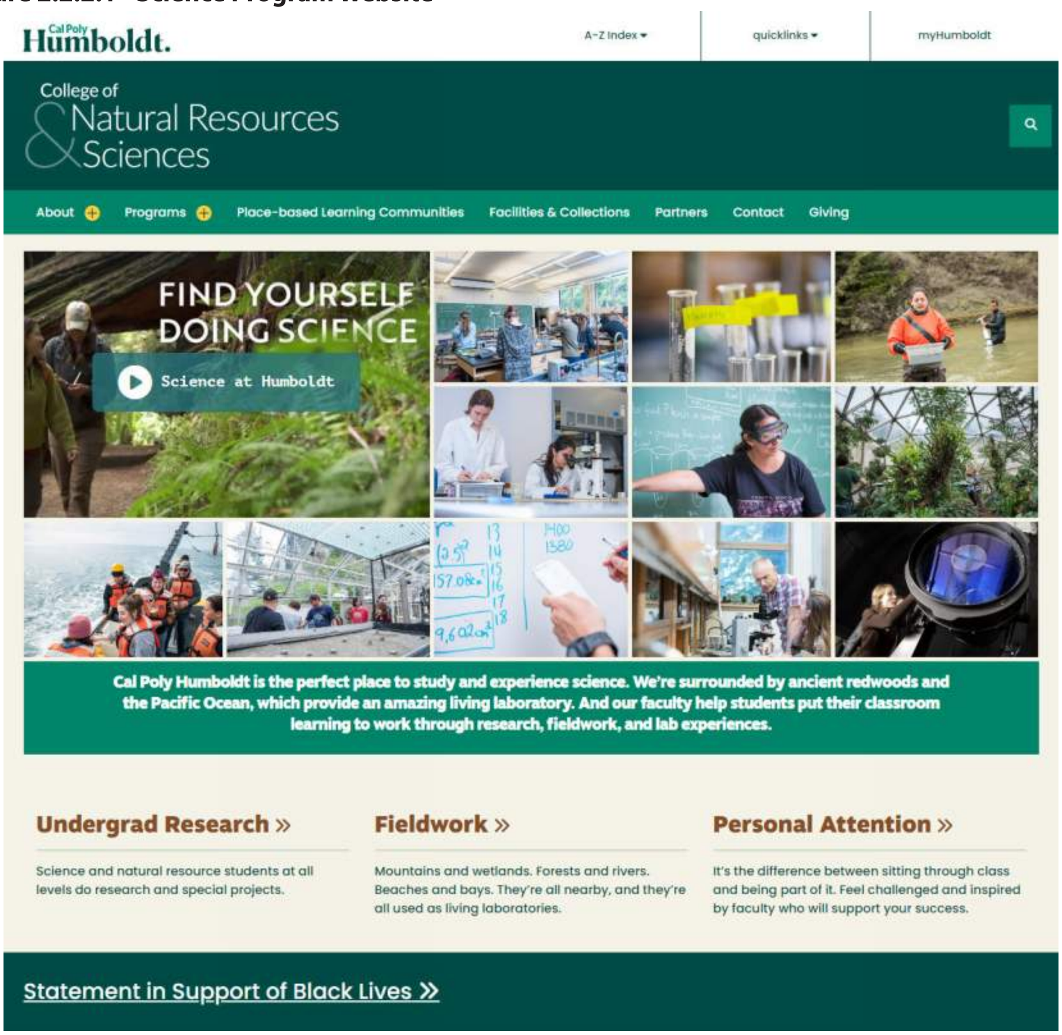


2.2.2 COLLEGE OF NATURAL RESOURCES AND SCIENCES

Science is a potent and positive force for change in contemporary society, and Cal Poly Humboldt's College of Natural Resources and Sciences is dedicated to educating the students who will shape the culture of our collective future. The College majors comprise some of the largest on campus, and students learn hands-on techniques in the classrooms, laboratories, research spaces, multiple ancillary nationally recognized facilities, and in the field, to address self-directed lifelong learning, interdisciplinarity, professional development, and research, discovery, and innovation.

The College of Natural resources & Sciences curriculum is designed to empower students to take risks, to arrive at insights from research, and to understand themselves. Students are provided a rigorous grounding in the fundamentals as well as an excellent education in the history, practice and teaching of science. Students are challenged to exceed their preconceived limits, and the department produces graduates who will go forward with confidence in their skills, abilities, and potential. The importance of technology is also recognized a force in society with the ability to free scientists from the boundaries of our traditional disciplines.

Figure 2.2.2.1 - Science Program Website



2.3 POLYTECHNIC VISION

A focus on applied learning is what sets a polytechnic university apart from a traditional university. Also known as experiential learning, it combines the in-depth study found at universities with practical, technology-based skills training. Polytechnic institutions specialize in STEM courses, providing students with hands-on learning and educational experiences in addition to a strong liberal arts foundation.

In preparation to becoming a polytechnic university, Cal Poly Humboldt was required to submit an in-depth and honest look at strengths and aspirations. The community worked together on a comprehensive self-study – the Polytechnic Prospectus, conducted with critical input and collaboration from staff, faculty, students, alumni, and stakeholders.

Recognizing the impact of the California State University on the state's economy and workforce, the State of California made a significant investment of $458 million in the 2021-22 state budget to help propel Humboldt State University's transition to become a polytechnic university. The funding will enable California State Polytechnic University, Humboldt to add new academic programs that will help fill workforce gaps, modernize existing facilities, and build new infrastructure and increase access for the state's students seeking science, technology, engineering, and math (STEM) degrees.

After the self-study process was completed and the polytechnic prospectus was submitted to the CSU Board of Trustees, an unprecedented effort began. Working groups were charged with the Polytechnic Implementation of the University's polytechnic vision with bold, innovative, and forward-looking plans.

Figure 2.3 - Positioning Statement

2.4 PROJECT PARAMETERS

As part of the Polytechnic plan, the existing Science Complex buildings A,B,C and D updates, in conjunction with the forthcoming Cal Poly Humboldt Physical Campus Plan guidelines, will serve as hub for the science programs and offer the potential of connecting multiple science programs through both the connected buildings and grounds --as a complex--allowing cross-pollination between these areas of expertise. Here, all the students would not only find a sense of belonging and community, but also engage with vital themes like justice, equity, and holistic sustainability, with science as an integral facet to their academic journey, fostering their overall well-being and success in this evolving polytechnic environment.

The College Academic Departments include Biological Sciences, Chemistry, Computer Science, Environmental Resources Engineering, Environmental Science and Management, Fisheries Biology, Forestry and Wildland restoration, Geology, Mathematics, Oceanography, Physics & Astronomy, and Wildlife, while the Graduate Programs include Biological Sciences, Environmental Systems, and Natural Resources.

2.5 VISIONING CRITERIA

In the Visioning section of the feasibility study, the stakeholders were prompted with a series of workshop exercises that captured the collective **Project Goals**, **Project Challenges**, **Metrics of Success**, and **Success Factors**.

After these workshops, a **Programmatic Deep-dive** exercise session was held, as per further illumination the programmatic complexities of the project. In coordination with this exercise, the Feasibility Document team analyzed both Classroom and Laboratory Utilization in detail, by room and with graphs.

Next, towards each buildings specific needs and refined program development, this Visioning Criteria was organized and distilled into a **Prioritization Matrix** for the Science Complex building as another exercise. The Prioritization Matrix and evaluation criteria categorization represents the culmination of responses gathered from the aforementioned four Visioning exercises and Programmatic Deep-dive--as an initial summarization of notable, key outcomes.

Lastly, the Feasibility Document team prepared a **Consolidating Responses** where again, the initial Visioning workshop exercises were amplified through four, final project relevant categories. These categories included **Function**, **User Experience**, **Learning Resource and Engagement,** and **Future Ready Resilience**.

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2.5.1 PROJECT GOALS AND CHALLENGES

PURPOSE

This exercise supported stakeholders in voicing their aspirations and concerns about the project in a crowd sourced format on virtual post-its followed by discussion. The format promotes interdisciplinary feedback, allows for transparent discussion in a safe forum while promoting healthy debate and listening to differing points of view.

SUMMARY OF PRIORITIES

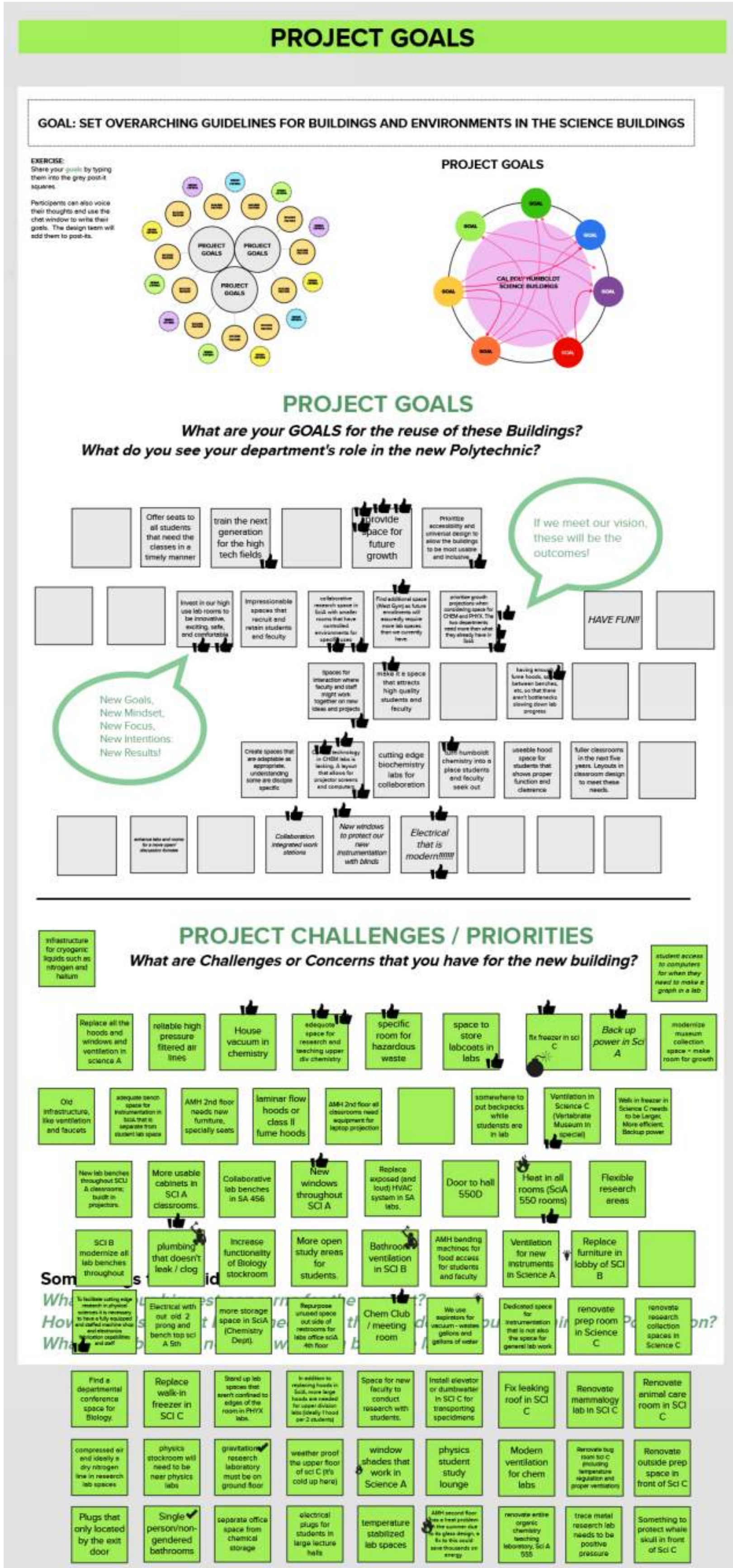
Key project GOALS for the group include the following:

- Making the buildings more accessible, inclusive and public for experiencing the sciences--creating a vibrant community hub.
- Create functional and flexible classroom and laboratory spaces that could be modified to adapt to technological advancements and curriculum updates.
- Cross-pollination in between the sciences, increased collaboration with new and greater visions to work together.
- High utilization, exciting, technologically adaptable lab spaces that provide for innovation and safety.
- Impressionable spaces for recruiting--and retaining--students.

Key project CHALLENGES for the group include the following:

- Technological Updates:
  - Cryogenic liquid infrastructure (nitrogen / helium) / freezers
  - Compressed air for lab research spaces / reliable high pressure filtered air lines
  - Backup power
  - Replacement of all hoods, windows, and mechanical in Science A
  - Temperature controls & ventilation / HVAC and plumbing updates
  - Elevators / dumbwaiters (specimen transport)
  - Window shades
- Spatial Modifications:
  - Flexible research spaces
  - Modern museum / exhibit collection spaces
  - Furniture / seating / lab bench updates
  - Roof leak in Science C
  - Trace metal research lab (requires positive pressure)
- Spatial Additions:
  - Additional research space, and space for upper division chemistry
  - Open study areas / student study lounge / meeting rooms
  - Hazardous waste room
  - Cabinets, lockers, lab coat, instrumentation, and stockroom storage
  - Vending machine area / local food access
  - Physical sciences machine shop
  - Prep room
  - All gender restrooms

Figure 2.5.1 - Project Goals and Challenges



2.5.2 SUCCESS FACTORS AND MEASURING SUCCESS

PURPOSE

This exercise built upon the established project goals and challenges and asked the working group stakeholders to provide more detailed descriptions of success factors and metrics of success that would begin to shape ideas of physical characteristics of spaces within the program. The success factors and metrics would also be leveraged to make connections between the project goals and challenges to establish evaluation criteria for determining the program adjacency priorities.

SUMMARY OF PRIORITIES

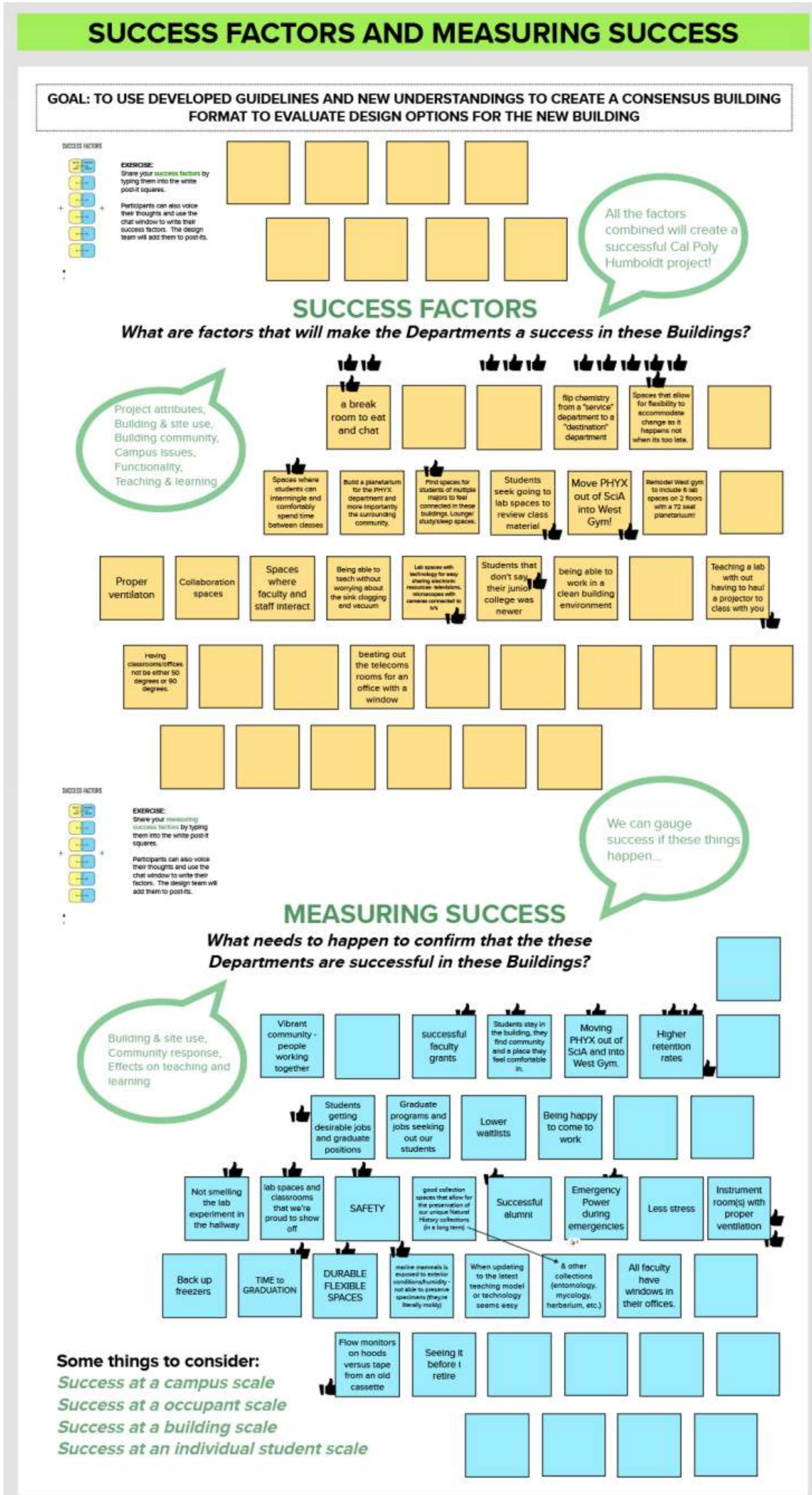
Key project SUCCESS FACTORS for the group include the following:

- Making chemistry a "destination" department (not just a "service" dept.)
- Labs with proper ventilation and mechanical / plumbing
- Labs with updated digital technologies (sharable, microscope cameras, digital projector)
- Labs that have student access (for reviewing class materials)
- Spatial flexibility--anticipating future technologies
- Student spaces for in-between classes
- Collaborative spaces / lounge and study spaces / faculty and staff interactivity space / break room
- Offices with proper mechanical (air handling system)

Key project METRICS OF SUCCESS for the group include the following:

- Vibrant community
- Spatial retention--spaces that feel comfortable and encourage people to stay
- Emergency power back-up system (freezers, lab experiments, specimen preservation)
- Safety
- Exhibition spaces for the many collections (Natural History, Entomology, Mycology, Herbarium)
- Job fair space / graduate student space
- Lab and classroom spaces that the community can share and be proud of.

Figure 2.5.2.1 - Success Factors and Measuring Success



2.5.3 PROGRAMMATIC DEEP DIVE

PURPOSE

This exercise built upon the established project goals and challenges and the success factors and metrics of success where the working group stakeholders were asked to provide more detailed descriptions of programmatic elements, essentially unpacking their deep knowledge base to help better shape the issues surrounding individual programs and their interdependencies, either currently existing or proposed.

Figure 2.5.3.1 - Programmatic Deep-Dive

2.6 PRIORITIZATION MATRIX EVALUATION CRITERIA

Based on the defined priorities from the Visioning exercises and outcomes described above, the feasibility team facilitated the development of the Visioning Criteria for the Science Complex Assessment and Programming phases (as found in Section 3: Assessment). The following are the definitions of those Vision Criteria as a matrix is organized both in terms of Functionality and current room Utilization.

The evaluation criteria questions on this four areas are:

Hidden Gem

- Not being used because of out of the way or changing pedagogy needs. A few upgrades, could make this a power lab/space.

Power Lab / Space

- Works well, with minimal issues and is highly utilized, lower priority for upgrades.

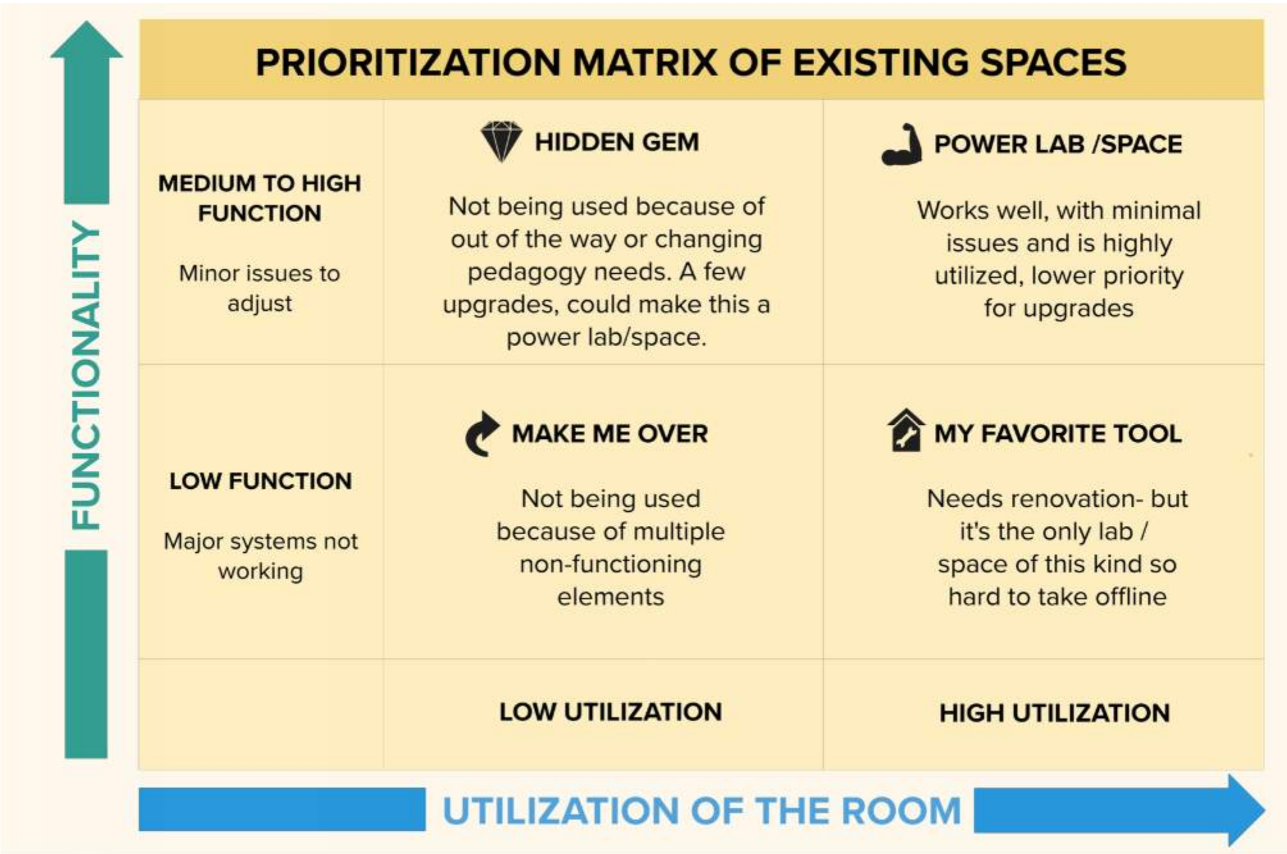
Make Me Over

- Not being used because of multiple non-functioning elements.

My Favorite Tool

- Needs renovation--but it's the only lab / space of this kind so hard to take offline.

Figure 2.6.1 - Prioritization Matrix of Existing Spaces



2.7 CONSOLIDATING RESPONSES

In the visioning section of the feasibility study, the stakeholders responses from the previous workshop exercises that captured the collective Goals and Challenges, Success Factors and Metrics of Success as combined with the Programmatic Deep-dive and Prioritization Matrix for the Science Complex buildings were organized into four final Visioning Criteria categories.

The first Visioning Criteria category, 'Function', underscores a commitment to fostering healthy and safe learning environments. Next, 'User Experience' emphasizes the creation of spaces that transcend mere functionality. These spaces are designed to empower individuals to be their authentic selves, while also encouraging interdisciplinary collaboration. 'Learning Resources and Engagement' signifies a dedication to crafting spaces that not only pay homage to the rich legacy of science education at CPH but also embracing its future potential, ultimately enriching the broader Polytechnic educational experience. Lastly, 'Future ready resilience' embodies a forward-thinking approach, aiming to create spaces that are adaptable, sustainable and flexible over time. These criteria serve as the guiding stars in our endeavor to create an innovative and inclusive Science Complex ecosystem.

Function: Health and Safety - Health, Fire / Life, etc.

- Prioritization of Higher Utilization labs / classrooms, with swing space before 2025

User Experience: Learning, Research and Teaching

- Evaluate which Renovation / Upgrades can be integrated with priority projects and phased for 2nd and 3rd phase of work
- Elaborate on the "what" needs to be renovated-- if prompted
- Evaluate under utilized spaces for storage, but also assess storage management--i.e. off-site, recycle, repurpose items that are no longer useful for instruction

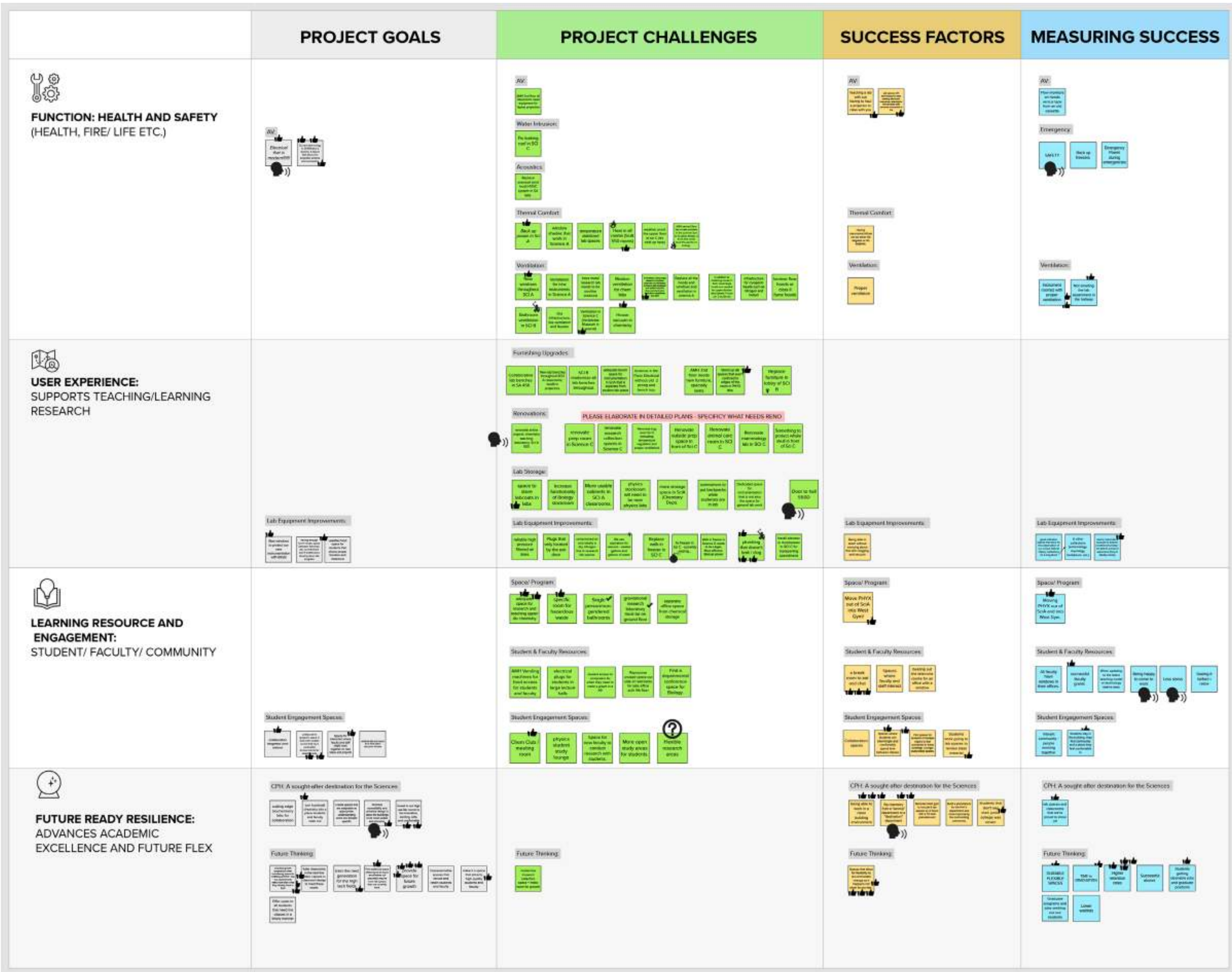
Learning Resource and Engagement: Students, Faculty, and Community

- Prioritize under utilized spaces for serving as the "third, or sticky" spaces for fostering engagement, learning resources and community
- Champion spaces for student clubs / collaboration

Future Ready Resilience: Advancement of Academic Excellence and Future Flexibility

- Depending on the assessment of these buildings, determine the overall need / growth of lab / research space and support needed--this will feed into the campus planning process for future utilization and current capacity

Figure 2.7.1 - Consolidating Responses: Project Goals & Challenges, Success Factors & Measuring Success




EXIT
EXIT

03
SITE CONSIDERATIONS

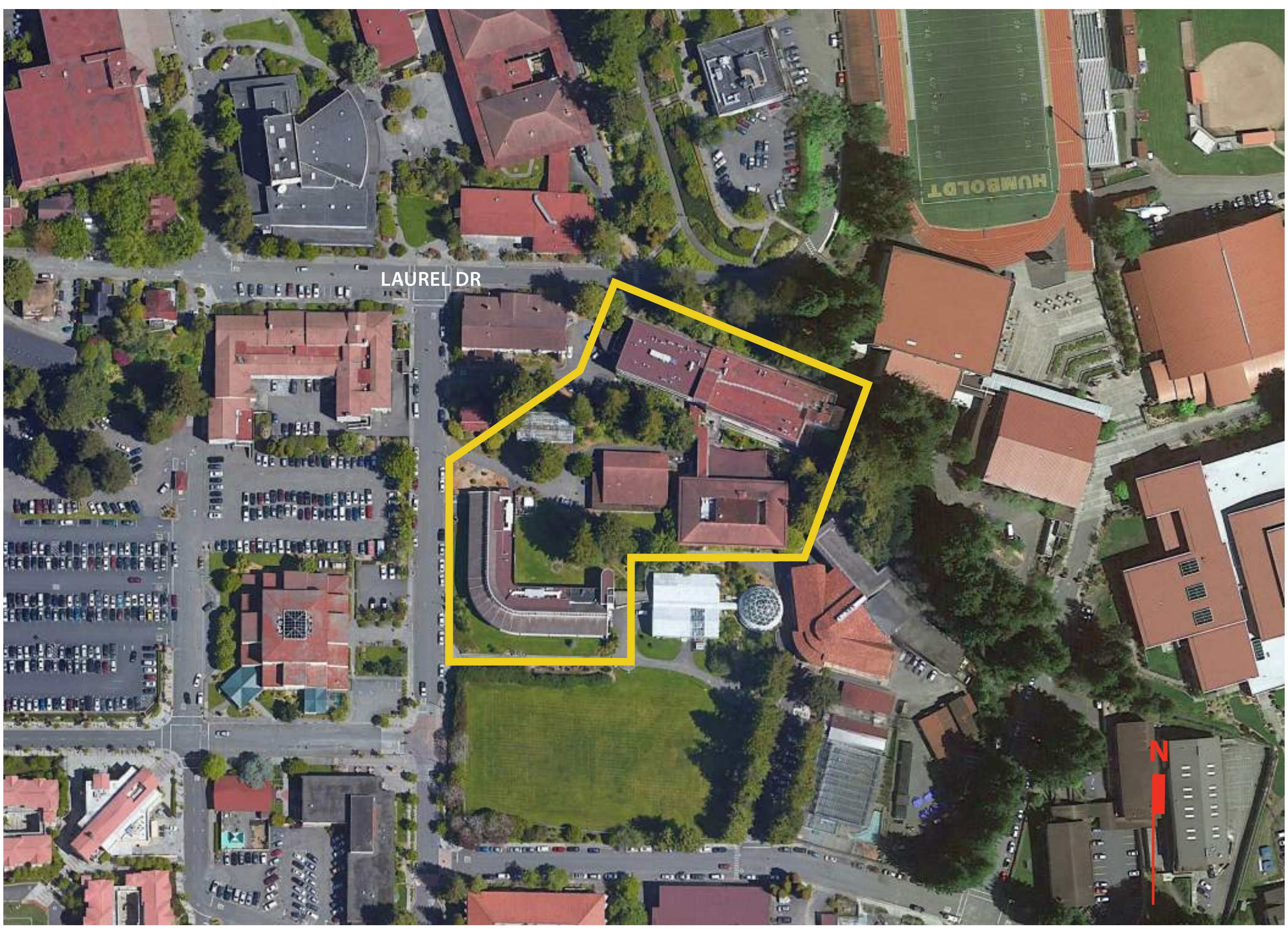
3.1 SITE ANALYSIS

3.1.1 SITE LOCATION AND CONTEXT

The site for the Science ABCD Complex sits at the heart of the campus, adjacent to both the newer and older portions of the campus. The site is located off of Laurel Drive and B Street, southeast of Jenkins Hall, and is on a topographically complex site with multiple pedestrian access ways currently running through the site from east to west, and from north to south. The site is bounded by B Street to the west, with Jenkins Hall and Science A building to the north, with Science D building to the south, and below that, the open lawn area located north of 17th Street (Figure 4.1.1.1).

The Diagram below highlights the approximate site boundary for the Science Buildings A,B, C and D.

Figure 3.1.1.1 - Aerial Site Photo



3.1.2 SITE OBSERVATIONS

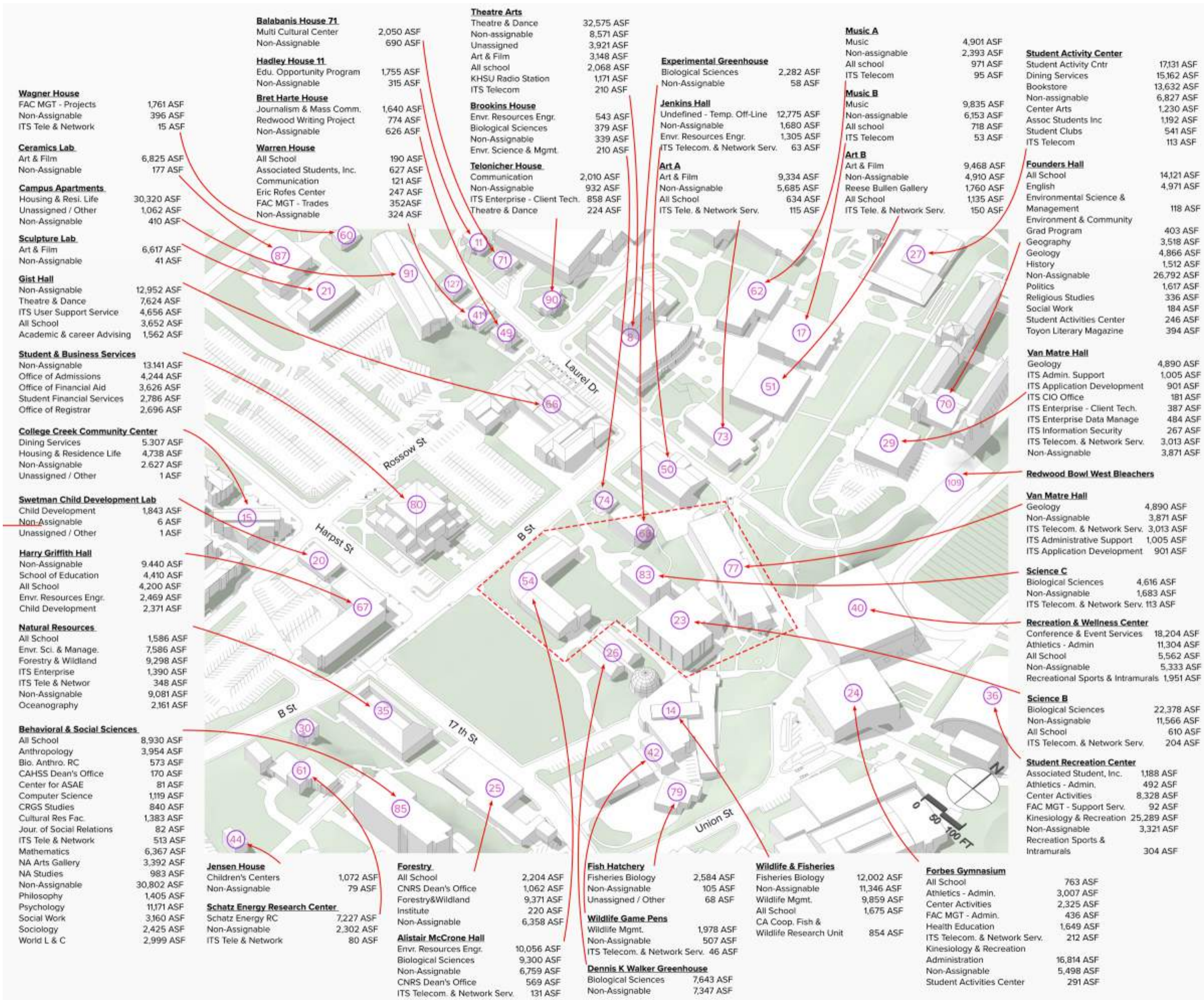
The northern portion of the Science ABCD Complex project site currently houses several structures, including the adjacent Jenkins Hall, the Science A building, and the Brookins House and Experimental Greenhouse. The southern portion of the project site currently houses Science Buildings B, C and D, and the Dennis K. Walker Greenhouse complex, comprised of three greenhouse type buildings. The exterior spaces located in-between the four Science Buildings allow for shared outdoor spaces, and establishes both visual and spatial connections between the four buildings. Notably, there are substantial elevation differences on both Laurel Drive, running East - West, and B Street, running North-South, making accessibility a challenge, in between the four Science Buildings. Future connections between these four buildings should be thoughtfully designed to incorporate outdoor spaces and potential outdoor gathering and learning areas, providing visibility and prominence in alignment with the existing structures and creating a distinctive image for the Science programs, easily recognizable across the campus.

On the southern side of the site lies Science D, featuring labs that offer opportunities for collaboration between the Science programs and the future Engineering and Technology building, to be constructed adjacent to 17th Street and the great lawn area to the south of the site. Ample parking is available in the vicinity, with some ADA accessible parking spaces conveniently located near the site.

Figure 3.1.2.1 - Science Complex ABCD

Figure 3.1.2.1 - Site Background

Figure 3.1.2.1 - Context Map with Assignable Square Footages



3.1.3 SITE TOPOGRAPHY

The topography of the site is sloped primarily from the west to the east, and secondarily, from the south to the north. The topography generally rises from the southwest corner of the site to the northeast corner, and there is approximately a 55-foot differential in grade change across the site, between the southwest and northeast corners. There are a variety of mature tree species located to the north – northeast area of the site, and multiple existing walkways and hardscape, paved areas between the individual buildings.

Figure 3.1.3.1 - Site Topography

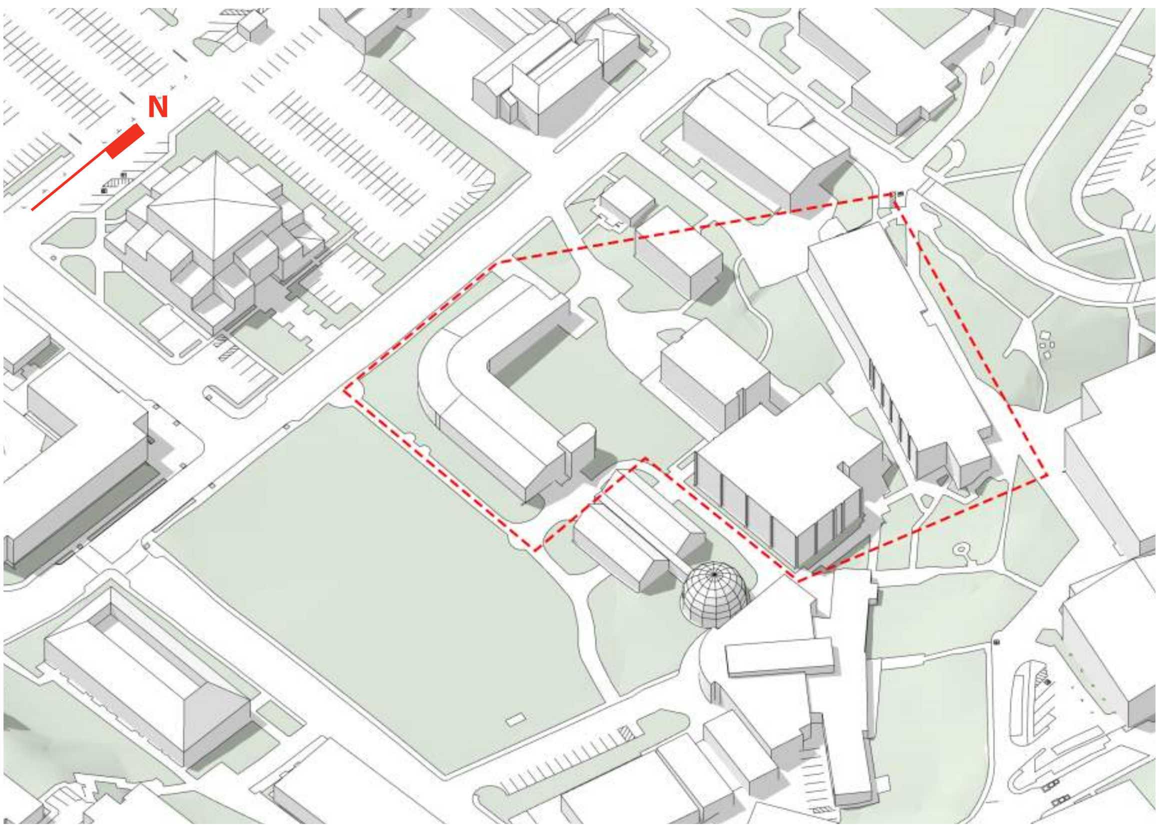
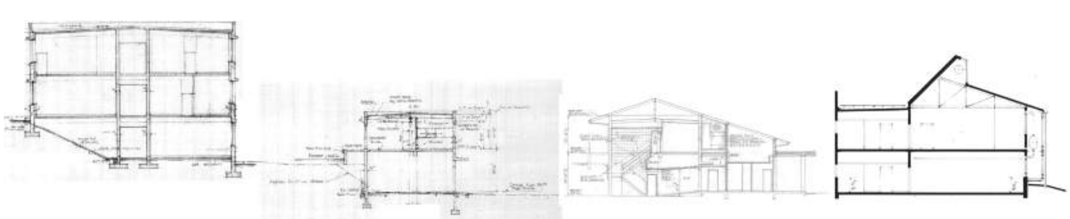


Figure 3.1.3.2 - Relational Building Sections



Building A

3.1.4 CLIMATE FACTORS

The temperature in Arcata is mild with highs in the upper 60's in the summer and lows in the winter in the lower 40's. Typically, the change in temperature over a given day is 15 degrees. The summer is mostly clear of clouds, but in the winter, the sky is cloudy up to 67% of the time. Rain is frequent in Arcata in the fall, winter, and spring. Arcata gets 46 inches of rain on average per year; the US average is 38 inches. The rain reaches a peak in December with an average of 15 days of rain in the month and a volume of 9 inches.

https://weatherspark.com/y/310/Average-Weather-in-Arcata-California-United-States-Year-Round#Sections-Topography

Figure 3.1.4.1 Historical Diurnal Temperature Range, Arcata, CA

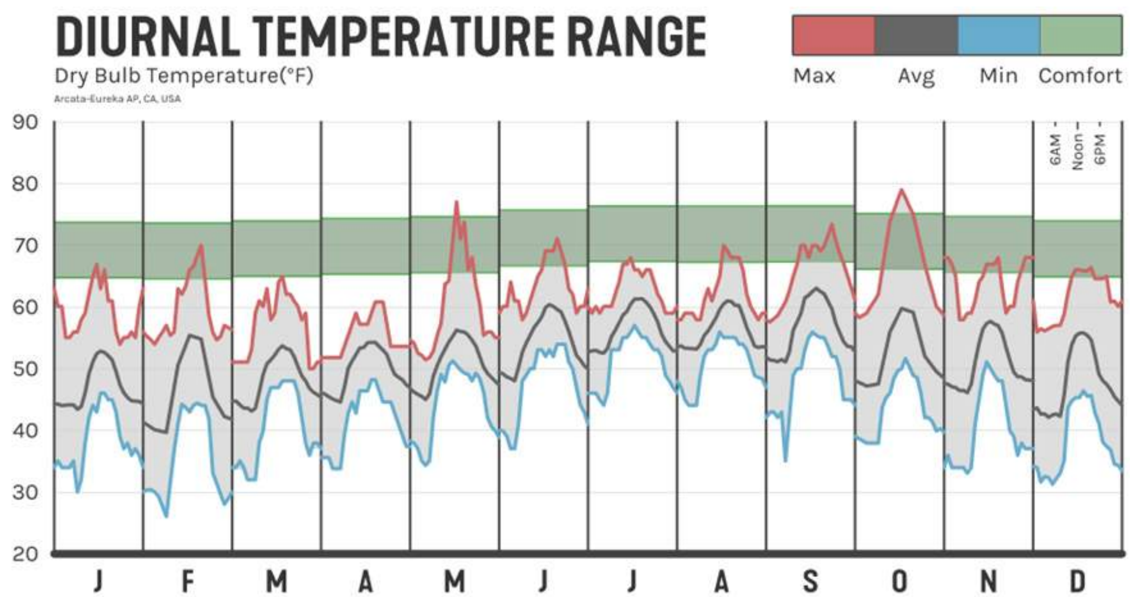
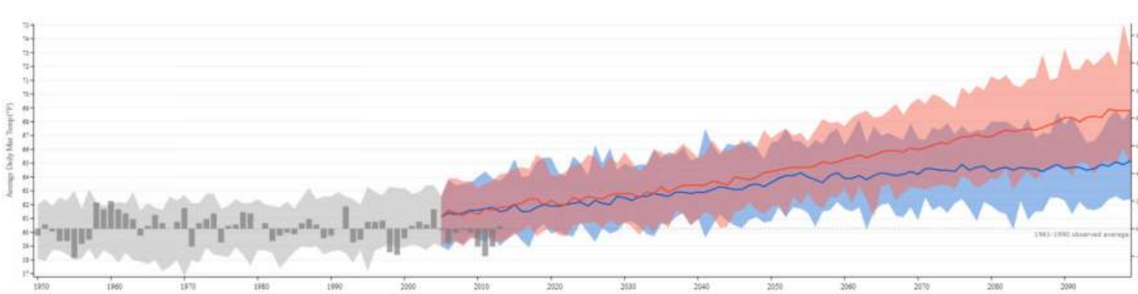


Figure 3.1.4.2 Anticipated Future Temperature Ranges

Under a high and low Global Emissions Model for Arcata, CA

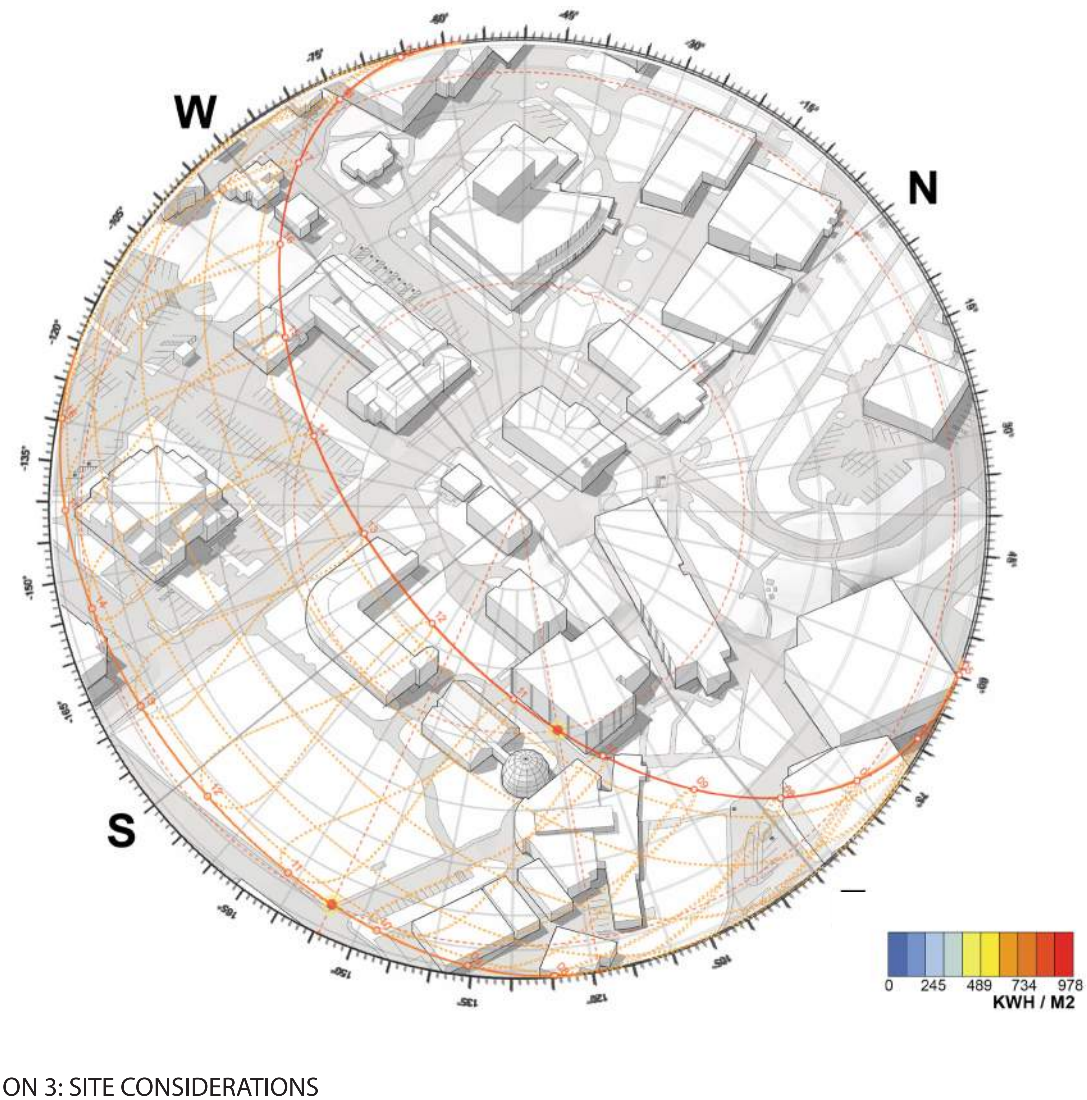


3.1.5 SITE SOLAR CONDITIONS

As shown in the solar diagram (Figure 4.1.5.1), the project site receives most of its sunlight from the south-southwest, along the access road to Science C, and the yard area off Science D. Given the current open condition character for a large percentage of the site, the site receives a generous amount of sunlight from all sides except for the wooded area to the north. During the summer and winter months, early morning and late afternoon sun will reach most all non-wooded portions of the site. The current site has a variety of mature trees located toward the north - northeast area of the site. Depending on how many of the existing trees located in this area are retained, portions of the open areas of the site to the north will receive less direct sun for brief time spans throughout the day.

https://weatherspark.com/y/310/Average-Weather-in-Arcata-California-United-States-Year-Round#Sections-Sun

Figure 3.1.5.1 - Solar Diagram - Summer and Winter Solstice

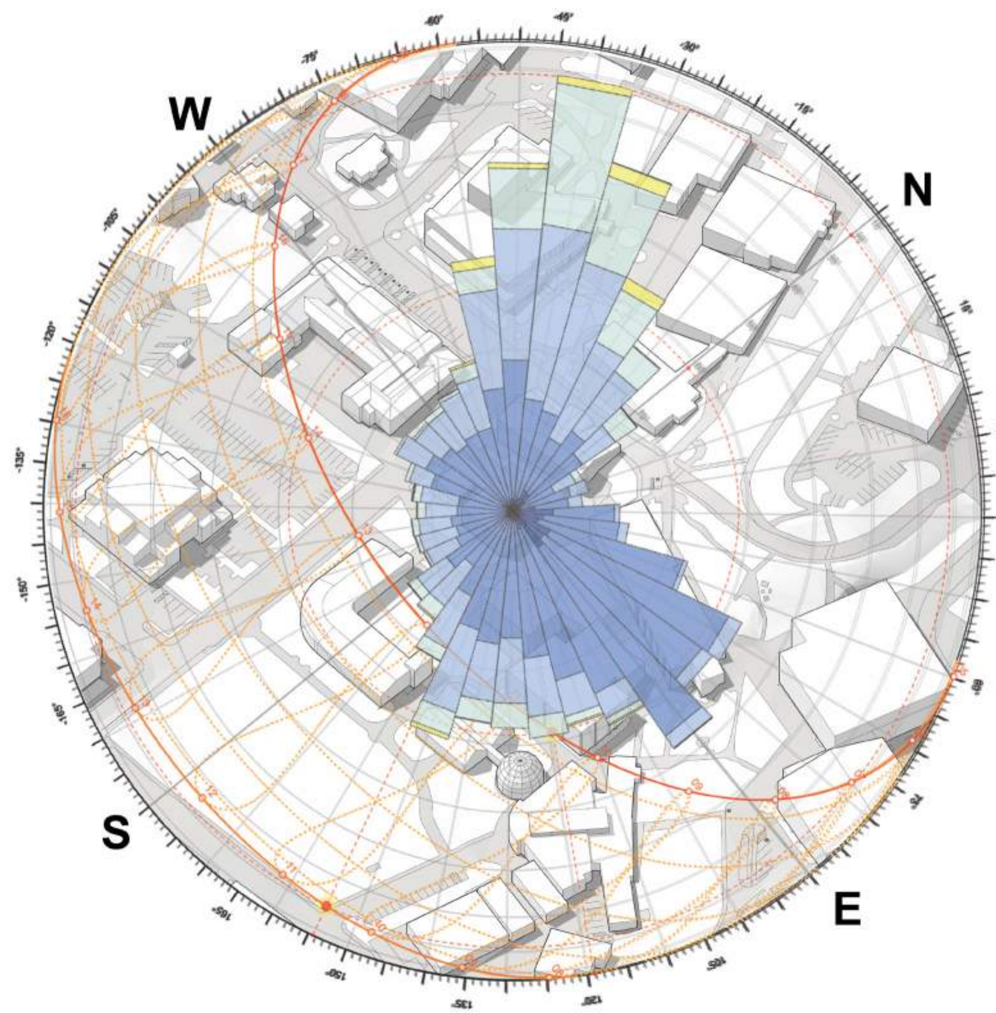


3.1.6 SITE WIND CONDITIONS

The wind analysis diagram (Figure 4.1.6.1) shows that the prevailing winds during both the summer and winter months are out of either the northwest or southeast. The cluster of trees to the northern and northeast portions of the site will mitigate the amount of wind that the sloped topography of the site will receive. Along with Jenkins Hall located to the north of the site, this tree cluster to the north - northeast currently creates a wind break, sheltering the site from the prevalent north-westerly winds.

https://weatherspark.com/y/310/Average-Weather-in-Arcata-California-United-States-Year-Round#Sections-Wind

Figure 3.1.6.1 - Annual Wind Diagram

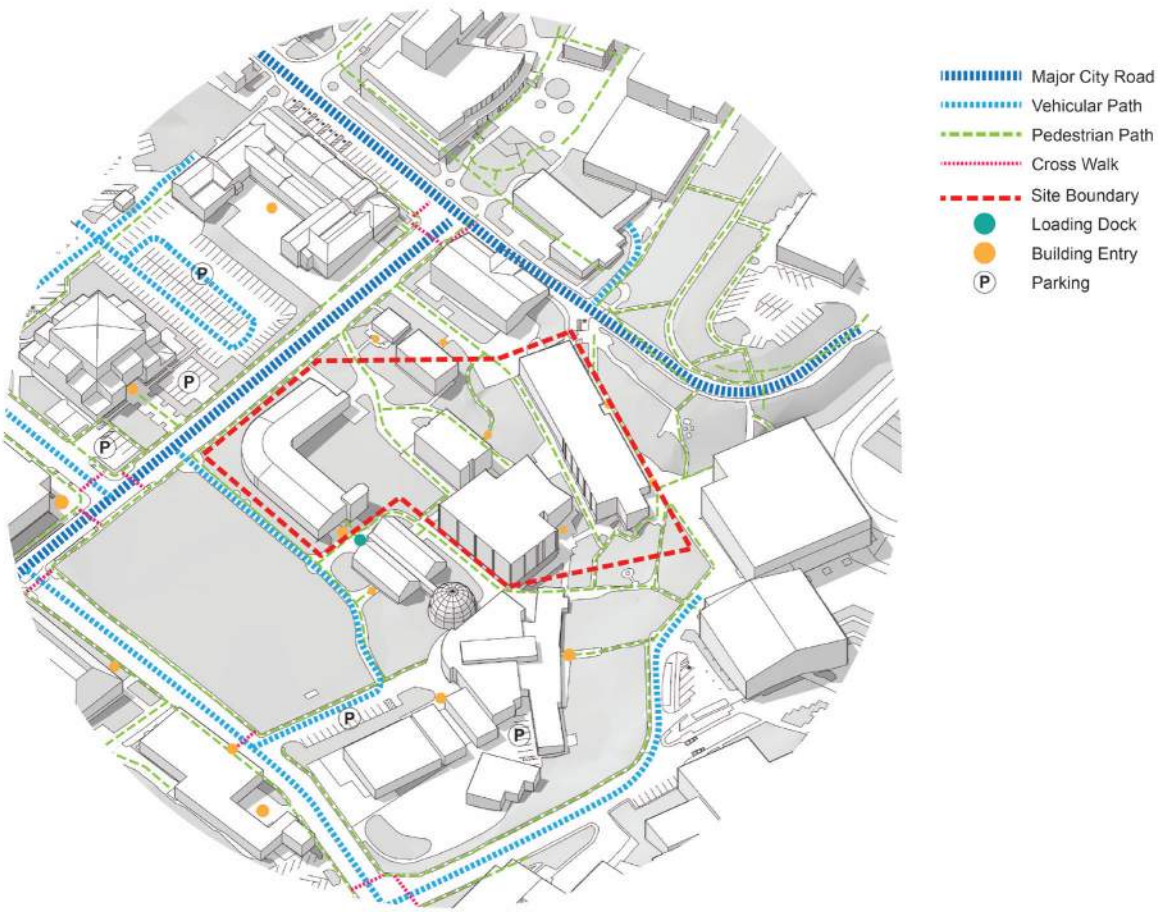


3.1.7 SITE CIRCULATION

The location of the site is near the central portion of the main campus. The site sits close by to one of the busier corners of the campus where B Street terminates into Laurel Drive. It is served by a variety of transportation modes along B Street. The varied topography does affect some site access, especially for pedestrians and larger trucks. As shown in the Site Circulation Diagram (Figure 4.1.8.1), the site is located at the edge of busy B Street.

Pedestrians can walk into the site from a variety of access points—form the north, south, east and west, edges of the site. The current pedestrian walkways that roughly connect from the northeast area of the site to the southwest are highly utilized. As part of any new site development, this roughly diagonal axis of pedestrian circulation at a campus scale may want to be retained. Main vehicular access comes from B Street, where there is an access road that runs parallel to the southern edge of the site. This accessway, which includes a pedestrian walkway, connects the adjacent campus buildings located to the east and southern portions of the site. This access way may need enhancements/adjustments to accommodate required access, loading, accessible parking and fire truck access.

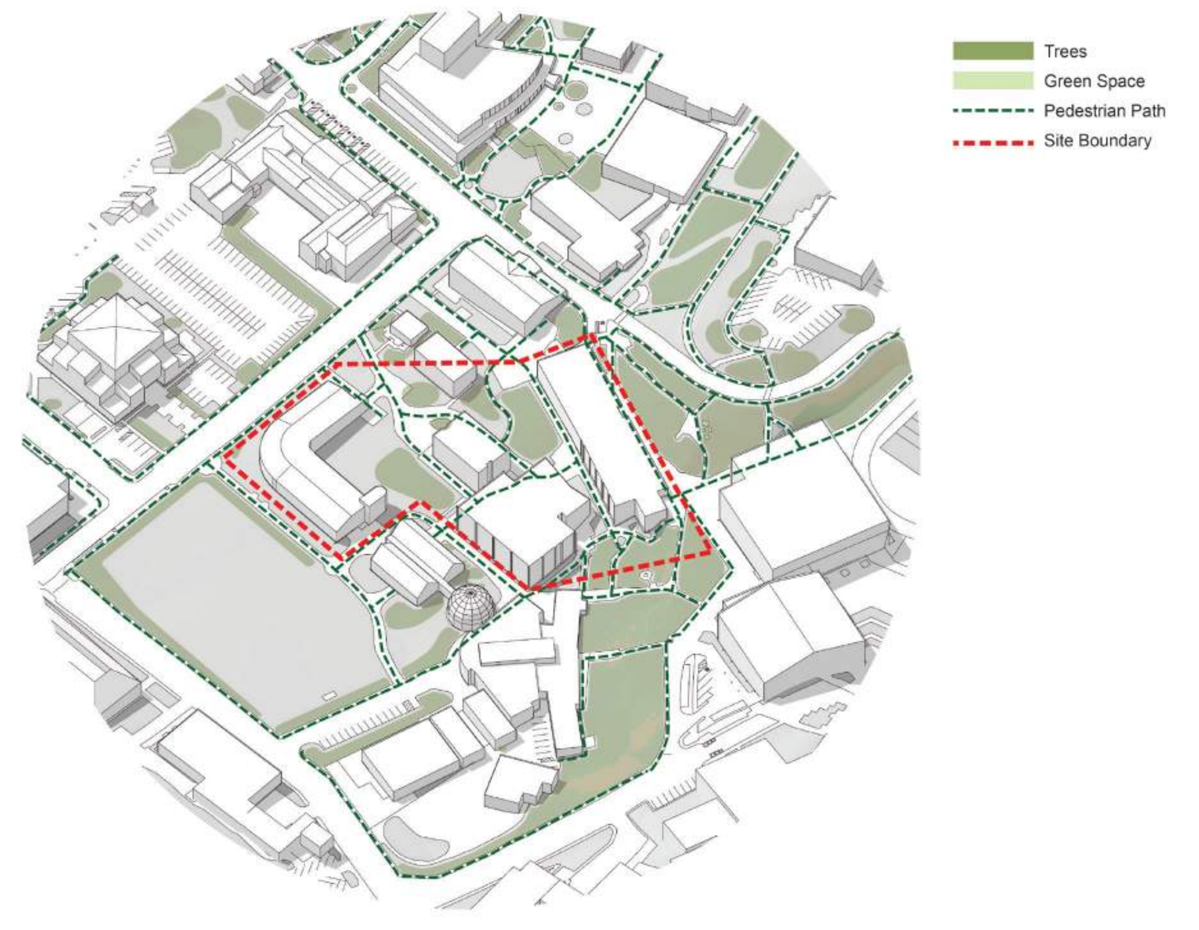
Figure 3.1.7.1 - Site Circulation Diagram



3.1.8 SITE OPEN SPACE

The site includes a large area of space that is populated with mature redwood trees located in the northern – northeast area of the site. Some of this wooded area may need to be cleared to provide space for either new structures or formal connections between any of the buildings located in that area. The southern edge of the site should be developed to create additional inviting/pedestrian-friendly open space that ties to the new Engineering and Technology building, and which may create connections between the larger complex, particularly the Science B, C and D buildings. Any new exterior development should also embrace the remaining eastern sloped area of the site and celebrate the existing redwood trees with newly reconfigured pedestrian accessways along the eastern edge of the site—as they can potentially create both eastern and southernly accessways. All open spaces created or developed with the project should keep in mind the local climate and the need for direct solar access to make them successful and populated.

Figure 3.1.8.1 - Open Space Connection Diagram



3.2 SITE CONTEXT

The academic context surrounding the site is varied both in terms of program and character. The complex site topographically is one of the main site characteristics effecting access, views and building-to-building relationships.

Figure 3.2.1 - Project Scope and Surrounding Context

- 3A Science A
- 3B Science B
- 3C Science C
- 3D Science D
- 3E Dennis K Walker Greenhouse
- 26 Van Matre Hall
- 24D Recreation & Wellness Center
- 07 Jenkins Hall
- 2B Art B
- 11 Wildlife & Fisheries
- 23 Gist Hall
- 04 Harry Griffith Hall
- 29 Experimental Greenhouse
- 2A Art A
- 18 Brookins House
- 24A Forbes Gymnasium
- 100 Student & Business Services
- 10 Theater Arts

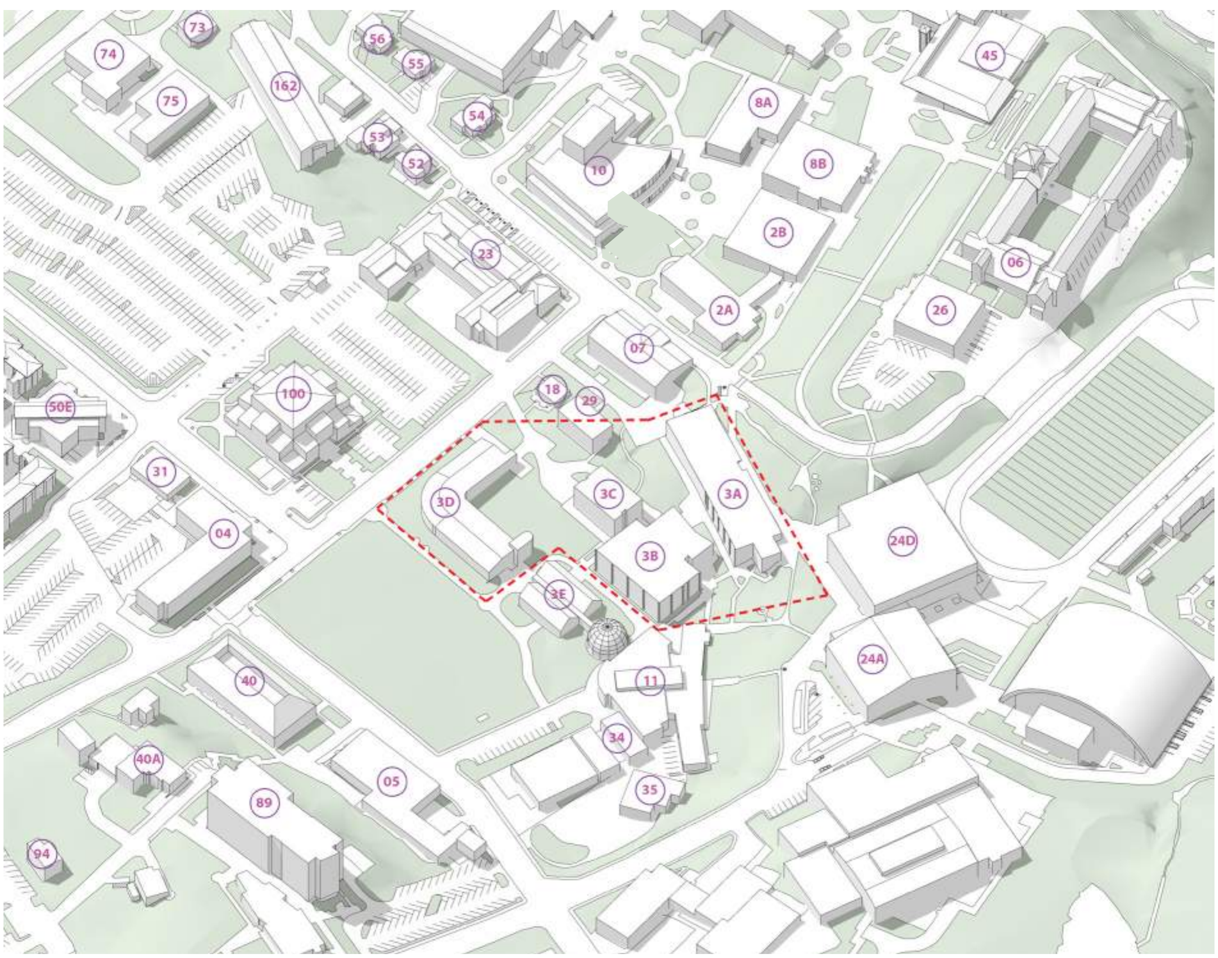
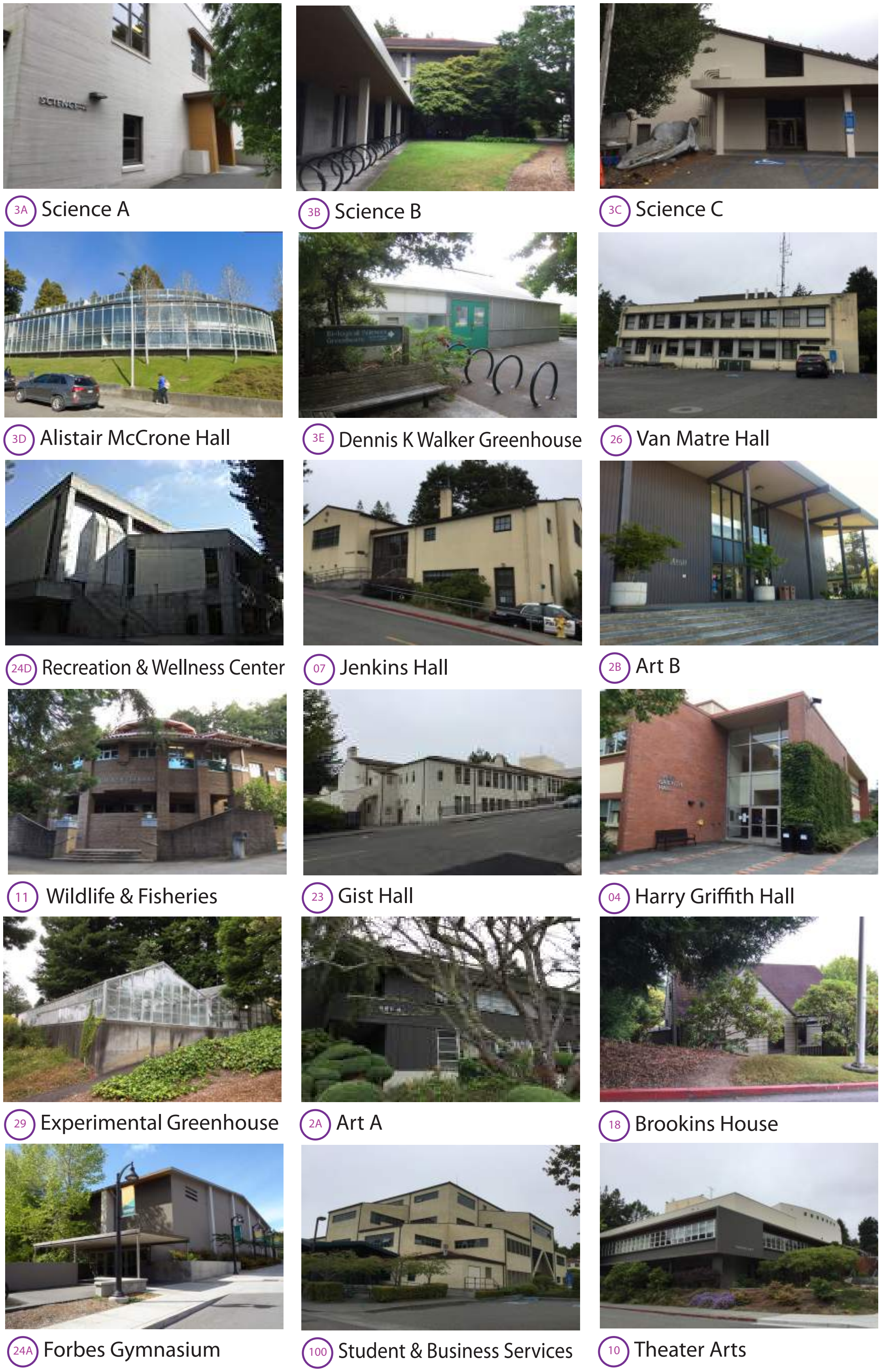


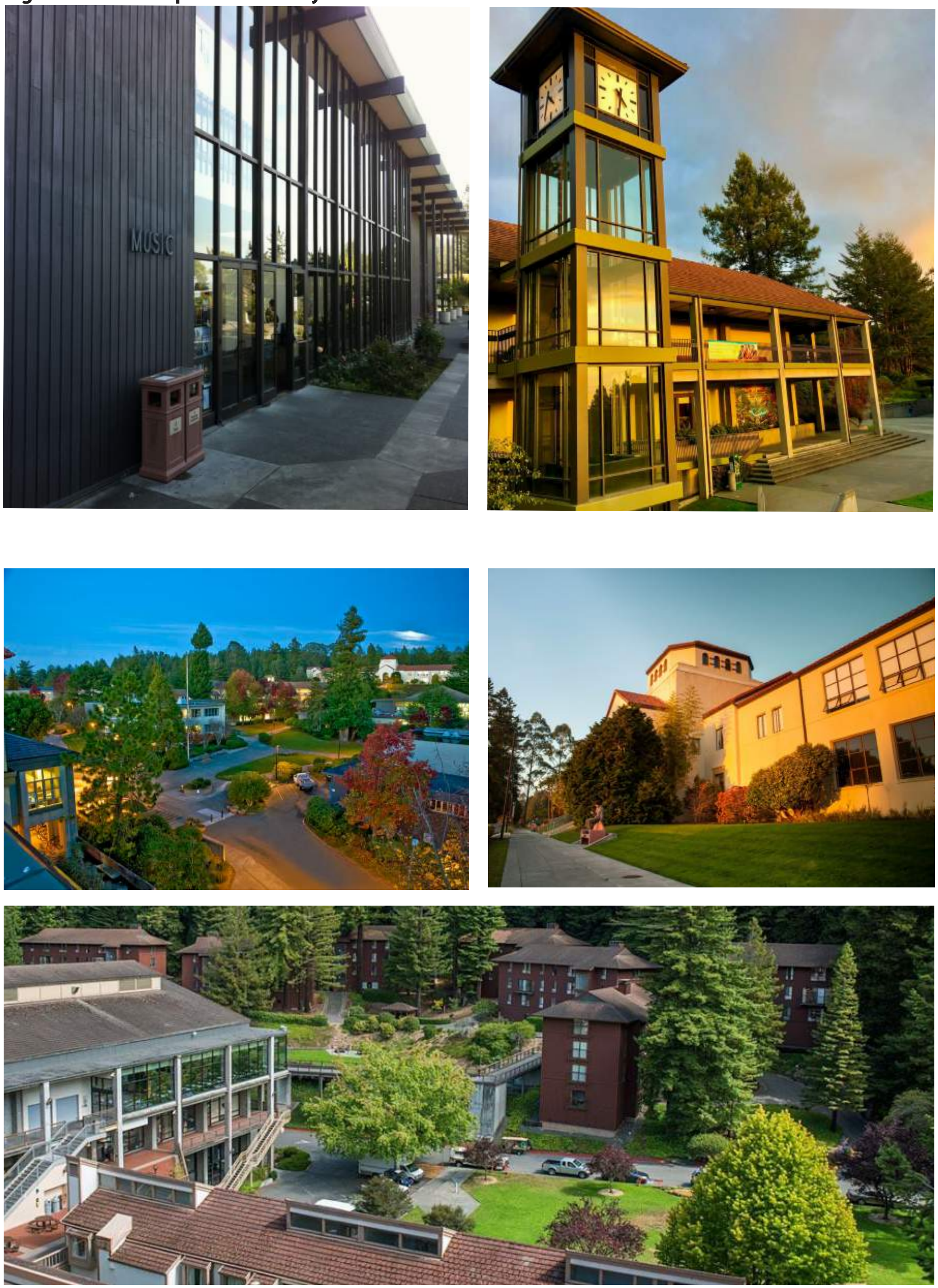
Figure 3.2.2 - Project Scope and Surrounding Context



3.2.1 SITE VISIT / OBSERVATION

The following photographs represent some of the most prominent architectural features of the campus context.

Figure 3.2.1 - Campus Vocabulary




BEHAVIORAL

04

EXISTING CONDITIONS ASSESSMENT

4.1 ARCHITECTURAL

4.1.1 SCIENCE A BUILDING

This building was constructed in two different phases approximately 10 years apart. The West wing as-built drawings are dated 1951. The west wing was originally constructed as a three-story building (as viewed from the south) in 1960. The building is a concrete structure with exterior concrete walls and concrete roof as well as 10" concrete walls along each side of the major east-west hall across the whole building. The roof structure on the west wing was constructed with a slope built into the structural roof itself while the newer east wing was constructed with a nearly flat concrete roof structure.

4.1.1.1 ROOF

The roof at the east and west are both built of built-up composition roof with a mineral cap sheet per the detail below. The amount on insulation varies across the roofs as the roof structure on the west wing was constructed with a sloped structural concrete and the newer east wing was constructed with a nearly flat concrete.

There are drawings for a re-roof at the West (original 1951) portion of the building for both 1988 and again in 1999 on the campus metaBIM link. It is likely the work was not performed in 1988, but instead in 1999 and would look to the university to confirm when the work was performed. The west portion of the roof appears to be in notably better condition than the east side.

1. 1988_Reroof_Physical_Science.pdf
2. 1999_Reroof_Physical_Science.pdf

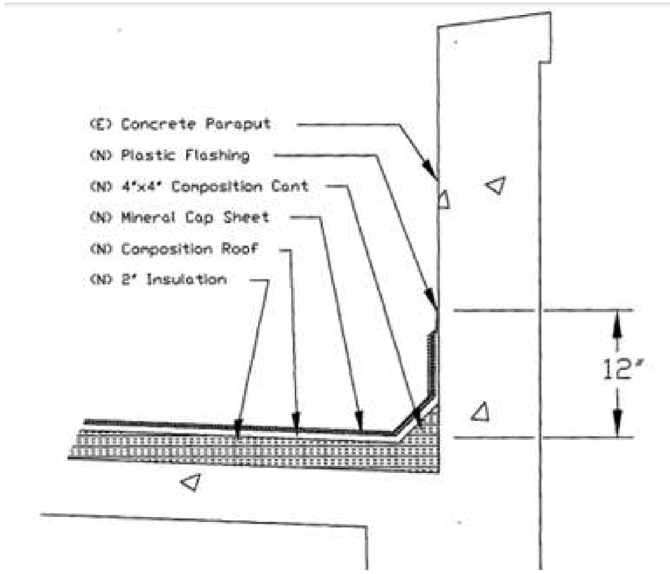
At the time of site walk, the building was experiencing moderate rain and there was significant ponding at all roof surfaces: east portion of the building, west portion of the building as well as the penthouses. Roof overflow seems to be addressed via ~3" diameter wall penetrations through the concrete parapets. There was also significant corrosion of the guards that protected the roof drain openings from larger debris which could impact the functionality of these roof drains over time.

There is a galvanized metal pipe fall protection guardrail that runs the perimeter of the east portion of the building at the Main roof, Level 5. At current, portions of this guardrail exceed the required 42" guardrail height, but large portions of the guardrail also do not meet this height requirement, particularly where there are stepped transitions in the roof level itself.

There is no fall protection guardrail installed at the west portion of the building the height is typically under guardrail height requirements. It is recommended that when a re-reroofing occurs, that the insulation thicknesses be increased to me the current code and that roof slopes be increased to at least be 2% at the valleys of the roofing. Options should be discussed as a whole when reroofing this building that the roof.

There appear to be openings into the penthouses that may create some challenges if insulation is added to the roof to meet current codes. Openings already appear low in some areas and already interrupt the metal flashing and or future upturns at the existing roof; adding insulation would likely exacerbate these conditions.

Upon visual inspection, the re-roof seems visually aligned to the below detail that was shared among the two drawings sets mentioned above. The parapet cap flashing appears to be in good shape, however would need to be uninstalled entirely for any reroofing work at the flashing cap is held in place with exposed fasteners at least one side where installed.



Neither portion of the roof meets current insulation requirements. It would be recommended that when the roof is next replaced, that the roof insulation thickness be brought up to meet current CEC requirements at each portion of the roof. This will result in some unique conditions.

4.1.1.2 ENVELOPE

The building is primarily painted concrete. It is not clear if this is an elastomeric, but there were no obvious major deficiencies as viewed from the ground. There are concrete overhangs approximately 3' deep nearer the top level with cast-in drip edges.

There are signs of water at the building interior in ceiling tiles in the upper floors, but it was not clear if these were from building systems, condensate, or leaking or water from the roof.

The windows appear to be single pane at the building. Stair B appears to have large single pane storefront glass with integral wire mesh. Glazing near the floor should be reviewed to determine if safety requirements are met.

4.1.1.3 BUILDING ACCESSIBILITY

Wherever work is performed, it should be per CBC 11B-202 so that where existing elements or spaces are altered, each altered element or space shall comply with the applicable requirements of Division 2, including Section 11B-202.4.

There are general door accessibility issues throughout the building. Strike side clearances often do not meet clearance requirements, particularly at 'mini suites' that are off the main hallways and at restrooms. There are no powered door openers at interior spaces within the building. Providing powered door openers may be an acceptable alternate to the AHJ to provide access to spaces where some doors would not be met, though this would need to be reviewed with the AHJ.

Drinking fountains typically do not meet accessibility throughout the interior spaces. Fire alarm pull stations typically exceed reach range heights per CBC 11B. The rough-ins for these and other items at typically cast into the existing concrete walls.

4.1.1.4 SITE ACCESSIBILITY

The main entry of the building (at level 3, but signed as the 4th floor) appears to be served by accessible parking that is located to the northwest of the building along Laurel street. The west and east entrances on each end of the building are difficult to reach by wheelchair and have either non-accessible sloped walks and or steps to reach. The entrance at the south of the building where the bridge abuts the Science A building is a good candidate to become a possible accessible entrance, but there would need to be renovation work performed from the parking at the south west of Science A up the walkway and to the entrance itself. The parking that is currently at the southwest area of Science A is not accessible.

Each point of entry should be reviewed for accessibility on an individual basis.

4.1.1.5 BUILDING ENTRIES

There are 5 entrance points into the building.

Each entry point should be reviewed for accessibility and egress.

1. Level 1 East end of the building near Stair B
2. Level 2 West end of the building near Stair A
3. Level 2 South middle of the building
4. Level 3 North middle of the building facing Laurel St
5. Level 3 East end of the building near Stair B

The Level 3 middle entry point is the main entry most directly connected to accessible parking. The pathway between the parking and the building should be re-evaluated for slope and barriers along the path of travel.

4.1.1.6 RESTROOMS

The most recent barriers removal project appears to have been performed in 1976 and 1980 which pre-dates the ADA by at least 11 years – see "1976_Remodel_to_Meet_Handicapped_Specs.pdf" in campus Facilities metaBIM link.

Most of the toilet fixtures flush via foot activated controls which do not meet accessibility. The widest “accessible stalls” currently in the building are approximately 3’-0” wide. There are no stalls in the building that meet today’s accessibility standards width. Heights, clearances and distances of all accessories and fixtures should be reviewed, discussed, and upgraded as required as part of future renovation per CBC 11B.

4.1.1.7 STAIRS

There are 2 sets of stairs that serve the building. The latest assembled plans from the campus metaBIM link label the stairs at the west end of the building as Stair A (S-#A whereas # is equal to the floor designation) and the stairs at the east as Stair B.

1. Stair A serve levels 2-4 and are concrete cast-in-place stairs.
   b. The stairs at Stair A have 11-1/2" treads with 6-3/4" risers. The stairs are 5'-7" wide with an intermediate landing that is 5'-6-1/2" deep.
   c. The floor to floor is 13'-6" with 24 risers.
2. Stair B serves level 1-5 and are also concrete cast-in-place stairs.
   c. These stairs have 11" treads with approximately 7-3/8" tall risers. The stairs are approximately 5'-0" wide with an intermediate landing that is 5'-0" deep.
   d. The floor to floor is 13'-6" with 22 risers.

The cast-in-place concrete at Stair A meets the minimum rise and run requirements set forth by CBC 11B.

The cast-in-place concrete at Stair B just meets the minimum tread depth requirement of CBC 11B. The rise at Stair B exceeds the minimum permitted under CBC 11B-504.

The handrails at both stairs meet height requirements, but neither stair has handrails and guardrails the meet the full requirements of the current code. While neither stair meets the current accessibility code, the challenges at Stair A appear less then at Stair B.

Conditions should be reviewed in detail at both stairs. It is recommended to discuss both stairs and the building's accessibility in whole as part of any renovation.

It was observed that there appears to be plugged in equipment located in Stair B consisting of refrigerators and icemakers at the time of site walks in February 2024.

4.1.1.8 ELEVATOR

The elevator shaft is original to the 1951 portion of the original building. The elevator is a 3-stop elevator that serves Levels 2-4 and does not serve the lowest level 1 and or the roof. Per the original drawings, the shaft is 6'-8" deep by 6'-9" wide with a 4'-8" available at the opening. There are 10" concrete walls at the north and south sides and 8" concrete walls at the east and west sides of the shaft.

In addition to the cab not meeting cab interior clear floor / ground space requirements and or gurney compliance, the controls and signals are not located at heights that would meet today's current accessibility per CBC-11-B. Controls do not meet accessibility at interior or exterior of elevator.

It is recommended to discuss both the elevator and the building's accessibility in whole as part of any renovation.

4.1.2 SCIENCE B BUILDING

This building was constructed in 1969 and designed as a part of a single project with the neighboring Science C building located to the immediate west as well as a bridge connection between Science B and the original portion of Science A.

The floor plan has two main portions, the butterfly lecture hall arrangement on the North Side and the offices/classroom portion on the south side.

The building is an all concrete structure including the pitched roofs. There is a large race-track configuration mechanical area at the top of the building that is open to the sky with a large enclosed mechanical room in the center of the racetrack. There is a large amount of open area under the concrete pitched roofs that are used for general storage with doors all along the perimeter to grant access to the low-height areas under the sloped concrete roof (these areas were not able to be accessed at time of site walk).

The Mechanical room at the roof level is constructed with metal stud walls and a metal deck roof supported by structural steel beams. The exterior of the metal framed walls are finished with stucco at both the exterior and inside facing into the mechanical room. It is accessible by a single roof ladder at the open mechanical area.

4.1.2.1 ROOF

On the day of exterior site visit February 19, 2024, the area incurred 0.47" of rain.

The building's primary perimeter sloped roof is roof tiles over a sloped concrete deck with the equivalent of sloped concrete rafters. Near the perimeter of this sloped roof is an continuous integral gutter cast into the concrete structure surrounded by flat roofing tiles.

Per campus provided details, the water is routed to internal drains back through the concrete structure and the drains at the gutter are screened. Typical in these buildings, overflow drains are not installed. It would be difficult to tell if this gutter system is functioning properly and or if any part of the length of the gutter needs maintenance. There are large redwood trees located to the immediate east of this building which may affect the long-term functionality of the existing roof gutter system.

The flat roof over the mechanical room appears to have been replaced in 2018 per campus provided materials and is a granulated torch-down roofing system. This roof is nearly flat and at time of site visit only had a few shallow puddles remaining on the roof no greater than ½" deep. Again, there is only a single drain at this high roof, but there is very little opportunity for water to accumulate at this flat roof without spilling over the edges onto the sloped roof. There are perimeter fasteners through the top-most face of the sheet metal holding down the metal flashing at the parapet that are typically areas of water intrusion. Given the flatness of this roof, these are possible areas of concern for water intrusion.

In documents provided by the University, there appears to have been a re-roof performed at the bridge where the selected roofing product was specified as a Johns-Manville built-up roofing system applied over a Ga-Co deck.

There is currently no insulation at the roof or upper level of the Science B building and there does not appear to be any opportunity given that most of the roof is existing walking surface at a mechanical space.

There is no measure for fall protection at any of the roofs. Though there does not appear to be any equipment that requires maintenance at the roof that is not located at the mechanical level.

Exterior vertical faces

The building is primarily exposed concrete at the vertical faces. The uppermost concrete overhang at the roof provides a 5'-8" overhang from building face. There are 18" structural concrete overhangs as part of the perimeter structure at each floor level below. There is a visible drip edge at the highest roof level perimeter concrete. Each overhang at the floor levels provide a generous positive slope and there were no obvious signs of water intrusion at the building perimeter.

The floor of the portion of the mechanical area that is exposed to the weather is covered with an elastomeric membrane that has a lot of staining and also some large cracks that may be or become a source of water intrusion. There appear to be roof-type drains at this area without secondary overflow drains. There was pooling water around the area drains at the time of visit.

The exterior stucco walls at the rooftop mechanical room have large visible cracks that appear to have been finished over. If the finish has elastomeric properties, then this may be acceptable back of house solution to remain.

The windows appear to be the original single pane at the building. There were no obvious points of failure, though the current windows likely do not meet current energy standards.

There are numerous instances where glass is within 18" of the floor; it should be inspected upon revisions to meet CBC 2406.3.4. Safety glazing was not obviously visible upon site walk observations per CBC 2406.3 i

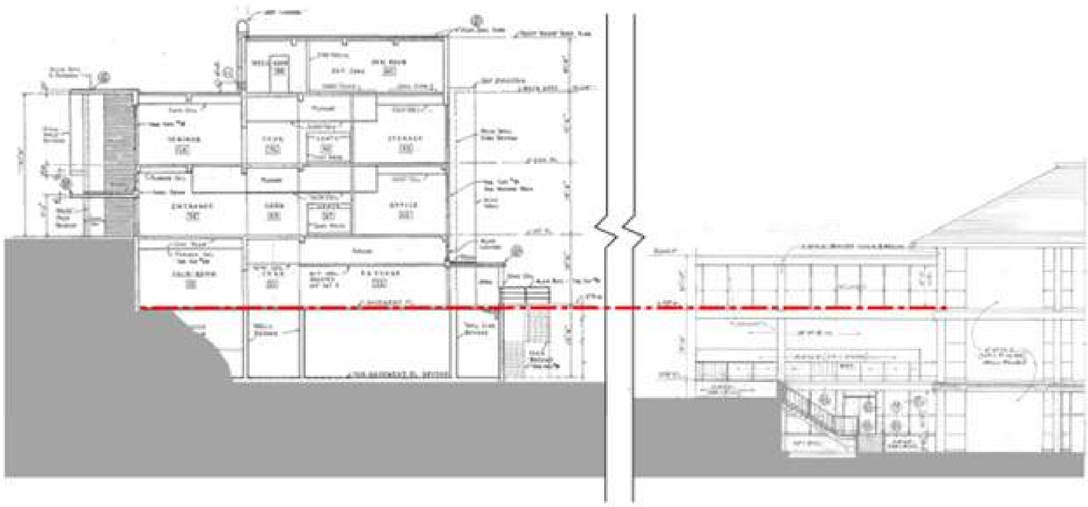
4.1.2.2 BRIDGE

There is a bridge/walkway between the Science A and B buildings. The levels being connected are the North side floor Level 3 of Science B connects via a level-surface enclosed bridge to the South side of the actual Level 2 of Science A. See snip of approximate building sections below.

The bridge is constructed of cast concrete columns for the main supporting structure as well as the floors and roof of the bridge. The bridge is integrally connected to both Science A and Science B buildings. The roof level of this structure is separated from the Science A with a 4" expansion joint per the Architectural drawings.

There is ducting that services the interior portion of the bridge that originates from Science B. The lower level walking surface of the connecting bridge open to the exterior environment has an applied traffic coating that has visible openings through the traffic coating to the concrete below.

A June 1993 seismic evaluation at the bridge was performed by R. P. Gallagher Associates, Inc of San Francisco, CA. Results of the evaluation found that the bridge does not meet CSU criteria that were in place at the time. It was determined that important moment frames that are part of the bridge are nonductile frames. The report states, "Nonductile concrete elements generally tend to degrade in strength and stiffness more rapidly than those of new, ductile concrete" (Page 5 of 201). "Damage to the bridge is expected to be significantly more than that of ordinary buildings design to recent codes." (Page 5 of 201) where as the "recent codes" referenced were those in place in 1993.



4.1.2.3 BUILDING ACCESSIBILITY

Wherever work is performed, it should be per CBC 11B-202 so that where existing elements or spaces are altered, each altered element or space shall comply with the applicable requirements of Division 2, including Section 11B-202.4.f

There are general door accessibility issues throughout the building. Strike side clearances do not meet clearance requirements, particularly at within 'mini suites', classrooms, and restrooms. There are no powered door openers at interior spaces within the building. Providing powered door openers may be an acceptable alternate to the AHJ to provide access to spaces where some doors would not be met, though this would need to be reviewed with the AHJ.

Wall mounted items throughout should be reviewed for meeting accessible heights per CBC 11B-309. It was observed that some fire alarm pull stations and public phones exceed reach range heights per CBC 11B-309. The rough-ins for these are typically cast into the existing concrete walls.

Protruding objects throughout should be reviewed for meeting CBC 307. It was observed that clocks are below 80" minimum clearances at hallways.

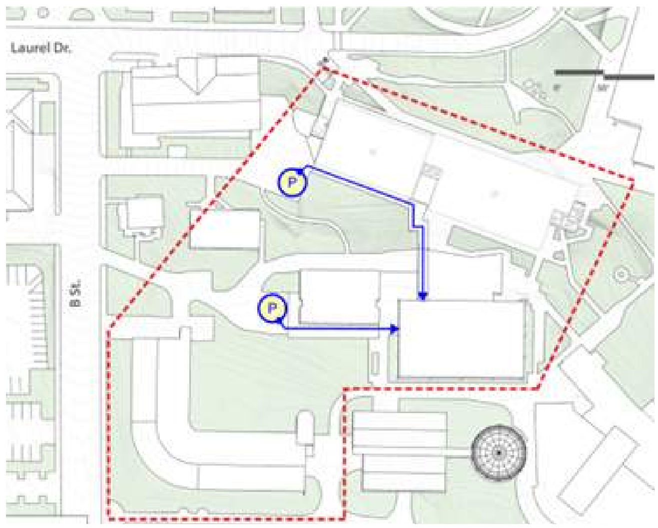
Lecture rooms 135 and 133 have numerous accessibility challenges. A few are listed below:

- Wheelchair users are not able to access the rear of the lecture halls
- Available clearances are limited at the existing terraces at the room.
- The existing terraces are cast concrete
- The lowest tier of the lecture halls may be accessed via wheelchair, but the path is circuitous and not signed.
- There are door clearance accessibility challenges at all the doors serving these room

4.1.2.4 SITE ACCESSIBILITY

Science B is nestled in the center of 5 buildings with no immediate direct entry for a pedestrian vehicle to pull up to the building. Per the original drawings, the main entry of the building is at Level 1 and accessed from the West side. There is asphalt provided spaces painted as accessible that appear to be share between Science C and Science B.

There is also asphalt provided parking spaces that are painted accessible about 150' north that seem to lead to the bridge and may be shared between Science A and Science B. See diagram below.



Only three of the nine building entry points appear accessible by a wheelchair:

- Level 1 West end at the lower lobby direct to exterior
- Level 1 West end direct single leaf door from Science C lowest level
- Level 3 North side within the enclosed bridge

The most recent 2006 Science B DSA upgrade documents illustrate an accessible path at the east side of the building. At time of site visit, there were changes in level at the east side of the building in the pavement that exceed changes in level allowed by current code CBC 11B. Also documented was an existing 1:12 ramp.

These site accessibility elements should be verified as part of any renovation work.

4.1.2.5 BUILDING ENTRIES

There are 9 entrance points into the building as listed out immediately below:

a. Level 1 West end at the lower lobby direct to exterior

b. Level 1 West end direct single leaf door from Science C lowest level

c. Level 1 Northwest lower courtyard near lecture 135

d. Level 1 North side end near lecture 135

e. Level 1 East side of building directly from exterior into lecture 133

f. Level 1 East side of building directly from exterior into lecture 133

g. Level 1 East side of building into Stair B adjacent to lecture 133

h. Level 2 North side under enclosed bridge

i. Level 3 North side within the enclosed bridge

There are ostensibly 2 main entries into the Science B building.

The first main entry is at level 1 at the west end at the lower lobby direct to exterior. This appears to share access to existing parking marked as accessible with Science C.

The second main entry is at Level 3 at the north side within the enclosed bridge. This entry provides direct enclosed access between Science A and Science B and also appears to share access to existing parking marked as accessible. This existing parking marked as accessible located at the southwest area of Science A is not accessible.

Each entry point should be reviewed for accessibility and egress on an individual basis.

4.1.2.6 RESTROOMS

The restrooms have been updated since the original construction and a toilet fixture was eliminated at the toilet rooms on level 1 only to make room for an accessible stall at each of the 2 restrooms on Level 1. There is no restroom on Level 2. The restrooms on Level 3 appear to be in the original configuration per the 1969 original drawings.

The most recent barriers removal project appears to have been performed in 2006 and is documented in below drawing file available on the campus Facility metaBIM link: "2006_Science_B_Lecture Halls Upgrades_SFM DSA.pdf"

The 2006 barrier removal project documents focus on the level 1 restrooms, elevator controls and signage.

It was observed that the plumbing fixtures generally appear to be at correct heights. A drinking fountain impinging on required door strike side clearances at level 1 was observed outside room 128 Mycology Lab as part of the site walk.

Although updated strike side details were provided in the 2006 upgrade documents, there are still numerous instances where door clearances are not being met; these challenges are exasperated by the concrete wall construction and the difficulty presented to move cast in place items.

All clearances and distances of all accessories and fixtures should be reviewed and upgraded as part of future renovation per CBC 11B.

4.1.2.7 STAIRS

There are 2 main sets of stairs that serve the building interior. The latest assembled plans from the campus metaBIM link label the stairs at the northwest corner of the building as Stair A (S-#A whereas # is equal to the floor designation) and the stairs at the northeast corner of the building as Stair B.

The stairs appear to have the original aluminum handrail/guardrails in place.

a. Stair A serve levels 1-4 and are cast-in-place stairs concrete stairs with precast terrazzo.
    ii. The stairs at Stair A have 11" treads with 6-3/4" risers. The stairs are approximately 48" wide with an intermediate landing that is 46" deep.
    iii. The floor to floor is 13'-6" with 24 risers.
    iv. This stair provide roof access
e. Stair B serves level 1-3 and are cast-in-place stairs concrete stairs with precast terrazzo.
    i. The stairs at Stair A have 11" treads with 6-3/4" risers. The stairs are approximately 48" wide with an intermediate landing that is 46" deep.
    ii. The floor to floor is 13'-6" with 24 risers.

The cast-in-place concrete stairs appear to meet the minimum rise and run requirements set forth by CBC 11B.

The handrails at both stairs functions as both a guardrail and a handrail and does not the requirements of the current code.

Conditions should be reviewed in detail at both stairs. It is recommended to discuss both stairs and the building's accessibility in whole as part of any renovation..

4.1.2.8 ELEVATOR

The elevator shaft is original to the 1969 the building. The elevator is a 4-stop elevator that serves Levels 1-4 and provides access to the roof. Per the original drawings, the shaft is approximately 7'-7" deep by 8'-2" wide with a 4'-0" available at the opening. There are 8" concrete walls at the sides and back walls with a 10" concrete walls at the hallway side of the shaft.

The cab should be evaluated to meet cab interior clear floor / ground space requirements and or gurney compliance. The controls and signals should be evaluated to meet the current accessibility requirements per CBC-11-B.

It is recommended to discuss both the elevator and the building's accessibility in whole as part of any renovation.

4.1.3 SCIENCE C BUILDING

This original building at Science C was the Corporation House built in 1951. This is the northern portion of the current building, including both levels with interior stair. The north wall of the exiting main corridor was the south exterior wall of the previous Corporation House building. The structure originally had short parapets with low slope roofs per the section available on the original 1951 drawings. The addition is everything south of that wall including the sloped roof with asymmetrical ridge.

The addition to the Corporation House to become Science C was constructed in 1969 and designed as a part of a single project with the neighboring Science B building located to the immediate east as well as a bridge connection between Science B and the original portion of Science A.

The original Corporation House is a concrete structure with low-sloped wood framed roofs, with the original roof framing seeming to remain as part of the 1969 renovation per section F on page 7 of 21 of the 1969 Architectural drawings.

The addition onto the original Corporation House is wood framed floor and walls with plaster and lathe walls. The added exterior walls and walkway roofs are made using a concrete structure.

The Mechanical room is on the second floor with part of the room on the original construction and a portion on the newer wood framed portion. The 1969 section call out 1-hour rated walls and floors at the new construction.

4.1.3.1 ROOF

On the day of exterior site visit February 19, 2024, the area incurred 0.47" of rain.

The building's primary sloped roof is roof tiles on horizontal battens over a sloped plywood sheathing deck with sloped wood rafters. At the perimeter of this sloped roof is a continuous metal gutter.

The flat concrete roof at the walkway should be evaluated as there are no recent details available and this area was able to be reviewed at time of site walk.

There is no measure for fall protection at the roof. Though there does not appear to be any equipment that requires maintenance at the roof that is not located at the mechanical level.

4.1.3.2 ENVELOPE

The building is primarily exposed concrete at the vertical faces. The eaves at the sloped portion of the roof provides an approximate 4'-0" overhang from building face at the south side of the building and an approximate 6'-0" overhang at the north side of the building. There is minimal overhang at the rake of the roof.

The exterior stucco walls at did not have signs of failure. There are some areas where the finish did not appear smooth near control joints and across the fields of some of the stucco, but no failures were apparent.

The windows appear to be the original single pane at the building. There were no obvious points of failure, though the current windows likely do not meet current energy standards.

4.1.3.3 BUILDING ACCESSIBILITY

Wherever work is performed, it should be per CBC 11B-202 so that where existing elements or spaces are altered, each altered element or space shall comply with the applicable requirements of Division 2, including Section 11B-202.4.

There are general door accessibility issues throughout the building. Strike side clearances do not meet clearance requirements at classrooms and restrooms. There are no powered door openers at interior spaces within the building. Providing powered door openers may be an acceptable alternate to the AHJ to provide access to spaces where some doors would not be met, though this would need to be reviewed with the AHJ.

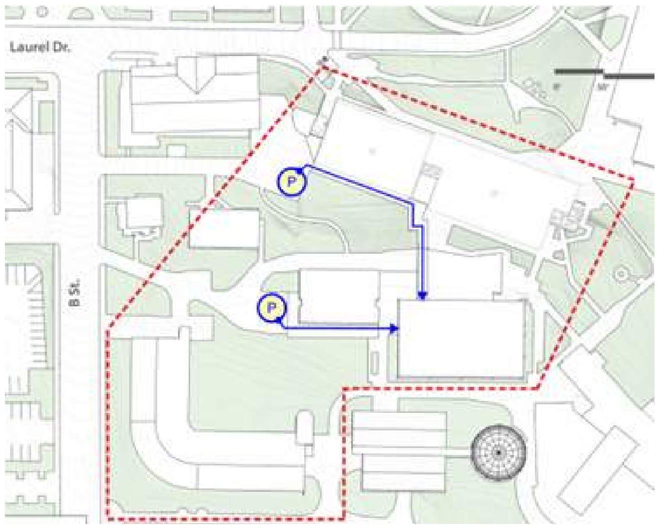
Wall mounted items throughout should be reviewed for meeting accessible heights per CBC 11B-309. It was observed that some fire alarm pull stations and public phones exceed reach range heights per CBC 11B-309.

The majority portion of level 1 of this building has numerous accessibility challenges. A few are listed below:

- Wheelchair users are not able to access the north half of level 1. Ramp exceeds accessibility requirements.
    - Users are not able to access: the vertebrate museum, research spaces, restrooms, and or the bottom of the stairs via an accessible path at the lower level.
- The interiors of the restrooms are not accessible.
- Some spaces at the southern portion of level 1 were under construction at level 1. The accessibility of these spaces will need to be evaluated as part of any future renovation.
- Level 2 can only be accessed by a wheelchair if one were to come from the north side of the building through room 207 to get to the hallway.
- There are door clearance accessibility challenges at many of the doors serving this floor.

4.1.3.4 SITE ACCESSIBILITY

Science C shares accessible parking with Science B with parking immediately west of the building that is signed as accessible. These shared spaces are asphalt and striped/signed as accessible parking. These spaces should be evaluated for meeting accessibility requirements as part of any renovation work. See diagram below.



4.1.3.5 BUILDING ENTRIES

There are four exit/entries at the building. Only three of the nine building entry points appear accessible by a wheelchair:

- Level 1 West end at the lower lobby direct to exterior
- Level 1 East end direct single leaf door from Science B lowest level
- Level 2 North side at room 207
- Level 2 North side at room 203

The level 2 doors at the north are accessed either via a cast-in-place concrete stair that does not meet accessibility and or a temporary aluminum ramp that is installed over one set of the existing concrete stairs.

Each entry point should be reviewed for accessibility and egress on an individual basis.

4.1.3.6 RESTROOMS

The restrooms occur in the portion of original 1951 construction but were not added and renovated as part of the 1969 renovation/addition to the Corporation House building. Neither restroom is accessible via an accessible path to therefore neither is considered accessible. An accessible path would need to be proposed and evaluated to be able to access the restrooms. The nearest accessible restrooms are at Science B.

4.1.3.7 STAIRS

There is one interior stair at Science C and it is not accessible. The existing surrounding construction is made of concrete walls and is configured so that it would be difficult to fit an accessible stair in the footprint of the existing construction. Currently, there is no accessible stairway to the second floor of this building. To be able to access the second floor by stairs, a solution would need to be proposed and evaluated to install a larger footprint for interior stairs and or to provide a possible exterior stair solution.

4.1.3.8 ELEVATOR

There is no interior elevator at Science C. The existing surrounding construction is made of concrete walls would be difficult to fit an accessible elevator in the footprint of the original 1951 concrete construction. The 1969 addition is made primarily of wood framing where it may be easier to add an elevator. Another possible candidate may be an exterior elevator.

It is recommended to discuss both the elevator and the building's accessibility in whole as part of any renovation.

4.1.4 SCIENCE D BUILDING

This original building at Science D, also know as Alistair McCrone Hall, was built in 1980 over the infield of the previous baseball field. This singular project includes both the Science D building and a greenhouse to the immediate east connected by an overhead walkway.

The building has a unique double-glazed wall with approximately 4' clear between the inner and the outer glazing wall.

The building has an ell shape with a curve rather than a right angle at the building wing intersection. The double-wall is oriented to the south and the west and appears as though it was intended to make use of heat-gain throughout the day to aid in mechanical load.

There is only one stair that serves the building and existing is addressed with grade changes. At the southeast end of the building is the elevator and the stair. At the southeast end of the building is a direct exit to grade level that exits under the connecting walking bridge to the greenhouse. At the northwest end of the building is are two direct exists at grade for each floor level; on level one the exit is at the end of the hall exiting towards the shop area leading west to grade towards B street and the exit on level two is at the end of the hall exiting northwards towards the existing service drive.

The Science D building is a steel framed structure. The walls are framed with metal studs with a 3/4" plaster and lathe assembly. The second floor level is concrete over metal deck. The low-sloped portion of the roof level is metal deck with insulation and roofing only, no concrete visible in details per building section shown on sheet A13 on page 14 of 29 of the 1980 Architectural drawings.

The Mechanical room that serves the Science D building is located in the adjacent greenhouse. There are 30" diameter ducts buried between these buildings as well as related piping overhead that are supported from the underside of the existing bridge connector.

4.1.3.1 ROOF

On the day of exterior site visit February 19, 2024, the area incurred 0.47" of rain.

The building's primary sloped roofs are originally documented as roof tiles over 1x2 battens on a 1-1/2" sloped steel deck where this sloped tile roof occurs. The roof appears to be in decent condition with no obvious defects. At the south and west primary elevations, water is captured in an exposed gutter and rain water leader system. At the primary north and east elevations within the courtyard, the water from the sloped roofs sheds onto the built-up roofing that makes up the low-slope roof portion that provide service access for roof-top mechanical.

The condition of the built-up roof seems to be adequate but there are no documents in the campus metaBIM that documents that mention a new roof which means this built-up roof may be near the end of it's life expectancy and should be inspected by a qualified roofer. The built-up roof is littered with penetrations for mechanical, mechanical support, scuppers, chain link fences, electrical, and bolt penetrations with not all appearing to be adequately sealed against water penetration upon brief visual inspection. We would recommend more of a clear strategy to minimize the amount of penetrations when this is re-roofed to reduce possible points of failure.

Parapet caps inspected had no obvious signs of wear or rust which is not what was expected.

Water that is shed off the low-sloped built-up roof sheds towards the courtyards through wall scuppers and then feeds into wall mounted rainwater leaders throughout the courtyard. There are large redwood trees located at the east side of this courtyard. Though there did not appear to be a lot of roof debris, there also was not an obvious method of straining the water before it passed through to the scuppers. This should be inspected to ensure the long-term functionality of the existing roof gutter system.

The original drawings indicate a wood platform on sleepers in a sectional detail, but it is not clear where was intended to be located. Currently, there appears to be a Mira-drain type material that is laid over the roofing where there appears to be activity on the exterior 3rd floor roof. There does appear to be a small area outside that roof access door that may be used for some solar research or storage of solar research materials.

4.1.3.2 ENVELOPE

The building exterior walls consist of two primary systems, either original single-pane aluminum storefront and or cement wall plaster on metal lathe over building paper.

At the interior of the courtyard, there are steel posts between the windows that are exposed at both the interior and exterior at each of the sides of the windows within the stucco walls. There are visible signs of water intrusion at nearly every steel post along the interior hall with visible rust and areas of concrete spalling at many of these columns,

At the low-sloped areas of the roof, the built-up roofing is continuous up the inside vertical faces of the parapet walls to terminate under the Parapet caps inspected had no obvious signs of wear or rust which is not what was expected and are installed so that there is no removable snap flashing. In order to repair/replace the roofing.

There are instances where glass is within 18" of the floor; it should be inspected upon revisions to meet CBC 2406.3.4. Safety glazing was not obviously visible upon site walk observations per CBC 2406.3 i.

4.1.3.3 BUILDING ACCESSIBILITY

Wherever work is performed, it should be per CBC 11B-202 so that where existing elements or spaces are altered, each altered element or space shall comply with the applicable requirements of Division 2, including Section 11B-202.4.

There are general door accessibility issues throughout the building. The building's construction is nearer towards the innovation of the ADA, but there are still strike side clearances often do not meet clearance requirements. There are no powered door openers at interior spaces within the building. Providing powered door openers may be an acceptable alternate to the AHJ to provide access to spaces where some doors would not be met, though this would need to be reviewed with the AHJ.

Drinking fountains typically do not meet accessibility throughout the interior spaces. A campus phone is provided, but it exceeds reach range heights per CBC 11B.

4.1.3.4 SITE ACCESSIBILITY

The nearest accessible parking for Science D may be the accessible spaces outside of Science C. There is a relatively smooth surface between these areas, though slopes from the parking to Science D likely exceed those permitted by code.

4.1.3.5 BUILDING ENTRIES

There are four exit/entries at the building. Only three of the nine building entry points appear accessible by a wheelchair:

- Level 1 Northwest end at near service area / shop area which leads directly to B Street sidewalk
- Level 1 East end direct adjacent to elevator and stair
- Level 2 Northwest end leading towards accessible parking
- Level 2 East end at bridge from greenhouse

The northern most door on level 2 of Science D is provided with a powered door actuator.

Each entry point should be reviewed for accessibility and egress on an individual basis.

4.1.2.6 RESTROOMS

The widest "accessible stalls" currently in the building are approximately 56" wide not meeting the minimum requirements per code. There are no stalls in the building that meet today's accessibility standards width. General size of bathrooms also make it difficult to achieve 5'-0" turning radii in within the toilet rooms. Heights, clearances and distances of all accessories and fixtures should be reviewed, discussed, and upgraded as required as part of future renovation per CBC 11B.

4.1.2.7 STAIRS

There is only 1 set of stairs that serves this building. Stair 1 serves level 1-2 and are also steel bent stairs.

a. These stairs have 11" treads with approximately 7"max tall risers. The stairs are approximately 6'-0" wide with an intermediate landing that is radiused at 6'-0" deep.

b. The floor to floor is 12'-0" with 20 risers.

The stairs appear to meet the minimum rise and run requirements per the details, but the floor to floor math is greater than 7". The existing site condition should be evaluated to determine if the stairs meet CBC 11B.

The rails provided are floor mounted pipe rails with approximately 19" between the horizontal rails. The handrails meet handrail height requirements, but the stair does not meet the full requirements of the current code for either handrails and guardrails.

Conditions should be reviewed in detail at the stairs. It is recommended to discuss the stairs and the building's accessibility in whole as part of any renovation.

4.1.2.8 ELEVATOR

The elevator shaft is original to the building. The elevator is a 3-stop elevator that serves Levels 1-3 and provides access to the roof. Per the original drawings, the shaft is approximately 5'-9" deep by 8'-4" wide with approximately 3'-6" available at the opening. There elevator travels within a steel framed shaft with a window at the back wall of the elevator. The east wall of the shaft exterior is glazed.

The cab should be evaluated to meet cab interior clear floor / ground space requirements and or gurney compliance. The controls and signals should be evaluated to meet the current accessibility requirements per CBC-11-B.

It is recommended to discuss both the elevator and the building's accessibility in whole as part of any renovation.

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4.2 LAB PLANNING

4.2.1 EXISTING CONDITIONS

The following describes the existing conditions of the laboratory spaces as it relates to quality of lab casework and furnishings. Some comments may touch on accessibility issues so refer to the Architectural section for additional information. Comments may be made regarding gas or water services but refer to the MEP sections for additional information.

4.2.2 GENERAL COMMENTS - SCIENCE COMPLEX

Some general comments regarding all three buildings, Science A, B, and C include but are not limited to:

- All lab spaces in general have outdated fume hoods, some no longer work. The casework is nearing the end of its useful life. There are a couple of more recent renovations but even those spaces are showing wear and tear.
- Some of the labs will not accommodate 24 students, thus having an impact on the number of class sections needed to support the student population

Figure 4.2.2.1 - Existing Conditions - Science A, B and C (Left to Right)

4.2.3 SCIENCE A

Built 1951 (West), 1961 East

GSF: ~60,000

Science A contains spaces utilized by Chemistry, Physics, and Biological Sciences. The building features a range of lab space, environmental rooms, classrooms, offices and computer labs. The building was constructed in two phases approximately 9 years apart but the general conditions of the lab casework and fume hoods are similar between the two wings.

Science A - Constraints / Issues:

- The dumbwaiter is the only way to get chemicals down to level 2 where the chemical storerooms are located. The passenger elevator does not extend down to level 2.
- Many of the hoods appear to be auxiliary air fume hoods which were phased out in the late 1980's.
- Office space is often shared or within lab space requiring less hazardous work to be performed in a higher hazard space
- The environmental room has wood casework in the interior creating a breeding ground for mold. The Lab Manager mentioned she must treat the room for mold twice a year.
- The lab prep spaces are congested making aisleways unsafe in an emergency

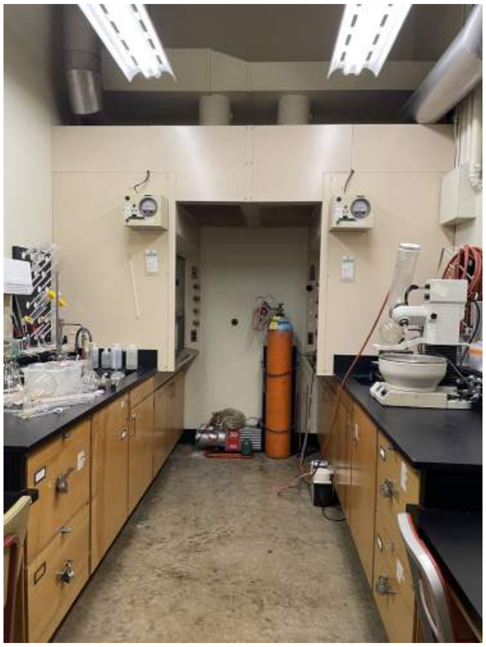

Figure 4.2.3.1 - Existing Conditions - Science A - Auxiliary Fume Hoods

Figure 4.2.3.2 - Existing Conditions - Science A - Office space within Lab space

Figure 4.2.3.3 - Existing Conditions - Science A - Wood within an Environmental room

Figure 4.2.3.4 - Existing Conditions - Science A - Overly congested stock rooms with unsafe egress

4.2.4 SCIENCE B

Built 1969

GSF: ~43,000

Building B is physically connected to Building A via an extended walkway running north / south. The building is for Biological Sciences, dominated by instructional lab spaces and their related prep spaces. The building also includes two large lecture hall spaces on the north side of the building.

Science B - Constraints / Issues:

- One of the biggest concerns with Science B is the storage of hazardous material. While specialty chemical storage cabinets are not required, CPH's current methodology is not in line with other institutions and best practices.
- Room 132 teaches BIO 105 Basic Biology which is taken by all students that are majors and non-majors. This lab is a new student's first experience in a CPH science lab. Efforts should be made to renovate this space or renovate another lab and move the BIO105 course to that newly remodeled space.

Figure 4.2.4.1 - Existing Conditions - Science B - Hazardous materials storage

Figure 4.2.4.2 - Existing Conditions - Science B - Room 132 - BIO 105 - Basic Biology Lab

4.2.5 SCIENCE C

Built 1969

GSF: ~8,000

Building C is largely focused on Zoology, with animal holding spaces, specimen storage, both dry and wet (in chemical solutions) plus prep labs containing fume hoods and expected chemical cabinets.

Science C - Constraints / Issues:

- Science C has many issues including, but not limited to, vibration, mechanical, temperature control, odors, accessibility, and a leaking environmental room that is undersized for its purpose.
- In general, the amount of specimen storage is severely undersized for the collection CPH has. Some are exposed to the elements which leads to quicker deterioration of the specimen.5

Figure 4.2.5.1 - Existing Conditions - Science C -

4.3 MECHANICAL

The following narrative describes the mechanical (HVAC) recommendations for the renovations of the Cal Poly Humboldt Science ABCD Complex. The project will be provided with mechanical systems that are cost-effective, energy-efficient, environmentally friendly, and maintainable.

All mechanical systems shall be designed to promote reliability, serviceability, flexibility, and capacity for future renovation. The systems and equipment should be all-electric, with an emphasis on heat pumps for supplying comfort heating and cooling and be sized to accommodate worst-case operational conditions.

In addition, wherever possible, natural refrigerants, or refrigerants with global warming potentials of 700 or less should be used in-line with EPA regulations and environmental best-practice.

Due to the campus location, consideration will be given to providing systems appropriate for the prevalence of coastal corrosive moist air.

4.3.1 DESIGN CONDITIONS

Cal Poly Humboldt campus is located in Arcata, CA, which has the following CA T24 Part 6 design conditions:

Climate Zone	1
Latitude	41.0°N
Longitude	124.1°W
Elevation	203 ft

Cooling 0.1% Drybulb	75°F
Cooling 0.1% MCWB	61°F
Heating 0.2% Drybulb	31°F
Heating Degree Days	5029 HDD

Figure 4.3.1.1 below illustrates the expected temperature fluctuation through the year and how this compares to a typical range for human comfort in a given month. This shows that the climate is heating dominant, with very few days in which outdoor air-dry bulb temperature exceeds a comfortable level.

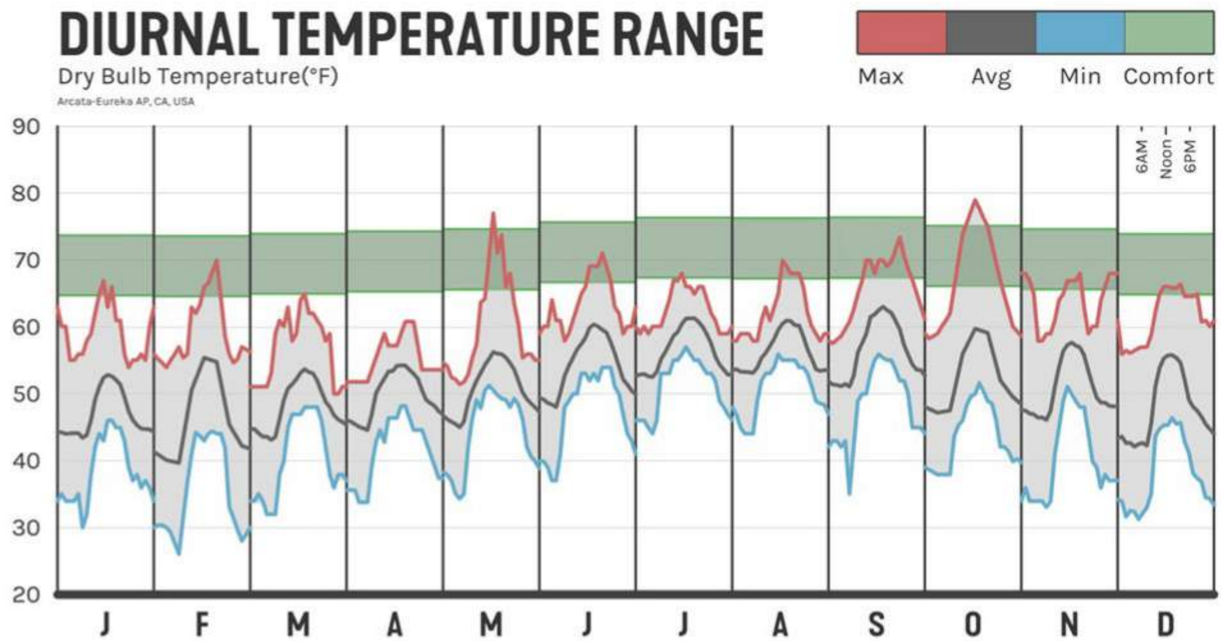

Figure 4.3.1.1 Historical Diurnal Temperature Range, Arcata, CA

While being this is the case in the current day, the mechanical design should allow some safety factors and allowance for expansion, given the expected change to climate over the lifetime of the systems. The number of heating days can be expected to decrease, while demand for active cooling increases as shown by Figure 4.3.1.2.

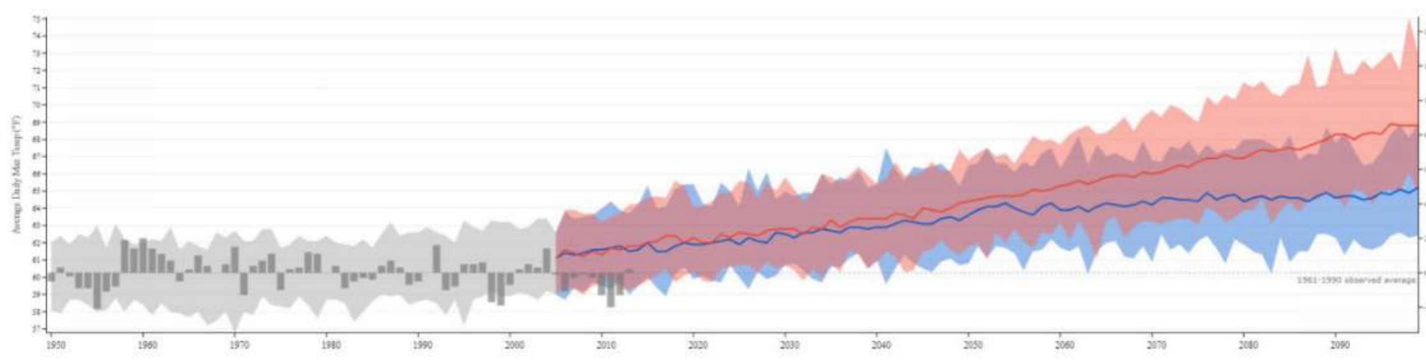

Figure 4.3.1.2 Anticipated Future Temperature Ranges for Arcata, based on high and low Global Emissions Model.

4.3.2 EXISTING CONDITIONS

The following describes the major building MEP infrastructure items that should be addressed as a part of the renovation of each of the (4) buildings. Please review the following in conjunction with the MEP systems zoning diagrams provided.

4.3.2.1 BUILDING A

Built: 1951 (West), 1960 (East)

GSF: ~60,000

Building A was constructed in 2 phases, with the east and west wing and the systems that serve them being mostly divided into dedicated systems. The building features a range of lab space, environmental rooms, science classrooms as well as faculty office. In general, the mechanical systems are aging and not fit for the future purpose of the building, with spaces generating complaints of odors, poor ventilation or even complete absence of HVAC leading to temporary heaters and fans being required.

- **Air Handling Unit (AHU (West))** - (2) AHUs feed the west wing of the building. A roof mounted unit connects to the top floor only, with ducts dropping vertically through a riser to the 3rd floor corridor at ceiling level. Floors 1 and 2 are fed via a floor mounted unit in the 1st floor mechanical room (260). Ducts extend the length of the central corridor, branching to zones and rising within shafts to feed the floor above.
- **AHU (AHU (East))** - (1) AHU feeds the east wing and is a custom-built basement unit with belt-driven supply and return fans, enclosed behind a solid wall. Drawings indicate the initial installation was circa-1960. It is expected that internal components will have been replaced in stages over time when reaching the end of working life. A total of (6) ducts extend west and rise in a mechanical shaft to feed all 3 floors above with a "hot" and "cold" duct.
- **Exhaust Fan (EF)** - A total of (~35) Individual fans EFs serve the lab fume hoods as well as general exhaust across both the east and west wings of the building. Fans appear to be all roof mounted and the majority are in poor condition, showing varying signs of wear and corrosion. Roof ducting (both intake and discharge) connected to EFs are in varying condition, as a program of replacement appears to already be taking place. Therefore, some show highly corroded outer surfaces while others are in good condition.
- **Chilled Water (CHW)** - There does not appear to be any chilled water at this block, with cooling being provided via direct expansion (DX).
- **Heating Hot Water (HHW)** - Building A heating was originally provided via a separate steam plant, connected to this building and others with buried piping. This system was upgraded to HHW supplied by on-site boilers circa-1994. (2) HHW boilers supply HHW to AHU heating coils and re-heat terminal units from the west wing mechanical room. (1) of these boilers is end of life while the other was more recently upgraded. Drawings indicate that HHW for west wing is fed via heat exchanger, drawing heat from an underground steam piping loop (it is unconfirmed if this still the current setup). HHW system was initially designed for a 200°F supply water temperature,

meaning heating coils (regardless of install date or conditions) will likely not be sufficient for heat pump led systems and will require replacement.

- **DX/Refrigerant** - Standalone fan coils are connected to dedicated condensing units to provide cooling to specific zones. The exact location and quantity of condensing units is not known. It is recommended that the cooling system for this building be upgraded to chilled water and all condensing units, refrigerant piping, and components be removed from the building.
- **Controls** - Condition of existing controls is not known, however, with the phased renovation of the project with new HVAC, the associated controls system must also be upgraded.

4.3.2.2 BUILDING B

Built: 1969

GSF: ~43,000

Building B is physically connected to Building A via an extended walkway running north/south, but all mechanical systems are independent of each other. This building is primarily for Biological Science, dominated by lab spaces and (2) large lecture halls on the north side of the building.

- **Air Handling Unit (AHU)** - There are 2 separate major sections of this building, supplied by separate AHUs. The main part of building B is served by a single AHU which sits within the 4th floor mechanical room. This unit supplies supply air via separate hot and cold ducts to all levels, with ducts dropping with a mechanical shaft near the center of the building. The more recently renovated lecture hall space on the north side of the building is served by (2) small AHUs installed directly above the respective rooms. These units were installed circa-2006 along with new distribution and terminal diffusers and have potential to be retained. They include heating coils only but would require an evaluation to determine if cooling coils are necessary given rising ambient temperatures.
- **Exhaust Fan (EF)** - A total of (21) individual fans EFs primarily served lab fume hoods, but also general exhaust for this building. Fans are mounted indoors with discharge ducts rising above roof level from the upper floor mechanical room. The age of existing exhaust fans is not confirmed, although there appears to be a program of replacement for end-of-life fume hood exhausts, with several being replaced as recently as 2019.
- **Chilled Water (CHW)** - There does not appear to be any chilled water at this block.
- **Heating Hot Water (HHW)** - (1) HHW boiler situated in the 4th floor mechanical room supplies HHW to AHU heating coils before dropping to individual zone coils. Drawings indicate that the HHW boiler along with expansion tank were upgraded in 1997, however all will require replacement in favor of low-carbon electric heating (via heat pump). The HHW system was initially designed for a 180°F supply water temperature, meaning heating coils (regardless of install date or conditions) will likely not be sufficient for heat pump led systems and will require replacement.
- **DX/Refrigerant** - Drawings indicate a small number of fan coils are connected to dedicated condensing units to provide cooling to specific zones. The exact location of condensing units

is not known. It is recommended that any active cooling systems for this building be upgraded to chilled water and all condensing units, refrigerant piping, and components be removed from the building.

- **Controls** - Condition of existing controls is not known, however, with the phased renovation of the project with new HVAC, the associated controls system must also be upgraded.

4.3.2.3 BUILDING C

Built: 1969

GSF: ~8,000

Building C is largely focused on Zoology, with animal holding spaces, storage + prep, labs containing fume hoods and expected chemical cabinet requirements. It features an independent ventilation system however the heating loop is connected to the boiler plant in Building B. Uncontrolled louvers within this building cause comfort issues in summer and winter and need to be addressed as part of the improvements.

- **Air Handling Unit (AHU)** - The AHU is located in the second-floor mechanical room and supplies air throughout the building via separate hot and cold ducts.
- **Exhaust Fan (EF)** - General exhaust is provided by indoor fans located within the mechanical room and ducted to zone ceiling end-units. A small number of dedicated EFs serve fume hoods and are also installed within the building envelope (condition of these is not known).
- **Chilled Water (CHW)** - There does not appear to be any chilled water at this block.
- **Heating Hot Water (HHW)** - HHW is supplied by the heating boiler located in Building B and piped via supply and return piping, which is routed below grade between the two buildings. HHW system supply water temperature is designed for 200°F with a 40°F delta T at AHU and terminal unit coils.
- **Controls** - Condition of existing controls is not known, however, with the phased renovation of the project with new HVAC, the associated controls system must also be upgraded.

4.3.2.4 BUILDING D

Built: 1969

GSF: ~29,000

This L-shaped building is mainly comprised of classroom spaces and labs dedicated to research, engineering, and design. Specific room renovations have taken throughout the life of the building, with programming changes and the mechanical system requirements changing alongside.

- **Air Handling Unit (AHU)** - The building ventilation system is split in half with separate air handlers each supplying 50% of the building floor area. Both AHUs are located outdoors on the roof and connected distribution ducting is ducted throughout the building above suspended ceilings to VAVs, with duct mains dropping in a total of 10 riser locations. AHUs feature both HHW and CHW coils.

- **Exhaust Fan (EF)** - (~7) Small distributed exhaust fans are located across the roof and are connected via ductwork to fume hoods and exhaust-only spaces (e.g. WCs). The condition of these fans is unknown.
- **Chilled Water (CHW)** - Chilled water is fed from a ~70-ton air-cooled chiller located at the adjacent Greenhouse. Piping is routed below grade before rising within the building and continuing to be Building D AHU coils. CHW pumps and associated plant are located in the Greenhouse mechanical room.
- **Heating Hot Water (HHW)** - HHW is supplied by the heating boiler located in the Greenhouse mechanical room and pumped via supply and return piping which is routed below grade between the two buildings. HHW is then fed to AHU heating coils and terminal VAVs with reheat. HHW system supply water temperature is designed at 210°F.
- **Controls** - Condition of existing controls is not known, however, with the phased renovation of the project with new HVAC, the associated controls system must also be upgraded.

4.3.3 HEATING AND COOLING SYSTEMS

4.3.3.1 PLANT

Given the installed capacities and/or services are similar for both heating and cooling, it is likely the buildings would benefit from 4-pipe heat pump led systems. Such systems can provide high efficiencies via heat recovery and vary output of HHW and CHW independently through variable speed compressors and fans. Modular plant systems would allow simple expansion of plant as need due to increase footprint, changing program and ongoing climate change. By supplying both HHW and CHW via the same units (i.e. 4-pipe heat pumps), the plant burden is reduced in number, footprint, and electrical infrastructure needed.

In a traditional high-intensity program type for this climate zone, an economizer would provide a substantial amount of cooling, with a chilled water loop adding additional sensible capacity while also handling latent loads and humidity control.

Due to the proximity of the campus to the coast, the available indoor mechanical spaces should be utilized wherever possible, and plant should only be placed outdoors (e.g. roofs or mechanical yards) when necessary, in order to prolong equipment life. Existing equipment positions may however be prioritized, in which case, protective coatings shall be required on metallic surfaces prone to corrosion such as coils and casings.

The heating systems currently utilizing natural gas as a source for steam and heating hot water are operating beyond their anticipated life expectancy and should be replaced. Note that intent is not to use any steam in the building and any steam needed for lab equipment, autoclaves and glass washers for instance, would be provided with point of use steam generators.

By eliminating a building level steam system, the new heating systems can be designed for a lower supply and return temperature regime, providing a large positive impact on the efficiency (Coefficient of Performance) of the plant heat pumps. The following ranges should be targeted:

- Heating Hot Water Systems: 95°F - 110°F
- Medium Chilled Water Systems: 55°F - 60°F

Initial sizing for heating and cooling loads indicates the following required capacities (as shown below in Figure 5.5.3). These numbers are based on an Sq Ft/Ton estimate and further building thermal modelling will be required to determine accurate loads for sizing.

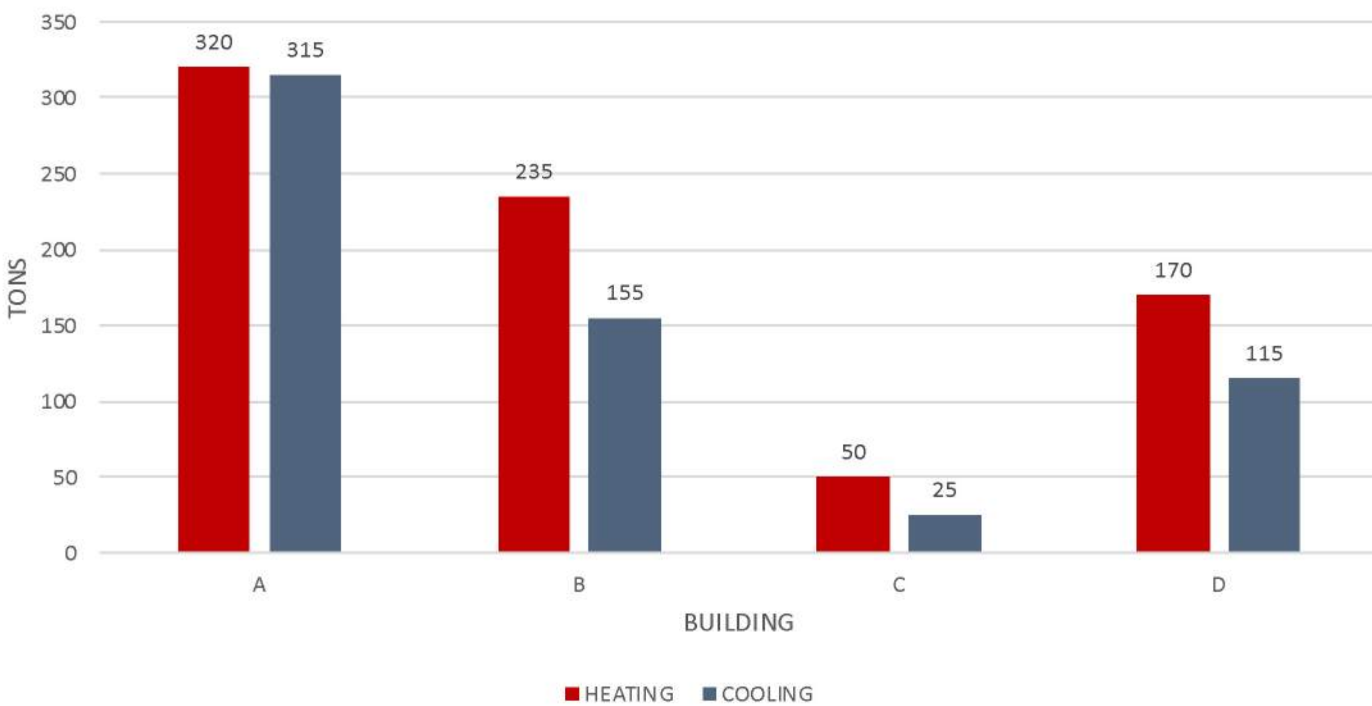

Figure 4.3.3.1.1 Estimated heating and cooling peak loads at each ABCD Science Building.

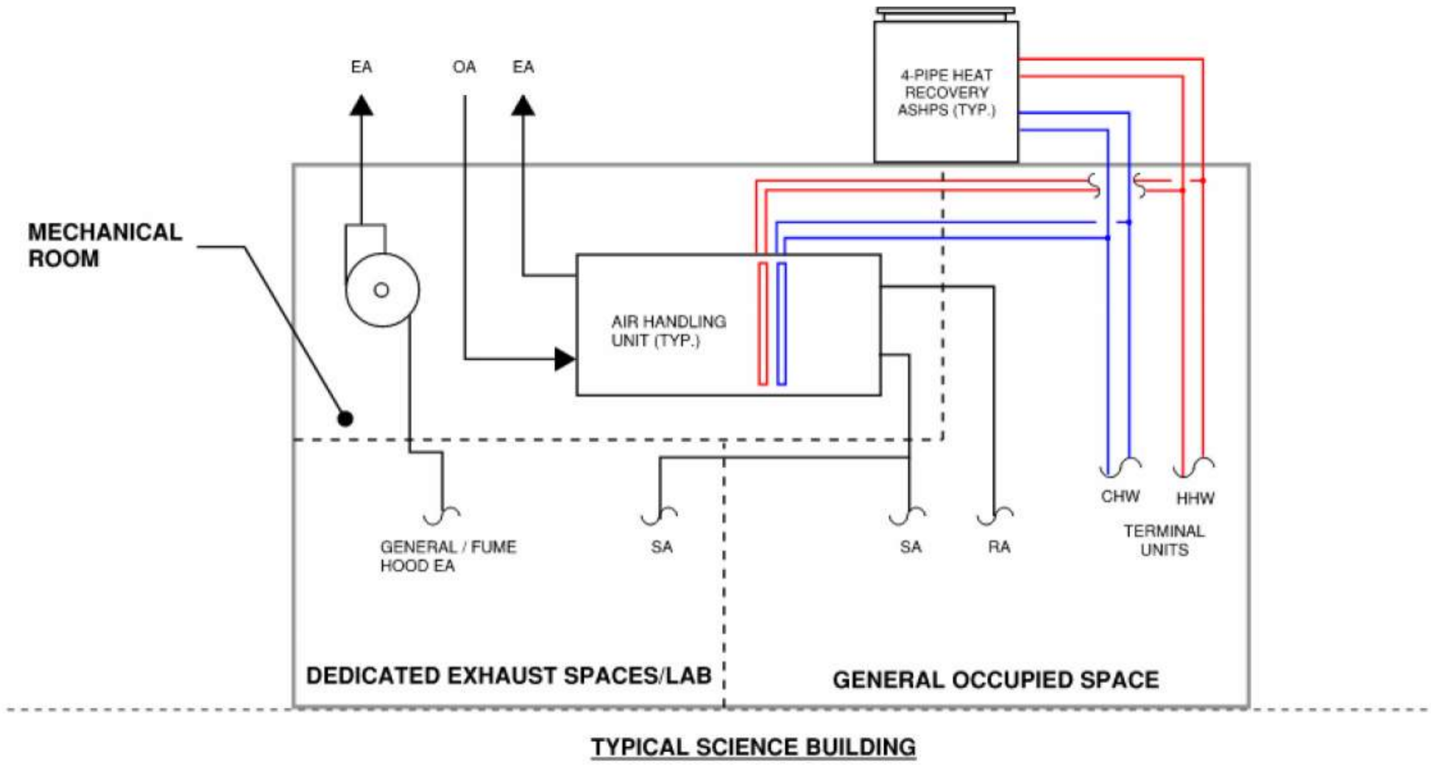

Figure 4.3.3.1.2 Simplified diagram of heating and cooling basis of design for all buildings.

4.3.3.2 ZONE LEVEL SYSTEMS

Terminal units controlling the zonal conditions should be fully modulating in order to provide better control and energy savings.

These can include:

- VAVs (variable air volume boxes) with pressure independent control,
- Fan powered units with EC or VFD fan motors able to modulate accurately to the appropriate airflow
- 2-way modulating hydronic valves (in HHW and CHW hydronic loops), creating variable flow conditions

Building zone level controls shall comply with Title 24 and ASHRAE Guideline 36 for heating, cooling and ventilation rates in order to provide the max available energy savings through setbacks and limiting of overheating and overcooling.

4.3.3.3 SYSTEM ALTERNATIVES

As an alternative to the basis system described above, the design team should also evaluate the following:

- Variable Refrigerant Flow (VRF System) with DOAS Ventilation (Buildings B, C & D)
  - Offers a more cost-effective all electric heating and cooling system.
  - Ability to simultaneously heat and cool different zones.
  - Consideration needed of refrigerant requirements (both by type and weight) and restrictive maintenance regime tied to installed manufacturer.
  - Unlikely feasible for the largest of buildings.
- Heat recovery heat pump + Thermal Energy Storage (TES)
  - Allows more flexibility in operating times of heat pumps, reduces total tonnage required which can mean lower install cost
  - Available footprint required externally at grade as depending on size, storage tank likely be too heavy to be placed on roof and too tall for internal space
- Geo-exchange heat pump system (Building D)
  - Although insufficient to supply all buildings, the adjacent field to the south covering ~65,000SF could feasibly house up to 60 boreholes. Assuming a depth of ~250ft this field could potentially provide ~1000MBH (90 tons) heating/cooling (season dependent) when supplied to a water-to-water heat pump.
  - This system would benefit from high efficiencies year-round but would be expensive to install and would still require some back-up/top up systems in the form of ASHPs, chiller, electric boiler etc in a hybrid configuration.
  - Note: Grant funding for these types of systems can be explored to help support the upfront costs.

Figure 4.3.2.1 Potential location for Geo-exchange field adjacent to ABCD Science Complex.

4.3.4 VENTILATION

Ventilation is critical to the health and wellbeing of students, staff, and faculty. Research laboratories require special attention to providing appropriate levels of ventilation. Ventilation rates will be the higher of CA Title 24 and 30% above ASHRAE 62.1 requirements for each space type, whichever is greater. In response to the COVID pandemic, and in alignment with ASHRAE Epidemic Taskforce, the project will limit the potential for exhaust air re-entrainment. The design team should review design solutions that include Dedicated Outdoor Air Systems (DOAS). Such systems do not recirculate ventilation air within the building.

4.3.4.1 SUPPLY AIR

The existing Air Handlers (AHU) are operating beyond their anticipated life expectancy and should be replaced. We would recommend consideration of placing the AHU on the roof of the buildings where there is space (A, B, & D) in an enclosure due to the ambient marine environment, which will free up floor space for occupant use. The existing shaft spaces can be reused but note that the chilled water and heating hot water systems will need to be extended to any new AHU locations. Based on 1.75 CFM/SF and an AHU that provides N+1 redundancy via a fan array system with multiple VFD for each AHU, the following AHU sizes are recommended:

- Building A: 112,000 CFM new system will combine the east and west wings into one system.
- Building B: 82,000 CFM

- Building C: 17,500 CFM
- Building D: 30,000 CFM per AHU and two AHU for the building.

4.3.4.2 HEAT/ENERGY RECOVERY

It is advised to include air-to-air heat recovery devices where possible in AHU/DOAS systems. Given the heating dominated climate zone and potentially high air-change rates associated with the lab spaces, heat recovery ventilation will reduce peak heating loads on the central heating heat pumps as well as energy use. Reducing peak loads will reduce the heat pump sizes required and therefore both costs for installation and supporting infrastructure from structural to electrical.

Fixed plate heat exchanger is preferred due to lack of moving parts and limited cross-contamination of opposing airstreams, however heat wheel or runaround coil heat recovery is also feasible in this climate.

4.3.4.3 EXHAUST SYSTEMS

Where the room program and/or equipment within the space requires dedicated exhaust, exhaust shall be provided in accordance with the California Mechanical Code. Given the potential for electrical work to be performed in the lab spaces, localized snorkel exhausts are recommended at work benches that may be used for soldering. Zones with chemical use shall have additional exhaust air requirements and no circulation shall be permitted to other spaces within buildings.

The existing Exhaust Fans (EF) are operating beyond their anticipated life expectancy and should be replaced. The EF systems are generally set up to be a single exhaust fan dedicated to a single Chemical Fume Hood (CFH) resulting in multiple EF on the roofs. This arrangement, which results in the CFH not operating when an EF fails, is less energy efficient, and requires higher maintenance costs than a manifolded system with N+1 EF provided. It is recommended to provide a new manifolded EF system on the roof of A, B, and D that provides three EF, each sized at 50% of the load, which will provide N+1 redundancy. Based on 1.75 CFM, the following EF sizes are recommended:

- Building A: 112,000 CFM: (3) EF at 56,000 CFM each, for a total of 168,000 CFM
- Building B: 82,000 CFM: (3) EF at 41,000 CFM each, for a total of 123,000 CFM
- Building C: 17,500 CFM: (3) EF at 8,750 CFM each, for a total of 26,250 CFM
- Building D: 59,000 CFM: (3) EF at 29,500 CFM each, for a total of 88,500 CFM

4.3.5 CONTROLS

With the phased renovation of the project, it is recommended that the existing control system in each building be replaced with a new Direct Digital Control (DDC) based system that will allow for remote monitoring of the equipment, remote diagnostic work on issues, and tracking of energy and water consumption over time.

4.3.6 MISCELLANEOUS

The following elements should be carefully considered for the design of the upgraded mechanical systems.

4.3.6.1 WILDFIRE CONSIDERATION

Arcata is currently a “moderate risk” in terms of how the area is affected by wildfire, but over the coming decades this level of concern is expected to rise. The ventilation systems provided for the buildings should be suitable for areas that can expect prolonged periods of low-air quality due to wildfire. These can either be active or passive means of mitigation, from higher efficiency filters (e.g. activated carbon matrix or HEPA), to control strategies via the BMS that limit the amount of outdoor air and increase recirculation in the event of wildfire.

4.3.6.2 SEISMIC IMPACTS

The site location is a seismically active zone, therefore all equipment selection, mounting and loading should be coordinated with relevant disciplines in order to ensure compliance with local regulations and a safe and resilient system overall.

4.3.6.3 ACOUSTICS AND VIBRATION

Mechanical equipment featuring fans, pumps or compressors will need to be carefully selected in conjunction with the Acoustical specialist’s design criteria to minimize impact to building occupants.

Existing equipment in buildings (particularly in Building C) has already generated some noise/vibration complaints, and so the upgrade may require an investigation of existing systems to understand how to effectively mitigate vibration from new equipment.

4.3.6.4 DEFROST

Special consideration should be given to Wet bulb temperatures during the heating season in this coastal climate zone. Air-Source Heat Pumps (ASHP) in heating dominated coastal zones can experience excessive frost build up on the evaporator coil, triggering significant hours of defrost cycle for the heat pump. The defrost cycle in most ASHP’s significantly reduces the heating capacity if not eliminating it all together. Additional capacity can be included in heat pump installations directly (via redundancy for example) but inclusion of stored volume of water in an oversized buffer tank or thermal store will also allow defrost to be carried out without directly impacting the building.

4.3.6.5 ZONING

Existing mechanical systems are zoned based on thermal elevation and split by the risers that serve each individual zone from the central air handlers. Phasing of upgrades may wish to take advantage of the predetermined zones, to allow replacement to take place in stages to renew sections of the building without having to take the whole building “offline” simultaneously. Pre-existing zones, however, may no longer be appropriate for the new system; this will be determined by the new architectural programming and should be investigated during the early schematic design.

Existing zoning plans can be found attached to this report.

4.4 PLUMBING

4.4.1 GENERAL

The following section provides a summary of the relevant Plumbing criteria and recommendations for the renovations of the Science ABCD Complex. The project will be provided with plumbing systems that are cost-effective, energy-efficient, environmentally friendly, and easily maintainable. Strategies will be employed to conserve energy in conjunction with various sustainability and wellness strategies. Design of the plumbing system shall promote forward thinking in engineering and be flexible in design incorporating minimum requirements needed to ensure a safe and healthy building while applying guidelines to minimize the environmental impact.

All plumbing systems shall be designed to promote reliability, serviceability, flexibility, and capacity for future renovation. Plumbing systems and equipment shall be all-electric, with heat pumps being the preferred recommendation, and be sized to accommodate worst-case operational conditions. The design of the systems and materials shall not compromise the systems' required cleanliness or purity levels.

4.4.2 BUILDING A

Building A was constructed in two different phases, commonly known as the West and East Wings. The East Wing was constructed around 1951 and is a four-story building, which includes a basement and sub-basement level. The West Wing was built around 1960 and is a three-story building, which includes a basement level. The total size of the building is about 60,000sf. The building provides space for a variety of teaching lab spaces and lecture rooms, as well as office and general student areas.

4.4.2.1 SANITARY WASTE & VENT

The sanitary waste and vent system primarily serves the core restrooms with a main riser. Floor drains and mop sinks in the back of house spaces also tie into sanitary system. The existing piping system is cast iron with hub and spigot connections.

Given the age of the building, SmithGroup is recommending that the system be replaced either in one large project or in a phased manner as spaces are renovated and use cast iron, no-hub fittings with four-band stainless steel couplings. Below grade, protect piping from ambient soil conditions with a polyethylene sleeve.

4.4.2.2 LAB WASTE & VENT

The lab waste and vent system is organized so that waste is collected from a single space or group of spaces in the ceiling below into risers before dropping vertically to the floor below. The existing lab waste piping system is borosilicate glass with gasketed connections.

In the West Wing, the various lab waste risers are collected into a common lab waste line below grade, that exits the building before tying into the sanitary waste system. In the East Wing, it appears there may be some lab waste risers that tie into the sanitary main below grade, and a single pipe serving both the sanitary and lab waste systems exits the building.

Given the age of the building, SmithGroup is recommending that the system be replaced either in one large project or in a phased manner as spaces are renovated and use socket fused polypropylene piping. Sanitary waste and lab waste systems shall be separate, dedicated systems throughout the building. Below grade, the lab waste lines shall exit the building in close proximity to the sanitary line. Once outside the building, provide a sample port prior to connection to the sanitary line. SmithGroup is assuming that CPH uses Good Lab Practice, so that only clear waste (no chemicals) is discharged into the lab waste system, and therefore, there does not seem to be the need for an acid neutralization tank on the exterior of the building.

4.4.2.3 DOMESTIC COLD & HOT WATER

In the West Wing, there is one main riser for cold and hot water each, although on the first floor the north half of the building has fixtures that are primarily served from distribution from below. In the East Wing, there is one main riser for cold and hot water each, although fixtures on the Basement Level are served from a cold water drop from Level 1. The cold water riser serving the restrooms comes from Level 2.

The West Wing water heater, with existing sizing listed below, is located on the Basement Level. The East Wing water heater, with existing sizing listed below, is located on the Roof level. Both wings have circulating systems complete with recirculating pumps.

- Building A (West): (2) 50-gallon storage, 4.5kW
- Building A (East): (2) 70-gallon storage, 151 GPH @ 100F rise recovery rate (per as-builts, not accessible on site), gas-fired

Given the age of the equipment, SmithGroup recommends the water heaters and circulating pumps be replaced. In an attempt to reduce the use of natural gas, it is recommended to switch gas-fired water heaters to an electric solution, either electric resistance, or a heat pump solution if space allows.

Also given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and soldered joints.

4.4.2.4 LABORATORY COLD & HOT WATER

There is no separate laboratory water system for Building A. Domestic and laboratory fixtures are served from the same water distribution system.

SmithGroup recommends a dedicated laboratory water distribution system be provided off the domestic water system separated by a reduced pressure backflow preventer. If hot water is also needed at lab fixtures, a new laboratory hot water heater and piping distribution shall be provided. All piping shall be copper with soldered joints.

4.4.2.5 LABORATORY COMPRESSED AIR

For the West Wing, compressed air equipment was observed on site, but SmithGroup was not able to verify distribution through available existing drawings. In the East Wing, compressed air is distributed from two main risers, one per the North and South halves of the building.

The West Wing air compressor, with existing sizing listed below, is located in the Basement Level. The East Wing air compressor, with existing sizing listed below, is located on the Roof Level.

- Building A (West): 2-hp (per nameplate data, no information on as-builts)
- Building A (East): 50 cfm @ 125 psi, 15-hp pump, 120-gallon receiver (per as-builts, nameplate data did not confirm)

It has not been confirmed when the West Wing air compressor was installed and while the East Wing air compressor does look to be original to the building, both appear to be in good working condition and no operating issues were raised by the users. There does not seem to be a need to replace this equipment.

Given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and brazed joints.

4.4.2.6 LABORATORY VACUUM

Vacuum for the West Wing is distributed to the levels from a main riser. There does not appear to be any vacuum for the East Wing based on existing drawings or what was observed on site.

The vacuum equipment, with existing sizing listed below, is located in the Basement Level.

- Building A (West): 41 cfm @ 25 in. Hg, 3-hp pump (per as-builts, nameplate data did not confirm)

Given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and brazed joints.

4.4.2.7 NATURAL GAS

In the West Wing, natural gas is supplied to labs through distribution piping that primarily runs in the Basement Level with risers to Levels 1 and 2 at each lab fixture. In the East Wing, natural gas is distributed through a main riser to all labs on all levels, including the water heaters on the Roof Level.

4.4.2.8 TREATED WATER

In the West Wing, distilled water is served by the East Wing and supplied to the Level 2 labs. In the East Wing, there are two main distilled water risers serving the North and South halves of the building.

The water still equipment, with existing sizing listed below, is located on the Roof Level.

- Building A (East): 10-GPH, 150-gallon storage (per as-builts, nameplate data did not confirm)

While the exact date of installation is not confirmed, it appears that filtration equipment is in good condition and has been replaced relatively recently.

4.4.3 BUILDING B

Building B was constructed around 1969 and is a three-story building of approximately 43,000 sf. The building provides space for a variety of teaching lab spaces and support offices and prep rooms.

4.4.3.1 SANITARY WASTE & VENT

The sanitary waste and vent system primarily serves the core restrooms with a main riser. Floor drains and mop sinks in the back of house spaces also tie into sanitary system. The existing piping system is cast iron with hub and spigot connections.

Given the age of the building, SmithGroup is recommending that the system be replaced either in one large project or in a phased manner as spaces are renovated and use cast iron, no-hub fittings with four-band stainless steel couplings. Below grade, protect piping from ambient soil conditions with a polyethylene sleeve.

4.4.3.2 LAB WASTE & VENT

The lab waste and vent system is organized so that waste is collected from all the second level spaces in the ceiling below into a single riser before dropping vertically to the floor below. The existing lab waste piping system is borosilicate glass with gasketed connections.

The lab waste piping ties into the sanitary piping below grade, and a single pipe serving both the sanitary and lab waste systems exits the building.

Given the age of the building, SmithGroup is recommending that the system be replaced either in one large project or in a phased manner as spaces are renovated and use socket fused polypropylene piping. Sanitary waste and lab waste systems shall be separate, dedicated systems throughout the building. Below grade, the lab waste lines shall exit the building in close proximity to the sanitary line. Once outside the building, provide a sample port prior to connection to the sanitary line. SmithGroup is assuming that CPH uses Good Lab Practice, so that only clear waste (no chemicals) is discharged into the lab waste system, and therefore, there does not seem to be the need for an acid neutralization tank on the exterior of the building.

4.4.3.3 DOMESTIC COLD & HOT WATER

Cold water is supplied by Building C. There is one main riser for cold and hot water each to serve all levels.

The domestic hot water equipment, with existing sizing listed below, is located on the Roof Level.

- Building B: 50-gallon capacity, 40,000 BTUH-input

Given the age of the equipment, SmithGroup recommends the water heaters and circulating pumps be replaced. In an attempt to reduce the use of natural gas, it is recommended to switch gas-fired water heaters to an electric solution, either electric resistance, or a heat pump solution if space allows.

Also given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and soldered joints.

4.4.3.4 LABORATORY COLD & HOT WATER

Laboratory cold water is provided from Building C. There is one main riser for cold and hot water each to serve all levels. On Level 1, laboratory cold and water are run in a trench.

The laboratory hot water equipment, with existing sizing listed below, is located on the Roof Level.

- Building B: 82-gallon capacity, 156,000 BTUH-input

Given the age of the equipment, SmithGroup recommends the water heaters and circulating pumps be replaced. In an attempt to reduce the use of natural gas, it is recommended to switch gas-fired water heaters to an electric solution, either electric resistance, or a heat pump solution if space allows.

Also given age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and soldered joints.

4.4.3.5 LABORATORY COMPRESSED AIR

Compressed air is supplied to labs on all levels from a main riser. On Level 1, compressed air piping is run in a trench.

The air compressor, with existing sizing listed below, is located on the Roof Level.

- Building B: 40 cfm @125 psi, 10-hp pump, 120-gallon receiver (per as-builts, nameplate data did not confirm)

While the air compressor does look to be original to the building, it appears to be in good working condition and no operating issues were raised by the users. There does not seem to be a need to replace this equipment.

Given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and brazed joints.

4.4.3.6 LABORATORY VACUUM

Vacuum is distributed to the labs on all levels from a main riser. On Level 1, vacuum piping is run in a trench.

The vacuum equipment, with existing sizing listed below, is located on the Roof Level.

- Building B: 90 cfm @ 20 in. Hg, 5-hp pump (per as-builts, nameplate data did not confirm)

While the vacuum equipment does look to be original to the building, it appears to be in good working condition and no operating issues were raised by the users. There does not seem to be a need to replace this equipment.

Given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and brazed joints.

4.4.3.7 NATURAL GAS

Natural gas is supplied to the building through a main riser to labs on all levels. Gas also serves the domestic and laboratory hot water equipment on the roof, as well as mechanical heating equipment. On Level 1, gas piping is run in a trench.

4.4.3.8 TREATED WATER

Distilled water is supplied by a main riser to labs on all levels. On Level 1, distilled water is run in a trench.

The water still equipment, with existing sizing listed below, is located on the Roof Level.

- Building B: 20-GPH, 150-gallon storage (per as-builts, nameplate data did not confirm)

While the exact date of installation is not confirmed, it appears that filtration equipment is in good condition and has been replaced relatively recently.

4.4.4 BUILDING C

Building C was constructed around 1969 and is a two-story building of approximately 8,000 sf. The building provides space for a variety of teaching lab spaces, and support offices and prep rooms.

4.4.4.1 SANITARY WASTE & VENT

The sanitary waste and vent system primarily serves the restrooms. The existing piping system is cast iron with hub and spigot connections.

Given the age of the building, SmithGroup is recommending that the system be replaced either in one large project or in a phased manner as spaces are renovated and use cast iron, no-hub fittings with four-band stainless steel couplings. Below grade, protect piping from ambient soil conditions with a polyethylene sleeve.

4.4.4.2 LAB WASTE & VENT

The lab waste and vent system is organized so that waste is collected from all the second level spaces in the ceiling below into a single riser before dropping vertically to the floor below. The existing lab waste piping system is borosilicate glass with gasketed connections.

The lab waste piping ties into the sanitary piping below grade, and a single pipe serving both the sanitary and lab waste systems exits the building.

Given the age of the building, SmithGroup is recommending that the system be replaced either in one large project or in a phased manner as spaces are renovated and use socket fused polypropylene piping. Sanitary waste and lab waste systems shall be separate, dedicated systems throughout the building. Below grade, the lab waste lines shall exit the building in close proximity to the sanitary line. Once outside the building, provide a sample port prior to connection to the sanitary line. SmithGroup is assuming that CPH uses Good Lab Practice, so that only clear waste (no chemicals) is discharged into the lab waste system, and therefore, there does not seem to be the need for an acid neutralization tank on the exterior of the building.

4.4.4.3 DOMESTIC COLD & HOT WATER

The domestic cold and hot water is primarily distributed in the Level 2 ceiling with drops down to each fixture on Level 1.

The domestic hot water equipment, with the existing sizing listed below, is located in the Level 2 equipment room. The domestic hot water system is a circulating system complete with a recirculating pump.

- Building C: 29-gallon capacity, 32,000 BTUH-input

Given the age of the equipment and in an attempt to reduce the use of natural gas, it is recommended to switch gas-fired water heaters to an electric solution, either electric resistance, or a heat pump solution if space allows.

Also given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and soldered joints.

4.4.4.4 LABORATORY COLD & HOT WATER

There is a laboratory cold water system separated from the domestic cold water by a backflow preventer located in the Level 2 equipment room.

The laboratory cold and hot water is primarily distributed in the Level 2 ceiling with drops down to each fixture on Level 1.

The laboratory hot water equipment, with existing sizing listed below, is also located in the Level 2 equipment room. The laboratory system is a circulating complete with a recirculating pump.

- Building C: 50-gallon capacity, 40,000 BTUH-input

Given the age of the equipment and in an attempt to reduce the use of natural gas, it is recommended to switch gas-fired water heaters to an electric solution, either electric resistance, or a heat pump solution if space allows.

Also given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and soldered joints.

4.4.4.5 LABORATORY COMPRESSED AIR

Compressed air is served by Building B equipment per information shown on the existing drawings. There was an air compressor observed on site in the Level 2 equipment room, but it was not confirmed what this serves.

Compressed air piping is mainly distributed within the ceiling of Level 2 with drops down to lab fixtures on Level 1.

Given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and brazed joints.

4.4.4.6 LABORATORY VACUUM

Vacuum is served by Building B equipment.

Vacuum piping is mainly distributed within the ceiling of Level 2 with drops down to lab fixtures on Level 1.

Given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and brazed joints.

4.4.4.7 NATURAL GAS

Natural gas is supplied to the building with the majority of the piping distribution located within the ceiling of Level 2 and drops to each lab fixture on Level 1 below. Gas also serves the domestic and laboratory hot water heaters.

4.4.4.8 TREATED WATER

There are no treated water systems in Building C.

4.4.5 BUILDING D

Building D was constructed around 1969 and is a two-story building of approximately 29,000 sf. The building provides space for a variety of teaching labs, shop space, support offices and prep rooms, and a greenhouse.

4.4.5.1 SANITARY WASTE & VENT

The sanitary waste and vent system primarily serves the core restrooms with a main riser. Floor drains and catch basins in the back of house spaces also tie into sanitary system. There is also a trench system in the Hydraulics lab that drains to the sanitary system. The existing piping system is cast iron with hub and spigot connections.

Sanitary waste is collected below grade and exits the building.

Given the age of the building, SmithGroup is recommending that the system be replaced either in one large project or in a phased manner as spaces are renovated and use cast iron, no-hub fittings with four-band stainless steel couplings. Below grade, protect piping from ambient soil conditions with a polyethylene sleeve.

4.4.5.2 LAB WASTE & VENT

The lab waste and vent system is organized so that waste is collected from a group of spaces in the ceiling below into a single riser before dropping vertically to the floor below. The existing lab waste piping system is borosilicate glass with gasketed connections.

The various lab waste risers are collected into a common lab waste line below grade and exits the building.

Given the age of the building, SmithGroup is recommending that the system be replaced either in one large project or in a phased manner as spaces are renovated and use socket fused polypropylene piping. Once outside the building, provide a sample port prior to connection to the site sanitary line. SmithGroup is assuming that CPH uses Good Lab Practice, so that only clear waste (no chemicals) is discharged into the lab waste system, and therefore, there does not seem to be the need for an acid neutralization tank on the exterior of the building.

4.4.5.3 DOMESTIC COLD & HOT WATER

The domestic cold and hot water is primarily distributed in the Ground Level ceiling with risers to each fixture on Level 1.

The domestic hot water equipment, with the existing sizing listed below, is located in the Ground Level equipment room. The domestic hot water system is a circulating system complete with a recirculating pump.

- Building D: 204-MBH water-to-water heat exchanger (per as-builts, not verified in field)

While the water heater equipment was not verified on site, it is recommended that the water heater be switched to an electric solution, either electric resistance or heat pump type, if the source water is produced by gas-fired equipment.

Also given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and soldered joints.

4.4.5.4 LABORATORY COLD & HOT WATER

There is no separate laboratory water system for Building D. Domestic and laboratory fixtures are served from the same water distribution system.

SmithGroup recommends a dedicated laboratory water distribution system be provided off the domestic water system separated by a reduced pressure backflow preventer. If hot water is also needed at lab fixtures, a new laboratory hot water heater and piping distribution shall be provided. All piping shall be copper with soldered joints.

4.4.5.5 LABORATORY COMPRESSED AIR

Compressed air piping runs in the Ground Level ceiling to all labs and to risers per lab on Level 1.

The air compressor equipment, with the existing sizing listed below, is located in the Ground Level equipment room.

- Building D: 109 cfm, 25-hp pump, 120-gallon receiver (per as-builts, not verified in field)

The condition of compressed air equipment was not verified on site, but if original to the building, is likely near its end-of-life expectancy and should be replaced.

Also given the age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and brazed joints.

4.4.5.6 LABORATORY VACUUM

Vacuum piping runs in the Ground Level ceiling to all labs and to risers per lab on Level 1.

The vacuum equipment, with the existing sizing listed below, is located in the Ground Level equipment room.

- Building D: Tank-mounted duplex vacuum pumps (per as-builts, not verified in field)

The condition of vacuum equipment was not verified on site, but if original to the building, is likely near its end-of-life expectancy and should be replaced.

Also given age of the piping systems, SmithGroup recommends that the system be replaced in a phased manner as spaces are renovated with copper piping and soldered joints.

4.4.5.7 NATURAL GAS

Natural gas is supplied to the building with the majority of the piping distribution located within the ceiling of Level 2 and drops to each lab fixture on Level 1 below. Gas also serves the domestic and laboratory hot water heaters.

4.4.5.8 TREATED WATER

There are no treated water systems in Building D.

4.5 ELECTRICAL

The following section provides a summary of the relevant Electrical related assessment of the existing Science ABCD Complex and recommendations for the renovations to address issues found in the field.

The project will provide electrical system design with emphasis on life safety, quality of power service, reliability, efficiency, ease of maintenance, flexibility, and functionality. Overall, the approach is to provide a balanced economical and high-quality electrical system improvements.

4.5.1 EXISTING SYSTEMS - BUILDING A

4.5.1.1 ELECTRICAL SERVICE

The existing electrical service is tied to the campus 12.47kV medium voltage distribution loop. The existing main service equipment is an indoor unit substation located in the ground level main electrical space. It is with a 500KVA dry type transformer 12.47KV primary and 208/120V 3-phase 4-wire secondary voltage. It includes a 1,600A switchboard by GE Spectra Series, 1,600A main breaker and distribution breakers.

The unit substation lineup has non-electrical related piping and duct work overhead. This is a code violation. It is recommended to utilize drip pans installed at the bottom of the ducts and water pipes that are over the footprint of the switchboard and transformer. This will protect the equipment from leaks and water intrusion.

The equipment is in good condition and continued maintenance shall ensure lengthy useful life.

There is a switchboard, panelboards and control panels located in the hallway and accessible to the public. This is a code violation and present hazard. It is recommended to construct a barrier or enclosure around the equipment and allow authorized access only to facilities personnel.

4.5.1.2 ELECTRICAL DISTRIBUTION

The existing Motor Control Center "MCC" is original to the building made by Klockner-Moeller, which was acquired by Eaton.

The existing panelboards are a mix of original to the building product made by Westinghouse, and upgraded products by GE and Cutler-Hammer. The original panelboards are old and recessed in cement walls, making replacement of adding new circuits difficult.

Most of the distribution boards, panelboards and MCC's are original to the building, over 50 years old and passed their useful life. These are obsolete and we suspect that finding replacement parts, circuit breakers for example, are hard to procure or not available at all.

It is recommended to replace obsolete equipment to avoid unexpected downtime due to equipment failure and repair issues.

4.5.1.3 STANDBY POWER

The building has no standby power source.

4.5.1.4 LIGHTING

Lighting and controls are a mix of original fixtures, replacement fixtures and upgraded lamps. Fluorescent lamps were replaced with LED lamps. Lighting controls are manual on and off with time clock functions for site lighting.

It is recommended to replace existing incandescent and fluorescent light fixtures with new LED light fixtures to improve energy efficiency and reduce maintenance. Also, replace lighting controls with networked lighting controls with dimming, occupancy sensing and daylight sensors to further reduce energy use.

4.5.1.5 EGRESS LIGHTING

Emergency lights and exit signs are provided with integral batteries to the fixtures.

4.5.2 EXISTING SYSTEMS - BUILDING B

4.5.2.1 ELECTRICAL SERVICE

The existing electrical service is tied to the campus 12.47kV medium voltage distribution loop. The existing main service equipment is an indoor 600A medium voltage switchboard labeled as "SPLICE BOX" located in the ground level main electrical room. It is unknown where and how the medium voltage service is stepped down. The building is served with an upgraded 800A, 480/277V 3-phase 4-wire switchboard made by IEM. The equipment is recently installed in 2020.

The service switchboard does not have proper working clearance due to the existing transformer blocking the area. This is a code violation. It is recommended to re-install the transformer to ensure it is not blocking the switchboard.

4.5.2.2 ELECTRICAL DISTRIBUTION

The existing panelboards are a mix of original to the building product made by GE and upgraded products by Eaton. The original panelboards are old and recessed in cement walls, making replacement of adding new circuits difficult.

Most of the distribution boards, panelboards and MCC's are original to the building, over 50 years old and passed their useful life. These are obsolete and we suspect that finding replacement parts, circuit breakers for example, are hard to procure or not available at all.

It is recommended to replace obsolete equipment to avoid unexpected downtime due to equipment failure and repair issues.

There are panelboards with working clearance less than 3 feet. This is a code violation. It is recommended to remove any obstruction in front of the panelboards, and/or relocate the panelboard with 3 feet clearance for 208/120V equipment and 4 feet clearance for 480/277V equipment.

4.5.2.3 STANDBY POWER

It has a 42KW generator made by Cummins and installed in 2004. The equipment is in good condition.

4.5.2.4 WIRING DEVICES

There are non-GFCI outlets on lab benches within 6 feet from the sinks. This is a code violation. It is recommended to replace these outlets with GFCI outlets, providing grounding protection against electric shock risk near sources of water.

4.5.2.5 LIGHTING

Lighting and controls are a mix of original fixtures, replacement fixtures and upgraded lamps. Fluorescent lamps were replaced with LED lamps. Lighting controls are manual on and off with time clock functions for site lighting.

It is recommended to replace existing incandescent and fluorescent light fixtures with new LED light fixtures to improve energy efficiency and reduce maintenance. Also, replace lighting controls with networked lighting controls with dimming, occupancy sensing and daylight sensors to further reduce energy use.

4.5.2.6 EGRESS LIGHTING

Emergency lights and exit signs are provided with integral batteries to the fixtures.

4.5.3 EXISTING SYSTEMS - BUILDING C

4.5.3.1 ELECTRICAL SERVICE

The existing electrical service is tied to the campus 12.47kV medium voltage distribution loop. The existing main service equipment is not located within this building and there is no indication of the location of its source. It is recommended for facilities to provide signage where the source is located and name the equipment.

4.5.3.2 ELECTRICAL DISTRIBUTION

The existing panelboards and distribution boards are original to the building product made by GE.

Most of the distribution boards, panelboards and MCC's are original to the building, over 50 years old and passed their useful life. These are obsolete and we suspect that finding replacement parts, circuit breakers for example, are hard to procure or not available at all.

It is recommended to replace obsolete equipment to avoid unexpected downtime due to equipment failure and repair issues.

There are panelboards with working clearance less than 3 feet. This is a code violation. It is recommended to remove any obstruction in front of the panelboards, and/or relocate the panelboard with 3 feet clearance for 208/120V equipment and 4 feet clearance for 480/277V equipment.

4.5.3.3 STANDBY POWER

The building has no standby power source.

4.5.3.4 WIRING DEVICES

There are non-GFCI outlets on lab benches within 6 feet from the sinks. This is a code violation. It is recommended to replace these outlets with GFCI outlets, providing grounding protection against electric shock risk near sources of water.

4.5.3.5 LIGHTING

Lighting and controls are a mix of original fixtures, replacement fixtures and upgraded lamps. Fluorescent lamps were replaced with LED lamps. Lighting controls are manual on and off with time clock functions for site lighting.

It is recommended to replace existing incandescent and fluorescent light fixtures with new LED light fixtures to improve energy efficiency and reduce maintenance. Also, replace lighting controls with networked lighting controls with dimming, occupancy sensing and daylight sensors to further reduce energy use.

4.5.3.6 EGRESS LIGHTING

Emergency lights and exit signs are provided with integral batteries to the fixtures.

4.5.4 EXISTING SYSTEMS - BUILDING D

4.5.4.1 ELECTRICAL SERVICE

The existing electrical service is tied to the campus 12.47kV medium voltage distribution loop. The existing main service equipment is not located within this building. It is located and shared in Building E. The existing main service equipment in Building E is an indoor unit substation located in the ground level main electrical space. It is with a 500KVA dry type transformer 12.47KV primary and 480/277V 3-phase 4-wire secondary voltage. It includes a 1,000A switchboard by GTE Sylvania, 700A main breaker and distribution breakers.

4.5.4.2 ELECTRICAL DISTRIBUTION

The existing panelboards are original to the building product made by GTE. The original panelboards are old and recessed in cement walls, making replacement of adding new circuits difficult.

Most of the distribution boards, panelboards and MCC's are original to the building, over 50 years old and passed their useful life. These are obsolete and we suspect that finding replacement parts, circuit breakers for example, are hard to procure or not available at all.

It is recommended to replace obsolete equipment to avoid unexpected downtime due to equipment failure and repair issues.

4.5.4.3 STANDBY POWER

The building has no standby power source.

4.5.4.4 WIRING DEVICES

There are non-GFCI outlets on lab benches within 6 feet from the sinks. This is a code violation. It is recommended to replace these outlets with GFCI outlets, providing grounding protection against electric shock risk near sources of water.

4.5.4.5 LIGHTING

Lighting and controls are a mix of original fixtures, replacement fixtures and upgraded lamps. Fluorescent lamps were replaced with LED lamps. Lighting controls are manual on and off with time clock functions for site lighting.

It is recommended to replace existing incandescent and fluorescent light fixtures with new LED light fixtures to improve energy efficiency and reduce maintenance. Also, replace lighting controls with networked lighting controls with dimming, occupancy sensing and daylight sensors to further reduce energy use.

4.5.4.6 EGRESS LIGHTING

Emergency lights and exit signs are provided with integral batteries to the fixtures.

4.5.5 RECOMMENDATIONS

1. Rectify code violations as described in the above sections within "EXISTING SYSTEMS".
2. It is recommended for renovation of labs to provide a dedicated panelboard for each lab room. It limits the impact to operation and power availability due to upgrades, renovations, repairs or failure incident due to breaker tripping and other issues.
3. It is recommended for upgrades of HVAC and plumbing to provide new distribution board and panelboards with sufficient capacity and rating.
4. Refer to separate Lighting Section for additional recommendations.

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05
PHASING STRATEGIES

5.1 PROJECT INTENT

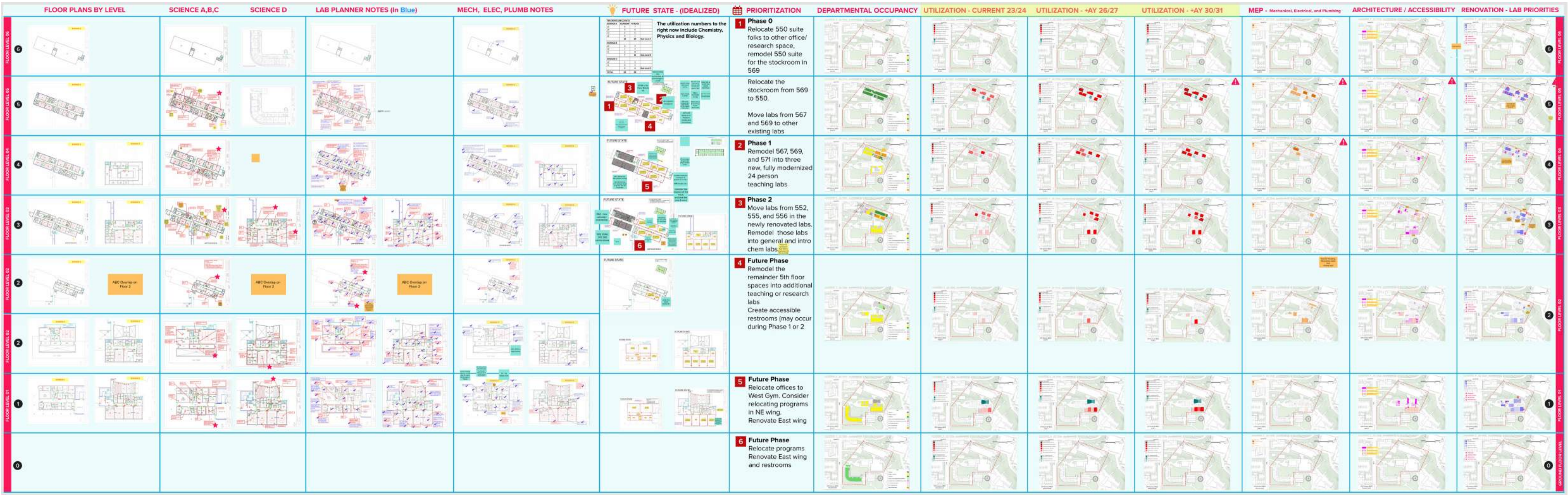
The Science Complex Building project began with the Feasibility Team working closely with the working group stakeholders in a parallel process for the Visioning workshops to develop and align the renovation strategies. Through a series of workshops and meetings, initial assumptions were reviewed, tested and refined to arrive at a renovation phasing strategy, in accordance with the Assessment graphics as shown on the following pages, and as explained in the Summary of Priorities (Section 5.2), and related Phasing Opportunities text (Section 5.3). The initial narratives and the resulting renovation phasing strategies are described in further detail below.

The Science Complex consists of buildings A, B, C and D / Allister McCrone Hall (approximately 84,886 assignable square feet to 124,035 gross square feet at 68% utilization). The quality of the assignable square feet in these buildings is the focus of this effort. The university hoped to find some efficiencies in buildings by combining adjacent rooms, creating more flexibility and capacity. The ultimate goal is the Science Complex creates a welcoming hub for the science programs that are centered around justice, equitable and regenerative values. Major program areas include:

1. Chemistry instruction and research including lab prep spaces and faculty offices.
2. Physics instruction and research including lab prep spaces and faculty offices.
3. Biology instruction and research including lab prep spaces and faculty offices.
4. During the Feasibility Study Team's initial site visit and during subsequent stakeholder meetings, the team learned that many of the spaces that were originally planned to vacate Science D--primarily Engineering with some Biology--were not leaving, and as a result, there was not an assessment of the lab spaces in that building.

This assessment study doesn't solve the strategic research space question, sponsored or otherwise. The Future State in Phasing Strategy 1 - Full Building sought to maximize the number of teaching labs. For campus organization that addresses research refer to the 2024 CPH Physical Campus Plan document.

Figure 5.1.1 - Assessment Diagram - Full Matrix



The first half of this Assessment Diagram graphic is a compilation of site visits observations from varying disciplines, for each floor, at all four buildings--A, B, C and D.

The second half of this Assessment Diagram graphic is a compilation of thematic mappings that include Departmental Occupancy, current and future Utilization, and varying, discipline specific Priorities, all at the complex scale, culminating in both initial Prioritization and Idealized Future State Phasing assessments.

Figure 5.1.2 - Assessment Diagram - Floor Plans by Level, Lab Planner Notes, and MEP Notes

Figure 5.1.3 - Assessment Diagram - Future State, Prioritization, and Departmental Occupancy

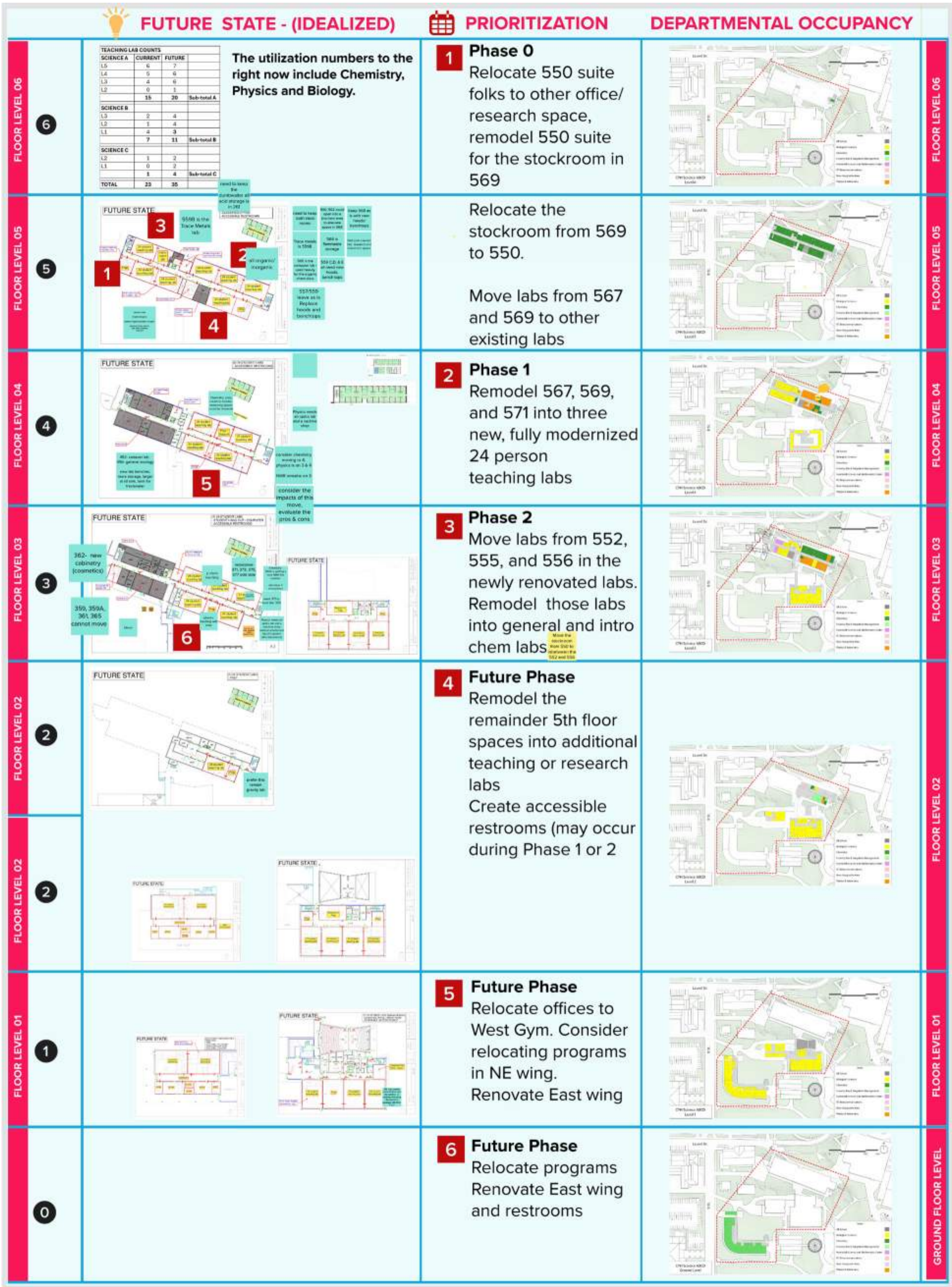


Figure 5.1.4 - Assessment Diagram - MEP, Accessibility, and Lab Priorities

Figure 5.1.5 - Assessment Diagram - Restrooms / Vertical Egress, Classrooms / Offices, and Combined

5.2 SUMMARY OF PRIORITIES

Typically, Feasibility Studies are to determine the feasibility of a targeted project. This section attempts to define the parameters of specific project scopes. After a preliminary Assessments Recommendation, with the corresponding graphics as shown in Figures 5.2.1 and 5.2.2 below, on the following pages, was initially completed as a subsequent, smaller initial Feasibility Cost Estimate exercise that was conducted for the 5th floor of the Science A building--which highlighted the complex nature of a sequential renovation within the Science A building. This approach proved too rigid for the possible combinations of renovation scenarios that may occur at these buildings which will be based on numerous potential factors; such as available funds, enrollment, possible construction schedules overlaid onto academic calendars, etc.

The intention of this section of this Feasibility Study is to provide qualitative descriptions for three flexible scenarios for cost modelling to various aspects of work to buildings Science A, B, C, and D. These are described in the Phasing Strategies listed below.

In agreement with the University stakeholders, the intent of these phasing strategies are to demonstrate a cost-estimated basis position for future upcoming capital outlay programs. This is achieved through the narratives with accompanying graphics being provided in the sub-sections below.

As mentioned earlier, the three targeted phasing strategies being provided below are as follows:

1. A macro (full building renovations),
2. Prototypical labs, and finally
3. A targeted smaller scale renovation project that the University can use to establish a baseline for potential future renovations at these buildings.

A possible framework for the Cost Estimating effort may be the following breakout line items:

A. **Phasing Strategy 1 – Full Building**

Science A

- Lab Planning
- MEP Systems
- Architecture and Accessibility

Science B

- Lab Planning
- MEP Systems
- Architecture and Accessibility

Science C

- Lab Planning
- MEP Systems
- Architecture and Accessibility

Science D

- MEP Systems
- Architecture and Accessibility

B. **Phasing Strategy 2 – Lab Prototypes**

- General Chemistry
- Organic/Inorganic Chemistry
- General Physics
- Basic Biology
- Microbiology
- Zoology
- Anatomy

C. **Phasing Strategy 3 – Targeted Renovation Scenarios**

- Science A renovation

Figure 5.2.1 - Assessment - Preliminary Recommendations

1. Mechanical:
   1. AHU/EF: Replace based on equipment life, noise and vibration issues, and / or capacity.
   2. Heating/Cooling:
      1. Replace based on equipment life and / or capacity.
      2. Change form Steam to heating hot water.
         This could have a greater impact on areas of renovation given this would be from the heat generation source (boiler) up to the AHU out to the VAV's throughout the building. Could tear a lot of ceiling up. May have rated wall implications.
   3. Ducting: Given the age of equipment, consider replacement of distribution for improved insulation and decrease leakage.
      1. Could tear a lot of walls and ceiling up.
      2. Title 24 increased insulation requirements. This is good practice, not code req'd.
2. Electrical:
   1. Standby Power: Replace based on equipment life and or capacity.
      1. Currently a diesel generator (located close by)
      2. E-power not for egress - elevators are recall-only

      Gas Powered Generator, not diesel

      Back Up Power for sensitive instruments and **freezers/ refrigerators** (-80s) NMR has UPS
   2. Lighting - Fixture replacement: Replace (E) fixtures with LED.
3. Plumbing:
   1. Water and Waste/Vent Systems: Multiple comments about leaks and clogs, so recommend partial or full replacement of distribution systems.
      1. Could tear a lot of walls and ceiling up.

      Lab Waste and Domestic Scoping to determine local or building wide
   2. Acid Waste: System condition and treatment (or not) and change to PP (polypropylene) socket fused.
      1. Recommendation to remove and replace the existing glass pipes chemical waste system w/ PP pipes with sampling port.
      2. Could tear a lot of walls and ceiling up.

      1/2 or full floor - Propose upgrade of mains to be considered

      Limestone Pit replacement recommended.

      Response: Chemical Waste disposal is dedicated collection.

CPH ABCD Feasibility Study Lab Planning Share Out

Looking across all the graphic columns...

1. 5th floor is rising to the surface as a high priority based on utilization, MEP assessment and what we heard during our walk-through (purple shading)
2. Looking at Utilization alone:
   a. Current is OK
   b. By AY 26/27 many labs go well over 25 hrs/week. Need to begin looking for other spaces where these class sections can be taught.
   c. By AY 30/31 most labs are up to 40 hrs/week or higher. Likely unable to handle all class sections within the week. SciA 555 is at 63 hrs.
3. Some spaces have no color. What are the issues with the spaces? Why are they underutilized – Refer to Prioritization Exercise.
4. Classified staff do not have office space outside/away from prep rooms.
5. The data we have for classrooms is limited so if there are classrooms in A, B, and C that are not in the information we have, please let us know:
   a. Which rooms
   b. Number of hours/week they are used
   c. Projected growth
6. Spaces in McCrone Hall, especially ground level, appear to be spaces that may be moving into the new E&T building. Is this a correct assumption?
   a. Looking for swing space, or lab space to be repurposed
   b. Or are the swing spaces the low utilization labs?

Figure 5.2.2 - Assessment - Preliminary Phasing Strategy - 5th Floor Plan

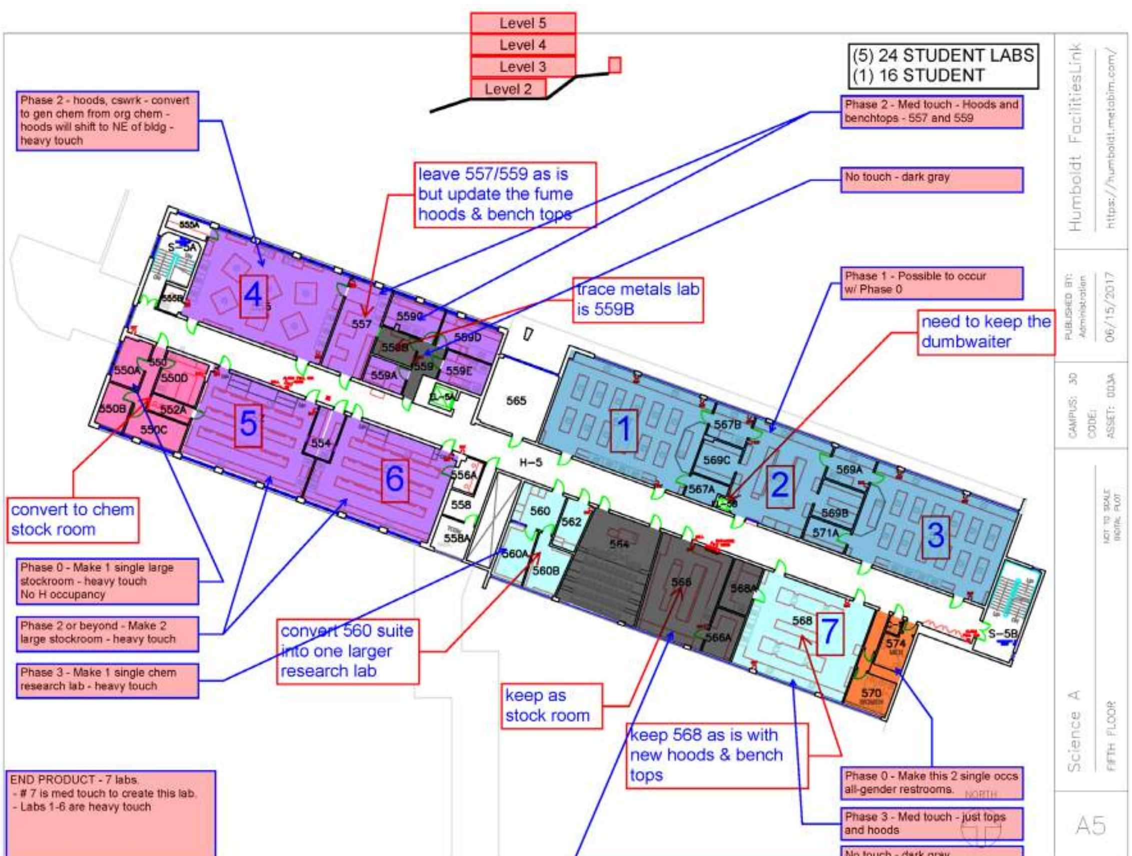
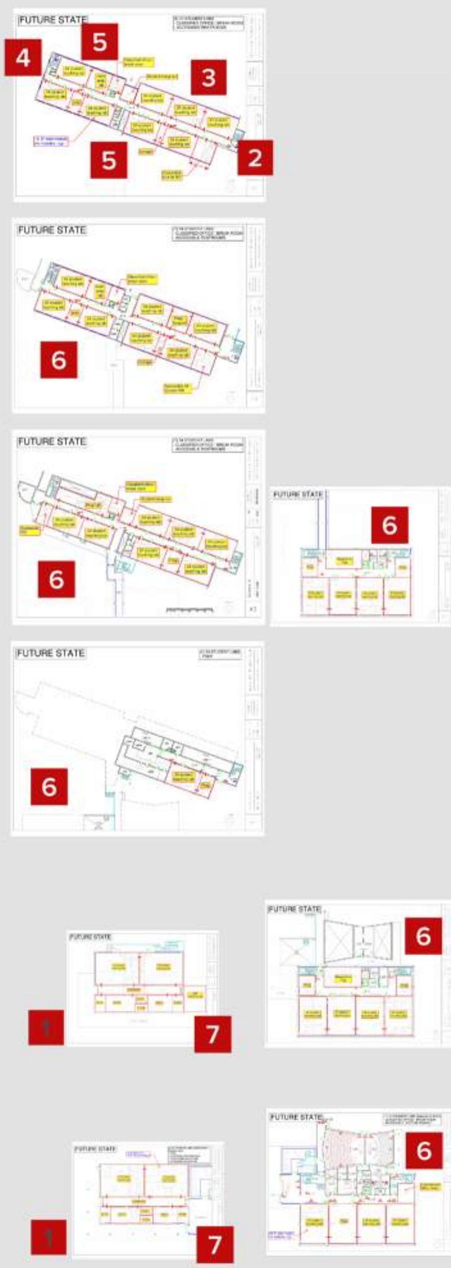


Figure 5.2.3 - Assessment Diagram - Preliminary Phasing Recommendations

TEACHING LAB COUNTS			
SCIENCE A	CURRENT	FUTURE	
L5	6	8	
L4	5	7	
L3	4	7	
L2	0	1	
	15	23	Sub-total A
SCIENCE B			
L3	2	4	
L2	1	4	
L1	4	3	
	7	11	Sub-total B
SCIENCE B			
L2	1	2	
L1	0	2	
	1	4	Sub-total C
TOTAL	23	38	

The utilization numbers to the right are for Chemistry & Physics and do not take into account Biology so the number of labs that exceed 25 hours / week will be much higher than what is currently showing.



1. Renovate all of Science C. This creates (3) new teaching labs for light chemistry or biology, possibly physics
2. Class labs taught in rooms 567, 568, & 571 shift to the swing space labs in Science C
3. Begin renovation of Science A, 5th floor, northeast wing
4. Once northeast wing is complete, classes taught in 552, 555 & 556 (heavy chemistry) move here.
5. This frees up much of the west end for renovation as funds become available.
6. The (3) swing labs in Science C continue to be used until Science A & B renovations are complete
7. The (3) swing labs in Science C can be converted to research or remain for future growth
8. Science A, B, & C ready for the next 20 years! :)

5.3 PHASING STRATEGIES

5.3.1 PHASING STRATEGY 1 - FULL BUILDING

Narratives and accompanying plans are provided here that describe the total renovation of each building, with each building as its own cost, with typical systems and accessibility upgrades. This strategy necessitates a breakdown of the Labs (with associated support spaces), MEP systems and Accessibility--each as their own cost within the overall building costs--for purposes of supporting the narrative and costing at the Full Building scale.

5.3.1.1 BACKGROUND

SmithGroup's Campus Strategy and Analytics group did a study regarding classroom and lab utilization which documented current needs. The department chairs reviewed the lab utilization and assessed utilization through academic year (AY) 26/27 and again through academic year 30/31. It became obvious that many of the labs are approaching full capacity and most will be at capacity by AY 26/27.

Most lab sections run on Mondays and Wednesdays or Tuesdays and Thursdays. Because the lab sections are typically twice a week, this makes utilization on Fridays difficult unless an alternate schedule is in place. Currently, many of CPH's labs are utilized on these alternate days including Saturdays.

Teaching laboratories are defined as rooms used primarily for regularly scheduled class labs that require special purpose equipment to serve the needs of a particular discipline for group instruction, participation, observation, experimentation, or practice. Space requirements are calculated using a formula that combines expected utilization in hours per week and percentage of seats filled. A benchmark for institutions similar to Cal Poly Humboldt would be an average utilization of 24 to 28 hours per week with 75% to 80% of the seats filled. The ASF per student station varies by discipline. Cal Poly Humboldt selected an average teaching lab utilization of 28 weekly rooms hours with 80% of the seats filled. Since science labs are typically expected to achieve higher utilization than the campus-wide average, the Cal Poly Humboldt science lab expectation is **32 hours per week**.

Research lab space factors at Cal Poly Humboldt are lower than typical benchmarks. It is assumed that all research space will be shared, and the campus will quickly adjust space allocations to reflect productivity.

This assessment study doesn't solve the strategic research space question, sponsored or otherwise. The Future State in Phasing Strategy 1 - Full Building sought to maximize the number of teaching labs. For campus organization that addresses research refer to the 2024 CPH Physical Campus Plan document.

Figure 5.3.1.1 - Assessment Diagram - Utilization

5.3.1.2 TEST-FITS

In an effort to maximize teaching lab space SmithGroup analyzed Science A, B, and C to see how many teaching labs we could create. This analysis assumed no spaces in the complex were sacred. A base module width of 10'-6" wide was used when possible. This is the basis for the full building renovation phasing strategy. We made some generic assumptions as to what the renovated lab spaces would be, keeping in mind the goal is to maximize the number of 24 person teaching labs and with the understanding that Faculty Offices could be located elsewhere on campus and Research Space could either be located elsewhere on campus or done in a teaching lab when that lab is not in use.

The first strategy being described here is intended to provide a broad high-level view of what it would take to fully renovate each building separately in its entirety. Below are narratives (and accompanying plans as needed) that describe the total renovation of each building, with each building as its own costs, with typical systems and accessibility upgrades. Labs (with associated support spaces), MEP systems and Accessibility at each building should each be their cost within the overall building costs for purposes of Narratives and costing at this first effort.

Approximate areas of renovations for the Full building Strategy by level.

Science A

- Level 5 17,540 gsf
- Level 4 17,779 gsf
- Level 3 18,767 gsf
- Level 2 8,242 gsf

Science B

- Level 4 9,516 gsf
- Level 3 10,042 gsf
- Level 2 10,757 gsf
- Level 1 14,402 gsf

Science C

- Level 2 3,622 gsf
- Level 1 6,105 gsf

Science D

- Level 2 17,204 gsf
- Level 1 16,341 gsf

5.3.1.3 SCIENCE A

Lab Planning

Refer to the following diagrams of Current State and Future State for our proposed renovation strategy for laboratory types. The Science A Current State and Future State diagrams included here are also included in the Section 7: Appendix at a larger scale. For pricing, refer to the Prototype Layouts.

This assessment study doesn't solve the strategic research space question, sponsored or otherwise. The Future State in Phasing Strategy 1 - Full Building sought to maximize the number of teaching labs. For campus organization that addresses research refer to the 2024 CPH Physical Campus Plan document.

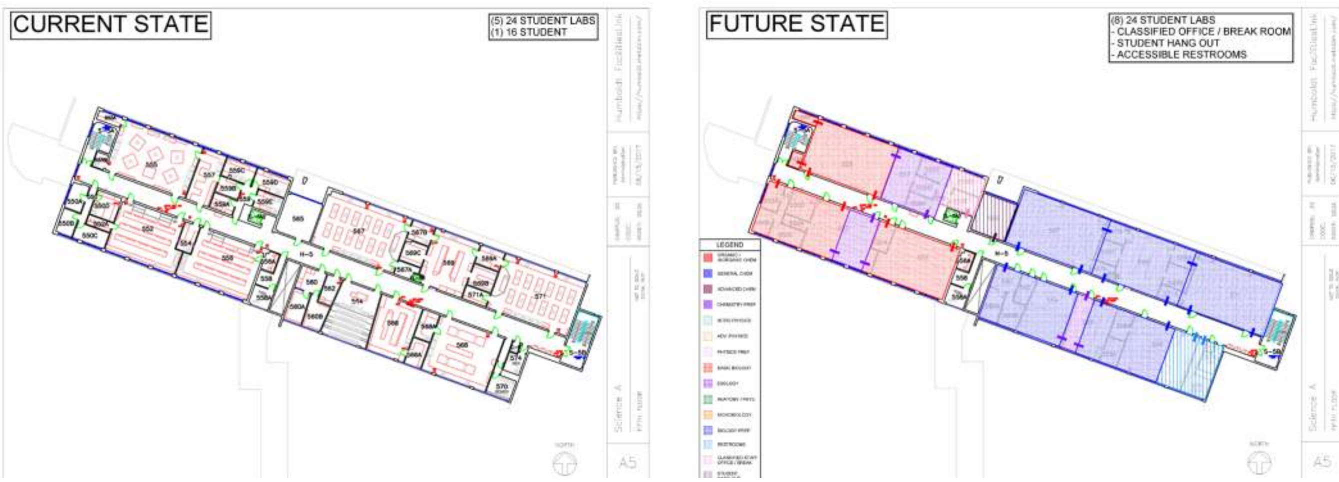


Figure 5.3.1.3 - Science A - Level 5

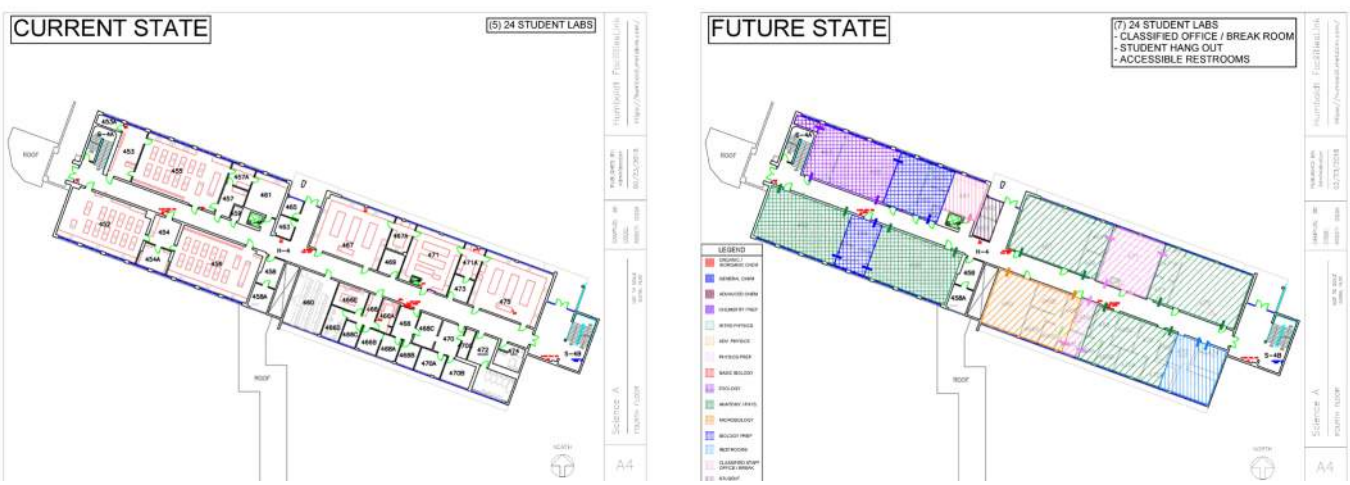


Figure 5.3.1.3 - Science A - Level 4

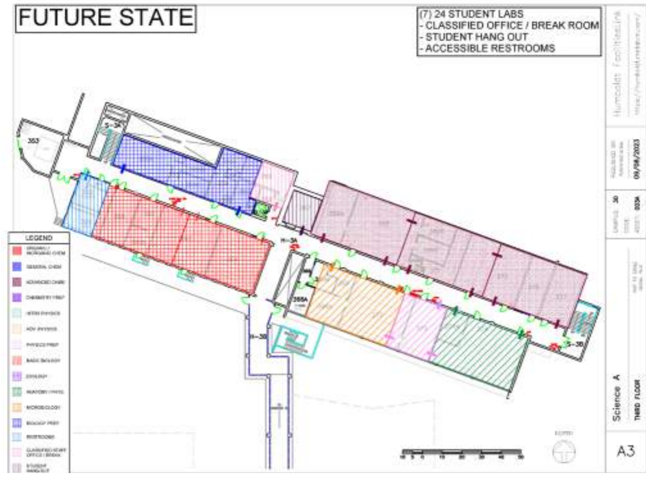
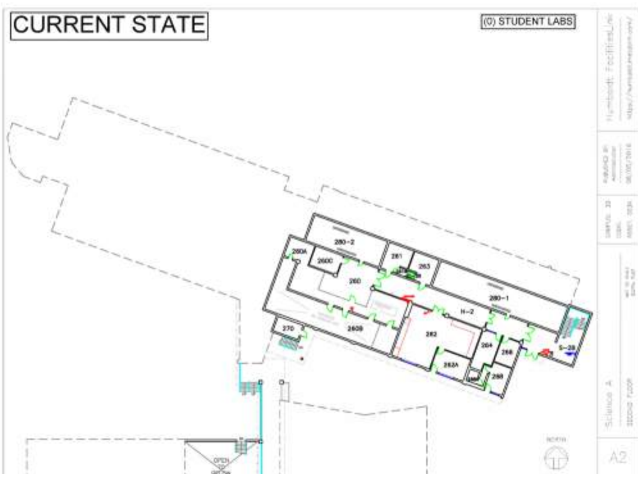


Figure 5.3.1.3 - Science A - Level 3



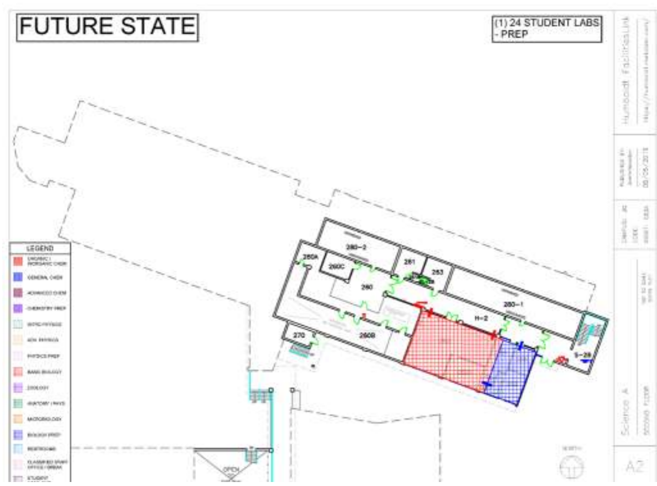


Figure 5.3.1.3 - Science A - Level 2

MEP Systems

The following MEP narratives describe the potential to fully renovate the entire building for a new proposed program. To accomplish these full renovations, each building should be considered as a separate project. The existing building users and programs will be vacated from the buildings to allow the general contracting team full access for construction purposes. Fully vacating the building removes restrictions and gives latitude for the construction team to freely organize their sequence of activities.

Note that if the change in program increases the loads on the MEP systems, then the equipment may not be able to be replaced in the same location. An example would be the air handler on Building A that is installed at the lowest level of the building may not be adequate for an increase in required air volume. The design / contracting team will need to take this into account.

To potentially offset any internal cooling/heating load increases due to either changes in program or densification of program or program equipment loads, the selected design team should consider envelope upgrades. A load model that evaluates different envelope upgrades, along with the resulting impact, ideally decrease) on heating and cooling loads could offset the costs associated with the envelope improvements. Note that a full building renovation project may trigger the need to upgrade the building envelope to comply with the Title 24 requirements in place when the project is in design.

Buildings A, B, and C, due to the envelope configuration, allow for the potential to install exterior insulated panels to increase the thermal performance of the buildings by incorporating a minimum of 2" of R-30 external insulation. The concept would be to add the insulated panels to the solid wall sections below the protruding window ledge down to the grade or window line of the floor below. Building D has a different wall construction and our visual review notes that improving the envelope performance would be more challenging, but that does not mean that it should not be considered.

In addition to the potential to improve the wall energy performance, the glazed areas also offer an opportunity to increase the energy performance of the building. While it is likely more involved and therefore likely to cost more, the replacement of the existing single pane windows have the potential to significantly increase the energy performance of the building. We would recommend that the detain team selected for the project also evaluate via energy modeling the costs and energy performance associated replacing the existing widow system with current Title 24 minimum or better windows.

Regarding controls, the intent of any selected project (full building, prototype, or focused scope of work) is to provide a new Direct Digital Control (DDC) system, installed to monitor and control the major MEP equipment, the zone level equipment and connect to a central monitoring system on campus, as relevant to the proposed scope of work. In all cases, the affected buildings will need a new front-end control system that is expandable to eventually convert the entire building and major MEP equipment over to the DDC control system. The campus is currently investigating upgrading their existing campus DDC system as a separate project, so the DDC system for these projects needs to be compatible with the existing campus and future campus control systems.

While a majority of the ductwork for any selected project (full building, prototype, or focused scope of work) will be galvanized metal ductwork, there are two exceptions where welded stainless steel ducting (316L) ductwork is needed:

1. Chemical Fume Hoods and Other Specialty Exhaust: Exhaust from chemical fume hoods, snorkels, and other lab air capture devices shall be welded stainless steel from the device to a point of dilution.
2. Roof Exhaust Ductwork and Stacks: All exhaust air ducting on the roof, including the exhaust air stack shall be welded 316L stainless steel duct.

The following discipline level discussions provide additional detail on the scope for each of the four buildings.

MECHANICAL - BUILDING A

The narrative below outlines the work required for a full upgrade of the mechanical systems at each building of the ABCD Complex. See the associated feasibility study for capacities of major plant equipment required.

Note: New equipment is proposed with an upgrade of building controls systems. A new Direct Digital Control (DDC) system will be installed to monitor and control the major MEP equipment, the zone level equipment and connect to a central monitoring system on campus.

1. Replace existing (2) AHUs (East & West Wing) with (1) roof mounted unit supplying the entire building.
    a. Include allowance for structural renovations required to house new larger AHU and a lightweight enclosure for the unit to protect its casing, components etc from the coastal climate.
2. Replace “Hot” and “Cold” ducted distribution in the east wing with supply and return ducting including risers and laterals.
3. Replace existing distribution ducting within the west wing, connecting from the AHU position on roof and extending throughout.
4. Replace existing dedicated fume hood exhaust fans (~17 in this building) and associated distribution ductwork with three (3) larger roof mounted exhaust fans and new ducting manifolded to connect to fume hoods. Three exhaust fans provide a level of redundancy that allows for maintenance and repair without impacting the operation of the building.
5. Provide new venturi exhaust valve for each fume hood.
6. Provide sash control for each fume hood.
7. Remove existing (2) gas boilers, gas piping, flues etc. and replace with 4-pipe air-source heat pump skid.
8. Replace existing HHW circulator pumps and install new CHW circulators (from ASHP to AHU coils).
9. Replace full heating hot water distribution piping throughout the building.
10. Replace terminal unit heating coils and 3-way valves with new VAVs (with reheat) and associated 2-way modulating valves.
11. Remove connection to steam network in basement and any associated heat exchangers, stripping piping back to point of entry to the building and capping.

ELECTRICAL - BUILDING A

1. Address code violations found. Below are the measures to fix these.
    a. The new unit substation line up shall be provided with new drip pans installed at the bottom of the overhead ducts and water pipes. This will protect the equipment from water leaks and intrusion within the switchgear.
    b. Construct barrier or enclosure around the switchboard located within the main hallway. This will prevent public access and limit access to facilities personnel only.
2. Replace obsolete equipment. Obsolete electrical equipment are over 50 years old and passed their useful life. Includes the following:
    a. Motor Control Center "MCC"
    b. Distribution boards
    c. Transformers
    d. Specific panelboards within Labs/Classrooms and Electrical rooms.
3. The existing normal power is fed from 500KVA transformer and 1,600A switchboard. The full building renovation estimated electrical load is 629KVA. It is recommended to upgrade the service or provide a supplemental service to meet the increased demand.
4. There is no generator standby power. Install a new outdoor diesel generator set with a sub-base fuel tank and housed in a weatherproof sound attenuated enclosure and automatic transfer switches. The generator shall be sized to accommodate the following load types:
    a. Fume hood exhaust fans
    b. Lab freezers and refrigerators
    c. Emergency egress lighting and exit signs
    d. Miscellaneous lab equipment loads
5. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures. This will provide grounding protection against electric shock risk.
6. Provide each Lab spaces a dedicated load center / panelboard rated at 60Amps (minimum) 208/120Volts installed within the space.
7. Provide new distribution boards with surge protection and dry type transformers to support the new lab panels. It shall be sized with a power density of 5W/SF and applied to all lab spaces.
8. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment.
9. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
10. Provide new LED lighting fixtures and exit signs.
11. Provide new lighting controls with wireless functionality.

PLUMBING - BUILDING A

1. Replace existing cast iron with hub and spigot fittings sanitary waste and vent system in its entirety with cast iron and no-hub 4-band couplings.
2. Replace existing borosilicate glass lab waste and vent system in its entirety with polypropylene piping with socket-fused joints.
3. Separate sanitary waste and lab waste systems until they exit the building and provide a sampling port prior to the lab waste connecting into the sanitary system.
4. Replace existing domestic cold and hot water distribution piping in its entirety with copper piping and soldered joints.
5. Replace all existing domestic water heaters with electric resistance or heat pump water heaters with fully recirculating distribution piping.
6. Provide dedicated lab cold and hot water distribution piping with copper piping and soldered joints.
7. Provide dedicated lab hot water heaters of electric resistance or heat pump type with fully recirculating distribution piping.
8. Replace lab compressed air (CA), Reverse Osmosis (RO), Natural Gas, and vacuum (VAC) distribution piping in its entirety with copper piping and brazed joints.
9. Replace existing CA, VAC, RO and natural gas equipment.

Architecture and Accessibility

Architecturally, the building will need upgrades to match the renovation work. Where work is to occur, ceilings should be suspension lay-in type at general classroom, hallways, and lab spaces. Casework should be replaced in all areas to receive work. Casework finishes should align with the programmatic use of the space – it would be recommended that all casework inside classrooms/labs in the Science A building all be chemical grade resistant similar to SEFA-8. Walls should be assumed to be painted gypsum board unless otherwise noted.

At restrooms to receive work, casework should be solid-surface countertops with drop-in sinks, walls should be tiled to a height of 7'-0" with 4x4 tiles, floors should be assumed to be 2x2 porcelain tiles, and toilet partitions to be assumed to be phenolic with overhead brace frame type system. Ceilings at restrooms are assumed to be painted gypsum board.

The roof of the Science A building should be replaced as part of a whole building renovation. The current roof is a built-up roof type. The new roof may want to consider a similar type roof as replacement. Insulation thickness should be increased as much as possible to align to current code. Fall protection guard rail should be added at the roof perimeter as well that are a minimum 42" above the finished elevation of the roof wherever guardrail is to occur.

As part of meeting the latest energy codes, the Science A building should also have renovation work at the exterior vertical envelope in addition to the roof to be captured as part of the cost model. At areas of solid walls, an open rain screen system should be considered with continuous mineral wool insulation installed at the exterior that would then be concealed by an exterior metal panel similar to Morin metal panel PULSE series with concealed fasteners and 12" wide panels.

New metal thermally broken metal windows, similar to Milgard A250 Series windows, at all classroom/ lab spaces and new curtain wall, similar to Kawneer 1600, at east stairs and building entrances.

Adding a new exterior material will greatly change the look of the building. Insulating at the interiors is also an option, but this will reduce the amount of assignable square footage that could be used for programmatic spaces.

Structural upgrades per California Existing Building Code (CEBC) 317.3.1 for Existing State-Owned Buildings should be considered for scale and costs of renovations that may trigger structural upgrades. To calculate the replacement cost, it is recommended to follow the guidelines set up by the Division of State Architect (DSA) for this purpose as a starting point that may be amenable to the Authorities Having Jurisdiction (AHJ).

Analysis of the existing structure of this building was not included in this Feasibility Study and nor was the cost of Structurally upgrading the Science A building included in this Cost Estimate portion of this Feasibility Study.

Regarding Accessibility, in this Phasing strategy under consideration is the interior renovation of the entire building. It is intended that all areas with student access will be upgraded to meet accessibility as much as possible and agreed to with the Authorities having Jurisdiction (AHJ) with the full scope of work. The California Existing Building Code provides guidance to establish priorities for providing accessibility renovation. Similar to the Existing Building Code, the California Building Code provides further guidance and establishes the priority of accessibility upgrades at renovation work. Below are a few excerpts from the current codes for consideration:

Excerpt from the 2022 California Existing Building Code as follows:

306.7.1 Alterations affecting an area containing a primary function. Where an alteration affects the accessibility to, or contains an area of primary function, the route to the primary function area shall be accessible. The accessible route to the primary function area shall include toilet facilities and drinking fountains serving the area of primary function.

Exceptions:

1. The costs of providing the accessible route are not required to exceed 20 percent of the costs of the alterations affecting the area of primary function.
2. This provision does not apply to alterations limited solely to windows, hardware, operating controls, electrical outlets and signs.
3. This provision does not apply to alterations limited solely to mechanical systems, electrical systems, installation or alteration of fire protection systems and abatement of hazardous materials.
4. This provision does not apply to alterations undertaken for the primary purpose of increasing the accessibility of a facility.
5. This provision does not apply to altered areas limited to Type B dwelling and sleeping units.

Excerpts from the 2022 California Building Code as follows:

11B-202.3 Alterations. Where existing elements or spaces are altered, each altered element or space shall comply with the applicable requirements of Division 2, including Section 11B-202.4. Exceptions:

1. Reserved.
2. Technically infeasible. In alterations, where the enforcing authority determines compliance with applicable requirements is technically infeasible, the alteration shall provide equivalent facilitation or comply with the requirements to the maximum extent feasible. The details of the finding that full compliance with the requirements is technically infeasible shall be recorded and entered into the files of the enforcing agency.

11B-202.4 Path of travel requirements in alterations, additions and structural repairs. When alterations or additions are made to existing buildings or facilities, an accessible path of travel to the specific area of alteration or addition shall be provided. The primary accessible path of travel shall include:

1. A primary entrance to the building or facility,
2. Toilet and bathing facilities serving the area,
3. Drinking fountains serving the area,
4. Public telephones serving the area, and
5. Signs.

There are exceptions noted in the California Building Code that will need to be reviewed and discussed with the Authority Having Jurisdiction (AHJ) at time of permit application and ideally in a pre-application meeting setting to determine the final extent of accessibility upgrades required as part of any renovation work. Of particular note for renovations at this scale is the term "Technically infeasible" and that this is confirmed as possible subjective information that needs to be determined with the AHJ in as early as possible in projects where this could dramatically affect the final project.

For the consideration of this project, this study will focus and provide a possible accessible outcome for full-renovation of the four buildings included in this study. Each building will have its own accessibility recommendations per the priorities as established in the California Building Code cited above.

SCIENCE A

1. A primary entrance to the building or facility.
    a. Parking / Entrances:
        i. For the purposes of this Feasibility Study, the primary accessible entrance shall be from the parking to the immediate northwest corner of the building on Laurel Street.
            1. The north building entrance enters the building at the "Fourth floor", actual floor level 3. The north building entrance seems to be the primary as this building entrance does have an auto door opener, albeit an older model with non-accessible controls and is located near the interior elevator. The north entrance is around 150' from the parking and will require updated concrete flatwork at both the parking areas but also as well as the path of travel from the parking to the building entrance.
        ii. The parking area has accessibility challenges and will need to be verified for access compliance at the area of parking as well as the path from the parking spot areas to the building entrances themselves. This study would suggest adding an auto-door operator at any exterior door that may need to meet accessible access as the mechanical systems often makes doors closing automatically a challenge unless assisted by an auto-door operator. Each door that receives an auto-door operator should also receive new accessible controls at both the interior and exterior.
        iii. Science A has six (6) existing points of entry to the building.
    b. Stairs:
        i. Neither of the existing stairs fully meet today's current accessibility code. The stairs are both cast in place concrete with only one of the two meeting rise/run requirements. The stairs may qualify as an item that is technically infeasible to fully update. The Design Team will need to discuss with the AHJ the implications of attempting to bring the existing stairs up to code and if there are grounds to come to an agreement for updating.
        ii. For the purposes of this Feasibility Study, assume new handrail and guardrails at each stair with the existing concrete stairs to remain in place.
    c. Elevators:
        i. The existing elevator does not meet the current code. The elevator is located centrally within the building with concrete walls defining the full-height shaft. The elevator may qualify as an item that is technically infeasible to fully update. The Design Team will need to discuss with the AHJ the implications of attempting to bring the existing elevator up to code and if there are grounds to come to an agreement for updating.
        ii. The existing elevator does not service the lowest level within this building, signed as 3rd floor.

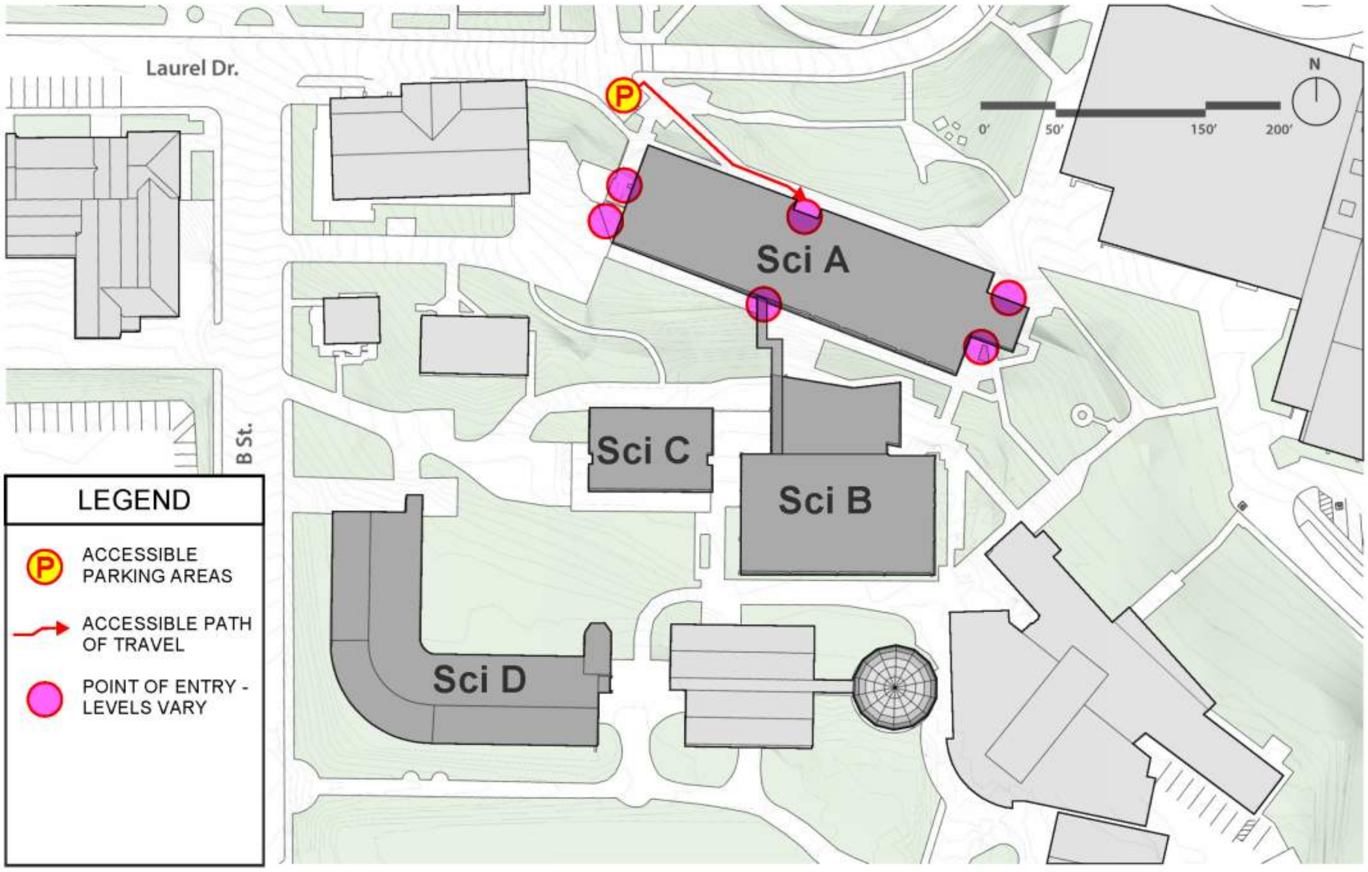


Figure 5.3.1.3 - Science A

iii. For the purposes of this Feasibility Study, assume new finishes within the existing elevator cab with updated accessible controls at both side of hallways at each floor (3 total) and within the elevator. However, the small footprint within the cab will need to remain.

iv. Also for the purposes of this Feasibility Study, we will assume a new 2-stop elevator that provides service From Level 2 to Level 1 of Science A – reference the plan diagrams below.

2. Toilet and bathing facilities serving the area.

   a. There are toilet facilities on the Third, Fourth, and Fifth floors (actual floor Levels 2, 3 and 4 respectively). It is possible that the AHJ may accept an approach to only locate accessible restrooms on every other floor, so that no person would be more than one level away from an accessible restroom.

   b. Given the scale of this renovation and that the elevator and stairs each have challenges preventing them from reaching full accessibility, it is likely that DSA would require all restrooms to be fully accessible.

   c. Since there is no accessible path to the 2nd floor (Level 1) of this building, a new restroom at this level should be provided.

   d. For the purposes of this Feasibility Study, it should be assumed that new accessible restrooms will be provided on Levels 2, 3, and 4 with the intent to maximize the existing restroom footprint at each floor level. Combined all-gender restrooms should be considered to maximize the available footprint without impacting adjacent areas where possible.
   e. For the purposes of this Feasibility Study, it should be assumed that a new single occupant accessible restroom will be created at the lowest level, Level1, within the Science A building so that there will be an accessible restroom option for this level.
3. Drinking fountains serving the area.
   a. There are wall mounted drinking fountains within the hallways mounted on the concrete walls. Where provided, drinking fountains shall be replaced with accessible drinking fountains mounted at accessible heights. There may need to be protection at either side given that these drinking fountains would protrude into the halls.
   b. For the purposes of this Feasibility Study, it should be assumed that a new accessible drinking fountain will be located on each floor.
4. Public telephones serving the area.
   a. Where provided, phones shall be replaced and installed to meet accessibility requirements.
   b. For the purposes of this Feasibility Study, it should be assumed that four new drinking fountains shall be installed.
5. Signs.
   a. Where provided, signs shall be replaced and installed to meet accessibility requirements.
   b. For the purposes of this Feasibility Study, it should be assumed that there will new code required signage throughout the building.

Following are building plans that support the Science A accessibility narrative above:

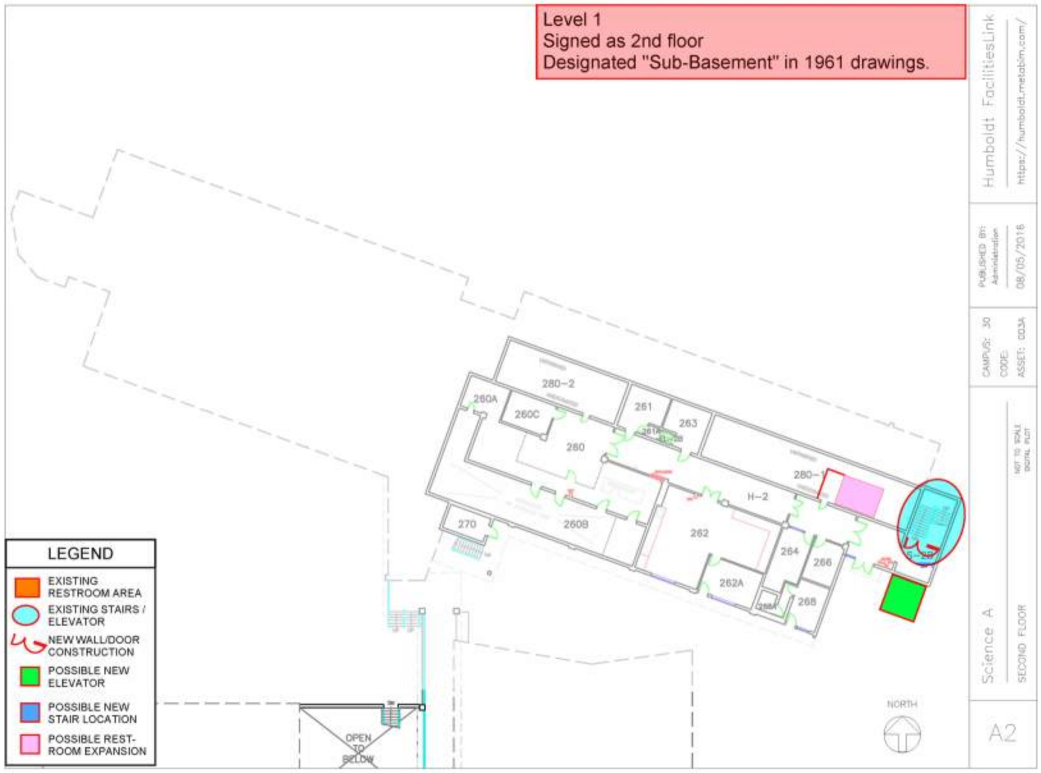


Figure 5.3.1.3 - Science A

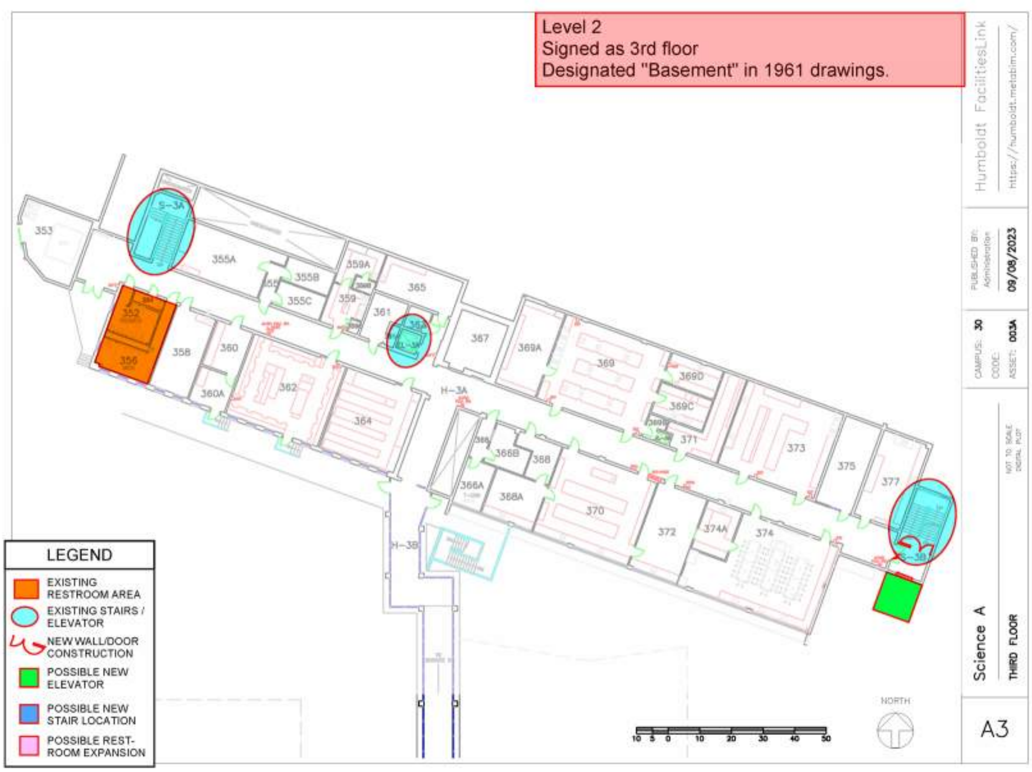


Figure 5.3.1.3 - Science A

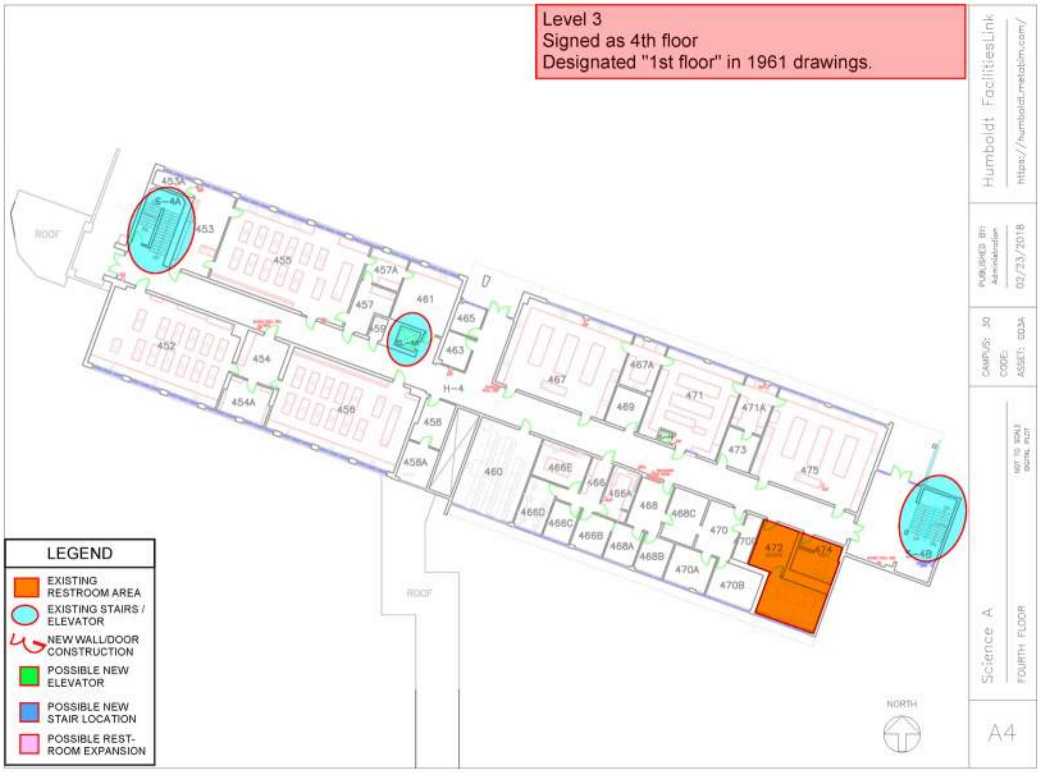


Figure 5.3.1.3 - Science A

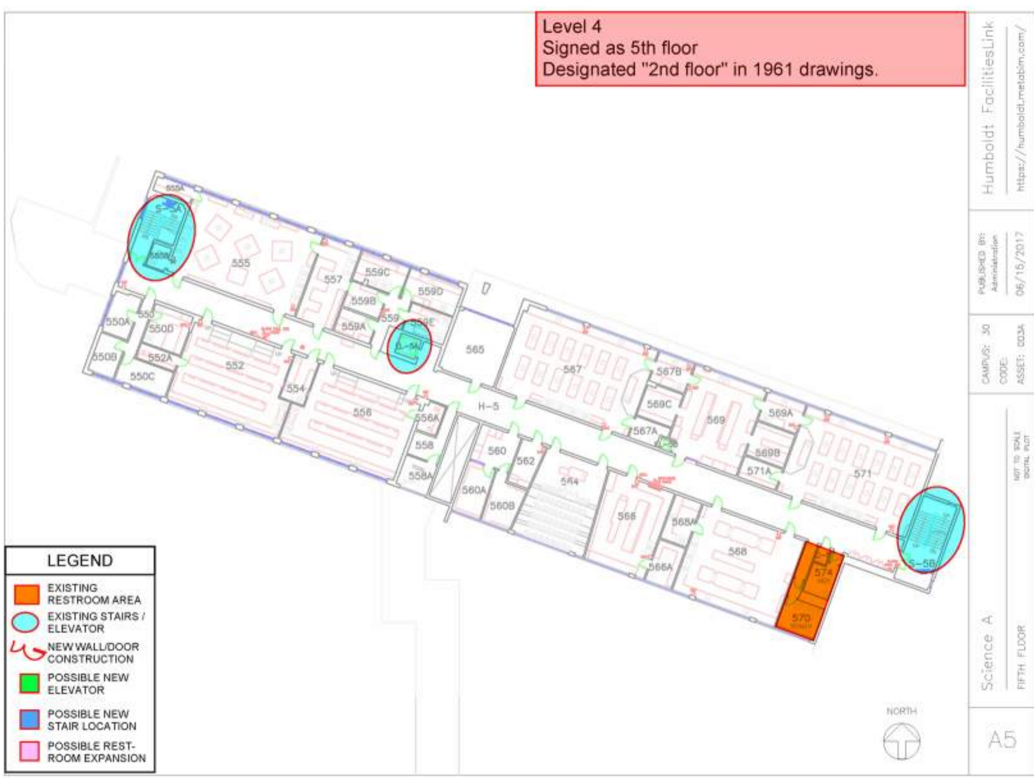


Figure 5.3.1.3 - Science A

Figure 5.3.1.3 - Science A

5.3.1.4 SCIENCE B

Lab Planning

Like with Science A, refer to the following diagrams of Current State and Future State for our proposed renovation strategy for laboratory types. For pricing refer to the Prototype Layouts.

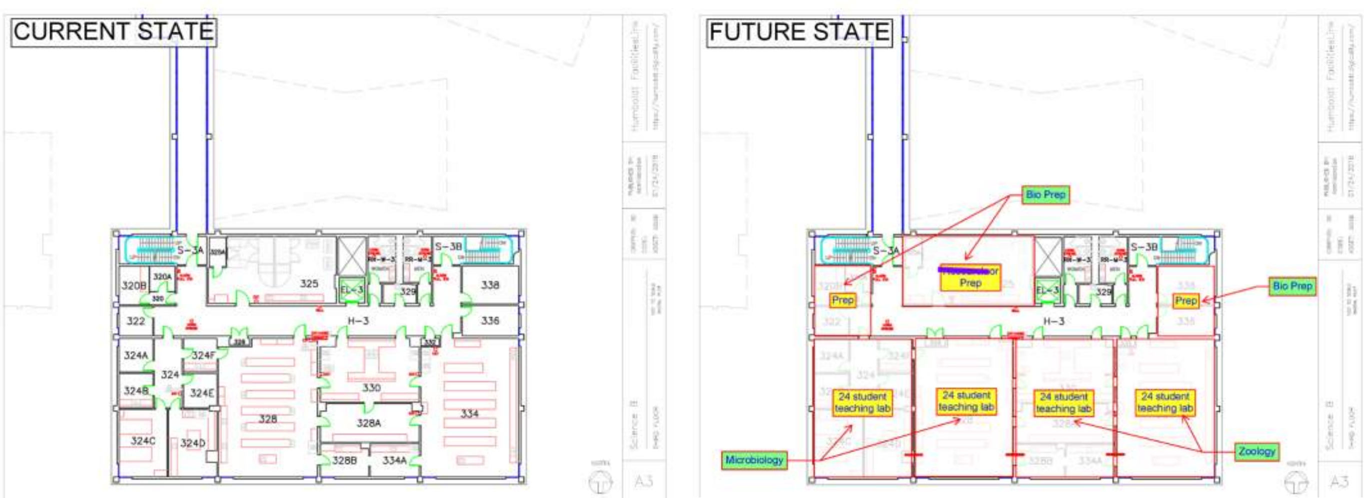


Figure 5.3.1.4 - Science B - Level 3

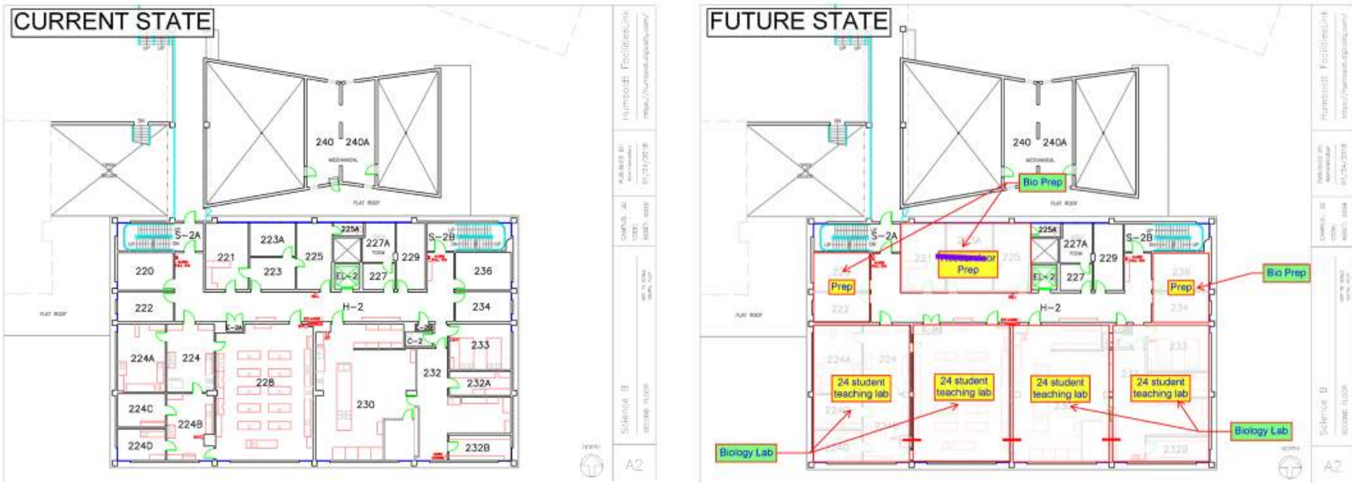


Figure 5.3.1.4 - Science B - Level 2

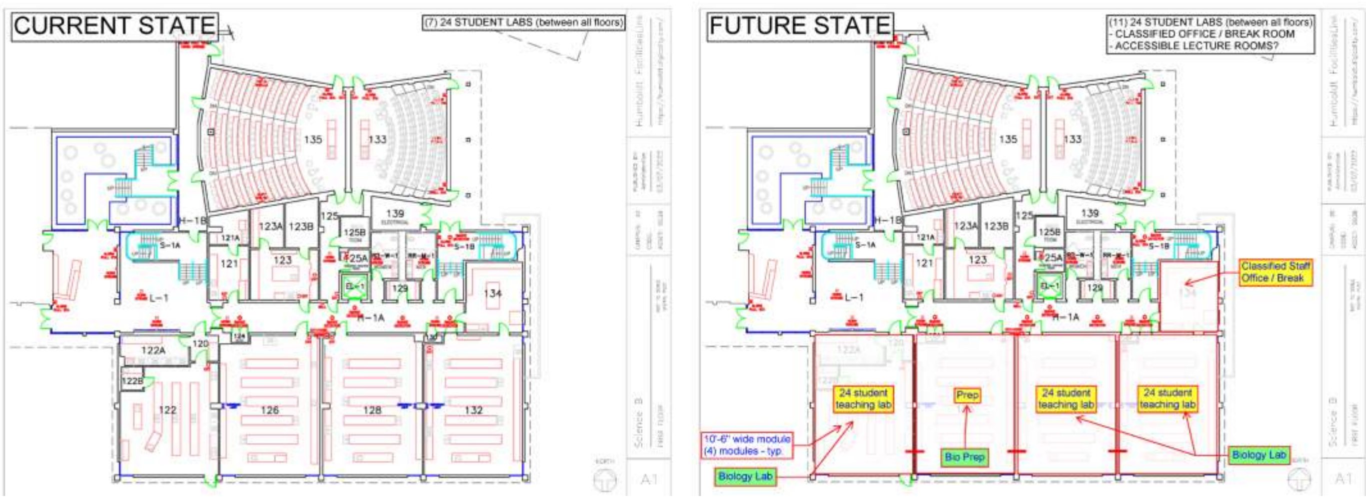


Figure 5.3.1.4 - Science B - Level 1

MEP Systems

This section illustrates prototypical rooms that may be replaced in the future. The following MEP narratives describe the impacts to renovate one room to one of the specific program types noted. There are a range of discipline specific impacts across the program types; from low impact programs, such as physics, to high impact programs, similar to organic chemistry. Regardless of the program type selected, if several rooms are renovated, the overall impact to the base building system may trigger the need to replace the aging MEP infrastructure (AHU, Exhaust Fans, Chilled Water, Heating Hot Water, and the associated distribution systems, including controls for mechanical systems, central plumbing systems like Compressed Air, Vacuum, RO/DI and domestic and Industrial Hot Water systems, and electrical gear and standby power source, etc.). Depending on the scale and scope of the project(s), the design / contracting team will need to evaluate and determine a strategy for the base building system, i.e. replace or renovate. Note that if the change in program increases the capacity of the MEP systems, the equipment may not be able to be replaced in the same location; an example would be the Building A air handler that is installed at the lowest level of the building, as it may not be adequate for an increase in required air volume.

In addition to length of life, considerations may include the need to replace the existing Air Handlers, Exhaust Fans, Electrical distribution systems, etc.

Regarding controls, the intent of the prototype scope of work is to provide a new Direct Digital Control (DDC) system, installed to monitor and control the major MEP equipment, the zone level equipment and connect to a central monitoring system on campus, as relevant to the proposed scope of work. The affected buildings will need a new front-end control system that is expandable to eventually convert the entire building and major MEP equipment over to the DDC control system. The campus is currently investigating upgrading their existing campus DDC system as a separate project, so the DDC system for these projects needs to be compatible with the existing campus and future campus control systems.

While a majority of the ductwork for the prototype scope of work) will be galvanized metal ductwork, there are two exceptions where welded stainless steel ducting (316L) ductwork is needed:

1. Chemical Fume Hoods and Other Specialty Exhaust: Exhaust from chemical fume hoods, snorkels, and other lab air capture devices shall be welded stainless steel from the device to a point of dilution.
2. Roof Exhaust Ductwork and Stacks: All exhaust air ducting on the roof, including the exhaust air stack shall be welded 316L stainless steel duct.

The following discipline level discussions provide additional detail on the scope for each of the prototype specific renovations.

MECHANICAL - BUILDING B

1. Replace existing end of life AHU with (1) top floor indoor-mounted unit supplying the entire building.
2. Replace “Hot” and “Cold” ducted distribution (terminating in mixing boxes) throughout the building with supply and return ducting including risers and laterals and new VAV terminals (with re-heat), runout ducts and diffusers.
3. Replace existing dedicated fume hood exhaust fans (~21 in this building) and associated distribution ductwork with three (3) larger roof mounted exhaust fans and new ducting manifolded to connect to fume hoods.
4. Provide new venturi exhaust valve for each fume hood.
5. Provide sash control for each fume hood.
6. Remove existing (2) gas boilers, gas piping, flues etc. and replace with 4-pipe air-source heat pump skid.
7. Replace existing HHW circulator pumps and install new CHW circulators (from ASHP to AHU coils).
8. Replace HHW piping system in its entirety within Building B and extend to connection point with Building C.
9. Install CHW piping from new plant to AHU. Extend piping to point of connection with Building C.

ELECTRICAL - BUILDING B

1. Address code violations found. Below are the measures to fix these.
    a. Within the Main Electrical room, it was found that an existing transformer is blocking the Switchboard working clearance. Re-install the transformer to clear the Switchboard working clearance.
    b. There are select panelboards within the Labs with working clearance less than 3 feet. Replace the panelboard with new and install in new location while meeting code required working clearance.
2. Replace obsolete equipment. Obsolete electrical equipment are over 50 years old and passed their useful life. Includes the following:
    a. Motor Control Center "MCC"
    b. Distribution boards
    c. Transformers
    d. Specific panelboards within Labs/Classrooms and Electrical rooms.
3. The existing normal power is fed from 800A switchboard. The full building renovation estimated electrical load is 545A. The existing service is sufficient to be reused.
4. There is an existing 42KW generator for standby power installed in 2004. It is sufficient to be reused and in good condition. It shall serve the following load types:
    a. Fume hood exhaust fans
    b. Lab freezers and refrigerators
    c. Emergency egress lighting and exit signs
    d. Miscellaneous lab equipment loads
5. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures. This will provide grounding protection against electric shock risk.
6. Provide each Lab spaces a dedicated load center / panelboard rated at 60Amps (minimum) 208/120Volts installed within the space.
7. Provide new distribution boards with surge protection and dry type transformers to support the new lab panels. It shall be sized with a power density of 5W/SF and applied to all lab spaces.
8. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment.
9. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
10. Provide new LED lighting fixtures and exit signs.
11. Provide new lighting controls with wireless functionality.

PLUMBING - BUILDING B

1. Replace existing cast iron with hub and spigot fittings sanitary waste and vent system in its entirety with cast iron and no-hub 4-band couplings.
2. Replace existing borosilicate glass lab waste and vent system in its entirety with polypropylene piping with socket-fused joints.
3. Separate sanitary waste and lab waste systems until they exit the building and provide a sampling port prior to the lab waste connecting into the sanitary system.
4. Replace existing domestic cold and hot water distribution piping in its entirety with copper piping and soldered joints.
5. Replace existing domestic water heater with electric resistance or heat pump water heaters with fully recirculating distribution piping.
6. Replace existing lab cold and hot water distribution piping in its entirety with copper piping and soldered joints.
7. Replace existing lab water heater with electric resistance or heat pump water heaters with fully recirculating distribution piping.
8. Replace lab compressed air (CA), Reverse Osmosis (RO), Natural Gas, and vacuum (VAC) distribution piping in its entirety with copper piping and brazed joints.
9. Replace existing CA, VAC, RO and natural gas equipment.

Architecture and Accessibility

Architecturally, the building will need upgrades to match the renovation work. Where work is to occur, ceilings should be suspension lay-in type at general classroom, hallways, and lab spaces. Casework should be replaced in all areas to receive work. Casework finishes should align with the programmatic use of the space – it would be recommended that all casework inside classrooms/labs in the Science B building all be chemical grade resistant similar to SEFA-8. Walls should be assumed to be painted gypsum board unless otherwise noted.

At restrooms to receive work, casework should be solid-surface countertops with drop-in sinks, walls should be tiled to a height of 7'-0" with 4x4 tiles, floors should be assumed to be 2x2 porcelain tiles, and toilet partitions to be assumed to be phenolic with overhead brace frame type system. Ceilings at restrooms are assumed to be painted gypsum board.

As part of meeting the latest energy codes, the Science B building should also upgrade at the building envelope to be able to meet code required minimums. The roof of the Science B building would be difficult to upgrade and should be studied with building energy modeling software. There are interstitial spaces, a large mechanical penthouse and there are portions of the upper slab that are only protected with a traffic coating; if the roof needs to be thermally updated, an underside approach may need to be considered so to not conflict with the possible amount of conflicts with the existing conditions at the top side of the fourth floor at Science B.

The exterior vertical envelope should also be captured as part of the cost model. At areas of solid walls, an open rain screen system should be considered with continuous mineral wool insulation installed at the exterior that would then be concealed by an exterior metal panel similar to Morin metal panel PULSE series with concealed fasteners and 12" wide panels.

New metal thermally broken metal windows, similar to Milgard A250 Series windows, at all classroom/lab spaces and new storefront, similar to Kawneer 451 TriFab series, at east stairs and building entrances.

Adding a new exterior material will greatly change the look of the building. Insulating at the interiors is also an option, but this will reduce the amount of assignable square footage that could be used for programmatic spaces.

Structural upgrades per California Existing Building Code (CEBC) 317.3.1 for Existing State-Owned Buildings should be considered for scale and costs of renovations that may trigger structural upgrades. To calculate the replacement cost, it is recommended to follow the guidelines set up by the Division of State Architect (DSA) for this purpose as a starting point that may be amenable to the AHJ.

Analysis of the existing structure of this building was not included in this Feasibility Study and nor was the cost of Structurally upgrading the Science B building included in this Cost Estimate portion of this Feasibility Study.

Regarding Accessibility, in this Phasing strategy under consideration is the interior renovation of the entire building. It is intended that all areas with student access will be upgraded to meet accessibility as much as possible and agreed to with the AHJ with the full scope of work. The California Existing Building Code provides guidance to establish priorities for providing accessibility renovation. Similar to the Existing Building Code, the California Building Code provides further guidance and establishes the priority of accessibility upgrades at renovation work. See 5.3.1.3 for relevant few excerpts from the current codes for consideration.

1. A primary entrance to the building or facility.
    a. Parking / Entrances:
        i. For the purposes of this Feasibility Study, the primary accessible entrance shall be from the parking lot immediately west of Science C.
            2. The west building entrance enters the building at level 1 and appears to be the primary building entrance but does not have an auto door opener. The west entrance is around 130' from the parking area and may require updated concrete flatwork at both the parking areas but also as well as the path of travel from the parking to the building entrance.
        ii. The parking area has accessibility challenges and will need to be verified for access compliance at the area of parking as well as the path from the parking spot areas to the building entrances themselves. This study would suggest adding an auto-door operator at any exterior door that may need to meet accessible access as the mechanical systems often makes doors closing automatically a challenge unless assisted by an auto-door operator. Each door that receives an auto-door operator should also receive new accessible controls at both the interior and exterior.
        iii. Science B has six (6) existing points of entry to the building. For the purposes of this Feasibility Study, it should be assumed to add 5 auto-door openers.

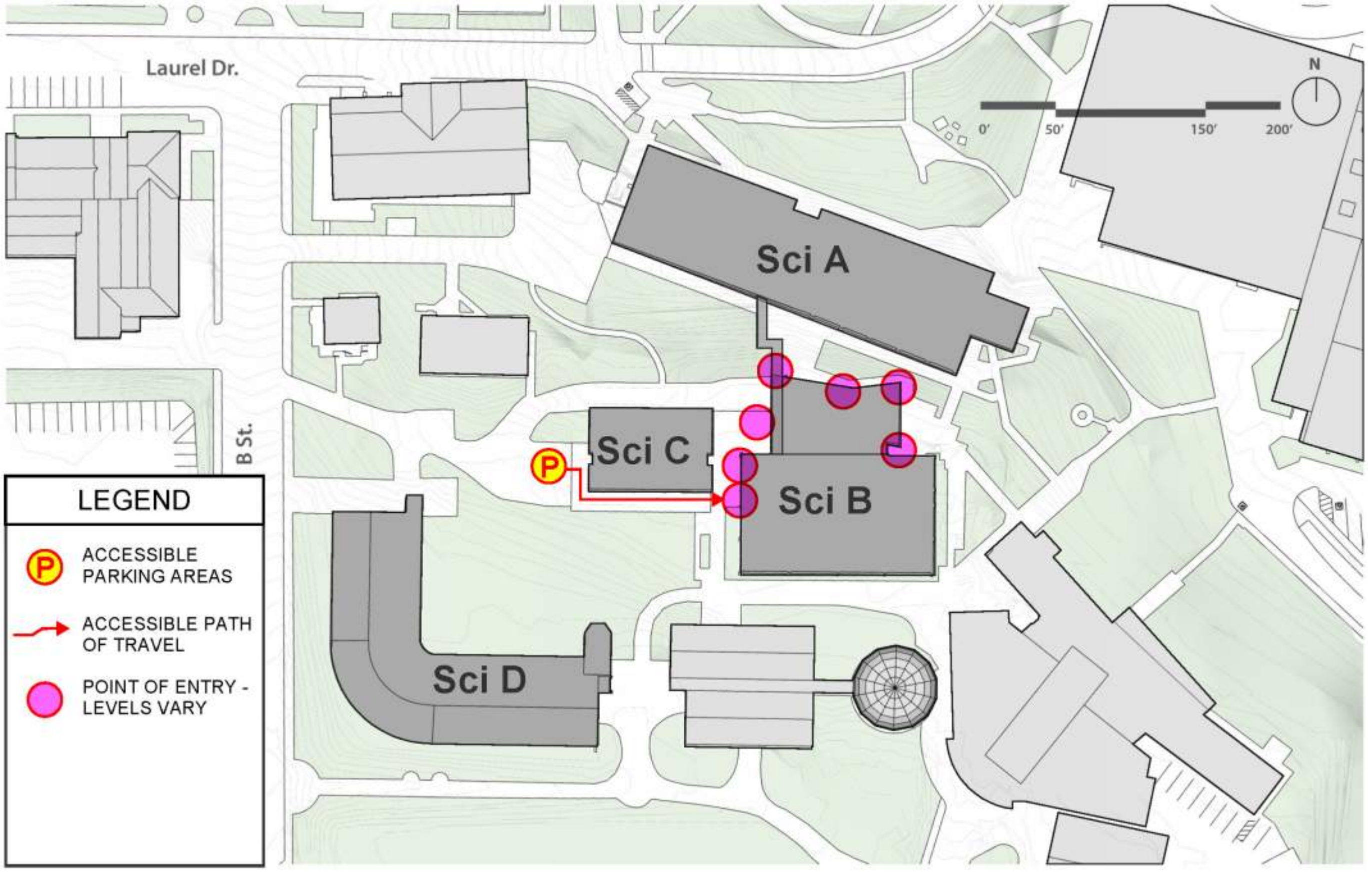


Figure 5.3.1.4 - Science B

b. Stairs:

i. Neither of the existing stairs fully meet today's current accessibility code. The stairs are both cast in place and appear to meet general rise/run requirements. The handrail and guardrails do not meet the current height requirements. The stairs may qualify as an item that is technically infeasible to fully update. The Design Team will need to discuss with the AHJ the implications of attempting to bring the existing stairs up to code and if there are grounds to come to an agreement for updating.

ii. For the purposes of this Feasibility Study, we will assume new handrail and guardrails at each stair with the existing cast-in-place stairs to remain in place.

c. Elevators:

i. The existing elevator does not appear to meet the current code and should be evaluated for gurney compliance. The elevator is located centrally within the building with concrete walls defining the full-height shaft. The elevator may qualify as an item that is technically infeasible to fully update. The Design Team will need to discuss with the AHJ the implications of attempting to bring the existing elevator up to code and if there are grounds to come to an agreement for updating.

   ii. For the purposes of this Feasibility Study, we will assume new finishes within the existing elevator cab with updated accessible controls at both side of hallways at each floor (4 total) and within the elevator. However, the small footprint within the cab will need to remain.

2. Toilet and bathing facilities serving the area.
   a. There are toilet facilities on Levels 1 and 3. It is possible that the AHJ may accept an approach to only locate accessible restrooms on every other floor, so that no person would be more than one level away from an accessible restroom, especially since this is already an existing condition.
   b. For the purposes of this Feasibility Study, it should be assumed that restrooms should be expanded and updated to meet accessibility where restrooms are currently provided on Levels 1 and 3. The restrooms will likely expand to take over the adjacent custodial closet adjacent to the restrooms on both levels 1 and 3. A goal would be to not reduce the current fixture count.
3. Drinking fountains serving the area.
   a. There are wall mounted drinking fountains within the hallways mounted on the concrete walls. Where provided, drinking fountains shall be replaced with accessible drinking fountains mounted at accessible heights. There may need to be protection at either side given that these drinking fountains would protrude into the halls.
   b. For the purposes of this Feasibility Study, it should be assumed that a new accessible drinking fountain will be located on each floor – 3 total.
4. Public telephones serving the area.
   a. Where provided, phones shall be replaced and installed to meet accessibility requirements.
   b. For the purposes of this Feasibility Study, it should be assumed that a new phone will be provided on each floor – 4 -total.
5. Signs.
   a. Where provided, signs shall be replaced and installed to meet accessibility requirements.
   b. For the purposes of this Feasibility Study, it should be assumed that there will new code required signage throughout the building.

As a general accessibility comment, it should be noted that the large lecture rooms 133 and 135 on the lowest level of Science B have accessibility challenges in that it is difficult to find the entrance to these spaces as through a couple doors that do not have auto openers. Also, only the lowest tiers of these lecture spaces are reachable via a wheelchair; the rear of these classrooms are not reachable by a wheelchair in their current state. If there are modifications to these spaces, these will need to be discussed with the AHJ for accessibility compliance. At the minimum, this study suggests adding auto openers to a certain number of doors which may address this issue.

Following are building plans that support the Science B accessibility narrative above:

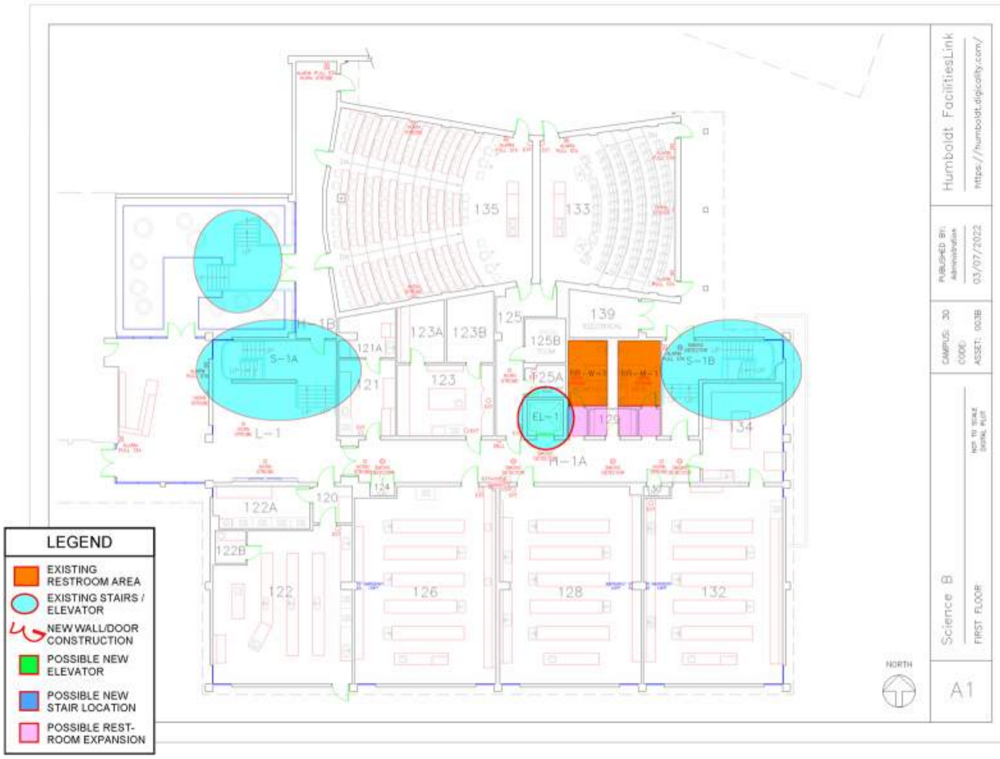


Figure 5.3.1.4 - Science B

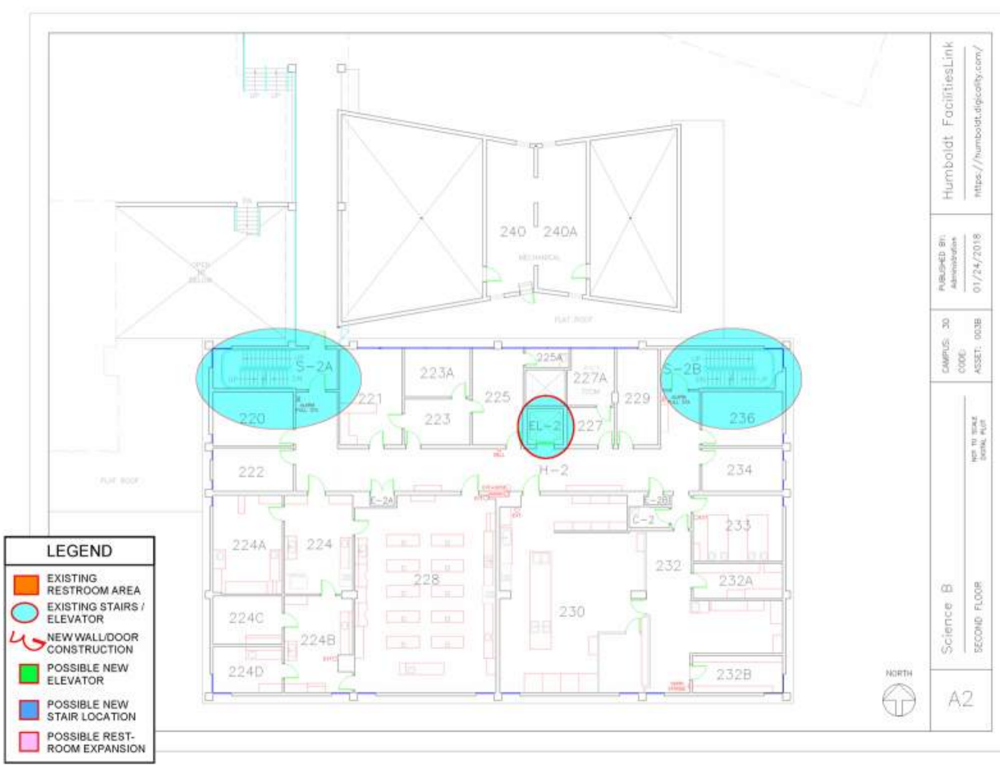


Figure 5.3.1.4 - Science B

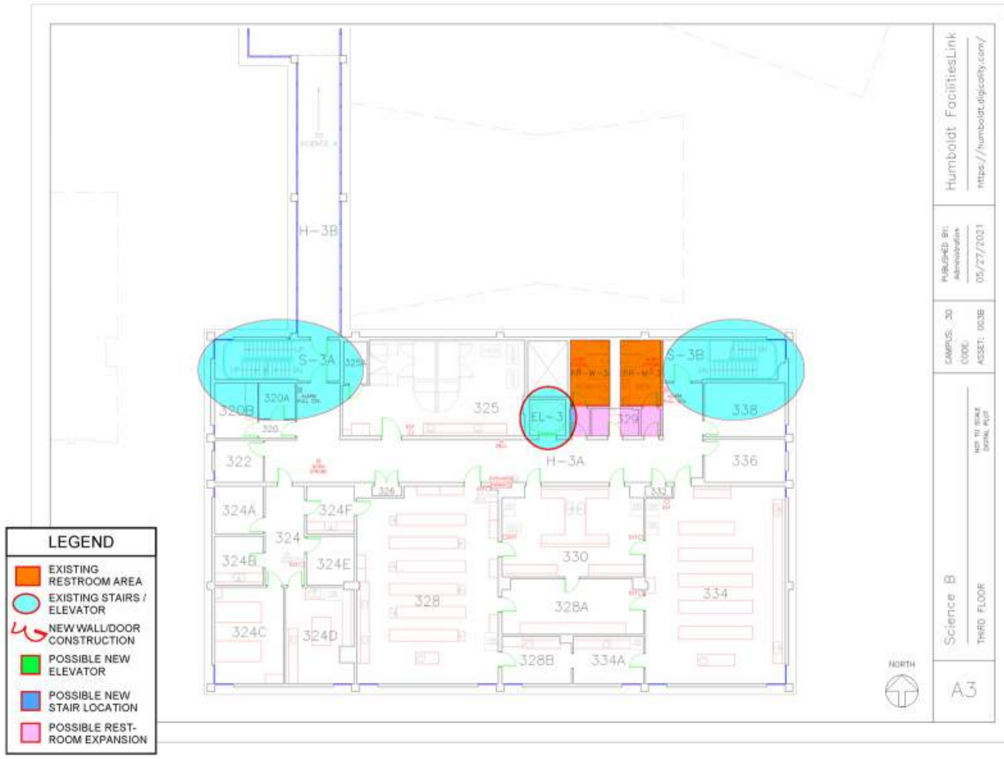


Figure 5.3.1.4 - Science B

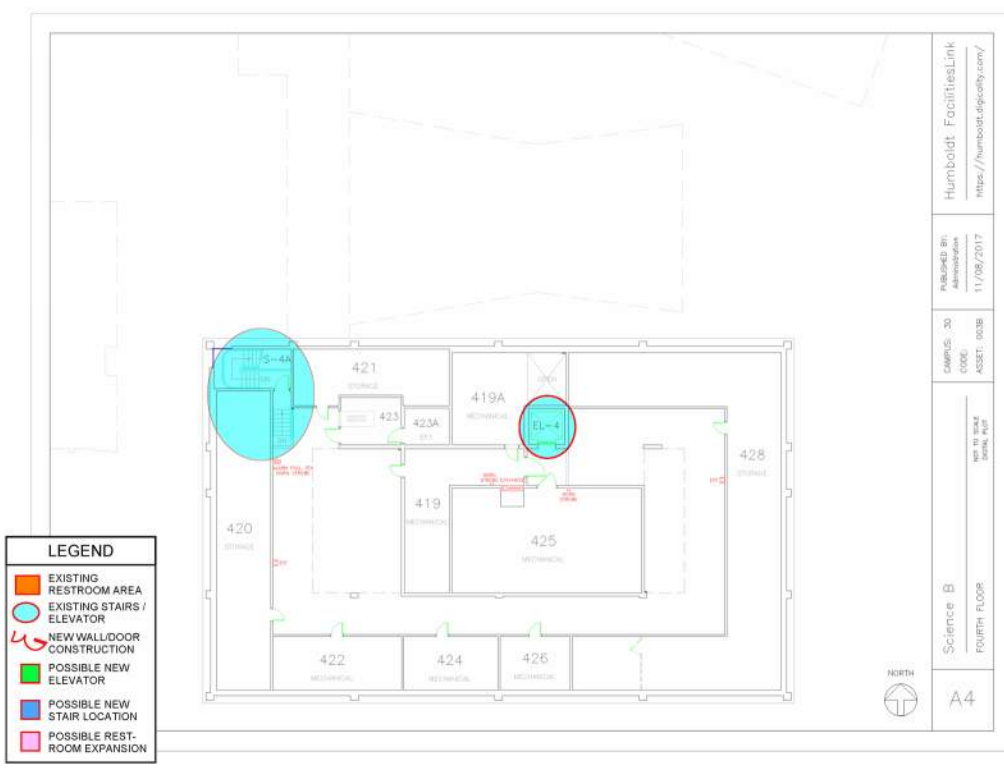


Figure 5.3.1.4 - Science B

5.3.1.5 SCIENCE C

Lab Planning

Science C has many issues including but not limited to vibration, mechanical, odors, accessibility and a leaking environmental room. We propose relocating all programs to other locations on campus so a complete gutting of the building could be done and renovate to bring the building up to meet current building codes, adding an elevator and creating (4) new teaching labs with related prep space.

Like with Science A, refer to the following diagrams of Current State and Future State for our proposed renovation strategy for laboratory types. For pricing refer to the Prototype Layouts.

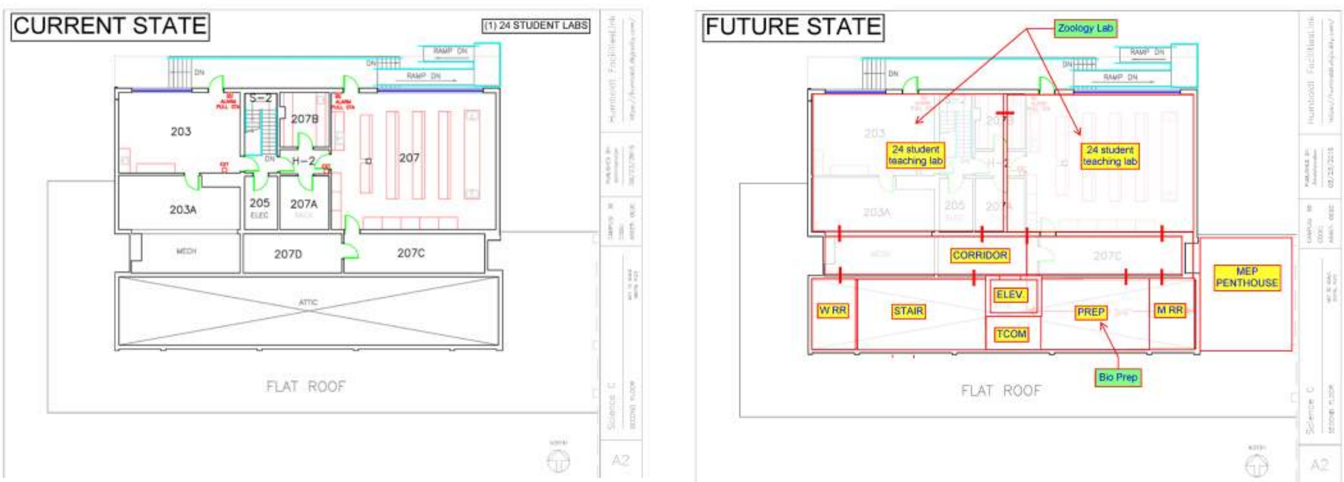


Figure 5.3.1.5 - Science C - Upper Level

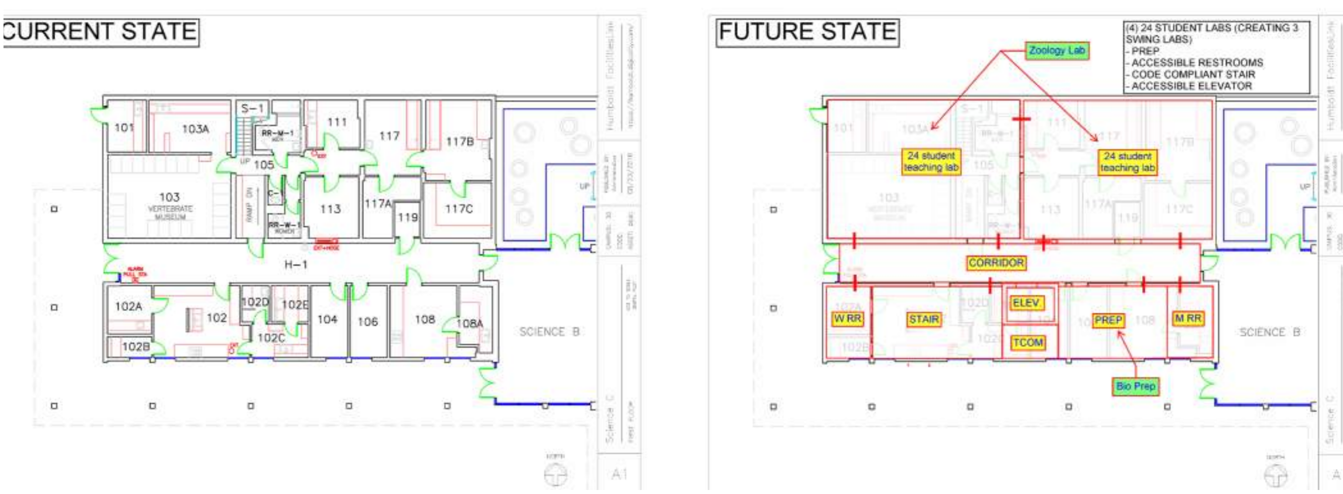


Figure 5.3.1.5 - Science C - Lower Level

MEP Systems

Targeted renovations in this feasibility strategy occur in Science A, levels 4 and 5, rooms 453, 453A, 455, 457, 457A, 467, 475, 552, 555, and 556, and Science B, level 1, room 132. The following MEP narratives describe the impacts to renovate targeted areas in these two buildings. Rooms 453, 453A, 455, 457, and 457A in Building A would be renovated as a part of the CiRM Shared Resource Laboratory, as described further in the lab portion of this Phasing Strategy. Room 132 in the adjacent Building B is core curriculum for the BIO 105 course. In addition to the scope impacts noted in the discipline narratives below, the programs or University may request infrastructure upgrades (AHU, Exhaust Fans, Chilled Water, Heating Hot Water, and the associated distribution systems, including controls for mechanical systems, central plumbing systems like Compressed Air, Vacuum, RO/DI and domestic and Industrial Hot Water systems, and electrical gear and standby power source, etc.) that are in alignment with the Full Building renovations noted above. For example, this could include providing branch electrical panels dedicated to the renovated labs to facilitate easier future renovations. The following discipline level discussions provide additional detail on the scope for the targeted renovation project.

While the targeted renovation will likely not trigger the need for envelope upgrades, the University and design team chosen for the project should consider the envelope upgrades noted in the Full Building renovations noted above.

Given the number of labs in this portion of the study, the variety of programs planned for these labs, and disparate heating, cooling, and electrical loads associated with each program type, the final impact on the central MEP systems (air handlers, exhaust fans, electrical systems etc will vary depending on the final lab count and the associated programs being planned. If the more load intense labs scope for the project, or additional high load labs are added to the scope of the project, then an upgrade to the central building systems is more likely.

Regarding controls, the intent of the focused scope of work is to provide a new Direct Digital Control (DDC) system, installed to monitor and control the major MEP equipment, the zone level equipment and connect to a central monitoring system on campus, as relevant to the proposed scope of work. In all cases, the affected buildings will need a new front-end control system that is expandable to eventually convert the entire building and major MEP equipment over to the DDC control system. The campus is currently investigating upgrading their existing campus DDC system as a separate project, so the DDC system for these projects needs to be compatible with the existing campus and future campus control systems.

While a majority of the ductwork for any the focused scope of work will be galvanized metal ductwork, there are two exceptions where welded stainless steel ducting (316L) ductwork is needed:

1. Chemical Fume Hoods and Other Specialty Exhaust: Exhaust from chemical fume hoods, snorkels, and other lab air capture devices shall be welded stainless steel from the device to a point of dilution.
2. Roof Exhaust Ductwork and Stacks: All exhaust air ducting on the roof, including the exhaust air stack shall be welded 316L stainless steel duct.

The following discipline level discussions provide additional detail on the scope for the targeted renovation project.

MECHANICAL - BUILDING C

1. Replace existing end of life AHU with (1) indoor-mounted unit (2nd floor) supplying the entire building.
2. Replace "Hot duct" and "Cold duct" distribution (terminating in mixing boxes) throughout the building with supply and return ducting including risers, laterals and new VAV (with re-heat) terminals, runout ducts and diffusers.
3. Replace existing dedicated fume hood exhaust fans associated distribution with three (3) of larger roof mounted exhaust fans and new ducting manifolded to connect to fume hoods.
4. Provide new venturi exhaust valve for each fume hood.
5. Provide sash control for each fume hood.
6. Upgrade HHW piping system within Building C (to be fed by plant located in Building B).
7. Install new CHW piping from entry into building (from Building B) to new AHU.
8. Provide outdoor condensing unit and DX coil within AHU to meet cooling demand for the building.

ELECTRICAL - BUILDING C

1. Replace obsolete equipment. Obsolete electrical equipment are over 50 years old and passed their useful life. Includes the following:
    a. Motor Control Center "MCC"
    b. Distribution boards
    c. Transformers
    d. Specific panelboards within Labs/Classrooms and Electrical rooms.
2. The existing normal power serving this building is unknown, and the distribution equipment are recommended to be fully replaced. The full building renovation estimated electrical load is 214KVA or 595A. It is recommended to upgrade the service with 600A service at 208/120V.
3. There is no generator standby power. It is recommended to derive standby power using a UPS sufficiently sized to handle motor loads. The generator shall be sized to accommodate the following load types:
    a. Fume hood exhaust fans
    b. Lab freezers and refrigerators
4. The Emergency egress lighting and exit signs shall able to utilize central lighting inverter for light fixtures and exit signs.
5. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures. This will provide grounding protection against electric shock risk.
6. Provide each Lab spaces a dedicated load center / panelboard rated at 60Amps (minimum) 208/120Volts installed within the space.

7. Provide new distribution boards with surge protection and dry type transformers to support the new lab panels. It shall be sized with a power density of 5W/SF and applied to all lab spaces.
8. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment.
9. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
10. Provide new LED lighting fixtures and exit signs.
11. Provide new lighting controls with wireless functionality.

PLUMBING - BUILDING C

1. Replace existing cast iron with hub and spigot fittings sanitary waste and vent system in its entirety with cast iron and no-hub 4-band couplings.
2. Replace existing borosilicate glass lab waste and vent system in its entirety with polypropylene piping with socket-fused joints.
3. Separate sanitary waste and lab waste systems until they exit the building and provide a sampling port prior to the lab waste connecting into the sanitary system.
4. Replace existing domestic cold and hot water distribution piping in its entirety with copper piping and soldered joints.
5. Replace existing domestic water heater with electric resistance or heat pump water heaters with fully recirculating distribution piping.
6. Replace existing lab cold and hot water distribution piping in its entirety with copper piping and soldered joints.
7. Replace existing lab water heater with electric resistance or heat pump water heaters with fully recirculating distribution piping.
8. Replace lab compressed air (CA), Reverse Osmosis (RO), Natural Gas, and vacuum (VAC) distribution piping in its entirety with copper piping and brazed joints.
9. Replace existing CA, VAC, RO and natural gas equipment.

Architecture and Accessibility

Architecturally, the building will need extensive renovation work. Where work is to occur, ceilings should be suspension lay-in type at general classroom, hallways, and lab spaces. Casework should be replaced in all areas to receive work. Casework finishes should align with the programmatic use of the space – it would be recommended that all casework inside classrooms/labs in the Science C building all be chemical grade resistant similar to SEFA-8. Walls should be assumed to be painted gypsum board unless otherwise noted.

Level 1 has significant accessibility challenges in that the north half of the level is approximately 18" below the adjacent main level of level 1 that is aligned to the exterior accessible parking. Assuming the desire is to keep and renovate the existing building, two initial concepts to address this situation would be to (1.) infill the lower level with gravel and pour a new concrete floor to align to the main level 1, or (2.) to install a raised flooring system that could align the floor to the height of the main level 1. For the purpose of this feasibility study, we will assume to add a new raised flooring system that will occur at rooms 101, 103, 103A, 105, 111, 113, 117, 117A, 117B, 117C, 119 as well as the areas of the restrooms and stairs which are proposed to be relocated per Lab Planning Future State diagram. Any approach here will also need to be verified with the AHJ for acceptability. The final design-contractor team will need to select the option that best works with the final floor plan at this level.

Restrooms are to be completely new at new locations in Science C. Casework should be solid-surface countertops with drop-in sinks, walls should be tiled to a height of 7'-0" with 4x4 tiles, floors should be assumed to be 2x2 porcelain tiles, and toilet partitions to be assumed to be phenolic with overhead brace frame type system. Ceilings at restrooms are assumed to be painted gypsum board.

As part of meeting the latest energy codes, the Science C building should also upgrade at the building envelope to be able to meet code required minimums. The roof of the Science B building would likely be addressed by adding lay-in insulation at the attic space of this building then creating unconditioned attic space which will just need to be ventilated per code.

The exterior vertical envelope should also be captured as part of the cost model. At areas of solid walls, an open rain screen system should be considered with continuous mineral wool insulation installed at the exterior that would then be concealed by an exterior metal panel similar to Morin metal panel PULSE series with concealed fasteners and 12" wide panels.

New metal thermally broken metal windows, similar to Milgard A250 Series windows, at all classroom/ lab spaces and new storefront, similar to Kawneer 451 TriFab series, at building entrances.

Adding a new exterior material will greatly change the look of the building. Insulating at the interiors is also an option, but this will reduce the amount of assignable square footage that could be used for programmatic spaces.

Structural upgrades per California Existing Building Code (CEBC) 317.3.1 for Existing State-Owned Buildings should be considered for scale and costs of renovations that may trigger structural upgrades. To calculate the replacement cost, it is recommended to follow the guidelines set up by the Division of State Architect (DSA) for this purpose as a starting point that may be amenable to the AHJ.

Analysis of the existing structure of this building was not included in this Feasibility Study and nor was the cost of Structurally upgrading the Science C building included in this Cost Estimate portion of this Feasibility Study.

Regarding Accessibility, in this Phasing strategy under consideration is the interior renovation of the entire building. It is intended that all areas with student access will be upgraded to meet accessibility as much as possible and agreed to with the AHJ with the full scope of work. The California Existing Building Code provides guidance to establish priorities for providing accessibility renovation. Similar to the Existing Building Code, the California Building Code provides further guidance and establishes the priority of accessibility upgrades at renovation work. See 5.3.1.3 for relevant few excerpts from the current codes for consideration.

1. A primary entrance to the building or facility.
    a. Parking / Entrances:
        i. The main entrance from Accessible parking is on the west side of the Science C building as shown in the graphic site below. The west building entrance enters the building at level 1 and appears to be the primary building entrance. The accessible parking area is immediately outside the building and may require updated concrete flatwork at the parking area as well as the path of travel from the parking to the building entrance.
        ii. Science C has six (4) existing exterior points of entry to the building with only 2 that appear to receive frequent use. For the purposes of this Feasibility Study, it should be assumed to add 2 auto-door openers.

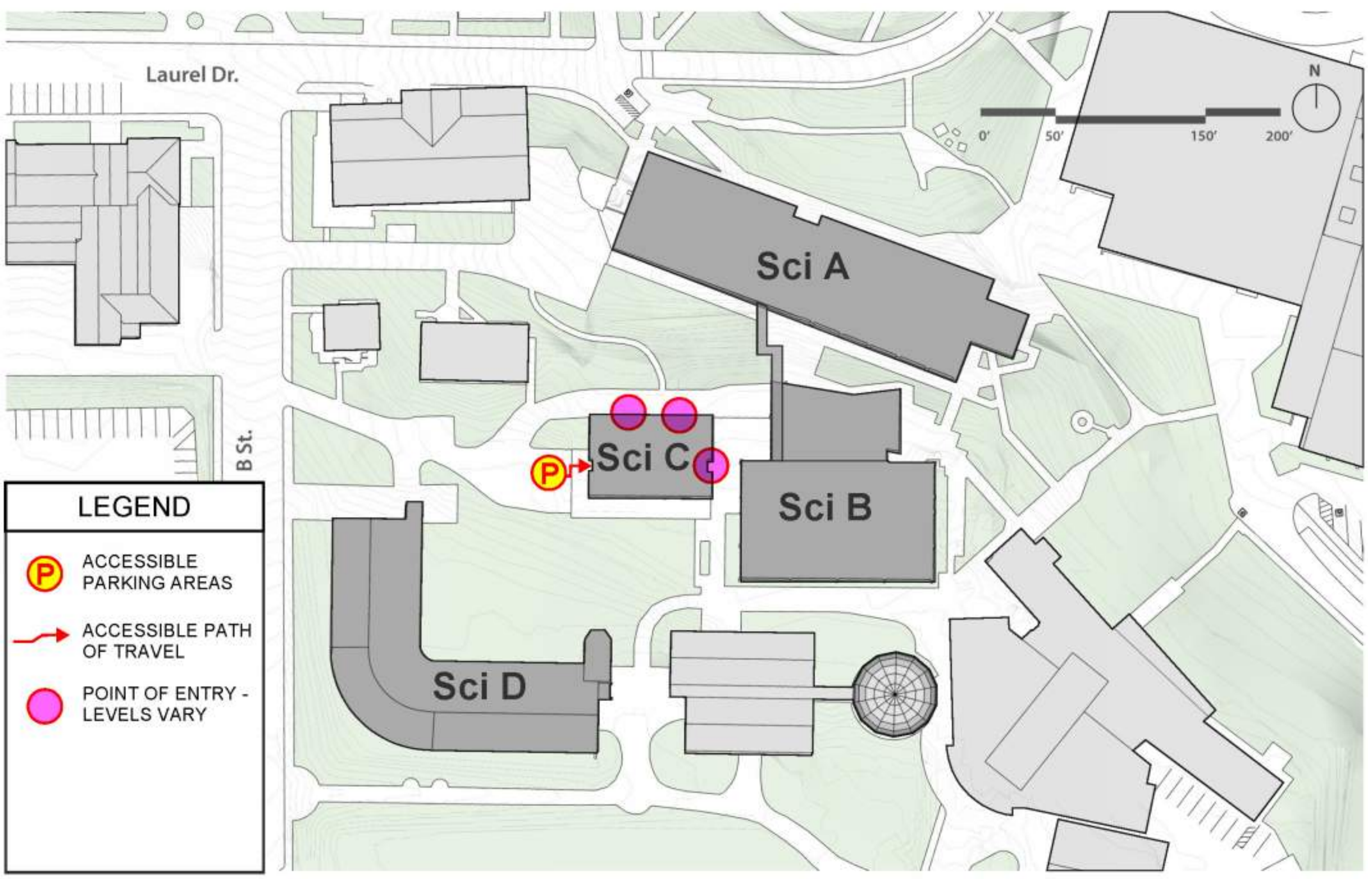


Figure 5.3.1.5 - Science C

b. Stairs

i. Science C has one existing stair that does not comply with the current accessibility code and would be difficult to do so in the footprint of its current location.

ii. For the purposes of this Feasibility Study, we will assume a new accessible stairwell with new handrail and guardrails at a new location per the diagram below. The stairway construction will be supported by metal framed supporting structure.

c. Elevators

i. There is no existing elevator at the Science C building.

ii. For the purposes of this Feasibility Study, we will assume to add a new accessible elevator at a new location within the building per the supporting plan diagrams below.

2. Toilet and bathing facilities serving the area.

a. There are toilet facilities on Level 1 only. The toilet facilities do not meet the current accessibility code and would be difficult to do so in the footprint of its current location.

b. For the purposes of this Feasibility Study, it should be assumed that new restrooms should be provided at new locations as shown on diagrams – 4 total.

3. Drinking fountains serving the area.

a. There are wall mounted drinking fountains within the hallways mounted on the concrete walls. Where provided, drinking fountains shall be replaced with accessible drinking fountains mounted at accessible heights. There may need to be protection at either side given that these drinking fountains would protrude into the halls.

b. For the purposes of this Feasibility Study, it should be assumed that a new accessible drinking fountain will be located on each floor – 2 total.

4. Public telephones serving the area.

a. Where provided, phones shall be replaced and installed to meet accessibility requirements.

b. For the purposes of this Feasibility Study, it should be assumed that a new phone will be provided on each floor – 2 total.

5. Signs.

a. Where provided, signs shall be replaced and installed to meet accessibility requirements.

b. For the purposes of this Feasibility Study, it should be assumed that there will new code required signage throughout the building.

As a general accessibility comment for Science C is that the original lowest level of the building is approximately 18" below the newer addition to the building. This large of a differential increases the difficulty of meeting accessibility while making best use of the space within the building's footprint. The accessibility changes presented at this building are large and the value of a full building replacement may need to be considered as part of any future renovation work.

Following are building plans that support the Science C accessibility narrative above:

Figure 5.3.1.5 - Science C

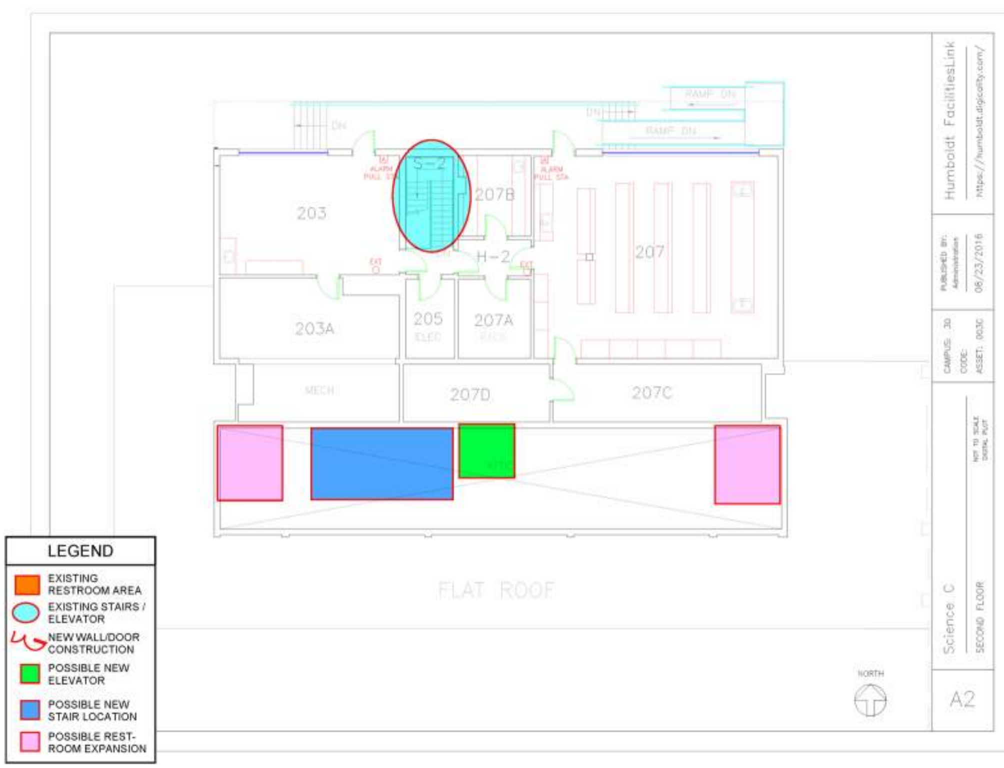


Figure 5.3.1.5 - Science C

5.3.1.6 SCIENCE D

Lab Planning

During our initial site visit and in subsequent meetings with Cal Poly Humboldt we learned many of the spaces that were planned to vacate Science D were not leaving so we did not assess the interior conditions of that building for any lab planning upgrades.

MEP Systems

MECHANICAL - BUILDING D

1. Replace (2) existing end of life AHUs with (2) new roof mounted units in the same positions.
2. Replace all ducted distribution throughout the building with supply and return ducting including risers, laterals and new VAV (with re-heat) terminals, runout ducts and diffusers.
3. Replace existing dedicated fume hood exhaust fans associated distribution with a small number (~2) of larger roof mounted exhaust fans and new ducting manifolded to connect to fume hoods.
4. Provide new venturi exhaust valve for each fume hood.
5. Replace heating boiler and air-cooled chiller plant (located at the adjacent Mech/Greenhouse Building) with combined HHW/CHW 4-pipe heat pump skid.
6. Replace HHW and CHW circulators and associated plant, reconnecting to existing piping which runs below grade to Building D.
7. Replace HHW piping within Building D in its entirety (from point of entry to building to heating coils).
8. Replace CHW piping within Building D in it’s entirety (from point of entry to building to AHU CHW coils).

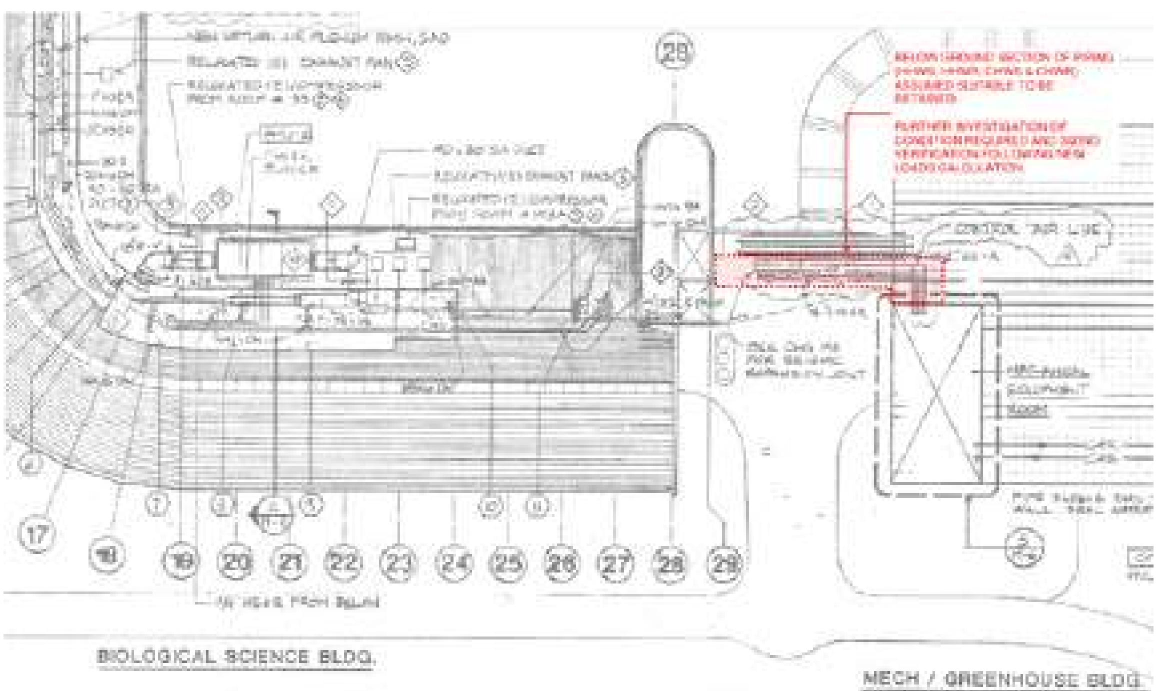


Figure 5.3.1.6 - Science D - Site

ELECTRICAL - BUILDING D

1. Replace obsolete equipment. Obsolete electrical equipment are over 50 years old and passed their useful life. Includes the following:
    a. Motor Control Center "MCC"
    b. Distribution boards
    c. Transformers
    d. Specific panelboards within Labs/Classrooms and Electrical rooms.
2. The existing normal power is shared and fed from Bldg E with 500KVA transformer and 1,000A switchboard with 700A main breaker. The full building D renovation estimated electrical load is 370KVA. The existing building E load is unknown and recommend being metered for determination.
3. There is no generator standby power. Install a new outdoor diesel generator set with a sub-base fuel tank and housed in a weatherproof sound attenuated enclosure and automatic transfer switches. The generator shall be sized to accommodate the following load types:
    a. Fume hood exhaust fans
    b. Lab freezers and refrigerators
    c. Emergency egress lighting and exit signs
4. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures. This will provide grounding protection against electric shock risk.
5. Provide each Lab spaces a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space.
6. Provide new distribution boards with surge protection and dry type transformers to support the new lab panels. It shall be sized with a power density of 5W/SF and applied to all lab spaces.
7. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment.
8. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
9. Provide new LED lighting fixtures and exit signs.
10. Provide new lighting controls with wireless functionality.

PLUMBING - BUILDING D

1. Replace existing cast iron with hub and spigot fittings sanitary waste and vent system in its entirety with cast iron and no-hub couplings.
2. Replace existing borosilicate glass lab waste and vent system in its entirety with polypropylene piping with socket-fused joints.
3. Provide a sampling port prior to the lab waste connecting into the sanitary system.

4. Replace existing domestic cold and hot water distribution piping in its entirety with copper piping and soldered joints.
5. Replace existing domestic water heater with electric resistance or heat pump water heaters with fully recirculating distribution piping.
6. Provide dedicated lab cold and hot water distribution piping with copper piping and soldered joints.
7. Provide dedicated lab hot water heaters of electric resistance or heat pump type with fully recirculating distribution piping.
8. Replace lab compressed air and vacuum distribution piping in its entirety with copper piping and brazed joints.
9. Replace lab compressed air and vacuum equipment.
10. Feasibility report did not include replacement gas piping.

Architecture and Accessibility

Architecturally, the building will need upgrades to match the renovation work. Where work is to occur, ceilings should be suspension lay-in type at general classroom, hallways, and lab spaces. Casework should be replaced in all areas to receive work. Casework finishes should align with the programmatic use of the space – it would be recommended that all casework inside classrooms/labs in the Science B building all be chemical grade resistant similar to SEFA-8. Walls should be assumed to be painted gypsum board unless otherwise noted.

At restrooms to receive work, casework should be solid-surface countertops with drop-in sinks, walls should be tiled to a height of 7'-0" with 4x4 tiles, floors should be assumed to be 2x2 porcelain tiles, and toilet partitions to be assumed to be phenolic with overhead brace frame type system. Ceilings at restrooms are assumed to be painted gypsum board.

There are no envelope upgrades assumed at Science D as part of this Feasibility study. As part of meeting the latest energy codes, it would be best to upgrade the Science D building envelope to be able to meet code required minimums, but the Science D building is mostly glazing systems and would be nearly a complete careful removal and replacement to ~85% of the building exterior envelope. There are some minor areas of flat roof at the building, but these are largely covered with mechanical equipment and pads.

Structural upgrades per California Existing Building Code (CEBC) 317.3.1 for Existing State-Owned Buildings should be considered for scale and costs of renovations that may trigger structural upgrades. To calculate the replacement cost, it is recommended to follow the guidelines set up by the Division of State Architect (DSA) for this purpose as a starting point that may be amenable to the AHJ.

Analysis of the existing structure of this building was not included in this Feasibility Study and nor was the cost of Structurally upgrading the Science D building included in this Cost Estimate portion of this Feasibility Study.

Regarding Accessibility, in this Phasing strategy under consideration is the interior renovation of the entire building. It is intended that all areas with student access will be upgraded to meet accessibility as much as possible and agreed to with the AHJ with the full scope of work. The California Existing Building Code provides guidance to establish priorities for providing accessibility renovation. Similar to the Existing Building Code, the California Building Code provides further guidance and establishes the priority of accessibility upgrades at renovation work. See 5.3.1.3 for relevant few excerpts from the current codes for consideration.

1. A primary entrance to the building or facility.
    a. Parking / Entrances:
        i. The main entrance from Accessible parking is on the east side of the Science D building as shown in the graphic site below. The east building entrance enters the building at level 1 and appears to be the primary building entrance. The accessible parking area is located approximately 300' feet away near the Forestry and Wildlife building. The accessible parking may require updated concrete flatwork at the parking area as well as the path of travel from the parking to the building entrance.
        ii. Science D has six (4) existing exterior points of entry to the building with only 3 at grade. For the purposes of this Feasibility Study, it should be assumed to add 3 auto-door openers.

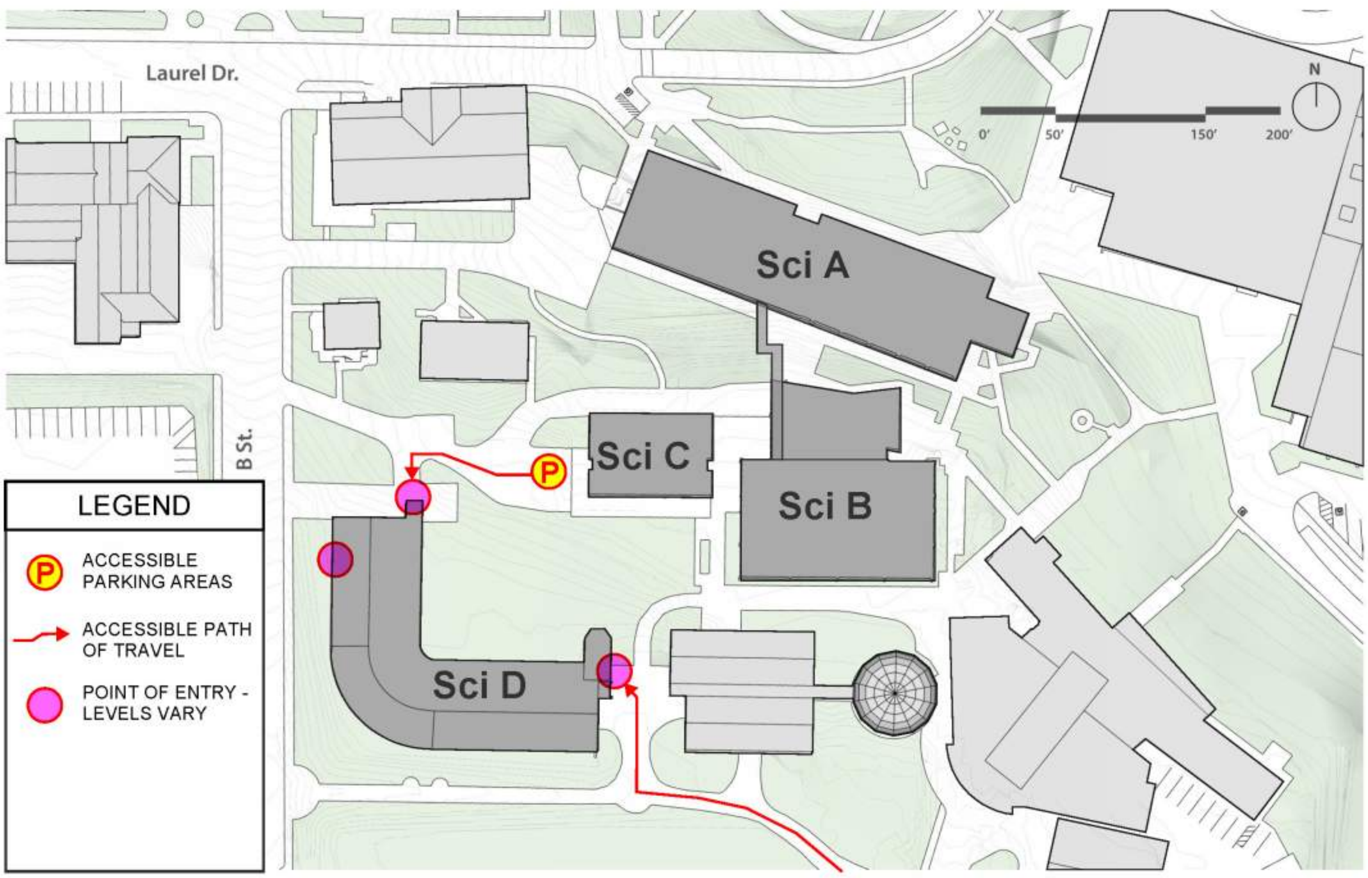


Figure 5.3.1.6 - Science D

    b. Stairs
        i. Science D has one existing stair in the building, and it does not comply with the current accessibility code

ii. The stairs are steel treads and risers between steel stringers. The stairs may qualify as an item that is technically infeasible to fully update. The Design Team will need to discuss with the AHJ the implications of attempting to bring the existing stairs up to code and if there are grounds to come to an agreement for updating.

iii. For the purposes of this Feasibility Study, we will assume new handrail and guardrails at the stair with the existing steel stairs to remain in place.

c. Elevators

i. The existing elevator appears to meet the overall sizes required by the current code. The elevator is located at the south-east end of the building. The existing elevator should be reviewed by the responsible designer to verify access compliance.

ii. The existing elevator provides service to all levels of the building – 3 stops total.

iii. For the purposes of this Feasibility Study, we will assume new finishes within the existing elevator cab with updated accessible controls at both side of hallways at each floor - 3 total.

2. Toilet and bathing facilities serving the area.

a. There are toilet facilities on both levels. The toilet facilities do not meet all portions of the current accessibility code and would need to be renovated within the footprint of their current location.

b. For the purposes of this Feasibility Study, it should be assumed that existing restrooms should be renovated at the existing locations as shown on the diagrams – 4 restrooms total in this building.

3. Drinking fountains serving the area.

a. There are wall mounted drinking fountains within the hallways mounted on the concrete walls. Where provided, drinking fountains shall be replaced with accessible drinking fountains mounted at accessible heights. There may need to be protection at either side given that these drinking fountains would protrude into the halls.

b. For the purposes of this Feasibility Study, it should be assumed that a new accessible drinking fountain will be located on each floor – 2 total.

4. Public telephones serving the area.

a. Where provided, phones shall be replaced and installed to meet accessibility requirements.

b. For the purposes of this Feasibility Study, it should be assumed that a new phone will be provided on each floor – 2 total.

5. Signs.

a. Where provided, signs shall be replaced and installed to meet accessibility requirements.

b. For the purposes of this Feasibility Study, it should be assumed that there will new code required signage throughout the building.

Following are building plans that support the Science D accessibility narrative above:

Figure 5.3.1.6 - Science D

Figure 5.3.1.6 - Science D

5.3.2 PHASING STRATEGY 2 - LAB PROTOTYPES

This section is providing fitment plans that document the outfitting for various prototypical labs that would fit at these buildings for instances where there may only be targeted funds allocated for specific lab and or lab types with these buildings.

These prototype plans are being provided to determine cost on a square-footage basis with consideration given to equipment and plan layouts. Sample floor plans for these room types can be found in the Appendix, Section 7: Phasing Strategy - Prototypes.

The cost estimating being provided for these prototypes should be 'general in nature' and are not to thought of as building specific and or related to the MEP systems as updates or necessary changes to MEP systems can vary widely depending on building infrastructure, location within a building, and specific lab needs as related to building systems.

The prototypical labs documented here are as follows:

- Organic/Inorganic Chemistry
- General Chemistry (Options 1 and/or 2)
- General Physics
- General Biology
- Microbiology
- Anatomy / Zoology
- 24 Person Classroom
- 48 Person Classroom
- Faculty Office
- Part-time Faculty Office
- Faculty Workspace
- Break room
- Conference - Small
- Computer Lab

MEP Systems

MECHANICAL - TYPICAL LAB SPACES

Organic/Inorganic Chemistry

1. Provide 10,100 CFM (7.6 CFM/SF) exhaust air and ventilation air.
    a. Provide (1) 10,000 CFM AHU to serve each chemistry lab or (1) 33,000 CFM AHU to serve the three chemistry labs. AHU is assumed to be roof mounted and provided with N+1 redundancy via a fan array fan arrangement. The 100% OSA AHU will need to be provided with new chilled water and heating hot water extensions from the floor below to condition the outside air for delivery to the occupied spaces. Provide MERV 8 pre-filters and MERV 15 final filters. Due to existing services in the Level 5 Ceiling space, roof mounted ductwork and new roof penetrations into each lab may be needed.

b. Provide (2) 10,100 CFM, 15 HP exhaust fans with N+1 redundancy per each lab renovated or a manifolded 33,000 CFM fan system providing three fans, each sized at 50% of the load or 16,500 CFM.

c. Heating and cooling loads will be increased by 280 BTUH/SF and 40 BTUH/SF respectively to condition the additional ventilation air compared with typical labs with 1 CFM/SF.

2. Provide dedicated venturi exhaust air valve for each fume hood.
3. Provide sash control for each fume hood.
4. Provide variable volume pressure independent terminal boxes. Controls and actuators on all terminal boxes to match the speed of response of the fume hood air valve – fast acting.
5. Connect lab controls to BMS. (BMS DDC upgrade will be a separate scope)

General Chemistry

1. Provide 3,200 CFM (2.4 CFM/SF) exhaust air and ventilation air.
   a. Provide (1) 10,000 CFM AHU to serve each chemistry lab or (1) 33,000 CFM AHU to serve the three chemistry labs. AHU is assumed to be roof mounted and provided with N+1 redundancy via a fan array fan arrangement. The 100% OSA AHU will need to be provided with new chilled water and heating hot water extensions from the floor below to condition the outside air for delivery to the occupied spaces. Provide MERV 8 pre-filters and MERV 15 final filters. Due to existing services in the Level 5 Ceiling space, roof mounted ductwork and new roof penetrations into each lab may be needed.
   b. Provide (2) 10,100 CFM, 15 HP exhaust fans with N+1 redundancy per each lab renovated or a manifolded 33,000 CFM fan system providing three fans, each sized at 50% of the load or 16,500 CFM
   c. Heating and cooling loads will be increased by 60 BTUH/SF and 10 BTUH/SF respectively to condition the additional ventilation air required.
2. Provide dedicated venturi exhaust air valve for each fume hood.
3. Provide sash control for each fume hood.
4. Provide variable volume pressure independent terminal boxes. Controls and actuators on all terminal boxes to match the speed of response of the fume hood air valve – fast acting.
5. Connect lab controls to BMS. (BMS DDC upgrade will be a separate scope)

Physics

1. Provide 1,330 CFM (1 CFM/SF) exhaust air and ventilation air.
2. Provide variable volume pressure independent terminal boxes.
3. Connect lab controls to BMS. (BMS DDC upgrade will be a separate scope)

General Biology

1. Provide 1,330 CFM (1 CFM/SF) exhaust air and ventilation air.
2. Provide dedicated venturi exhaust air valve for each fume hood.

3. Provide sash control for each fume hood.
4. Provide variable volume pressure independent terminal boxes. Controls and actuators on all terminal boxes to match the speed of response of the fume hood air valve – fast acting.
5. Connect lab controls to BMS. (BMS DDC upgrade will be a separate scope)

Microbiology

1. Provide 1,330 CFM (1 CFM/SF) exhaust air and ventilation air.
2. Provide variable volume pressure independent terminal boxes.
3. Connect lab controls to BMS. (BMS DDC upgrade will be a separate scope)

Anatomy / Zoology

1. Provide 1,330 CFM (1 CFM/SF) exhaust air and ventilation air.
2. Provide dedicated venturi exhaust air valve for each fume hood.
3. Provide sash control for each fume hood.
4. Provide variable volume pressure independent terminal boxes. Controls and actuators on all terminal boxes to match the speed of response of the fume hood air valve – fast acting.
5. Connect lab controls to BMS. (BMS DDC upgrade will be a separate scope)

ELECTRICAL - TYPICAL LAB SPACES

Organic/Inorganic Chemistry

1. Provide each Lab space with a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation – assuming 6-foot lengths where these may occur.
2. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment. Refer to Mechanical and Plumbing narratives for the loads.
3. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures.
4. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
5. Provide new LED lighting fixtures and exit signs.
6. Provide new lighting controls with wireless functionality.

General Chemistry

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation – assuming 6-foot lengths where these may occur.

2. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment. Refer to Mechanical and Plumbing narratives for the loads.
3. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures.
4. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
5. Provide new LED lighting fixtures and exit signs.
6. Provide new lighting controls with wireless functionality.

Physics

1. Provide each Lab space with a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation – assuming 6-foot lengths where these may occur.
2. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures.
3. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
4. Provide new LED lighting fixtures and exit signs.
5. Provide new lighting controls with wireless functionality.

General Biology

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation – assuming 6-foot lengths where these may occur.
2. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment. Refer to Mechanical and Plumbing narratives for the loads.
3. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures.
4. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
5. Provide new LED lighting fixtures and exit signs.
6. Provide new lighting controls with wireless functionality.

Microbiology

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation – assuming 6-foot lengths where these may occur.
2. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures.
3. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
4. Provide new LED lighting fixtures and exit signs.
5. Provide new lighting controls with wireless functionality.

Anatomy / Zoology

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation – assuming 6-foot lengths where these may occur.
2. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment. Refer to Mechanical and Plumbing narratives for the loads.
3. Outlets shall be GFCI type where it is within 6 feet from sinks, eye wash, shower and other water source fixtures.
4. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
5. Provide new LED lighting fixtures and exit signs.
6. Provide new lighting controls with wireless functionality.

PLUMBING - TYPICAL LAB SPACES

Organic/Inorganic Chemistry

1. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
2. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (4) sinks.
3. Provide gas and lab vacuum piping and connections to (1) fume hood.
4. Provide gas, lab vacuum, and lab air piping and connections to (12) fume hoods.

5. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

General Chemistry

1. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
2. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (4) sinks.
3. Provide gas and lab vacuum piping and connections to (4) fume hoods.
4. Provide lab vacuum, lab air, gas piping and connections to (6) bench-mounted turrets.
5. Provide lab cold water piping and connections to (6) bench-mounted cup sinks.
6. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Physics

1. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (4) sinks.
2. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
3. Provide lab cold and hot water piping and connections to sink and lab vacuum and air piping and connections to (1) demonstration bench.
4. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

General Biology

1. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (4) sinks.
2. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
3. Provide lab cold and hot water piping and connections to sink and lab vacuum and air piping and connections to (1) demonstration bench.

4. Provide gas and lab vacuum piping and connections to (1) fume hood.
5. Provide lab vacuum, lab air, gas piping and connections to (12) bench-mounted turrets.
6. Provide lab cold water piping and connections to (6) bench-mounted cup sinks.
7. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Microbiology

1. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (3) sinks.
2. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
3. Provide lab vacuum and gas piping and connections to (1) demonstration bench.
4. Provide lab vacuum and gas piping and connections to (12) bench-mounted turrets.
5. Provide DI water piping and connections to (6) bench-mounted cup sinks.
6. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Anatomy / Zoology

1. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (3) sinks.
2. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
3. Provide lab vacuum, lab air, and gas piping and connections to (1) fume hood.
4. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Architecture and Accessibility

Architecturally, buildings will need upgrades to match the renovation work. However, given the nature of the prototype phasing strategy, it is not clear where renovations may occur based on ever-changing needs.

For the purposes of this Feasibility Study, we will not address any associated architectural upgrade costs outside of the prototype plans.

Structural upgrades per California Existing Building Code (CEBC) 317.3.1 for Existing State-Owned Buildings should be considered for scale and costs of renovations that may trigger structural upgrades. To calculate the replacement cost, it is recommended to follow the guidelines set up by the Division of State Architect (DSA) for this purpose as a starting point that may be amenable to the AHJ.

Analysis of the existing structure of this building was not included in this Feasibility Study and nor was the cost of Structurally upgrading the Science A building included in this Cost Estimate portion of this Feasibility Study.

Regarding Accessibility, each existing building has accessibility challenges. As stated above, any renovation work may need to consider accessibility per both the California Existing Building Code and the California Building Code for "alterations" and or more specifically "Alterations affecting an area containing a primary function."

For the purposes of this Feasibility Study, we will not address the associated accessibility costs of prototype plans.

5.3.3 PHASING STRATEGY 3 - TARGETED RENOVATION

The last section is intended to describe a possible targeted renovation scenario that the team believes is a strong candidate for the first phase of actual renovation work. This renovation would take into consideration the associated costs for lab casework and fume hood upgrades, related MEP revisions, along with architectural finishes and accessibility issues. Proposed layouts for these items can be found in the Appendix, Section 7 PHASING STRATEGY 3 – TARGETED RENOVATION. Additional information for the services can be found in the prototype layouts. This renovation would take into consideration the associated costs for lab casework and fume hood upgrades, related MEP revision along with architectural finishes and addressing any accessibility issues.

This should be looked at as two possible costing scenarios; a base scenario and an add alternate scenario.

- Phasing Strategy 3 - Tier 3-a will consist of the following spaces in the Science A building:
  - Organic/Inorganic Chemistry rooms 552 , 555, and 556, CIRM CNRS rooms 453 and 455, Anatomy and Zoology rooms 452, 454, and 456, and Physics rooms 370, 372, 374 A/B.
- Phasing Strategy 3 - Tier 3-b: add alternate
  - Physics rooms 467 and 475
- Approximate areas of renovations for this Targeted Renovation Strategy by level in Science A.
  - Level 5 4,605 nsf
  - Level 4 5,618 nsf
  - Level 3 3,350 nsf
- The team does want to make note of items that were also considered during discussions and meetings during the creation of this document, but are not being incorporated into any diagrams nor will be part of the costing effort. Items immediately below are purely for record for future consideration as these renovation projects may evolve after this document has been published.
  1. Currently, room 377 is a faculty office with low partitions that separates it from a research lab. This is not an ideal condition per the faculty. The faculty would like this room to be re-envisioned with full height walls separating the office and the research area. Alternatively, there should be discussions on how this space may be used in the future for future needs that are not determined at this time. Mechanical upgrades to be considered as necessary.
  2. It was discussed on more than one occasion that space at the West Gym is underutilized and should be considered in possible future expansions and or as temporary swing spaces.
  3. Science A room 568 was also discussed as a future renovation candidate. Final plan here was not discussed, but there will likely also need to be Mechanical upgrades considered as necessary.

Science A - Third, Fourth and Fifth Floor program areas for focus of Targeted Renovation:

(Diagram does not include circulation, secondary areas, and or path of travel)

LEGEND	
Phasing Strategy 3 - Tier 3-a	(magenta)
Phasing Strategy 3 - Tier 3-b - Add alternates	(blue)

Lab Planning

Following is a brief narrative defining the specific areas to receive lab renovation work that align to the Phasing Strategy 3 Tier 3-a and Tier 3-b strategies graphically represented in the section prior to this Lab Planning portion. There will be additional related renovation work that is described further in the MEP, Architectural, and Accessibility portion of this strategy. See Appendix for supporting plan diagrams.

Below are some elaborations on the initial renovation effort as described in the diagrams above:

1. Science A rooms 552, 555, and 556. These three spaces would become Organic/Inorganic teaching labs with the see-through teaching style hoods located at the student island benches when possible. These hoods are to be provided with power, gas, vacuum, air, cold water, cupsink and drain. Each lab to have a minimum of (1) waste collection fume hood. Student "lockers" are drawers assigned to each student. Student lockers are 18" wide cabinets with three drawers per cabinet. The goal is to provide enough assigned drawer storage for a minimum of eight (8) class sections of 24 students per class section in each room. Locate (4) lab sinks around the perimeter of the room with hot/cold water, DI and eye wash. Provide projection screens, instructor's station and demonstration bench. Lighting, casework, and general room finishes are also to be upgraded.
2. Science A rooms 467 and 475 are highly utilized for the Physics program and would remain for general physics labs. The computer stations are currently located on the perimeter around the room and need to be relocated to the student island benches. The student benches are currently at sitting height and should be revised and replaced with standing height benches. Both labs 467 and 475 labs do not need the current existing amount of sinks, nor do they need the gas services, so as the casework and bench tops are replaced, cap all services that were feeding legacy outlets. Provide (2) lab sinks with hot/cold water, DI and eye wash units. Provide a Unistrut grid mounted at ceiling for suspension of science experiments. Provide projection screens, instructor's station and demonstration bench. Lighting, casework, and general room finishes are also to be upgraded.

3. Science A CiRM Shared Resource Laboratory for Human Stem Cell-Based Modeling (SRL-hSC) will occupy rooms 453A, 453, 455, 457, and 457A. Many of the existing walls will remain. A few additional walls will be added to create space for research functions. The spaces will comprise both teaching and research functions. Rooms 453 and 453A are BSL-2 spaces with lab vacuum at the BSCs , power on the walls with emergency power at select locations. Room 455 is a teaching lab space with cold water, drain, vacuum and gas at the student and instructor's bench. For additional information, refer to the CiRM Facilities Proposal located as part of the Phasing Strategy 3 – Targeted Renovation in the Appendix. Lighting, casework, and general room finishes are also to be upgraded at these spaces.
    - Notes for CiRM Suite - Shared Resource Laboratories (SRL) for Stem Cell Based Modeling:
        - Room 453 and 453A are BSL-2 spaces. Vacuum at BSC. Power on all walls with emergency power in select locations.
        - Under counter refrigerator, freezer, centrifuge are OFOI. Assume BSC, Chem cabinets are in contract.
        - Room 455, student and instructor benches to have CW, cupsink, drain, vac, gas.
        - Room 453, 455 have surface mount ESEW stations.
        - For additional information, refer to the CiRM grant and the facility layout in that proposal (see Appendix).
4. Science A Room 370 – Physics Instruction to include student benches at standing height with power, plus one equipment bench with storage below and also base-cabinet storage around the perimeter of the room. Provide (1) lab sink with hot/cold water, DI and eye wash unit and a location for soldering with (2) soldering snorkels. Provide projection screens, instructor's station and demonstration bench. Lighting, casework, and general room finishes are also to be upgraded.
5. Science A Room 374A – Physics Preparation – Similar to Physics Instruction, dedicated for class preparation. Lighting, casework, and general room finishes are also to be upgraded.

6. Science A Room 452 – Anatomy Instruction to include a teaching wall with 36 inch deep storage behind the projection screens with open space storage nearer the lower portion of the teaching wall to allow for storage of the cadaver tanks. The area above the open storage at the teaching wall could consist of framed wall and or casework that is still ground supported with posts spaced to allow cadaver storage below. The student benches to have new power supplies as minimum one duplex outlet per bench. There will be storage around the perimeter for microscopes, models, etc. Lighting, casework, and general room finishes are also to be upgraded.
    - Notes for Room 452:
        - Power at perimeter walls with some dedicated outlets.
        - Student bench with power, point exhausts (1 per 2 students), and hooks for student backpacks.
        - Teaching Wall: sliding, writable boards, with storage behind and below. In Room 452, open space below for cadaver tanks.
        - Room 452 to have a projecting compound scope. Room 456 currently has an existing one.
        - Room 452 storage need: 24 compound microscopes, 2 dissecting microscopes, mounted skeletons, microscope slides, miscellaneous specimen bins, dissecting supplies, drawers of human bones.
7. Science A Room 454 Lab Preparation – Similar to Anatomy, dedicated for class preparation.
    - Notes for Room 454:
        - Power at perimeter walls with some dedicated outlets.
        - Student bench with power, point exhausts (1 per 2 students), and hooks for student backpacks.
        - Teaching Wall: sliding, writable boards, with storage behind and below.
        - Room 454 has 24" deep bench top with glass fronted cabinets, and tall cabinets.
8. Science A Room 456 – Zoology – Similar to Anatomy, except the teaching wall is only 24 inches deep.
    - Notes for Room 456:
        - Power at perimeter walls with some dedicated outlets.
        - Student bench with power, point exhausts (1 per 2 students), and hooks for student backpacks.
        - Teaching Wall: sliding, writable boards, with storage behind and below.
        - Room 456 storage need: 28 compound microscopes, 28 dissecting microscopes, specimens (dry) and jars, aquarium (2x4), skeleton closet.

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MEP Systems

MECHANICAL - TARGETED RENOVATION

Note that if the change in program increases the loads on the MEP systems, then the equipment may not be able to be replaced in the same location. An example would be the air handler on Building A that is installed at the lowest level of the building may not be adequate for an increase in required air volume.

Note that this targeted renovation includes high CFM demand at the Chemistry, Anatomy, and Zoology rooms. To make the final determination, a field study will need to be performed on the existing AHU by the awarded construction team to measure its existing capacity, and the potential to increase the capacity of the existing equipment.

For the purposes of this feasibility study, it shall be assumed that the existing AHU and exhaust fans can provide CFM air flow as stated in the room descriptions requirements. For the purposes of this feasibility study, it shall be assumed that the existing AHU and exhaust fans can provide CFM air flow for the low ventilation programs that do not have high ventilation requirements, such as Physics. High ventilation rooms, such as Chemistry, will require either dedicated AHU and or EF systems per room or a central AHU and or EF system that serve all the high ventilation rooms.

Science A - Room 370

Type: Physics

1. Provide 1,360 (1 CFM/SF) exhaust air and ventilation air and associated distribution to supply and exhaust air grilles.
2. Provide (2) constant volume snorkel exhausts (200 CFM each) for soldering.
3. Provide variable volume pressure independent terminal boxes.
4. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 374

Type: Physics Prep Lab

1. Provide 320 CFM (1 CFM/SF) exhaust air and ventilation air and associated distribution to supply and exhaust air grilles.
2. Provide variable volume pressure independent terminal boxes.
3. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 467

Type: Physics

1. Provide 1,330 CFM (1 CFM/SF) exhaust air and ventilation air and associated distribution to supply and exhaust air grilles.
2. Provide variable volume pressure independent terminal boxes.
3. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 475

Type: Physics

1. Provide 1,330 CFM (1 CFM/SF) exhaust air and ventilation air and associated distribution to supply and exhaust air grilles.
2. Provide variable volume pressure independent terminal boxes.
3. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 452

Type: Anatomy

1. Reconfigure existing low wall exhaust to align with space in-between student benches (typ. 2, each handling 650 CFM)
2. Provide 100 cfm downdraft slot exhaust (2 grilles @ 50cfm per grille) for each bench and connect to house exhaust run in ceiling to wall chase.
3. Provide 1,900 CFM supply air, exhaust air, and ventilation air and associated distribution to supply and exhaust air grilles.
4. Provide variable volume pressure independent terminal boxes.
5. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 454

Type: Anatomy Prep Space

1. Provide 250 CFM (1 CFM/SF) exhaust air and ventilation air and associated distribution to supply and exhaust air grilles.
2. Provide variable volume pressure independent terminal boxes.

3. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 456

Type: Zoology

1. Reconfigure existing low wall exhaust to align with space in-between student benches (typ. 2, each handling 650 CFM)
2. Provide 100 cfm downdraft slot exhaust (2 grilles @ 50cfm per grille) for each bench and connect to house exhaust run in ceiling to wall chase.
3. Provide 1,900 CFM supply air, exhaust air, and ventilation air and associated distribution to supply and exhaust air grilles.
4. Provide variable volume pressure independent terminal boxes.
5. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 552

Type: Organic/Inorganic Chemistry

1. Provide (1) 10,000 CFM AHU to serve each chemistry lab or (1) 33,000 CFM AHU to serve the three chemistry labs. AHU is assumed to be roof mounted and provided with N+1 redundancy via a fan array fan arrangement. The 100% OSA AHU will need to be provided with new chilled water and heating hot water extensions from the floor below to condition the outside air for delivery to the occupied spaces. Provide MERV 8 pre-filters and MERV 15 final filters. Due to existing services in the Level 5 Ceiling space, roof mounted ductwork and new roof penetrations into each lab may be needed.
2. Provide (2) 10,100 CFM, 15 HP exhaust fans with N+1 redundancy per each lab renovated or a manifolded 33,000 CFM fan system providing three fans, each sized at 50% of the load or 16,500 CFM.
    a. Heating and cooling loads will be increased by 280 BTUH/SF and 40 BTUH/SF respectively to condition the additional ventilation air compared with typical labs with 1 CFM/SF.
3. Provide dedicated venturi exhaust air valve for each fume hood.
4. Provide sash control for each fume hood.
5. Provide variable volume pressure independent terminal boxes. Controls and actuators on all terminal boxes to match the speed of response of the fume hood air valve – fast acting.

6. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 555

Type: Organic/Inorganic Chemistry

1. Provide (1) 10,000 CFM AHU to serve each chemistry lab or (1) 33,000 CFM AHU to serve the three chemistry labs. AHU is assumed to be roof mounted and provided with N+1 redundancy via a fan array fan arrangement. The 100% OSA AHU will need to be provided with new chilled water and heating hot water extensions from the floor below to condition the outside air for delivery to the occupied spaces. Provide MERV 8 pre-filters and MERV 15 final filters. Due to existing services in the Level 5 Ceiling space, roof mounted ductwork and new roof penetrations into each lab may be needed.
2. Provide (2) 10,100 CFM, 15 HP exhaust fans with N+1 redundancy per each lab renovated or a manifolded 33,000 CFM fan system providing three fans, each sized at 50% of the load or 16,500 CFM.
    a. Heating and cooling loads will be increased by 280 BTUH/SF and 40 BTUH/SF respectively to condition the additional ventilation air compared with typical labs with 1 CFM/SF.
3. Provide dedicated venturi exhaust air valve for each fume hood.
4. Provide sash control for each fume hood.
5. Provide variable volume pressure independent terminal boxes. Controls and actuators on all terminal boxes to match the speed of response of the fume hood air valve – fast acting.
6. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

Science A - Room 556

Type: Organic/Inorganic Chemistry

1. Provide (1) 10,000 CFM AHU to serve each chemistry lab or (1) 33,000 CFM AHU to serve the three chemistry labs. AHU is assumed to be roof mounted and provided with N+1 redundancy via a fan array fan arrangement. The 100% OSA AHU will need to be provided with new chilled water and heating hot water extensions from the floor below to condition the outside air for delivery to the occupied spaces. Provide MERV 8 pre-filters and MERV 15 final filters. Due to existing services in the Level 5 Ceiling space, roof mounted ductwork and new roof penetrations into each lab may be needed.

2. Provide (2) 10,100 CFM, 15 HP exhaust fans with N+1 redundancy per each lab renovated or a manifolded 33,000 CFM fan system providing three fans, each sized at 50% of the load or 16,500 CFM.
    a. Heating and cooling loads will be increased by 280 BTUH/SF and 40 BTUH/SF respectively to condition the additional ventilation air compared with typical labs with 1 CFM/SF.
3. Provide dedicated venturi exhaust air valve for each fume hood.
4. Provide sash control for each fume hood.
5. Provide variable volume pressure independent terminal boxes. Controls and actuators on all terminal boxes to match the speed of response of the fume hood air valve – fast acting.
6. Provide DDC lab controls for the operation of the room level devices as well as the central AHU, EF, chilled water and heating hot water pump systems. The DDC system needs to be capable of controlling the noted equipment and be expandable to allow for a future full building BMS installation.

ELECTRICAL - TARGETED RENOVATION

Science A - Room 370

Type: Physics

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation.
2. Outlets shall be GFCI type where it is within 6 feet of sinks, eye wash, shower and other water source fixtures.
3. Provide 120V GFCI receptacles on benches.
4. Provide specialty power at 4 locations, with (2) 208V 1-phase, (1) 208V, 3-phase and (1) 480V, 3-phase circuits.
5. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, VAV boxes, BMS panels, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
6. Provide new LED lighting fixtures and exit signs.
7. Provide new lighting controls with wireless functionality and integrate the lighting controls into the BMS system.

Science A - Room 374

Type: Physics Prep

1. Outlets shall be GFCI type where it is within 6 feet of sinks, eye wash, shower and other water source fixtures.

2. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, VAV boxes, BMS panels, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
3. Provide new LED lighting fixtures and exit signs.
4. Provide new lighting controls with wireless functionality and integrate the lighting controls into the BMS system.

Science A - Rooms 452 & 456

Type: Anatomy/ Zoology

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation.
2. Outlets shall be GFCI type where it is within 6 feet of sinks, eye wash, shower and other water source fixtures.
3. Provide 120V GFCI receptacles on benches.
4. Provide 120V GFCI receptacles 20A dedicated circuit at select locations on the perimeter walls.
5. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, VAV boxes, BMS panels, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
6. Provide new LED lighting fixtures and exit signs.
7. Provide new lighting controls with wireless functionality and integrate the lighting controls into the BMS system.
8. Electrical conduits shall run along in ceiling and down to wall chase spaces for each bench.

Science A - Room 454

Type: Anatomy/ Zoology Prep

1. Outlets shall be GFCI type where it is within 6 feet of sinks, eye wash, shower and other water source fixtures.
2. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, VAV boxes, BMS panels, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
3. Provide new LED lighting fixtures and exit signs and integrate the lighting controls into the BMS system.
4. Provide new lighting controls with wireless functionality.

Science A - Room 475 (OR 467)

Type: Physics

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation.
2. Outlets shall be GFCI type where it is within 6 feet of sinks, eye wash, shower and other water source fixtures.
3. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, VAV boxes, BMS panels, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
4. Provide new LED lighting fixtures and exit signs.
5. Provide new lighting controls with wireless functionality and integrate the lighting controls into the BMS system.

Science A - Room 552

Type: Organic/Inorganic Chemistry

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation.
2. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment. Refer to Mechanical and Plumbing narratives for the loads.
3. Alternative to combine the lab, HVAC, Plumbing loads to be served by 200A panelboard.
4. Outlets shall be GFCI type where it is within 6 feet of sinks, eye wash, shower and other water source fixtures.
5. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, VAV boxes, BMS panels, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
6. Provide new LED lighting fixtures and exit signs.
7. Provide new lighting controls with wireless functionality and integrate the lighting controls into the BMS system.

Science A - Room 555

Type: Organic/Inorganic Chemistry

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation.

2. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment. Refer to Mechanical and Plumbing narratives for the loads.
    a. Alternative to combine the lab, HVAC, Plumbing loads to be served by 200A panelboard.
3. Outlets shall be GFCI type where it is within 6 feet of sinks, eye wash, shower and other water source fixtures.
4. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, VAV boxes, BMS panels, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
5. Provide new LED lighting fixtures and exit signs.
6. Provide new lighting controls with wireless functionality and integrate the lighting controls into the BMS system.

Science A - Room 556

Type: Organic/Inorganic Chemistry

1. Provide each Lab space a dedicated load center / panelboard rated at 60Amps 208/120Volts installed within the space. Note that the existing panelboards are recessed mounted in a concrete wall, making renovation and adding new circuits difficult. All new panel boards shall be installed in new furred wall (6" stud) to allow for easier future renovation.
2. Provide new distribution boards and panelboards to serve the new HVAC and Plumbing equipment. Refer to Mechanical and Plumbing narratives for the loads.
    a. Alternative to combine the lab, HVAC, Plumbing loads to be served by 200A panelboard.
3. Outlets shall be GFCI type where it is within 6 feet of sinks, eye wash, shower and other water source fixtures.
4. Provide new receptacles, disconnect switches and other power connections for special lab equipment, appliances, BMS panels, IT, AV, Security, Fire Alarm and other low voltage systems that require 120V and higher.
5. Provide new LED lighting fixtures and exit signs.
6. Provide new lighting controls with wireless functionality and integrate the lighting controls into the BMS system.

PLUMBING - TARGETED RENOVATION

Science A - Room 370

Type: Physics

1. Provide lab cold and hot water piping and connections to mixing faucet and lab waste and lab vent piping and connections at (2) sinks.
2. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Science A - Room 374

Type: Physics Prep

1. Provide lab cold and hot water piping and connections to mixing faucet and lab waste and lab vent piping and connections at (1) sink.
2. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Science A - Room 452, 456

Type: Anatomy / Zoology

1. Provide lab cold and hot water piping and connections to mixing faucet and lab waste and lab vent piping and connections at (2) sinks.
2. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Science A - Room 454

Type: Anatomy / Zoology Prep

1. Provide lab cold and hot water piping and connections to mixing faucet and lab waste and lab vent piping and connections at (1) sink.
2. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Science A - Room 475 (OR 467)

Type: Physics

1. Provide lab cold and hot water piping and connections to mixing faucet and DI water piping and connections to DI faucet at (2) sinks.
2. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Science A - Room 552

Type: Organic/Inorganic Chemistry

1. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
2. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (4) sinks.
3. Provide gas and lab vacuum piping and connections to (1) prep fume hoods.
4. Provide gas, lab vacuum, and lab air piping and connections to (12) teaching fume hoods.
5. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Science A - Room 555

Type: Organic/Inorganic Chemistry

1. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
2. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (4) sinks.
3. Provide gas and lab vacuum piping and connections to (4) prep fume hoods.
4. Provide gas, lab vacuum, and lab air piping and connections to (12) teaching fume hoods.
5. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

Science A - Room 556

Type: Organic/Inorganic Chemistry

1. Provide domestic cold and hot water piping, mixing valve, and connections to (1) emergency shower/eyewash station.
2. Provide lab cold and hot water piping and connections to mixing faucet, DI water piping and connections to DI faucet, and domestic cold and hot water piping, mixing valve, and connections to emergency eyewash at (4) sinks.
3. Provide gas and lab vacuum piping and connections to (1) prep fume hoods.
4. Provide gas, lab vacuum, and lab air piping and connections to (12) teaching fume hoods.
5. Replace the existing Borosilicate (glass) lab waste piping with new socket-fused polypropylene lab waste piping. Replace all lab waste piping in the room serving the floor above, the lab waste serving the room (floor below) and the vertical Lab Waste and Vent risers 2' above the floor above and 2' below the affected floor of the renovated room.

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Architecture and Accessibility: - Science A

Architecturally, the buildings will need upgrades to match the renovation work. Where work is to occur, ceilings should be suspension lay-in type at general classroom, hallways, and lab spaces. Walls should be assumed to be painted gypsum board unless otherwise noted.

Casework should be replaced in all areas to receive work. Casework finishes should align with the programmatic use of the space – it would be recommended that all casework inside classrooms/labs in the Science A building be chemical grade resistant similar to SEFA-8. Assume Lab grade casework, SEFA-8 - wood section, FSC, and meeting CARB guidelines, no urea/formaldehyde – typ.

1. Wood cabinets with p-lam surfaces and epoxy counter tops
   - Rooms 552, 555, and 556 – Chemistry
   - Room 456 – Zoology
   - Room 452 – Anatomy
   - Room 454 – Lab Preparation
   - Room 370 – Physics
   - Room 374A – Physics Prep
   - Rooms 467 and 475 - Physics
2. Steel cabinets with p-lam surfaces and epoxy counter tops
   - Rooms 453-457 - CiRM SRL Suite

At restrooms to receive work, casework should be solid-surface countertops with drop-in sinks, walls should be tiled to a height of 7’-0” with 4x4 tiles, floors should be assumed to be 2x2 porcelain tiles, and effectively full height partitions at all restroom to support All-Gender restrooms as required. Ceilings at restrooms are assumed to be painted gypsum board.

Enough work will be occurring at the roof that the entire roof of the Science A building should be replaced as part of the renovation. The current roof is a built-up roof type. The new roof may want to consider a similar type roof as replacement. Insulation thickness should be increased as much as possible to align to current code. Fall protection guard rail should be added at the roof perimeter as well that are a minimum 42” above the finished elevation of the roof wherever guardrail is to occur. There are no other envelope upgrades assumed at this building. There are no additional envelope upgrades assumed at Science A.

Structural upgrades per California Existing Building Code (CEBC) 317.3.1 for Existing State-Owned Buildings should be considered for scale and costs of renovations that may trigger structural upgrades. To calculate the replacement cost, it is recommended to follow the guidelines set up by the Division of State Architect (DSA) for this purpose as a starting point that may be amenable to the AHJ.

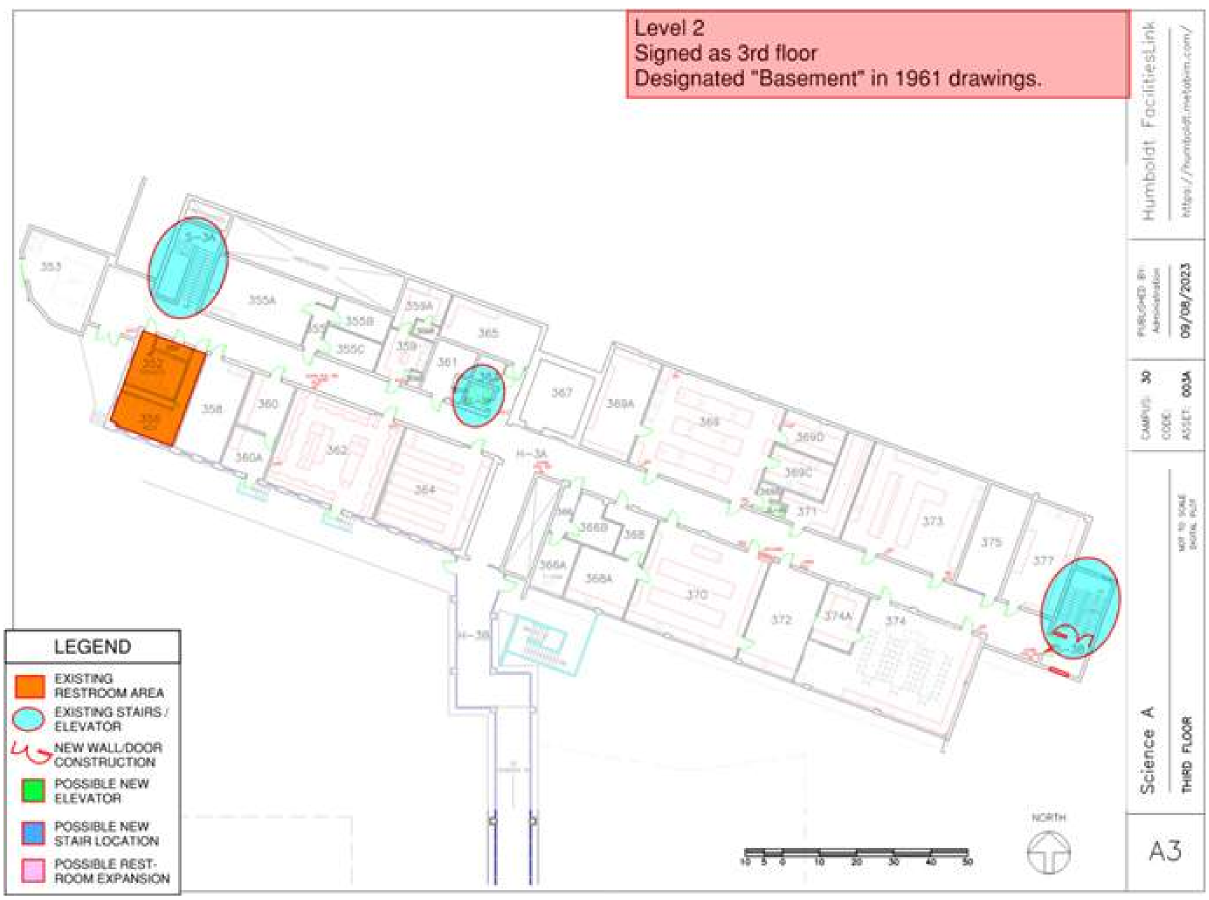
Analysis of the existing structure of this building was not included in this Feasibility Study and nor was the cost of Structurally upgrading the Science A building included in this Cost Estimate portion of this Feasibility Study.

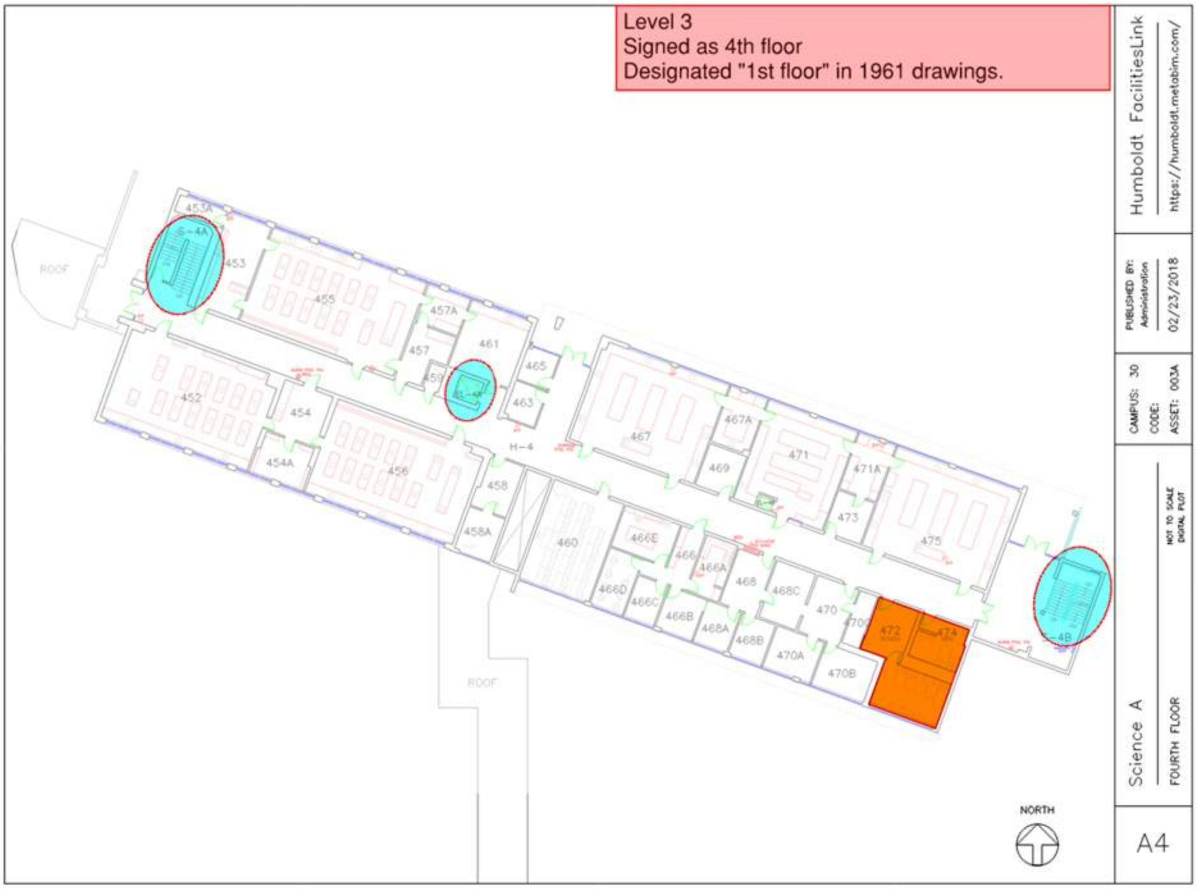
Regarding Accessibility, in this Phasing strategy under consideration is the interior renovation of the top three classroom levels of Science A and not the lowest level. A new direct accessible elevator to connect the bottom two levels of the Science A building is not being proposed in this costing strategy; only the existing elevator at its current location is being proposed to be updated with new updated interior elevator cab, accessible controls, and necessary signage is being proposed.

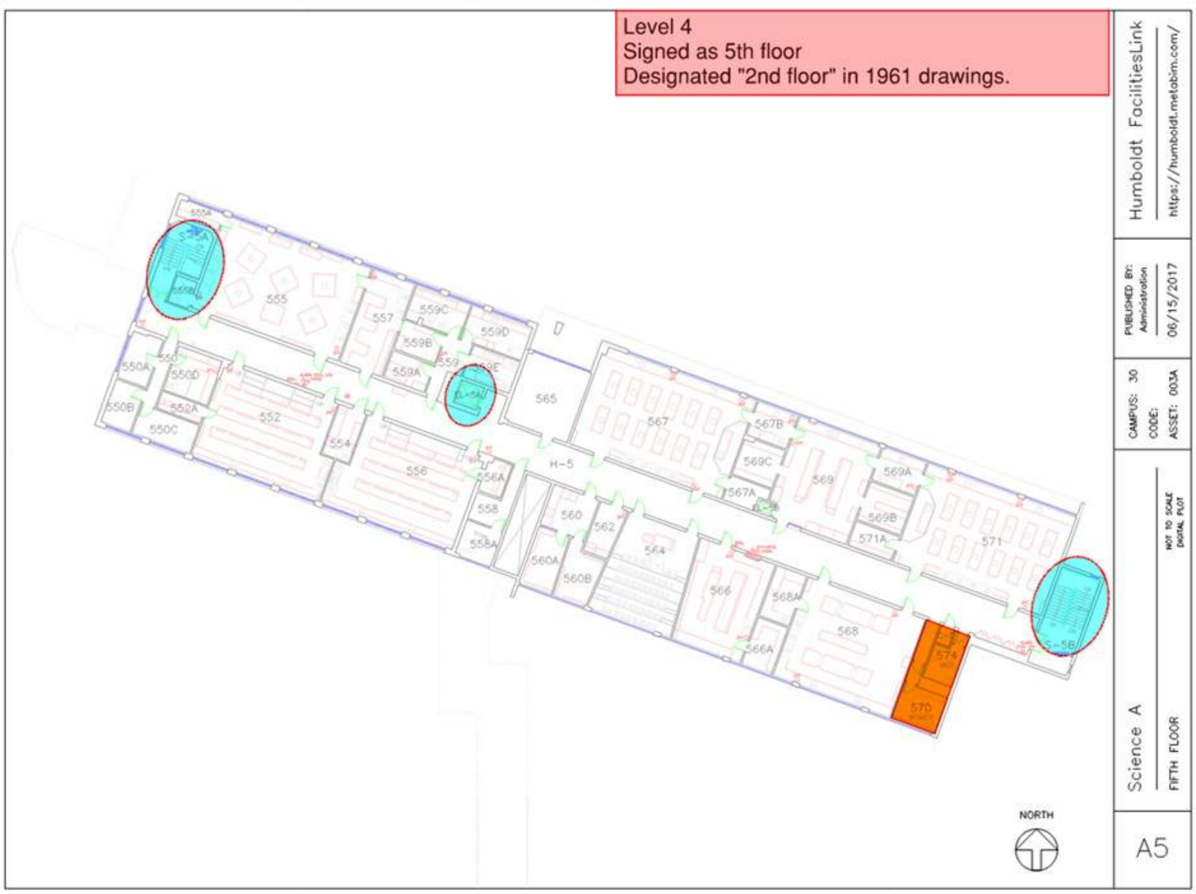
It is intended that all areas with student access will be upgraded to meet accessibility as much as possible and agreed to with the AHJ with the full scope of work. The California Existing Building Code provides guidance to establish priorities for providing accessibility renovation. Similar to the Existing Building Code, the California Building Code provides further guidance and establishes the priority of accessibility upgrades at renovation work.

See 5.3.1.3 for relevant few excerpts from the current codes for consideration.

Following are building plans that supports the Science A accessibility narrative above:




Level 3
Signed as 4th floor
Designated "1st floor" in 1961 drawings.
Humboldt FacilitiesLink
https://humboldt.metabim.com/
PUBLISHED BY: Administration
02/23/2018
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE DIGITAL PLOT
Science A
FOURTH FLOOR
A4
NORTH
ROOF
ROOF
453A
453
455
457A
457
461
465
463
452
454
454A
456
H-4
458
458A
460
467
467A
469
471
471A
473
475
466E
466
466A
466D
466C
466B
466A
468
468C
468B
468A
470
470A
470B
472
474


Level 4
Signed as 5th floor
Designated "2nd floor" in 1961 drawings.
Humboldt FacilitiesLink
https://humboldt.metabim.com/
PUBLISHED BY: Administration
06/15/2017
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE DIGITAL PLOT
Science A
FIFTH FLOOR
A5
NORTH
555
557
559C
559D
559B
559A
550A
550D
550B
552A
550C
552
554
556
556A
558
558A
565
H-5
560
560A
560B
562
564
566
566A
567
567B
567A
569C
569
569A
569B
571A
571
568A
568
574
570

Science A:

1. A primary entrance to the building or facility:

   a. Parking / Entrances:

      i. The north building entrance enters the building at the "Fourth floor", actual floor level 3. The north building entrance seems to be the primary as this building entrance does have an auto door opener, albeit an older model with non-accessible controls and is located near the interior elevator. The north entrance is around 150' from the accessible parking and will require updated concrete flatwork at both the parking areas but also as well as the path of travel from the parking to the building entrance.

      ii. Science A has six (6) existing points of entry to the building. For the purposes of this Feasibility Study, we will assume to add one auto door-operator at the main entry from the north accessible parking to permit entrance to the building.

      iii. See north entrance location in diagram immediately following with a connection to the intended accessible parking along Laurel Drive

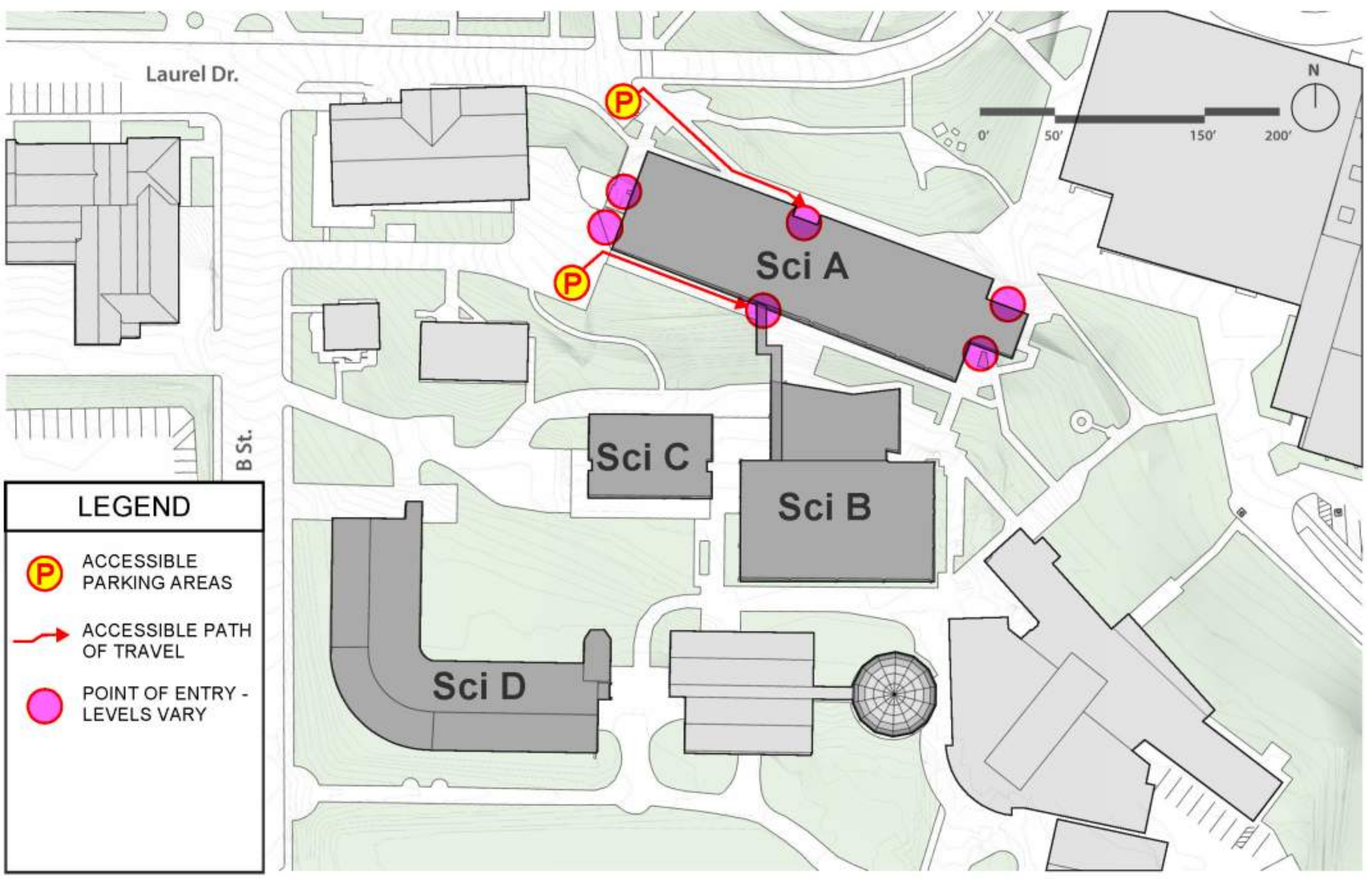


Figure 5.3.3.1 - Science A

b. Stairs

i. Neither of the existing stairs fully meet today's current accessibility code. The stairs are both cast in place concrete with only one of the two meeting rise/run requirements. The stairs may qualify as an item that is technically infeasible to fully update. The Design Team will need to discuss with the AHJ the implications of attempting to bring the existing stairs up to code and if there are grounds to come to an agreement for updating.

ii. For the purposes of this Feasibility Study, we will plan to create an accessible path of travel between the building entrance and the areas of remodel. With this, we will assume new handrail and guardrails to be replaced at the East stair only between Levels 2- 3 and Levels 3-4, since renovation work is only occurring on Levels 2, 3, and 4 (signed as Floors 3,4, and 5).

c. Elevators

i. For the purposes of this Feasibility Study, we will assume new finishes within the existing elevator cab with updated accessible controls at both side of hallways at each floor (3 floors total) and within the elevator. However, due to the existing concrete walls that define the elevator shaft, the small footprint within the cab will need to remain.

ii. The Design Team will need to discuss with the AHJ the implications of attempting to bring the existing elevator up to current code as stated to determine if this is acceptable.

2. Toilet and bathing facilities serving the area:

a. There are toilet facilities on Levels 2, 3 and 4. It is possible that the AHJ may accept an approach to only locate accessible restrooms on every other floor, so that no person would be more than one level away from an accessible restroom.

b. With the scale of this renovation and already imperfect connectivity/accessibility between floors, this last Phasing Strategy 3 – Target Renovation should assume to renovate restrooms on Levels 2, 3, and 4. The assumption for this Feasibility Study is that restrooms would be renovated at their current footprint. This should be studied as part of the final design with the AHJ.

c. The existing binary restrooms should be considered to become a single combined all-gender restroom where they occur to maximize the available footprint without impacting adjacent areas where possible. Partitions should be full height at water-closet fixtures. Floor plans will need to be evaluated to determine final plumbing occupant loads to determine the code required amount of fixtures. Typically when renovating buildings of this era, it is not uncommon that the toilet fixture counts may not align with the current code, especially after meeting current accessibility clearances. If the final toilet fixtures do not align with the current code, the AHJ may accept a reduced fixture count at the renovated building.

3. Drinking fountains serving the area:
    a. There are wall mounted drinking fountains within the hallways mounted on the concrete walls. Where provided, drinking fountains shall be replaced with accessible drinking fountains mounted at accessible heights. There may need to be protection at either side given that these drinking fountains would protrude into the halls.
    b. For the purposes of this Feasibility Study, it should be assumed that a new accessible drinking fountain will be provided on floors receiving renovation work – 3 total.
4. Public telephones serving the area:
    a. Where provided, phones shall be replaced and installed to meet accessibility requirements.
    b. For the purposes of this Feasibility Study, it should be assumed that a new phone will be provided on floors receiving renovation work – 3 -total.
5. Signs:
    a. Where provided, signs shall be replaced and installed to meet accessibility requirements.
    b. For the purposes of this Feasibility Study, it should be assumed that updated signage will be provided on floors receiving renovation work – 3 floors – total.
6. Hallways:
    a. Full renovation of the hallways may be required to provide the replacement of the ceiling as well as all fixtures and finishes in the hallways so that there is uniformity within the hallways.
    b. Additionally, since the existing electrical panels are embedded in the concrete, there is a likelihood that these will not be acceptable for the renovation work with increased electrical loads and current codes. With this, it should be noted to add a full-height 6-foot length of furred out wall in the hallways to house new electrical panels at the following locations:
        – Organic/Inorganic Chemistry 552, 555, & 556
        – Physics Room 370 and 475 or 467
        – Anatomy/Zoology Rooms 452 & 456

5.4 SYSTEMS ALIGNMENT - ICT (AV, IT AND SECURITY)

This Information & Communication Technology (ICT) Report is organized by the systems to better inform Cal Poly Humboldt of the priorities and feasibility of the renovation for the four science buildings. The goal is to provide Cal Poly Humboldt students with a technology enriched environment to facilitate the educational goals of the university.

As "the fourth utility," ICT is an essential component of the core enterprise – not merely a productivity enhancer, but rather one of the central drivers for daily functions from activities to core services that the community provides. Student satisfaction, compliance requirements, and regulatory demands are core to the technology requirements. As more applications critical to the overall experience and operation of a facility move to the building's network, reliable networks must be a top priority. A network's reliability, redundancy, disaster recovery, and security are crucial to the continued successful education and high quality of services throughout the campus.

Furthermore, as the Internet of Things (IoT) progresses, new devices will continually be added to the network – research systems, data sharing, building automation, wearable devices, and more. These connected "things" are now able to communicate and share powerful data to support meaningful analytics that ultimately can lead to improving the student's experience. This is especially true from a facilities and operations perspective as high performance and intelligent buildings require more of these devices.

5.4.1 SUMMARY

The following sections will lay out recommendations for AV, IT and security for the four buildings (Science A, Science B, Science C and Science D). Our recommendations are based on the following criteria:

- The California State University Telecommunications Infrastructure Planning (TIP) Standards (Edition 5.1 March 2022)
- Electronic Industry Association (EIA)
- Telecommunications Industry Association (TIA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Building Industry Consulting Services International (BICSI)
- The Audiovisual and Integrated Experience Association (AVIXA)
- Crime Prevention Through Environmental Design (CPTED)

Close coordination will be needed during design and construction since many of the building's functions will continue throughout the renovation process. It is critical that the existing network and cabling remain in place while the new system is being installed. Not until the work is complete can the existing cabling be removed. This means that parallel cabling and equipment will need to be installed and consideration for space will be critical.

Due to the nature of these buildings, it is important to not just plan for the current design but take into consideration future renovations. Equipment like cable tray, conduit and boxes and other infrastructure should be sized and located to consider future renovations. This will be closely coordinated with Cal Poly Humboldt during the design phase.

5.4.2 AUDIOVISUAL

5.4.2.1 INTRODUCTION

Current and future students come to expect technology rich spaces in all aspects of their life and most importantly in their learning environments. Active Learning, hybrid learning, Bring Your Own Device (BYOD), and wireless screen sharing are just a few of the techniques that students are expecting in the classroom. The current AV in the ABCD Complex is in need of a complete technology refresh. As the plans for each building are developed it is crucial that the AV is taken into consideration. Below are the spaces that are expected in these buildings and the technology that will be required to support the educational goals. It is extremely important to maintain and update audiovisual equipment--it is crucial for seamless operations, especially in today's educational environments.

5.4.2.2 TEACHING LABS (CHEMISTRY, PHYSICS, BIOLOGY, CADAVER, AND ZOOLOGY):

On day one, technology might not be needed in all labs but future consideration should be given to provide infrastructure (conduits, boxes, power and data) for future AV equipment. This could include the following:

- Flat panel displays (this could include one or more locations depending on the layout of the labs)
- Overhead voice lift and program audio system
- An ADA compliant assistive listening system
- Cameras and microphones to both capture lectures and for distance learning
- Wireless connectivity will be provided to allow both students and instructor to share content on their devices
- Equipment rack location
- Room scheduling panel

5.4.2.3 LECTURE CLASSROOOMS (SCIENCE B)

In the Science B building there is currently (2) lecture system classrooms that are in need of a technology refresh. Below is a list of systems and equipment that will be needed in each classroom:

- Dual motorized projection screens and ceiling mounted projectors
- An instructor's station will be used for laptop inputs and touch panel control for the AV system
- A voice lift and program audio system will be provided both in the ceiling and wall mounted speakers

- An ADA compliant assistive listening system
- Cameras and microphones to both capture lectures and for distance learning
- Wireless connectivity will be provided to allow both students and instructor to share content on their devices
- Equipment for the space will either be located in the instructor station or in a rack room.
- Room scheduling panel

5.4.2.4 COMPUTER LAB:

The computer labs will function similarly as the Teaching Labs and will have the following equipment:

- Flat panel display locations
- Overhead voice lift and program audio system
- An ADA compliant assistive listening system will be provided
- Cameras and microphones to both capture lectures and for distance learning
- Wireless connectivity will be provided to allow both students and instructor to share content on their devices
- Equipment rack location
- Room scheduling panel

5.4.2.5 HUDDLE ROOMS:

Huddle rooms will allow for students to collaborate with one another with the help of technology. Each room will have a flat panel display with a video conferencing enabled sound bar. Control for the room will come for a wall mounted button panel. Wireless connectivity will be provided to allow both students and instructor to share content on their devices. Rooms should be equipped with room scheduling panels for ease of reserving and checking availability.

5.4.2.6 COMMON AREAS AND LOBBIES:

During design it will be determined if Cal Poly Humboldt has any need for digital signage locations throughout the buildings. If not needed on day one, infrastructure could be provided for future displays to be installed. These displays could showcase research, student organization activities, or announcements pertaining to that particular building and departments.

5.4.3 TELECOMMUNICATIONS

5.4.3.1 INTRODUCTION

The current condition of the existing telecommunication infrastructure warrants a complete refresh. The telecommunications infrastructure includes data cabling (fiber optic and copper), telephone cabling, pathways (conduit and cable tray), outlets, faceplates, patch panels, terminal blocks, backboards, network equipment racks, network equipment cabinets, cable terminations and cable testing. The following is a description of the components of the Telecommunication Infrastructure and what is recommended to be replaced for the science buildings

5.4.3.2 TELECOMMUNICATION PATHWAYS

New data outlets will be provided with a 4" square by 3" deep box with a single gang mud ring. Each box will have a minimum of a ¾" conduit routed up to an accessible ceiling space. Where cables penetrate through walls, conduit sleeves with bushings on both ends, will be provided. All penetrations through fire rated walls will be fire stopped. Conduit sleeves will be sized to be filled with cables to no more than 40 percent of the cross-sectional area of the conduit. For rooms where existing outlets can be reused, new cabling and outlets will be installed in existing conduit and boxes to reduce cost and renovation disruption.

It is CSU's preference to install all cabling in wire mesh cable tray. Due to the existing conditions and crowded ceilings, new cable tray might not be feasible in all locations. This will be carefully examined during design. If new cable tray can be installed it would be a minimum of 4" deep x 12" wide will be provided and supported from the structural structure with a minimum of 3/8" diameter threaded rods to support the horizontal and backbone communications cables along the main pathways above the suspended ceiling space. In finished spaces without a suspended ceiling, a minimum of 4" deep x 12" wide solid bottom cable tray instead of wire mesh cable tray will be provided. Cable trays will be sized to be filled with cables to no more than 50% of the cross-sectional area of the cable tray. Where the cable tray fill ratio exceeds 50% of the cable tray cross-sectional area, a larger cable tray will be provided. Engineering for exact seismic requirements will be required. No J Hooks will be allowed unless for short distances. A minimum of 12 inches of free access shall be provided and maintained above the cable trays and along one side of the cable trays. This is ideal but it is understood that not all spaces within these buildings can accommodate cable tray due to ceiling space or type. Cable tray will be used where available and conduit or other methods will be used in other situations. In all cases, planning for the future is extremely important and will be taken into account during design.

5.4.3.3 TELECOMMUNICATION SPACES

We assume that the existing incoming service into the building will remain unchanged. The MDF could be relocated within the building but is not recommended due to cost and complexity. Each room will be evaluated to determine if the room needs to increase in size to accommodate the new equipment racks, future expansion and other equipment in the room.

All of the walls of the telecommunications rooms will be constructed from drywall deck to deck. All walls will be covered from the floor to a minimum height of 8'-0" above the floor with 3/4-inch exterior AC grade flame retardant plywood and painted a high gloss white with two coats of fire-resistant paint ensuring that one of the labels noting the type of plywood is preserved. Reserve a minimum of 12" dedicated space in front of the walls to accommodate equipment being mounted to the wall. 18" wide ladder racking cable tray will be provided and supported from the structure above with 3/8" diameter threaded rods over the equipment racks and the side walls to support the horizontal and backbone communications cables through-out the Telecommunications Room.

Due to the age of these buildings, the existing HVAC system for all the IT rooms will need to be evaluated to determine if it meets the current TIP standards. All telecommunications rooms must be maintained between 60° and 85°F. The relative humidity range must be between 30% and 60%.

For all Telecommunications Spaces, any pipe or duct system foreign to the room installation must not enter or pass through the room. Foreign piping such as water pipes, steam pipes, gas pipes, sanitary waste pipes, roof drains, AC ducts, and other unrelated piping containing liquids or gases are not installed or pass through any telecommunications spaces. Sprinkler piping shall not be routed through the room unless it serves to protect the installation. The rooms shall not be shared with electrical equipment, heating/ventilating and air conditioning equipment, fire detection systems, or other mechanical systems unless these systems are specifically needed and dedicated to support the room and its functions. If any of the aforementioned piping is required for these rooms, 4" drip trays shall be provided with a leak detection alarm tied to the building controls system.

5.4.3.4 TELECOMMUNICATION BONDING AND GROUNDING

The existing bonding and grounding system will be evaluated and determined if any new components will be needed to meet current standards and codes. The following is what will be provided if updates are needed.

The MDF Room will contain a Telecommunications Primary Bonding busbar for providing a central location for bonding all telecommunications equipment per the TIA-607-D Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, local codes, California State University TIP Standards, and National Electrical Safety Code.

The Telecommunications Primary Bonding busbar shall consist of a predrilled copper busbar with TIA-607 standard sizing and spacing. It will have minimum dimensions of ¼ inch thick, 4 inches wide, and the length shall be a minimum of 23 inches. The bonding busbar will be insulated from its support by a minimum of a 2-inch separation. Building structural steel (beams and/or columns) within 6 feet of the bonding busbar shall be bonded to the bonding busbar with a minimum of a 6 AWG copper conductor.

Each IDF will contain a Telecommunications Secondary Bonding Busbar for providing a central location for bonding all telecommunications equipment in the room per the TIA-607 standard. The Telecommunications Secondary Bonding Busbar will consist of a predrilled copper busbar with TIA-607 standard sizing and spacing. It shall have minimum dimensions of ¼ inch thick, 2 inches wide, and the length shall be a minimum of 12 inches. The bonding busbar shall be insulated from its support by a minimum of a 2-inch separation. Building structural steel (beams and/or columns) within 6 feet of the bonding busbar shall be bonded to the bonding busbar with a minimum of a 6 AWG copper conductor.

Racks within the Telecommunications Rooms will have a horizontal Rack Bonding Busbar installed in the top of the rack/cabinet in RU 45 to provide effective bonding of the rack to the Primary bonding busbar or Secondary Bonding Busbar and provide a central location for the bonding of all telecommunications equipment located in the rack per the TIA-607 standard. The busbar will consist of a pre-drilled copper busbar with TIA-607 standard sizing and spacing. The Rack Bonding Busbar will be bonded to the Telecommunications Primary Bonding busbar or Telecommunications Secondary Bonding busbar in the room with a minimum of a 6 AWG copper conductor. Rack mounted IT equipment with integral bonding terminals will be bonded to the Rack Bonding Conductor (RBC) or to a vertical/horizontal Rack Bonding Busbar (RBB). An RBC is a bonding conductor from the rack or RBB to the TEBC. Each cabinet or equipment rack will have a suitable connection point to which the bonding conductor can be terminated. Properly sized listed two-hole compression lugs or listed terminal blocks with two internal hex screw or equivalent torque characteristics shall be used at the connection point.

The Telecommunications Primary Bonding Busbar and Telecommunications Secondary Bonding Busbars will be bonded to the building grounding electrode system with a bonding backbone cable that is a minimum of a 3/0 AWG stranded copper conductor. The building structural steel shall not be used as a replacement for the bonding backbone cable.

Cable tray and/or Ladder racking will be bonded to the Primary Bonding Busbar or Secondary Bonding Busbar with a minimum of an insulated #6 AWG stranded copper conductor and connectors designed for the specific purpose. Bonding of other telecommunications equipment in the Telecommunications Rooms to the bonding busbars will be executed as required by the equipment manufacturer.

5.4.3.5 TELECOMMUNICATION EQUIPMENT RACKS

It is assumed that all new racks will be required in all telecommunications spaces in all four buildings. All new racks and cabinets will have an equipment mounting width of 19 inches and height of 45 RUs. Overall height will be 84 inches and width shall be 24 inches with a capacity of 2,500 lbs and meet seismic requirements Racks will be 2-post and quantity of racks within a room will depend on current future expansion of the area it is serving.

Power to the equipment racks will be located at the cable tray and power type/receptacles will vary based on the rack requirements. Electrical requirements for telecommunications rooms include a minimum of 100 amp dedicated electrical service panel. Exact outlets needed will be coordinated with Cal Poly Humboldt during the design process.

Power Distribution Units (PDUs) and Uninterruptable Power Supplies (UPSs) shall be provided per the TIP Standards.

5.4.3.6 STRUCTURED CABLING - HORIZONTAL CABLING

It is assumed that all existing horizontal cabling will be replaced with new CAT6 or CAT6A cabling. Most outlets will consist of a minimum of two (2) Category 6UTP LP rated cables to each work area outlet for voice and/or data. Each work area outlet will be provided with two (2) 8-position 568B RJ45/Category 6 jacks. The following indicates the data requirements in the following common space types.

- Offices
  - Each office will have a minimum of (2) telecommunications outlets with a minimum of (3) Data ports per outlet. Outlets will be located on opposite walls.
  - Larger offices and open suites will have more outlets depending on the layout and needs.
  - Open offices and cubicle areas will have a minimum of (1) telecommunications outlet with a minimum of (3) data ports for each work space.
- Conference Rooms
  - If the room is smaller than 12’x12’ then it will be designed in a similar fashion as an office. Depending on the AV in the room, more outlets will be added to support the technology in the room.
  - Rooms that are larger than 12’x12’ shall have one or more floor boxes.
- Instructional Areas
  - Outlets will be provided to support students, facility, AV, specialty equipment and other needs determined during the design process.
- Other Spaces
  - Careful coordination will occur between designers, users, and facility personnel to determine the location and quantity of outlets needed throughout the buildings.

5.4.3.7 COAXIAL CABLE SYSTEMS

CSU campuses have been phasing out the need for coaxial cable systems throughout their campuses but there are still needs within many buildings. During design it will be determined if a new coaxial cable system will be needed. If it is needed, below describes what will be required.

All campuses are equipped with a single service entrance for TV service. This system is converted to optical and distributed throughout the campus via fiber optic cabling. In each building, the fiber is then converted back to coax to feed the individual rooms within each building. The exact details of the distribution within the building are determined on a case-by-case basis and will be coordinated with Cal Poly Humboldt during design.

5.4.3.8 STRUCTURED CABLING - BACKBONE CABLING

Telecommunications services will be provided through existing campus connections. Existing backbone cable between IT rooms will be evaluated and determined if new cabling is to be provided. If new cabling is needed, below describes what is required:

Cooper Backbone Cabling

The cooper backbone cabling shall be the following:

- Shielded
- CMR (riser) rated
- 24 AWG with staggered twist and a mutual capacitance of not more than 19 nF per 1000 feet
- Quantities of pairs will be determined during design.

Fiber Optic Backbone Cabling

Single mode and multimode fibers will be installed between the MDF to all IDFs. A minimum of 48-strands of singlemode and 48-strands of multimode cabling will be installed so that they "home-run" from MDF to IDFs without splices. The cables will be run in innerduct to protect the cables and must be OFNR or OFNP rated, tight buffered, and fan-out. The cables must have 900 µm buffer and meet performance characteristics as defined in ANSI/ICEA S-83-596.

Wireless Networks

A new wireless network will be designed in all buildings. All new wireless access point locations will have (2) CAT6A cables terminated on modular jacks on outlets mounted depending on the ceiling conditions. Outlets will be located based on coordination with CPH's IT department for both coverage and bandwidth needs. Exterior coverage will also be discussed during design.

5.4.4 ELECTRONIC SECURITY

5.4.4.1 SUMMARY

Based on the existing security system it is recommended that a new electronic security system is provided that meets the current CSU standards and the needs of the university. During the design Crime Prevention Through Environmental Design (CPTED) principles will be used to provide students and faculty a safe learning environment. CPTED plays a crucial role in enhancing safety on college campuses. By focusing on the physical environment, CPTED aims to discourage criminal activity and promote a sense of security for everyone. Here's why it matters:

- Reducing Crime Risk: CPTED focuses on creating a physical environment that discourages criminal activity. Strategies such as proper lighting, natural surveillance, and thoughtful landscaping help reduce the risk of crimes occurring on campus.
- Enhancing Perceived Risk: Studies show that the top deterrent for criminal activity is the likelihood of getting caught. CPTED strategies enhance the perceived risk of detection and apprehension, making offenders less likely to commit crimes or succeed in doing so2.

- Student Retention and Attraction: Attractive campuses influence students' decisions when choosing a school. By implementing CPTED principles, colleges can maintain a pleasant aesthetic while ensuring safety, which contributes to student retention and recruitment.

For these buildings a new card access system and video surveillance system is recommended. Below are descriptions of what will be provided.

5.4.4.2 ELECTRONIC SECURITY - ACCESS CONTROL AND INTRUSION DETECTION

An Access Control system will provide card access at entry and exit points of the building and other building locations as required per the CSU and Cal Poly Humboldt standards. Card readers will be mounted to allow entrance into the facility without any interference. Locations include flush mounted on the exterior of the building if no ADA operator is present, or on a pole or bollard where an ADA operator is required.

The following locations will be planned to have access control readers:

- All exterior doors except for those where student access is prohibited such as outside access to mechanical rooms
- In instances where a card cannot be added due to egress requirements, stairwell to the corridor doors may be secured as an alternative.
- Telecommunication Rooms
- Other locations as deemed necessary during the design process.

The access control system will allow select doors and entryways that are electronically controlled either with a card reader or through software to be on a schedule that will permit the free passage of students, visitors and staff as determined by the university.

5.4.4.3 ELECTRONIC SECURITY - VIDEO SURVEILLANCE

A system of fully integrated security cameras will monitor the public-use areas of the building. The camera types are standardized on IP-based units and are planned to be fixed. The field of view of the cameras will vary depending upon the location of the installation. Camera housing will be primarily domes with other housing provided based on environment, architectural goals, or space limitations. Five feet of Category 6 Cable will be provided at each location that can be coiled above an accessible ceiling, if it is a hard ceiling, the cabling will terminate at a junction box.

The following locations are planned for cameras where and as applicable:

- Access Controlled entrances/exits
- Back of house entrances/exits
- Corridors
- Common areas
- Point of sale systems
- Chemical storage rooms
- Other storage areas deemed critical

5.4.4.4 ELECTRONIC SECURITY - OTHER SYSTEMS

The following security systems or products are not currently planned and may require further discussion as the design progresses:

- Duress Alarm / Panic Button
- Motion Sensors
- Glass Break Sensors
- Code Blue / Emergency phones

5.5 SYSTEMS ALIGNMENT - LIGHTING DESIGN

New lighting for the Science Complex ABCD seeks to reinforce a high level of efficiency and simplicity. To this end, lighting will focus primarily on illumination for the highly functional requirements of the spaces while offering flexibility for various scenarios. Lighting systems will also aid in the user experience with added focus on common areas and clarifying wayfinding throughout. Light fixture selection will also consider visual comfort, maintenance, economic value, and sustainability. Renovations shall consider Title 24 requirements for necessary upgrades to controls and light fixture replacement and upgrades. Renovations to one space may result in required updates to other spaces and/or building control systems.

5.5.1 GENERAL INTERIOR LIGHTING SYSTEMS

Any new lighting systems and controls for the interior spaces throughout the building will target the following attributes:

- Luminaires throughout the buildings will be LED type, 3500K CCT, 90 CRI, with lumen packages selected to provide light level in accordance with the recommendations of the Illuminating engineering Society of North America (IESNA) handbook and recommend practice guides and local ordinances.
- All new lighting shall be LED with dimmable drivers.
- Storage and unfinished areas will be provided with 2' x 4' standard lensed troffers or industrial type strip fixture.
- Emergency egress lighting: selected light fixtures shall be connected to the generator system to provide egress lighting along the egress paths in accordance with the California building code. 1.0 FC average, 0.1 FC minimum, 40:1 uniformity ratio.
- Illuminated exit signs will also be used along the path of egress, allowing a sign to be seen at any one time. Exit signs will be LED and UL listed with red lettering and an operating voltage of 277-volts.

Illumination Design Criteria:

Area	Illumination Levels
Lobby/Entry	5fc at floor, 15fc at desk
Collaboration	20fc at 2.5ft
Large Lecture	30fc at task, 50fc at demonstration
Computer Lab	15fc at 2.5ft
Work Room	10fc at floor, 30fc at task
Kitchenette/Breakroom	20fc at task
Classroom	40fc at 2.5ft
Conference	30fc at 2.5ft
Huddle	30fc at 2.5ft
Private Office	30fc at task
Open Office	30fc at task
Labs	50fc at 3ft, 75fc at 3ft demonstration
Lab Support	50fc at 3ft
Corridors	5fc at floor
Restrooms	5fc at floor, 10fc at Task, 20fc at vanity
Storage	20fc at floor

Lobbies and Entries:

Building lobbies and entries shall employ a multi-level lighting system to provide required functional lighting levels, articulate specific ceiling and wall surfaces, reinforce intuitive wayfinding, and provide accent for special programmatic elements such as donor walls, information walls, and art pieces. Recessed small aperture louvered downlights provide functional light levels. Continuous linear with mitered corners accent architectural ceilings. Recessed continuous perimeter coves and recessed asymmetric wall wash fixtures highlight strategic wall surfaces.

Collaboration:

Various informal collaboration areas will utilize low profile recessed downlights for general lighting. Continuous recessed linear fixtures provide functional illumination. Architecturally concealed continuous cove lighting will provide indirect accent for strategic wall surfaces.

Large Lecture:

The premier lecture space will utilize a multi-level lighting system to provide general lighting levels, presentation capabilities, and future flexibility. Functional lighting will utilize a pattern of suspended direct indirect lighting. Recessed asymmetric wall wash lighting will highlight perimeter teaching walls.

Computer Lab:

The classrooms will employ direct-indirect linear pendants with high performance widespread indirect distribution. Separate control will be provided for direct and indirect light components. Additional teaching walls will be illuminated with recessed asymmetric wall wash fixtures.

Work Room:

Linear recessed light fixtures provide general lighting to the space. Under cabinet lighting will be provided to increase function light levels at counter/task plane.

Kitchenette/Breakroom:

Linear recessed light fixtures provide general lighting to the space. Under cabinet lighting will be provided to increase function light levels at counter/task plane. Additionally recessed wall wash fixtures will accent strategic walls.

Classroom:

Continuous pendant direct indirect light fixtures will provide ambient and task lighting at desks. Teaching walls will be illuminated with recessed linear wall wash fixtures and controlled from separate switch.

Conference:

Recessed louvered linear fixtures will provide functional task illumination at the table. Perimeter walls will be uniformly washed with recessed baffled wall wash fixtures.

Huddle:

Wall mounted direct and indirect light fixtures will provide task illumination on work surface as well as ambient fill light on ceiling. Baffled downlights will provide additional light as needed.

Private Office:

A task-ambient lighting approach will be utilized to reduce energy and provide individual control. The ambient system will be comprised of pendant mounted direct/indirect LED fixtures. Furniture mounted LED under-cabinet task light fixtures will provide elevated lighting levels at the work plane.

Open Office:

A task-ambient lighting approach will be utilized to reduce energy and provide individual control. The ambient system will be comprised of pendant mounted direct/indirect LED fixtures. Furniture mounted LED under-cabinet task light fixtures will provide elevated lighting levels at the work plane.

Labs:

A task-ambient lighting approach will be utilized for lab spaces. The lighting system for this space will primarily utilize direct/indirect pendants centered between benches to provide the ambient lighting layer. The task system will vary depending on the lab bench type. For typical lab benches, under-cabinet LED task lights will be used to enhance lighting levels at the work plane. For open benches recessed adjustable spot fixtures located in the ceiling directly above the bench will provide enhanced lighting levels.

Lab Support:

Lab support spaces will utilize continuous recessed linear fixtures or recessed 2x2 troffers for functional illumination.

Corridors:

The hallways employ recessed downlights for general illumination. Classroom entry alcoves will be accented with asymmetric linear wall wash fixtures for wayfinding and vertical brightness.

Restrooms:

The restroom will employ continuous perimeter recessed wall slot lighting for general illumination. Downlights will provide additional lighting where needed.

Storage:

Standard strip light fixtures will be provided where no ceiling occurs. Recessed lensed linear fixtures will be provided where ceilings are placed.

Stair:

Secondary stairs will utilize surface mounted linear lighting at landings for functional illumination of stair tread.

5.5.2 BUILDING SPECIFIC CONSIDERATIONS

Each building presents unique existing conditions and attributes that may result in modifications to recommended lighting strategies. Consider the following items for each building when applying the previously mentioned space specific lighting systems:

Building A:

Several spaces do not have access to daylight and views. Regularly occupied spaces without access to daylight shall employ additional lighting systems. Consider vertical wall accent at exterior walls with either strategic wall wash lighting or backlit panels to enhance connection to the exterior.

Building B:

Ceilings are low throughout Building B. When evaluating applicable lighting strategies, emphasis shall be made on accenting perimeter surfaces and recessing lighting with shallow housings. Pendants and ceiling surface mounted lights shall be avoided to maximize openness of space. Wall mounted fixtures can be considered to add supplemental indirect light to enhance the perception of the ceiling height.

Building C:

Some ceilings are low throughout Building C. When evaluating applicable lighting strategies, emphasis shall be made on accenting perimeter surfaces and recessing lighting with shallow housings. Pendants and ceiling surface mounted lights shall be avoided to maximize openness of space. Wall mounted fixtures can be considered to add supplemental indirect light to enhance the perception of the ceiling height.

Building D:

Some spaces in Building D have unique vaulted ceilings. While pendant mounted direct/indirect functional lighting is still possible, implementation of additional task lighting needs to be integrated at bench shelves or pendant mounted if no shelves occur at benches. Daylight entering in clerestory windows in the vaulted spaces needs to be accounted for in lighting design and daylight harvesting control strategies.

5.5.3 EXTERIOR LIGHTING SYSTEMS

The lighting systems and controls for the exterior will target the following attributes:

- Exterior lighting design should reference any campus master plans available at the time of design for specific lighting guidance.
- Fixtures throughout the site and building exterior will be LED type, 3000K CCT, with lumen packages selected to provide light level in accordance with the recommendations of the Illuminating Engineering Society of North America (IESNA) handbook and recommended practice guides and Local Ordinances.
- All exterior light fixtures must utilize marine grade materials, copper free alloys, fully gasketed IP65 enclosures, marine rated powder coating, and stainless-steel hardware with stainless-steel inserts where applicable.
- MLO LZ2 will be used for outdoor lighting ordinances and for determining light pollution reduction targets.
- All exterior and site lighting fixtures will be fully shielded and adhere to B.U.G. rating recommendations for MLO LZ2.
- Light pollution reduction will also be addressed via controls and a curfew based on programmatic requires. Occupancy-based site lighting controls will be used where possible.
- LED wall packs will be used above exterior doors connected to emergency power circuits.
- LED pole mounted fixtures on 12’-15’ poles will be used for pedestrian walkway lighting.
- Pole mounted LED lighting fixtures will be used for roadways. Poles will be round tapered aluminum, 20’-25’ high with single or double arm mounted fixtures.

Illumination Design Criteria:

Area	Illumination Levels
Roadway	2.0fc avg. 0.9fc min., 4:1 avg./min.
Pedestrian Path	0.5fc min. and 1.0fc avg.
Entry	1.0fc min.
Plaza/Courtyard	0.5fc min. and 1.0fc avg.

Building Exterior/Facade:

Main building entries will be accented to provide an increased sense of wayfinding to denote main entry points to facility. Building exterior overhangs will be accented with soft up light to highlight building massing and stacking. Up lighting will be contained within overhang to eliminate light pollution. Building façade lighting will be curfew controlled.

Exterior Stairs:

Exterior stairs will be illuminated with a combination of stair integrated linear under tread lighting and handrail integrated LED lighting.

Plazas/Courtyards:

Any plazas or courtyards will utilize a combination of typical pedestrian area pole lights, linear bench integrated continuous under glow, and strategic landscape and building accent with ground mounted floodlights.

06
CODE ANALYSIS

6.1 PRELIMINARY BUILDING CODE ANALYSIS

The following preliminary code analysis is based on the California Code of Regulations, Title 24, Part 2 - the 2022 California Building Code (CBC). During Schematic Design, a comprehensive code analysis will need to be developed. The following analysis may vary with subsequent editions of the building code. Code edition is determined at the time of submittal of construction plans, this review is based on the 2022 code, thus a new code cycle will take effect January 1, 2026. Requirements may change with a new code cycle.

Type of Construction is a choice by the designer/owner to be the best feasible choice for meeting program requirements. Per campus metaBIM, the building is identified as Type II-B construction which has been used here.

SCIENCE A

Building Description:

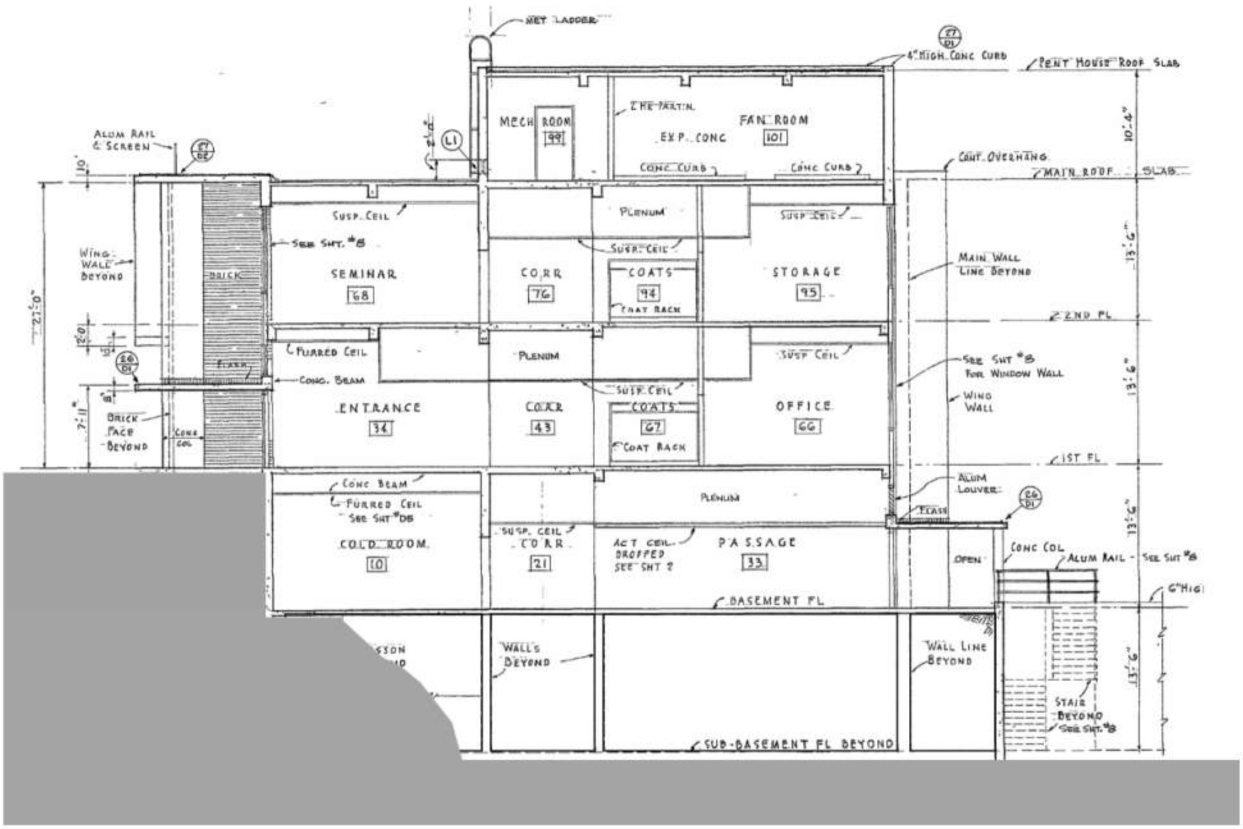
The existing building is approximately 4 stories tall and was originally constructed in two separate phases. The original West wing constructed in 1951 is 3 stories tall and the added East wing is 4 stories tall totaling excluding the roof/penthouse level. Areas are per the table provided below. The occupied floors are composed predominately of teaching labs, offices and research labs. The building contains primarily B Occupancies and a small amount of S-2.

Due to the laboratory programs in the building, hazardous materials are anticipated in the building. In order to avoid a Group H occupancy in the building, a control area strategy in accordance with CBC 414.2 shall be utilized. The entire building will be classified as a single control area. The maximum allowable quantities (MAQ) of hazardous materials shall be limited to the MAQ for control areas five stories above grade. No Group H occupancies are anticipated in the building.

Building Code: 2022 California Building Code

Building Area:

Actual Level	GSF	Campus floor level name	1961 drawings level name	Direct access to grade
1	8,242	Signed as Second floor	Sub-Basement	Yes
2	18,787	Signed as Third floor	Basement	No
3	18,239	Signed as Fourth floor	1st Floor	Yes
4	17,540	Signed as Fifth floor – Has ground access	2nd floor	No
5	883	Signed as Sixth floor	Main roof	No
	63,995	**TOTAL GSF**		



North-South Section cut at main Building entry Level 3 looking easterly

Occupancy:	B classrooms, offices, and labs with minor S-2 A control area strategy in accordance with CBC 414.2 shall be utilized in the building. The entire building will be classified as a single control area. The maximum allowable quantities (MAQ) of hazardous materials shall be limited to the MAQ for control areas five stories above grade. No Group H occupancies are anticipated in the building.
Construction Type:	Type II-B
Allowable Area: (Table 506.2)	23,000 max/per floor for B – No existing sprinkler 26,000 max/per floor for S-2 – No existing sprinkler Proposed – no change to the existing floor areas.
Maximum Number of Stories: (Table 504.4)	Allowed – B at 3 stories – No existing sprinkler Allowed – S2 at 3 stories – No existing sprinkler
Maximum Building Height: (Table 504.3)	Allowable B = 55 feet Existing - ±44’ along north elevation. There will be no change proposed to the building height.

High-Rise Classification: (Section 403)	Non high-rise
Highest Occupied Floor: (Section 403)	44' (Level 5) Allowed - 75' Proposed – 13'-6" (Level 2)
Chemical Quantities and Control Areas: (Section 307.1(1))	The Maximum Allowable Quantities (MAQ's) of hazardous materials will be in accordance with the CBC and CFC for indoor control areas. The entire building will be classified as a single control area. All chemicals will be stored in approved cabinets (i.e., corrosives, flammable and combustible liquids) where appropriate. The quantity of hazardous materials will not exceed the MAQ for each control area. Where increases in MAQ are permitted for storing chemicals in approved cabinets, those increases shall be applied to the MAQ.
Structural Fire Resistance:	The construction type of the building is Type IIB.; therefore, the fire resistance meetings for structural members shall comply with the following: Primary Structural Frame: 0 hours Bearing Walls: 0 hours Nonbearing Walls: 0 hours Floor construction and secondary members: 0 hours Roof construction and secondary members: 0 hours
Fire Sprinkler System:	The building is currently not sprinklered with no intention to upgrade the building to have sprinklers. The assumption is since there is no change in use of the building as well as no significant increase in occupant loads to trigger upgrading the building to be provided with automatic fire sprinklers (AFSS) throughout the building.
Fire Alarm System:	The building is equipped with a fire alarm and detection system. The system utilized horns and strobes for occupant notification. The designer shall survey the existing system to determine if the fire alarm system needs to be replaced in its entirety.
Occupancy Separation: (Table 508.4)	The building is assumed to remain non-sprinklered. A 2-hour occupancy separation shall be required between Group B and Group S-2 occupancies.

Elevator Lobby: Not required per CBC Section 3006.3-5. The elevators are not being used as a means of egress. The elevator is located near the central portion of the whole building in the far-eastern side of the original 1951 building. A two-way communication system shall be installed for all elevator lobbies above or below the ground floor.

Stair: The building is served with 2 exit stairs, one at each end of the building. The building is sited on a hill with a compound slope. The east stairs, Stair B, serve Levels 1-5 (these stairs provide direct roof access). The west stairs, Stair A, serve levels 2-4 and do not provide roof access.
A minimum of one exit stairway is required to be fully enclosed in fire-rated construction. The second stair may be an exit access stairway in accordance with CBC 1019 and CFC Chapter 11. The designer shall verify the rating requirements and provide sufficient opening protectives for one stair to provide a fully enclosed stair.

Corridors: Corridors in existing Group B occupancies shall comply with CFC 1104.17 below. Corridors in existing Group B occupancies shall be constructed to limit the passage of smoke. Refer to CFC 1104.17.1 for specific requirements for corridor openings.

Mass Notification: CFC 917 notes that a mass notification risk analysis be conducted prior to construction of buildings with an occupant load of 1,000 or more. This building is existing and mass notification is not required for this building.

High Fire Severity Zones: CalFire online maps for location of High Fire Severity Zones were reviewed as part of this analysis. It appears that the campus is within a Local Responsibility Area High or Moderate severity zone, thus CBC Wildland Urban Interface (WUI) requirements may apply. This should be verified with the Arcata Fire Department.

ERRCS: Because the building is existing, it is recommended that signal testing be performed in its current state to determine if an Emergency Responder Radio Coverage (ERRCS) be installed in the building.

Fire-Resistance Rating for Building Elements:
(per Table 601)

Primary Structural Frame	0-hrs
Bearing Walls Exterior	0-hrs
Bearing Walls Interior	0-hrs
Non-bearing walls/partitions Interior	**
Non-bearing walls/partitions Interior	0-hr
Floor construction	1-hrs
Roof Construction	0-hr

** This will need to be reviewed against the final design

SCIENCE B

Building Description:

The building is an existing 4 story tall structure (including mechanical / penthouse) originally constructed in one larger project that also involved creating a connection to Science A to the North and adding onto to the existing Corp Yard building that would become Science C in this phase. Science B and Science C were originally constructed as two separate buildings separated by 20' of exterior space and only connected by a covered walkway. Science B is approximately 46,405 GSF total. The occupied floors are composed predominately of teaching labs, offices and research labs and lecture space. The building contains primarily B and A-3 Occupancies.

Building Code:

2022 California Building Code

Building Area:

Level	Existin gGSF	Campus floor level name	Direct exterior exit
1	14,687	First Floor	Yes
2	11,148	Second Floor	Yes
3	10,042	Third Floor	Yes
4	10,528	Fourth Floor	No
	46,405	**TOTAL GSF per campus metaBIM**	

Occupancy:

B classrooms, offices
A-3 Lecture

Construction Type:

Type II-B per campus metaBIM used in this analysis
(Note file "2018_Science_B_Flat_Roof_Replacement_Permitted.pdf" located on campus metaBIM describes the building as Type I-B)

Allowable Area: (Table 506.2)	23,000 max/per floor for B – No existing sprinkler 9,500 max/per floor for A-3– No existing sprinkler
Maximum Number of Stories: (Table 504.4)	Allowed – B at 3 stories – No existing sprinkler Allowed – S2 at 3 stories – No existing sprinkler Allowed – A3 at 2 stories – No existing sprinkler
Maximum Building Height: (Table 504.3)	Allowable B = 55 feet, Allowable A - 55 feet Existing - ±54' There will be no change proposed to the building height.
High-Rise Classification: (Section 403)	Non high-rise
Highest Occupied Floor: (Section 403)	40'-6" (Level 5) Allowed - 75'
Chemical Quantities and Control Areas: (Section 307.1(1))	The Maximum Allowable Quantities (MAQ's) of hazardous materials will be in accordance with the CBC and NFPA 400 for indoor control areas. The number of control areas per floor will be determined in Schematic Design following an analysis of the chemicals used.
Fire Sprinkler System:	The building is currently not sprinklered with no intention to upgrade the building to have sprinklers. The assumption as since there is no change in use of the building as well as no significant increase in occupant loads to trigger upgrading the building to be provided with automatic fire sprinklers (AFSS) throughout the building.
Occupancy Separation: (Table 508.4)	The building is assumed to remain non-sprinklered. A 2-hour occupancy separation shall be required between Group B and Group S-2 occupancies where required. A 2-hour separations shall be provided between Group B and A-3 occupancies where required.
Elevator Lobby:	Not required per CBC Section 3006.3-5. The elevators are not being used as a means of egress. The elevator is located near the central portion of the building. The elevator does provide roof access.
Stair:	The building is served with 2 exit stairs, one at each end of the building. The east stairs, Stair B, serve Levels 1-3 (these stairs do not provide roof access). The west stairs, Stair A, serve levels 1-4 and do provide roof access.

Corridors:	Corridors in existing Group B occupancies shall comply with CFC 1104.17 below. Corridors in existing Group B occupancies shall be constructed to limit the passage of smoke. Refer to CFC 1104.17.1 for specific requirements for corridor openings.
Mass Notification:	CFC 917 notes that a mass notification risk analysis be conducted prior to construction of buildings with an occupant load of 1,000 or more. This building is existing and mass notification is not required for this building
High Fire Severity Zones:	CalFire online maps for location of High Fire Severity Zones were reviewed as part of this analysis. It appears that the campus is within a Local Responsibility Area High or Moderate severity zone, thus CBC Wildland Urban Interface (WUI) requirements may apply. This should be verified with the Arcata Fire Department.
ERRCS:	There is no ERRCS in place. Because the building is existing, it is recommended that signal testing be performed in its current state to determine if an Emergency Responder Radio Coverage (ERRCS) be installed in the building.

Fire-Resistance Rating	Primary Structural Frame	0-hrs
for Building Elements:	Bearing Walls Exterior	0-hrs
(per Table 601)	Bearing Walls Interior	0-hrs
	Non-bearing walls/partitions Interior	**
	Non-bearing walls/partitions Interior	0-hr
	Floor construction	1-hrs
	Roof Construction	0-hr

** This will need to be reviewed against the final design

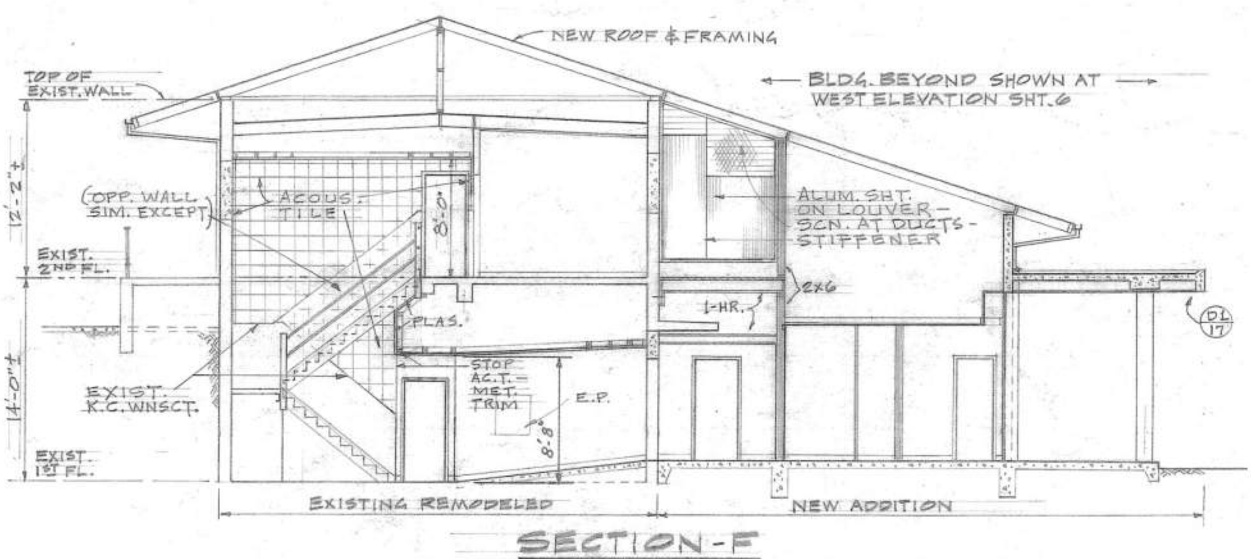
SCIENCE C

Building Description: The building is an existing 2 stories tall and originally constructed in two separate phases. The original North wing constructed in 1951 is 2 stories tall totaling approximately 5,600 GSF total. The added East wing is 2 stories tall bringing the updated area to approximately 9,727 GSF. The occupied floors are composed predominately of research spaces, offices and teaching spaces. The building contains primarily B Occupancies and a small amount of S-2.

Building Code: 2022 California Building Code

Building Area:

Level	Existin gGSF	Campus floor level name	Direct exterior exit
1	6,105	First Floor	Yes
2	3,622	Second Floor	Yes
	9,727	**TOTAL GSF per campus metaBIM**	



North-South Section cut looking easterly

Occupancy: B classrooms, offices, and labs with minor S-2

Construction Type: Type III-B

Allowable Area: 19,000 max/per floor for B – No existing sprinkler
(Table 506.2) 26,000 max/per floor for S-2 – No existing sprinkler
Proposed – no change to the existing floor areas.

Maximum Number of Stories: (Table 504.4)	Allowed – B at 3 stories – No existing sprinkler Allowed – S2 at 3 stories – No existing sprinkler
Maximum Building Height: (Table 504.3)	Allowable B = 55 feet, Allowable S - 55 feet Existing - ±31' There will be no change proposed to the building height.
High-Rise Classification: (Section 403)	Non high-rise
Highest Occupied Floor: (Section 403) (Section 403)	12'-0" Allowed - 75' Proposed – 14'-0" (Level 2)
Chemical Quantities and Control Areas: (Section 307.1(1))	The Maximum Allowable Quantities (MAQ's) of hazardous materials will be in accordance with the CBC and NFPA 400 for indoor control areas. The number of control areas per floor will be determined in Schematic Design following an analysis of the chemicals used.
Fire Sprinkler System:	The building is currently not sprinklered with no intention to upgrade the building to have sprinklers. The assumption as since there is no change in use of the building as well as no significant increase in occupant loads to trigger upgrading the building to be provided with automatic fire sprinklers (AFSS) throughout the building.
Occupancy Separation: (Table 508.4)	The building is assumed to remain non-sprinklered. A 2-hour occupancy separation shall be required between B and S-2. No other occupancies assumed.
Elevator Lobby:	There is currently no elevator in this building. If an elevator is provided, location shall be studied to provide adequate protections.
Stair:	The building is served with 1 stair, near the middle of the north side of the building. There is no roof access via the stairs or hatches.
Corridors:	Corridors in existing Group B occupancies shall comply with CFC 1104.17 below. Corridors in existing Group B occupancies shall be constructed to limit the passage of smoke. Refer to CFC 1104.17.1 for specific requirements for corridor openings.

Mass Notification: CFC 917 notes that a mass notification risk analysis be conducted prior to construction of buildings with an occupant load of 1,000 or more. This building is existing and mass notification is not required for this building

High Fire Severity Zones: CalFire online maps for location of High Fire Severity Zones were reviewed as part of this analysis. It appears that the campus is within a Local Responsibility Area High or Moderate severity zone, thus CBC Wildland Urban Interface (WUI) requirements may apply. This should be verified with the Arcata Fire Department.

ERRCS: There is no ERRCS in place. Because the building is existing, it is recommended that signal testing be performed in its current state to determine if an Emergency Responder Radio Coverage (ERRCS) be installed in the building.

Fire-Resistance Rating for Building Elements: (per Table 601)

Primary Structural Frame	0-hrs
Bearing Walls Exterior	2-hrs
Bearing Walls Interior	0-hrs
Non-bearing walls/partitions Interior	**
Non-bearing walls/partitions Interior	0-hr
Floor construction	2-hrs
Roof Construction	0-hr

** This will need to be reviewed against the final design

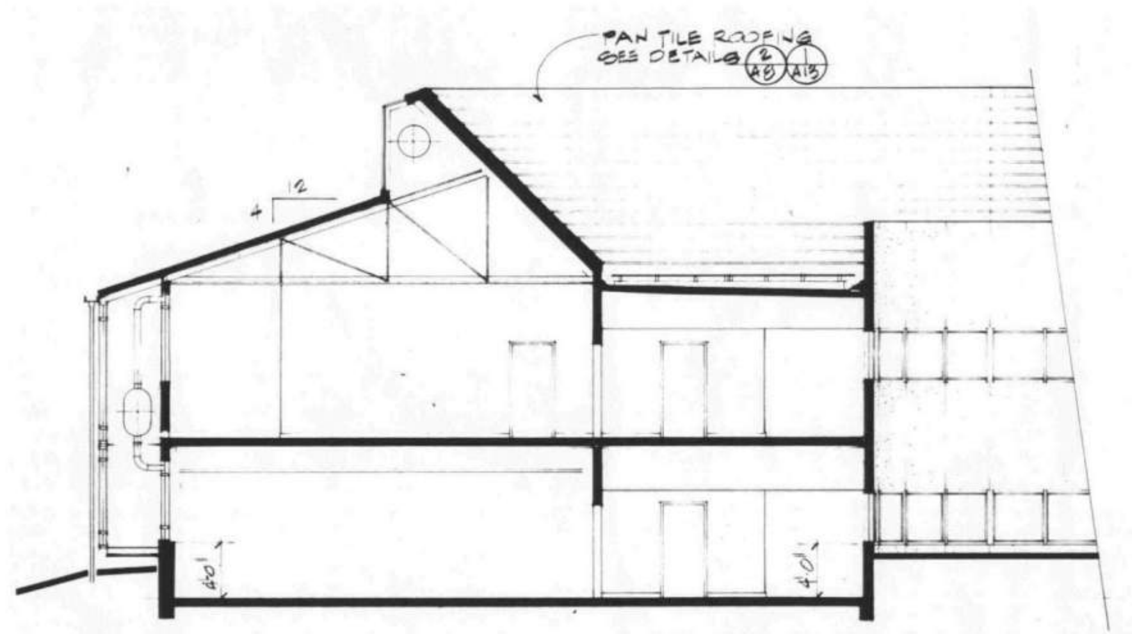
SCIENCE D

Building Description: The building is an existing 2 stories tall. The occupied floors are composed predominately of teaching spaces. The building contains primarily B Occupancies and a small amount of S-2.

Building Code: 2022 California Building Code

Building Area:

Level	Existin gGSF	Campus floor level name	Direct exterior exit
1	17,204	First Floor	Yes
2	16,341	Second Floor	Yes
	33,545	**TOTAL GSF per campus metaBIM**	



North-South Section cut looking westerly

Occupancy:	B classrooms, offices, and labs with minor S-2
Construction Type:	Type II-A
Allowable Area: (Table 506.2)	37,500 max/per floor for B – No existing sprinkler 39,000 max/per floor for S-2 – No existing sprinkler Proposed – no change to the existing floor areas.
Maximum Number of Stories: (Table 504.4)	Allowed – B at 5 stories – No existing sprinkler Allowed – S2 at 5 stories – No existing sprinkler
Maximum Building Height: (Table 504.3)	Allowable B = 65 feet, Allowable S - 65 feet Existing - ±37' There will be no change proposed to the building height.
High-Rise Classification: (Section 403)	Non high-rise
Highest Occupied Floor: (Section 403) (Section 403)	12'-0" Allowed - 75' Proposed – 14'-0" (Level 2)

Chemical Quantities and Control Areas: (Section 307.1(1))

The Maximum Allowable Quantities (MAQ's) of hazardous materials will be in accordance with the CBC and NFPA 400 for indoor control areas. The number of control areas per floor will be determined in Schematic Design following an analysis of the chemicals used.

Fire Sprinkler System:

The building has existing sprinklers and appears to sprinklered with automatic fire sprinklers (AFSS) throughout the building. The final design-build contractor will need to verify the system and operability before proceeding with any work.

Occupancy Separation: (Table 508.4)

The building is assumed to remain sprinklered.
1-hr separation shall be required between B and S-2
No other occupancies assumed.

Elevator Lobby:

There is currently no elevator in this building. If an elevator is provided, location shall be studied to provide adequate protections.

Stair:

The building is served with 1 stair, near the southeast of the building. This stair also provides direct roof access via a full-sized person door at roof level.

Corridors:

Corridors in existing Group B occupancies shall comply with CFC 1104.17 below. Corridors in existing Group B occupancies shall be constructed to limit the passage of smoke. Refer to CFC 1104.17.1 for specific requirements for corridor openings.

Mass Notification:

CFC 917 notes that a mass notification risk analysis be conducted prior to construction of buildings with an occupant load of 1,000 or more. This building is existing and mass notification is not required for this building

High Fire Severity Zones:

CalFire online maps for location of High Fire Severity Zones were reviewed as part of this analysis. It appears that the campus is within a Local Responsibility Area High or Moderate severity zone, thus CBC Wildland Urban Interface (WUI) requirements may apply. This should be verified with the Arcata Fire Department.

ERRCS:

There is no ERRCS in place. Because the building is existing, it is recommended that signal testing be performed in its current state to determine if an Emergency Responder Radio Coverage (ERRCS) be installed in the building.

Fire-Resistance Rating	Primary Structural Frame	1-hrs
for Building Elements:	Bearing Walls Exterior	1-hrs
(per Table 601)	Bearing Walls Interior	1-hrs
	Non-bearing walls/partitions Interior	**
	Non-bearing walls/partitions Interior	0-hr
	Floor construction	1-hrs
	Roof Construction	1-hr

** This will need to be reviewed against the final design

6.2 APPLICABLE CODES AND STANDARDS

Applicable State Codes (latest edition)

- Title 24, Part 1 - California Building Standards Administrative Code
- Title 24, Part 2 - California Building Code (CBC)
- Title 24, Part 3 - California Electrical Code (CEC)
- Title 24, Part 4 - California Mechanical Code (CMC)
- Title 24, Part 5 - California Plumbing Code (CPC)
- Title 24, Part 6 - California Energy Code (Title 24)
- Title 24, Part 9 - California Fire Code (CFC)
- Title 24, Part 11 - California Green Building Standards Code (CALGreen)
- Title 24, Part 12 - California Referenced Standards Code
- California Code of Regulations; Title 8, Title 19

Applicable National Codes (latest adopted edition)

- ADA - Americans with Disabilities Act Accessibility Guidelines
- IESI - Illuminating Engineering Society of North America
- NEMA - National Electrical Manufacturers Association
- National Fire Protection Association (NFPA) Guidelines and Standards

Guidelines and Standards (latest adopted edition)

- ACGIH Industrial Ventilation - A Manual of Recommended Practice
- ANSI Z358.1 Emergency Eyewash and Shower Equipment
- ANSI/AIHA Z9.5 - Laboratory Ventilation Standard
- ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 110 - Method of Testing Performance of Laboratory Fume Hoods
- LEED (Leadership in Energy and Environmental Design)
- OSHA (Occupational Safety and Health Administration Standard) 29 CFR 1926 and 29 CFR 1910
- Applicable National Codes: IEEE C2: National Electrical Safety Code (2007)
- Guidelines and Standards: IEEE Institute of Electrical and Electronics Engineers

07
APPENDIX

7.0 APPENDIX - CONTENT AND ORGANIZATION

Section 7.0 includes a record copy of the Initial Assessment phase, where the Feasibility Study Team targeted renovation strategies as applied to multiple disciplines, including Lab Planning, MEP, and Architecture and Accessibility. The **Science A 5th Floor** graphic (Section 7.0.1) and the subsequent **Preliminary Cost Estimate** (Section 7.0.2) highlight the initial rationales surrounding the project budget overage and "price bust"--or lack of feasibility--which allowed for both the project stakeholders and the Feasibility Study team to reorganize and evolving the Science Complex Feasibility Study by employing multiple Phasing Strategy project opportunities in order to advance Future State feasibility project potentials.

Sections 7.1 to 7.3 are organized in relation to the three Phasing Strategies as outlined in Section 5: Phasing Strategies. Each of these three Phasing Strategies includes Lab Planning, MEP, and Architecture and Accessibility related information:

- Section 7.1: Phasing Strategy 1 - Full Building
  - Section 7.1.1: Lab Planning: Current and Future States
  - Section 7.1.2: Lab Planning: Zoning Diagrams
  - Section 7.1.3: MEP: Zoning Diagrams
- Section 7.2: Phasing Strategy 2 - Laboratory Prototypes
  - Section 7.2.1: Lab Planning: Guide Plates
- Section 7.3: Phasing Strategy 3 - Targeted Renovation
  - Section 7.3.1: Lab Planning: Science A and B

Additionally, there is a record copy of CiRM (California Institute for Regenerative Medicine) Facilities Proposal as provided by CPH and as included in **Section 7.4**, with the Classroom and Laboratory Utilization Analysis and subsequent analytical categories as included in **Section 7.5**:

- Section 7.5.1: Classroom Use by day and Hour - By Building
- Section 7.5.2: Classroom Utilization Analysis - By Building
- Section 7.5.3: Classroom Utilization Analysis - By Room with Graph
- Section 7.5.4: Laboratory Use by day and Hour - By Building
- Section 7.5.5: Laboratory Utilization Analysis - By Building
- Section 7.5.6: Laboratory Utilization Analysis - By Room with Graph

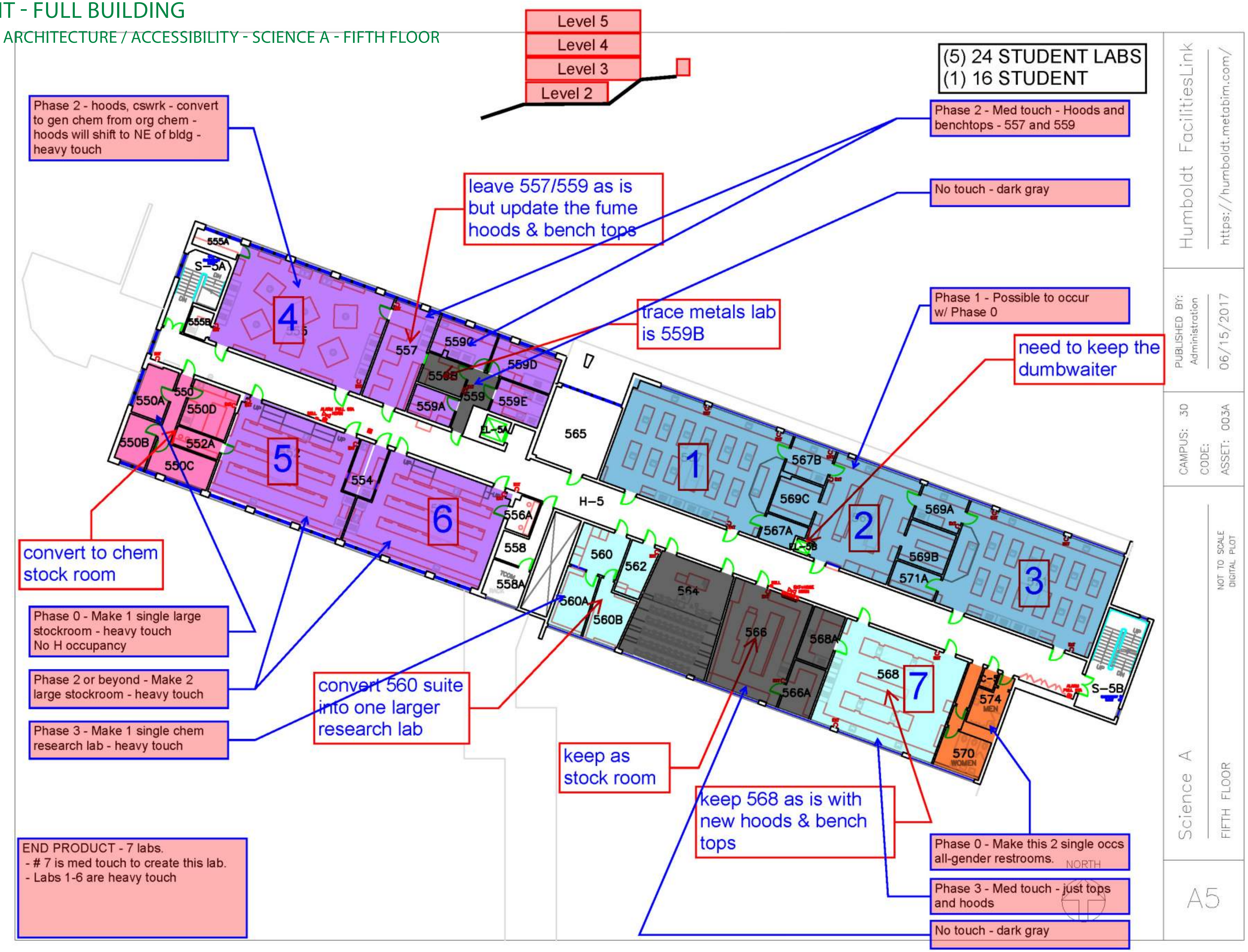
Continuing, there is a record copy of the digital canvas boards used to communicate with the client in **Section 7.6**:

- Section 7.6.1: Project Road Map
- Section 7.6.2: Visioning Board
- Section 7.6.3: Programming and Assessment Board

Finally, there is the Final Cost Estimate in **Section 7.7.**

7.0 INITIAL ASSESSMENT - FULL BUILDING

7.0.1 LAB PLANNING, MEP, AND ARCHITECTURE / ACCESSIBILITY - SCIENCE A - FIFTH FLOOR



7.0 INITIAL ASSESSMENT - FULL BUILDING

7.0.2 PRELIMINARY COST ESTIMATE

The Preliminary Cost Estimate as found on the following pages, was performed at the Science A Building Fifth Floor, as it was being looked at to be phased out on a singular floor, as part of the Initial Assessment for the Full Building. This information, in turn, informed the Phasing Strategies I, II, and III--Macro, Prototype, and Targeted--each as included here in the Appendix.

7.0.2 PRELIMINARY COST ESTIMATE, CONTINUED

Cal Poly Humbolt
Science Building
Program Options Rough Order of Magnitude Cost Plan
April 10, 2024

Overall Summary

	ASF	$/SF	TOTAL
Projects			
Level 5			
Phase 0 - Suite 550 Relocation	730	1,213.00	885,371
Phase 0 - Restroom & Elevator ADA upgrades	20,200	73.00	1,469,171
Phase 1 - Remodel 567, 569 and 571	3,750	2,240.00	8,399,972
Phase 2 - Remodel 552, 555 and 556, 557 &559	4,850	1,890.00	9,167,937
Phase 3 - Modify Lab 568 & 560	1,860	1,601.00	2,978,505
MEP Rooftop Equipment Upgrade - Building A	64,000	206.00	13,169,670
Roofing Replacement - Building A in Entirety	20,200	137.00	2,765,439
MEP Central Heating and Cooling Equipment Replacement - Building A	64,000	105.00	6,748,173
TOTAL BUILDING CONSTRUCTION			45,584,238
Escalation to Start Date (Nov 2025 - Nov 2027)			included in above
ROUGH ORDER OF MAGNITUDE CONSTRUCTION HARDCOSTS			45,584,238

Notes:
- Assumed building will be occupied during construction, Contractor access will be limited
- Project will be phased and bid in multiple GC bid packages
- Excludes upgrade to existing structural and envelop
- Excludes night time/off hours works
- Excludes Group 2 & 3 equipment
- Excludes Project Soft Costs

Cal Poly Humbolt
Science Building
Program Options Rough Order of Magnitude Cost Plan
April 10, 2024

Level 5 Phased Plan

Description	Quantity	Unit	Rate	Total
Phase 0 - Suite 550 Relocation				
Relocate 550 suite offices to other office space - Swing Space				*By Owner*
Remodel 550 suite for stockroom relocation				
Interior Demolition	730	SF	20.00	14,600
Interior Hazardous Materials Abatement, allow	730	SF	10.00	7,300
Interior Contruction	730	SF	100.00	73,000
Prep space casework & equipment	730	SF	285.00	208,050
Interior MEP modifications	730	SF	200.00	146,000
Patch and repair corridors or adjacent space	250	SF	15.00	3,750
Relocate lab 567 to swing space				*By Owner*
Cost Before Markups				452,700
Design Contingency	20.00%			90,540
Construction Contingency	7.50%			40,743
Phasing Allowance	10.00%			58,398
General Requirements	8.00%			46,719
General Conditions	10.00%			68,910
GL Insurance	3.00%			22,740
Contractor Fee	5.00%			39,038
Escalation to Start Date (Nov 2025)	8.00%			65,583
Premium for overtime or shiftwork	25.00%			*Excluded*
				885,371
Phase 0 - Restroom & Elevator ADA upgrades				
Remodel 570 and 574 into (2) single occupency restrooms				
Interior Demolition	460	SF	20.00	9,200
Interior Hazardous Materials Abatement, allow	460	SF	10.00	4,600
Restrooms complete upgrade				
Men & Women	460	SF	1,650.00	759,000
Elevator control panels upgrade	1	LS	38,500.00	38,500
Existing stairs				*Assume no work*
Cost Before Markups				811,300
Design Contingency	20.00%			162,260
Construction Contingency	7.50%			73,017
Phasing Allowance	10.00%			104,658

7.0.2 PRELIMINARY COST ESTIMATE, CONTINUED

Cal Poly Humbolt
Science Building
Program Options Rough Order of Magnitude Cost Plan
April 10, 2024

Level 5 Phased Plan

Description	Quantity	Unit	Rate	Total
General Requirements	8.00%			83,726
General Conditions	10.00%			123,496
GL Insurance	3.00%			40,754
Contractor Fee	5.00%			69,961
Escalation to Start Date (Nov 2025)	0.00%			
Premium for overtime or shiftwork	25.00%			*Excluded*
				1,469,171
Phase 1 - Remodel 567, 569 and 571				
Interior Demolition - lab 567	1,250	SF	28.00	35,000
Interior Demolition - suite 569	1,250	SF	28.00	35,000
Interior Demolition - lab 571	1,250	SF	28.00	35,000
Interior Hazardous Materials Abatement, allow	3,750	SF	10.00	37,500
Interior Construction				
Organic Chemistry Lab	2,500	SF	110.00	275,000
Inorganic Chemistry Lab	1,250	SF	110.00	137,500
Group 1 Equipment				
Organic Chemistry Lab	2	EA	750,000.00	1,500,000
Inorganic Chemistry Lab	1	EA	620,000.00	620,000
Interior MEP modifications	3,750	SF	400.00	1,500,000
Patch and repair corridors/adjacent space	1,800	SF	25.00	45,000
Rooftop equipment - AHU units replacement				*See Add Alternate*
Rooftop equipment - lab exhaust modification (temporary conditions)	3,750	SF	20.00	75,000
Roofing replacement				*See Add Alternate*
Excl. structural strengthening & façade upgrade				*Excluded*
Alternate Cost Before Markups				4,295,000
Design Contingency	20.00%			859,000
Construction Contingency	7.50%			386,550
Phasing Allowance	10.00%			554,055
General Requirements	8.00%			443,244
General Conditions	10.00%			653,785
GL Insurance	3.00%			215,749
Contractor Fee	5.00%			370,369
Escalation to Start Date (Nov 2025)	8.00%			622,220
Premium for overtime or shiftwork	25.00%			*Excluded*

Cal Poly Humbolt
Science Building
Program Options Rough Order of Magnitude Cost Plan
April 10, 2024

Level 5 Phased Plan

Description	Quantity	Unit	Rate	Total
				8,399,972
Phase 2 - Remodel 552, 555 and 556, 557 &559				
Move (E) labs into newly remodeled space				*By Owner*
Interior Demolition - lab 552	1,250	SF	28.00	35,000
Interior Demolition - lab 555	1,250	SF	28.00	35,000
Interior Demolition - lab 556	1,250	SF	28.00	35,000
Interior Hazardous Materials Abatement, allow	3,750	SF	10.00	37,500
Interior Construction				
General Chemistry Lab	3,750	SF	110.00	412,500
Group 1 Equipment				
General Chemistry Lab	3	EA	650,000.00	1,950,000
Interior MEP modifications	3,750	SF	375.00	1,406,250
Patch and repair corridors/adjacent space	1,800	SF	25.00	45,000
Med Touch - 557 & 559				
Interior Demolition (equipment only)	1,100	SF	15.00	16,500
Replace benchtops and fumehoods only, allow	1	LS	250,000.00	250,000
Patch and repair interiors	1,100	SF	50.00	55,000
Interior MEP modifications	1,100	SF	150.00	165,000
Rooftop equipment - AHU units replacement				*See Add Alternate*
Rooftop equipment - lab exhaust modification (temporary conditions)	3,750	SF	10.00	37,500
Roofing replacement				*See Add Alternate*
Excl. structural strengthening & façade upgrade				*Excluded*
Alternate Cost Before Markups				4,480,250
Design Contingency	20.00%			896,050
Construction Contingency	7.50%			403,223
Phasing Allowance	10.00%			577,952
General Requirements	8.00%			462,362
General Conditions	10.00%			681,984
GL Insurance	3.00%			225,055
Contractor Fee	5.00%			386,344
Escalation to Start Date (Nov 2026)	13.00%			1,054,718
Premium for overtime or shiftwork	25.00%			*Excluded*
				9,167,937

7.0.2 PRELIMINARY COST ESTIMATE, CONTINUED

Cal Poly Humbolt
Science Building
Program Options Rough Order of Magnitude Cost Plan
April 10, 2024

Level 5 Phased Plan

Description	Quantity	Unit	Rate	Total
Phase 3 - Modify Lab 568 & 560				
Med Touch - 568				
Interior Demolition (equipment only)	1,200	SF	15.00	18,000
Interior Hazardous Materials Abatement, allow	1,200	SF	10.00	12,000
Replace benchtops and fumehoods only, allow	1	LS	350,000.00	350,000
Patch and repair interiors	1,200	SF	50.00	60,000
Interior MEP modifications	1,200	SF	150.00	180,000
Suite 560 - convert to research lab				
Interior Demolition	660	SF	28.00	18,480
Interior Hazardous Materials Abatement, allow	660	SF	10.00	6,600
Interior Construction				
Research Lab	660	SF	180.00	118,800
Group 1 Equipment				
Research Lab, allow	1	EA	300,000.00	300,000
Interior MEP modifications	660	SF	500.00	330,000
Excl. structural strengthening & façade upgrade				*Excluded*
Alternate Cost Before Markups				1,393,880
Design Contingency	20.00%			278,776
Construction Contingency	7.50%			125,449
Phasing Allowance	10.00%			179,811
General Requirements	8.00%			143,848
General Conditions	10.00%			212,176
GL Insurance	3.00%			70,018
Contractor Fee	5.00%			120,198
Escalation to Start Date (Nov 2027)	18.00%			454,348
Premium for overtime or shiftwork	25.00%			*Excluded*
				2,978,505
MEP Rooftop Equipment Upgrade - Building A				
Air handing equipment				
AHU/Dedicated Outside Air System Units; including all MERV 13 filtration on supply air, coils and supply fans - Allow 1.75CFM/SF	112,000	CFM	23.00	2,576,000
Terminal Units				

Cal Poly Humbolt
Science Building
Program Options Rough Order of Magnitude Cost Plan
April 10, 2024

Level 5 Phased Plan

Description	Quantity	Unit	Rate	Total
Refrigeration piping, valves and accessories				*inc. above*
Unit ventilation/exhaust fans				
Allow for toilet exhaust, general exhaust	64,000	SF	1.00	64,000
Specialty exhaust- fume hood exhaust, etc. for Labs	168,000	CFM	9.50	1,596,000
Piping, fittings, valves and insulation				
Chilled and heated hot water, Refrigeration supply and return pipework, fittings, supports, valves and specialties	64,000	SF	15.00	960,000
System Testing & Balancing				
Allow	64,000	SF	2.00	128,000
Miscellaneous associated work				
Electrical connections to equipment	1	LS	10,000.00	10,000
Allow for minor electrical modifications to serve new AHU(panelboards, circuit breakers, disconnect switches, etc.)	1	LS	35,000.00	35,000
Architectural modifications for replacement of HVAC equipment	1	LS	50,000.00	50,000
HVAC Demo; removal of AHU units with associated piping, connections, valves, etc.	1	LS	30,000.00	30,000
Allow for miscellaneous HVAC modifications for removal and install of new equipment with all associated connections, etc. including electrical & plumbing (lighting, devices, sprinkler heads, floor drains, etc.)	1	LS	120,000.00	120,000
Allow for premium time during switchover - weekend work for entire crew	1	LS	100,000.00	100,000
Project requirements				
Project Management; including all rigging &handling, vibration isolation, commissioning, testing and all associated HVAC BIM coordination, drawings, etc.	1	LS	1,064,800.00	1,064,800
Alternate Cost Before Markups				6,733,800
Design Contingency	20.00%			1,346,760
Construction Contingency	7.50%			606,042
Phasing Allowance	10.00%			868,660
General Requirements	8.00%			694,928
General Conditions	10.00%			1,025,019
GL Insurance	3.00%			338,256

WORKING DRAFT

7.0.2 PRELIMINARY COST ESTIMATE, CONTINUED

Cal Poly Humbolt
Science Building
Program Options Rough Order of Magnitude Cost Plan
April 10, 2024

Level 5 Phased Plan

Description	Quantity	Unit	Rate	Total
Contractor Fee	5.00%			580,673
Escalation to Start Date (Nov 2025)	8.00%			975,531
Premium for overtime or shiftwork	25.00%			*Excluded*
				13,169,670
Roofing Replacement - Building A in Entirety				
Remove existing roofing including insulations and all acessories	20,200	SF	5.00	101,000
New roofing including tapered insulation, waterproofing and accessories	20,200	SF	65.00	1,313,000
Alternate Cost Before Markups				1,414,000
Design Contingency	20.00%			282,800
Construction Contingency	7.50%			127,260
Phasing Allowance	10.00%			182,406
General Requirements	8.00%			145,925
General Conditions	10.00%			215,239
GL Insurance	3.00%			71,029
Contractor Fee	5.00%			121,933
Escalation to Start Date (Nov 2025)	8.00%			204,847
Premium for overtime or shiftwork	25.00%			*Excluded*
				2,765,439
MEP Central Heating and Cooling Equipment Replacement - Building A				
Heat generation and cooling generating system				
Air Source Heat Pump System; VRF/VRV Type with all associated heat pumps, boxes and associated	215	TN	4,000.00	860,000
Hydronic pumps, HHW buffer tank	1	LS	60,000.00	60,000
Boiler incl misc heating system	320	TN	3,500.00	1,120,000
Piping, fittings, valves and insulation				
Chilled and heated hot water, Refrigeration supply and return pipework, fittings, supports, valves and specialties				*Incl*
Control & Instrumentation				*See below*

Cal Poly Humbolt
Science Building
Program Options Rough Order of Magnitude Cost Plan
April 10, 2024

Level 5 Phased Plan

Description	Quantity	Unit	Rate	Total
Heating Equipment	64,000	SF	5.00	320,000
BMS Programming & Testing	1	LS	25,000.00	25,000
System Testing & Balancing				
Allow	64,000	SF	2.50	160,000
Miscellaneous associated work				
Electrical connections to equipment	2	EA	15,000.00	30,000
Allow for minor electrical modifications to serve new boilers (panelboards, circuit breakers, disconnect switches, etc.)	1	LS	50,000.00	50,000
Architectural modifications for replacement of HVAC equipment	1	LS	65,000.00	65,000
HVAC Demo; removal of boilers with associated piping, connections, valves, etc.	1	LS	45,000.00	45,000
Allow for miscellaneous HVAC modifications for removal and install of new equipment with all associated connections, etc. including electrical & plumbing (lighting, devices, sprinkler heads, floor drains, etc.)	1	LS	120,000.00	120,000
Allow for premium time during switchover - weekend work for entire crew	1	LS	100,000.00	100,000
Allow for temporary heating during construction	1	LS	85,000.00	85,000
Project requirements				
Project Management; including all rigging &handling, vibration isolation, commissioning, testing and all associated HVAC BIM coordination, drawings, etc.	1	LS	509,000.00	509,000
Roof Structure Strengthening				*Excluded*
Alternate Cost Before Markups				3,549,000
Design Contingency	20.00%			709,800
Construction Contingency	7.50%			319,410
Phasing Allowance	10.00%			457,821
General Requirements	8.00%			366,257
General Conditions	10.00%			540,229
GL Insurance	3.00%			178,275
Contractor Fee	5.00%			306,040
Escalation to Start Date (Nov 2025)	5.00%			321,342
Premium for overtime or shiftwork	25.00%			*Excluded*
Description	Quantity	Unit	Rate	Total
				6,748,173

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7.1 PHASING STRATEGY 1 - FULL BUILDING

7.1.1.0 LAB PLANNING - CURRENT AND FUTURE STATES - SCIENCE A, B, C, AND D

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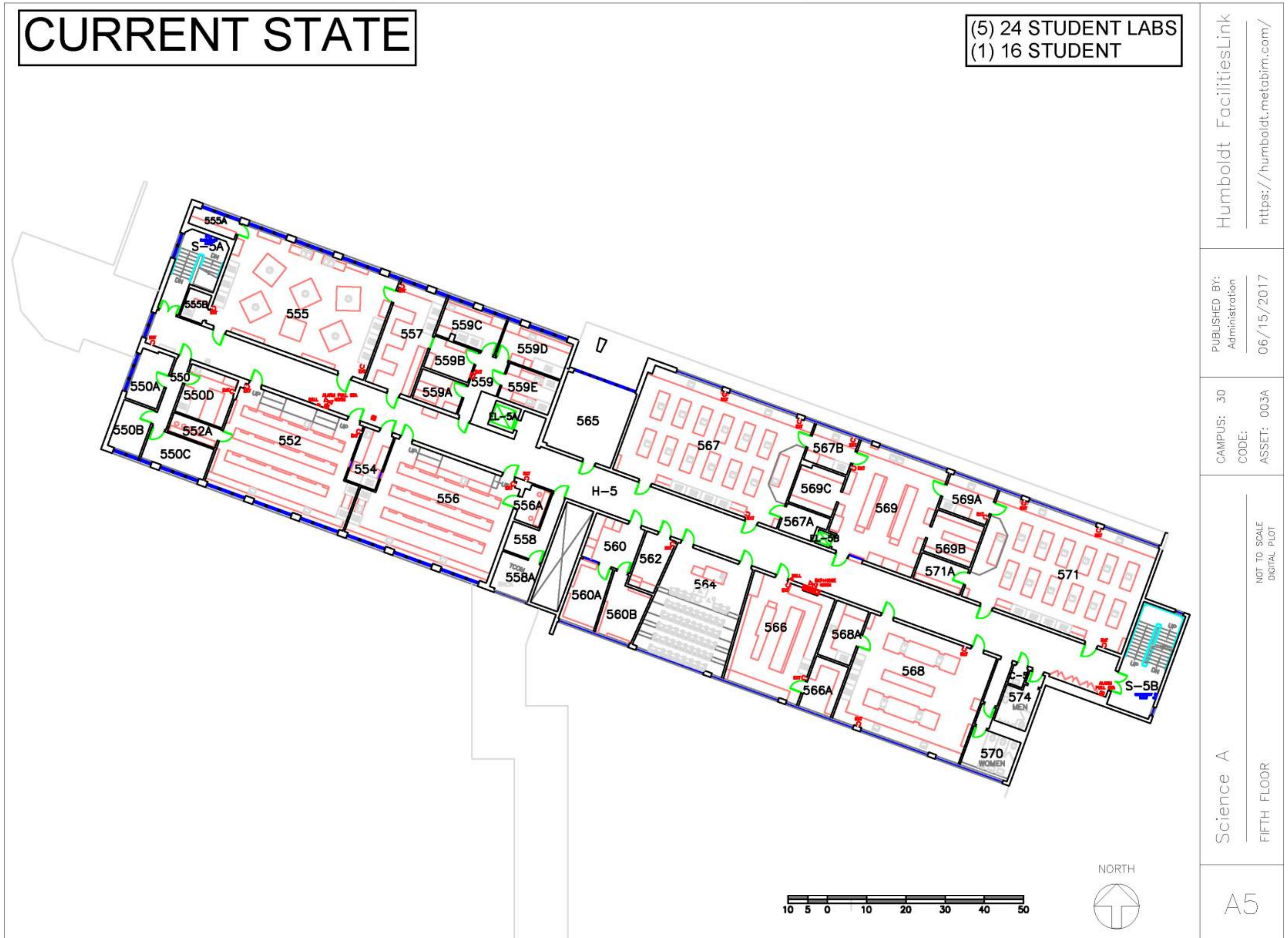
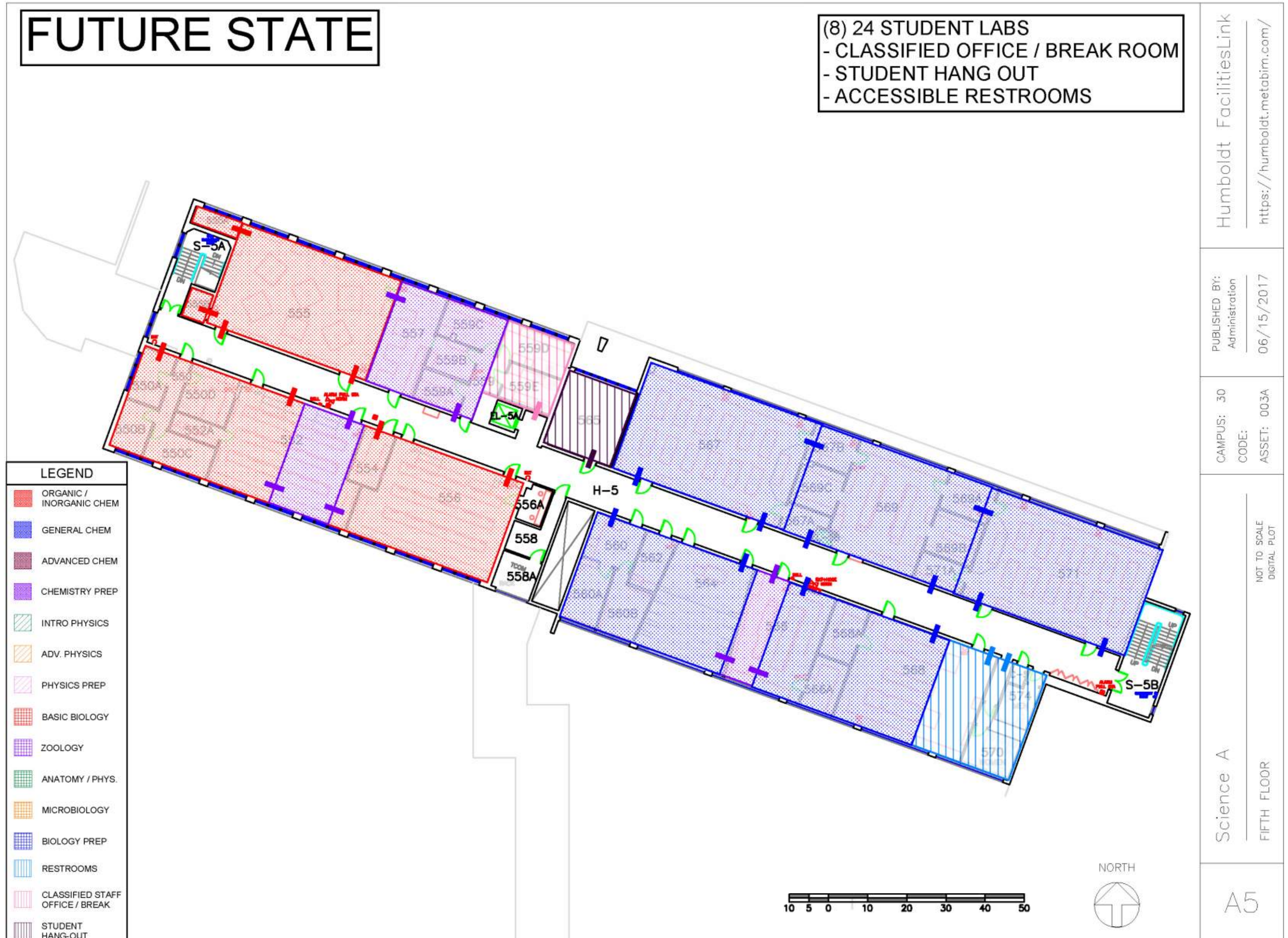
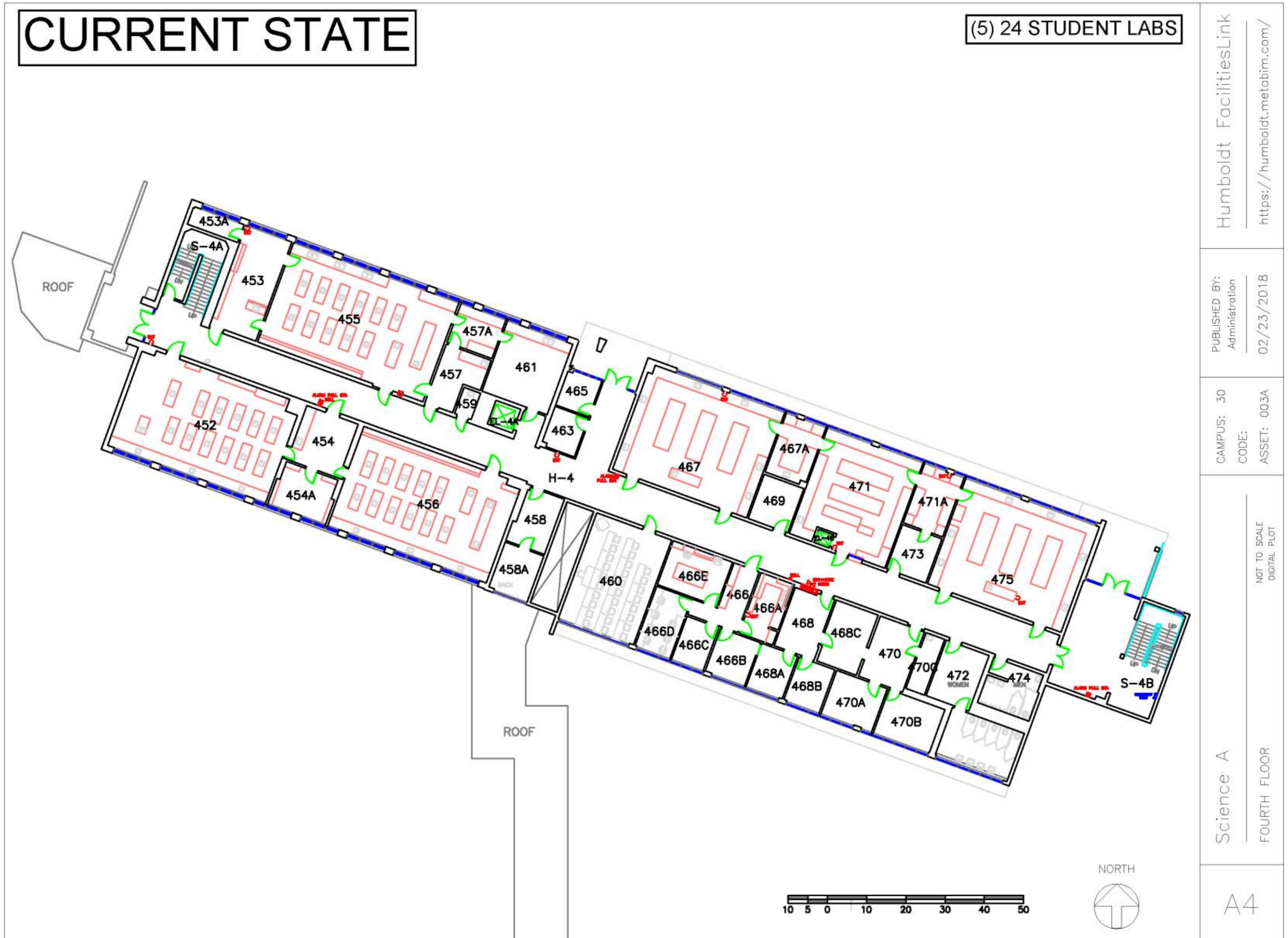
7.1 PHASING STRATEGY 1 - FULL BUILDING

7.1.1.1 LAB PLANNING - CURRENT AND FUTURE STATES - SCIENCE A




FUTURE STATE
(8) 24 STUDENT LABS
- CLASSIFIED OFFICE / BREAK ROOM
- STUDENT HANG OUT
- ACCESSIBLE RESTROOMS
S-5A
H-5
556A
558
558A
EL-5A
S-5B
LEGEND
ORGANIC / INORGANIC CHEM
GENERAL CHEM
ADVANCED CHEM
CHEMISTRY PREP
INTRO PHYSICS
ADV. PHYSICS
PHYSICS PREP
BASIC BIOLOGY
ZOOLOGY
ANATOMY / PHYS.
MICROBIOLOGY
BIOLOGY PREP
RESTROOMS
CLASSIFIED STAFF OFFICE / BREAK
STUDENT HANG-OUT
10 5 0 10 20 30 40 50
NORTH
Humboldt FacilitiesLink
https://humboldt.metabim.com/
PUBLISHED BY: Administration
06/15/2017
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE
DIGITAL PLOT
Science A
FIFTH FLOOR
A5


CURRENT STATE
(5) 24 STUDENT LABS
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https://humboldt.metabim.com/
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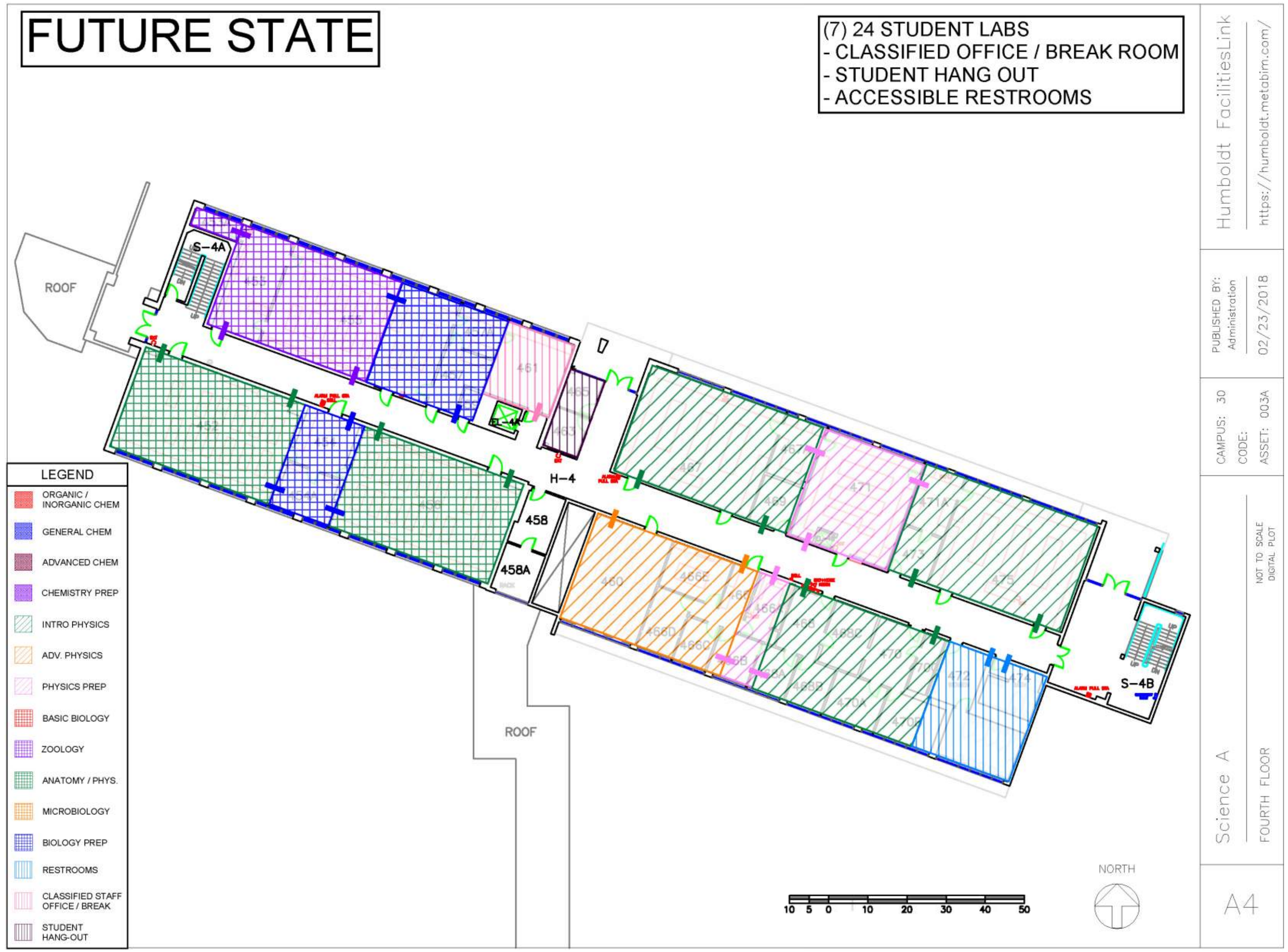
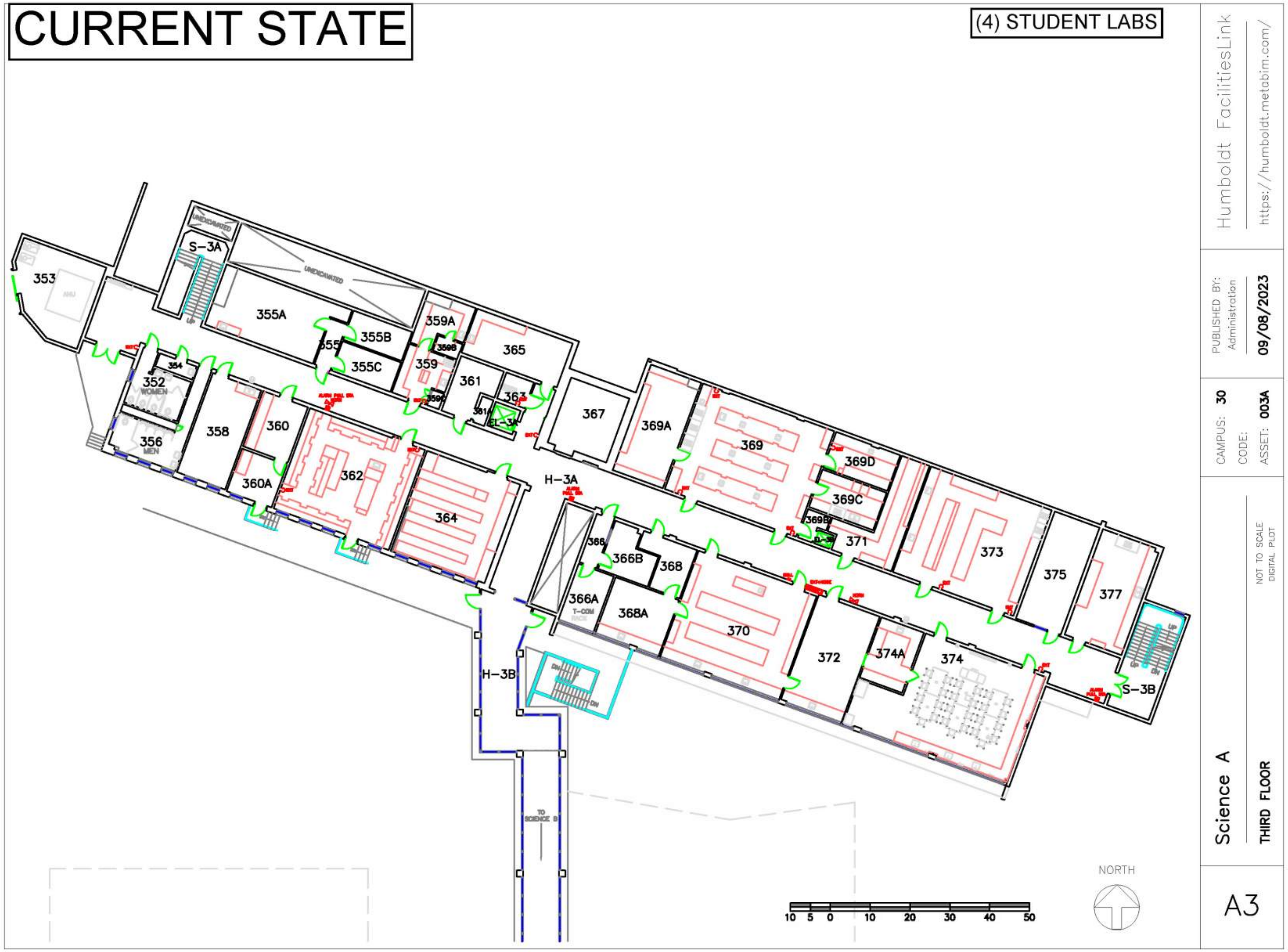
02/23/2018
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE
DIGITAL PLOT
Science A
FOURTH FLOOR
A4
NORTH
ROOF
453A
S-4A
453
455
457A
461
457
459
465
463
452
454
454A
456
H-4
467
467A
469
471
471A
473
475
458
458A
460
466E
466
466A
468
468C
470
470C
472
474
S-4B
466D
466C
466B
468A
468B
470A
470B
10 5 0 10 20 30 40 50


FUTURE STATE
(7) 24 STUDENT LABS
- CLASSIFIED OFFICE / BREAK ROOM
- STUDENT HANG OUT
- ACCESSIBLE RESTROOMS
ROOF
S-4A
H-4
458
458A
S-4B
ROOF
LEGEND
ORGANIC / INORGANIC CHEM
GENERAL CHEM
ADVANCED CHEM
CHEMISTRY PREP
INTRO PHYSICS
ADV. PHYSICS
PHYSICS PREP
BASIC BIOLOGY
ZOOLOGY
ANATOMY / PHYS.
MICROBIOLOGY
BIOLOGY PREP
RESTROOMS
CLASSIFIED STAFF OFFICE / BREAK
STUDENT HANG-OUT
10 5 0 10 20 30 40 50
NORTH
Humboldt FacilitiesLink
https://humboldt.metabim.com/
PUBLISHED BY: Administration
02/23/2018
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE
DIGITAL PLOT
Science A
FOURTH FLOOR
A4


CURRENT STATE
(4) STUDENT LABS
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https://humboldt.metabim.com/
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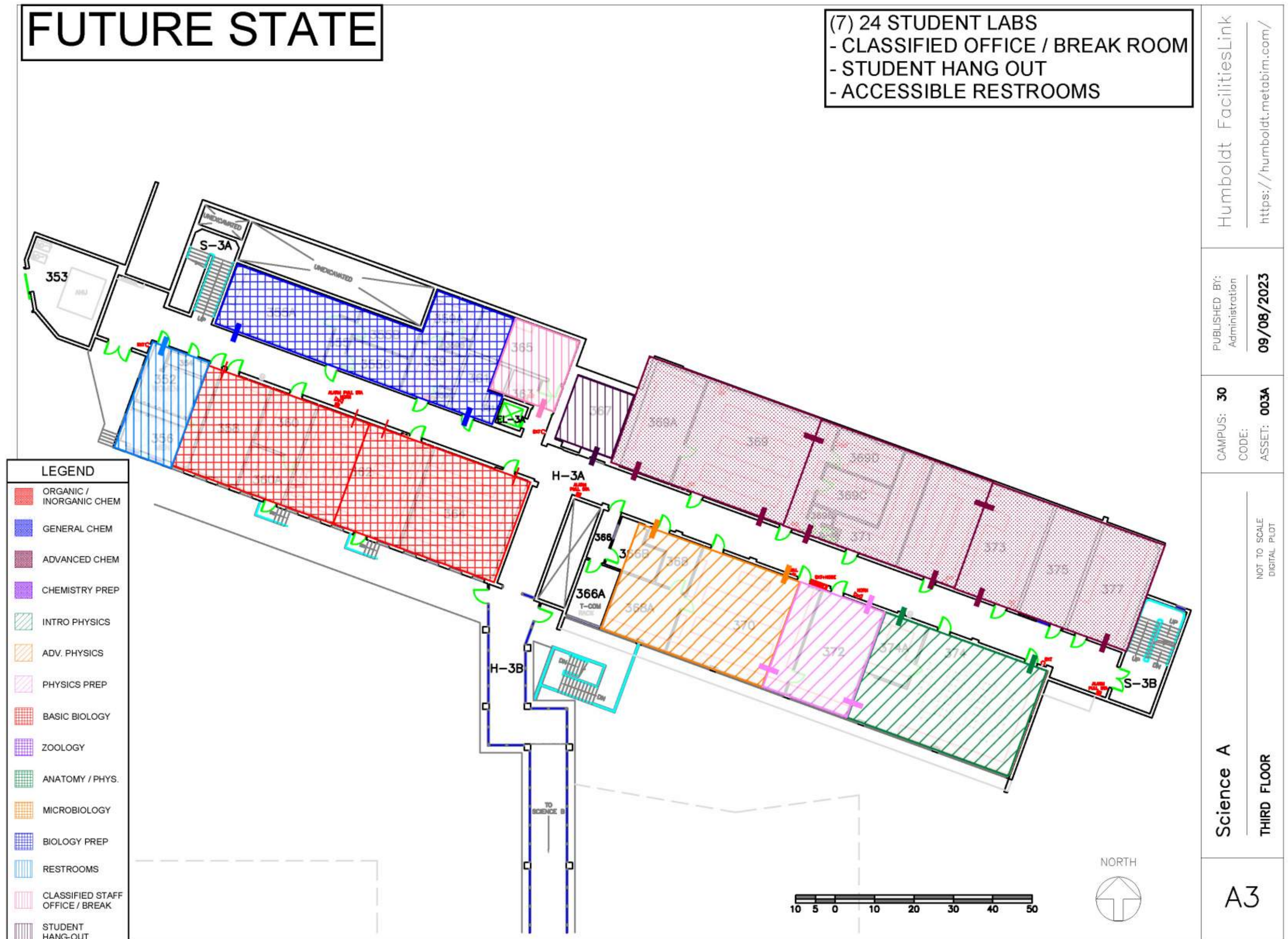
Administration
09/08/2023
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE
DIGITAL PLOT
Science A
THIRD FLOOR
A3
NORTH
10 5 0 10 20 30 40 50
353
S-3A
355A
355B
355C
359A
359
365
361
363
367
369A
369
369D
369C
371
373
375
377
352
354
356
358
360
360A
362
364
H-3A
366B
368
366A
368A
370
372
374A
374
S-3B
H-3B


FUTURE STATE
(7) 24 STUDENT LABS
- CLASSIFIED OFFICE / BREAK ROOM
- STUDENT HANG OUT
- ACCESSIBLE RESTROOMS
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https://humboldt.metabim.com/
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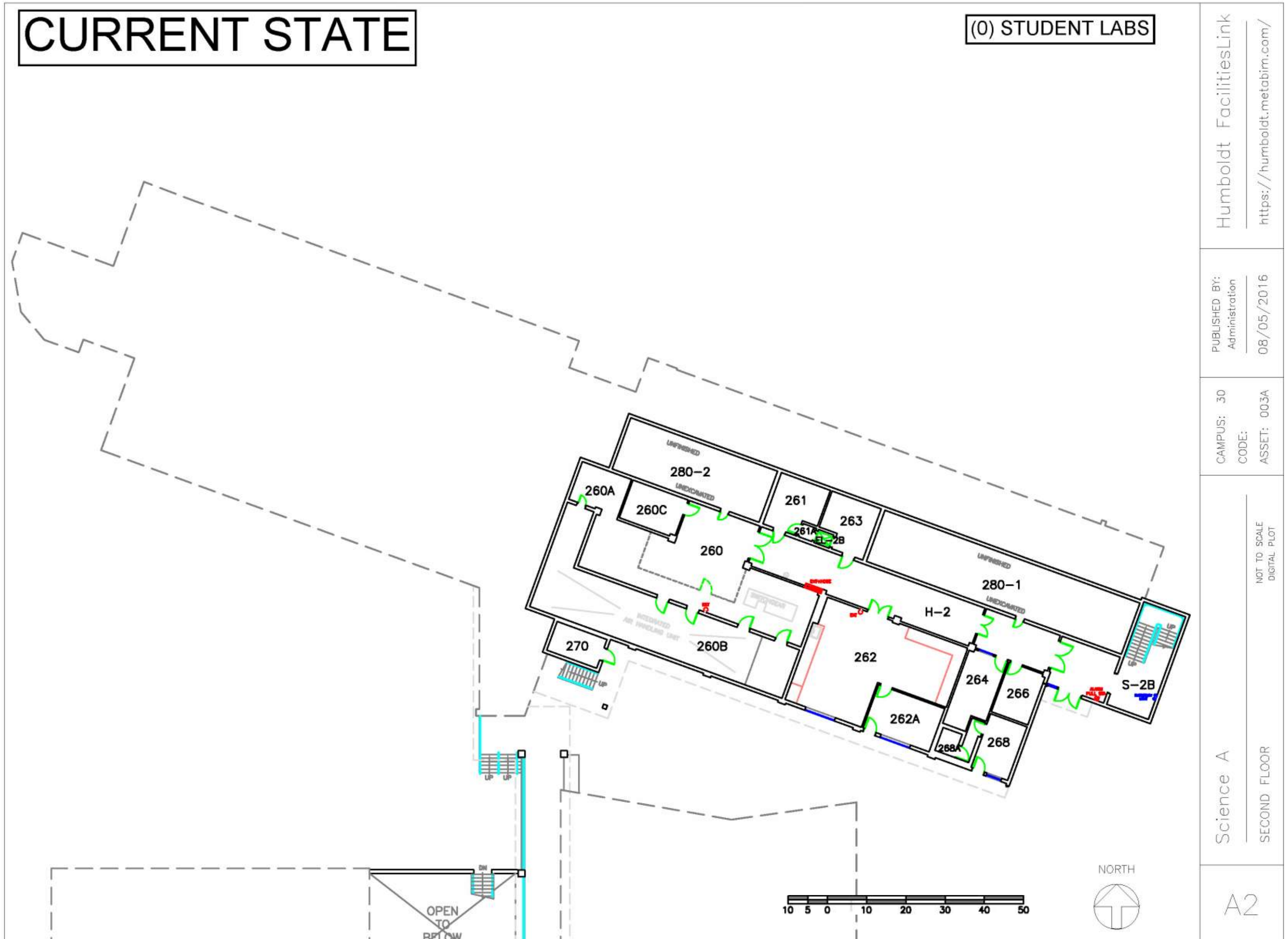
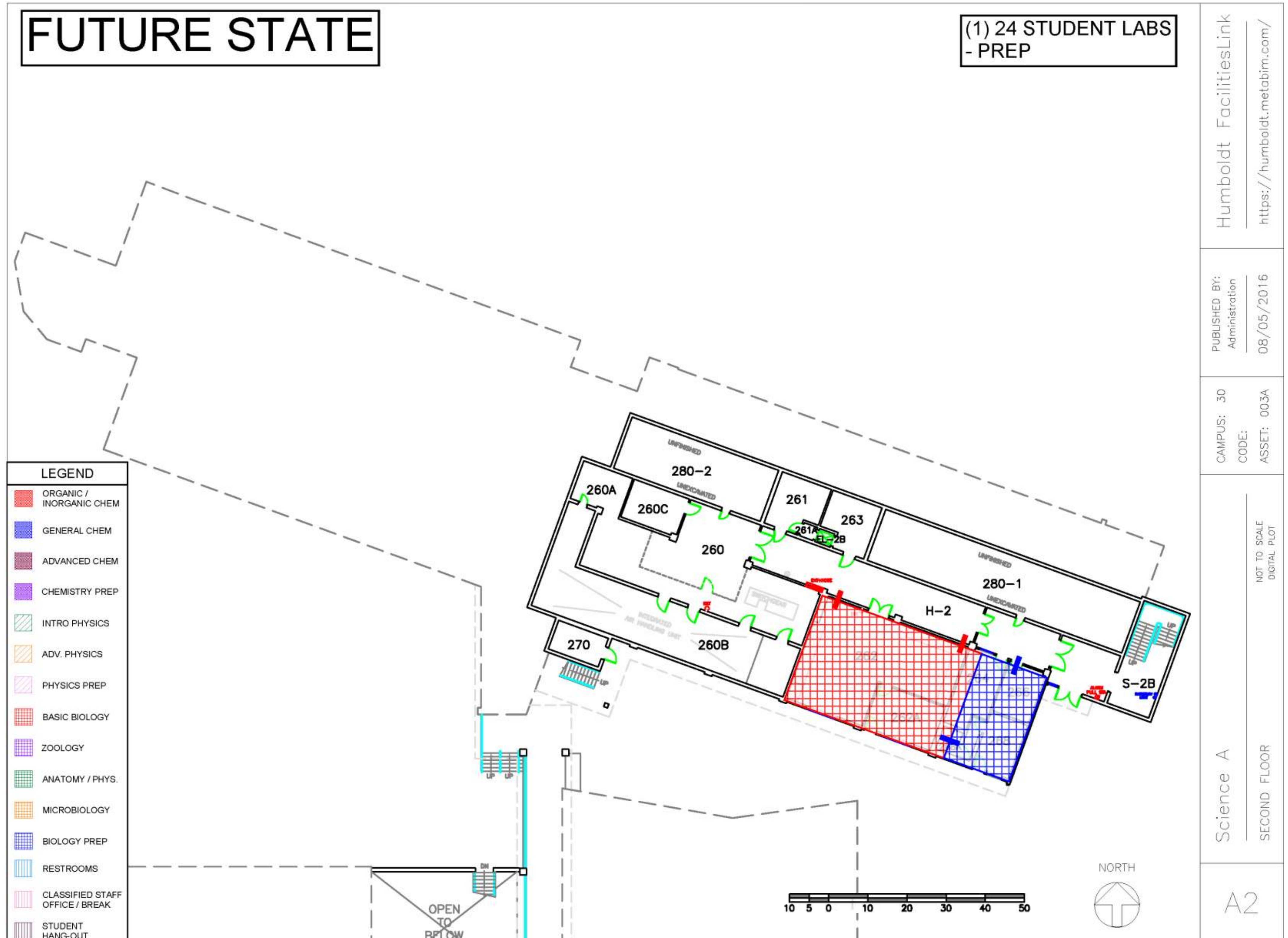
09/08/2023
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE
DIGITAL PLOT
Science A
THIRD FLOOR
A3
NORTH
LEGEND
ORGANIC / INORGANIC CHEM
GENERAL CHEM
ADVANCED CHEM
CHEMISTRY PREP
INTRO PHYSICS
ADV. PHYSICS
PHYSICS PREP
BASIC BIOLOGY
ZOOLOGY
ANATOMY / PHYS.
MICROBIOLOGY
BIOLOGY PREP
RESTROOMS
CLASSIFIED STAFF OFFICE / BREAK
STUDENT HANG-OUT
353
S-3A
H-3A
H-3B
366A
S-3B
10 5 0 10 20 30 40 50


CURRENT STATE
(0) STUDENT LABS
Humboldt FacilitiesLink
https://humboldt.metabim.com/
PUBLISHED BY:
Administration
08/05/2016
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE
DIGITAL PLOT
Science A
SECOND FLOOR
A2
NORTH
280-2
260A
260C
260
261
261A
EL-2B
263
280-1
H-2
262
262A
264
266
268
268A
S-2B
270
260B
UNFINISHED
UNEXCAVATED
UP
OPEN TO BELOW
10 5 0 10 20 30 40 50


FUTURE STATE
(1) 24 STUDENT LABS - PREP
LEGEND
ORGANIC / INORGANIC CHEM
GENERAL CHEM
ADVANCED CHEM
CHEMISTRY PREP
INTRO PHYSICS
ADV. PHYSICS
PHYSICS PREP
BASIC BIOLOGY
ZOOLOGY
ANATOMY / PHYS.
MICROBIOLOGY
BIOLOGY PREP
RESTROOMS
CLASSIFIED STAFF OFFICE / BREAK
STUDENT HANG-OUT
280-2
260A
260C
261
263
260
280-1
H-2
270
260B
S-2B
OPEN TO BELOW
NORTH
Humboldt FacilitiesLink
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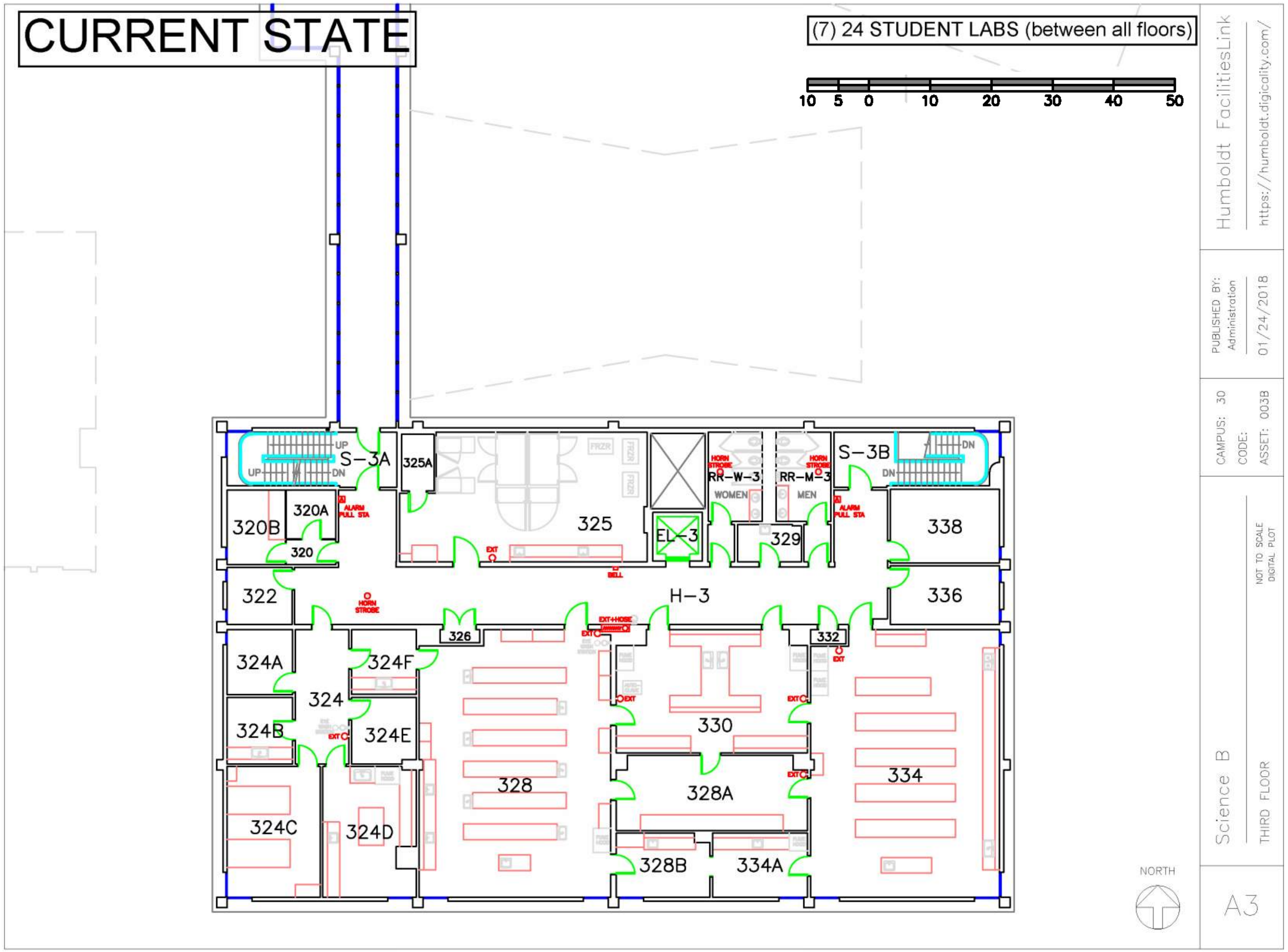
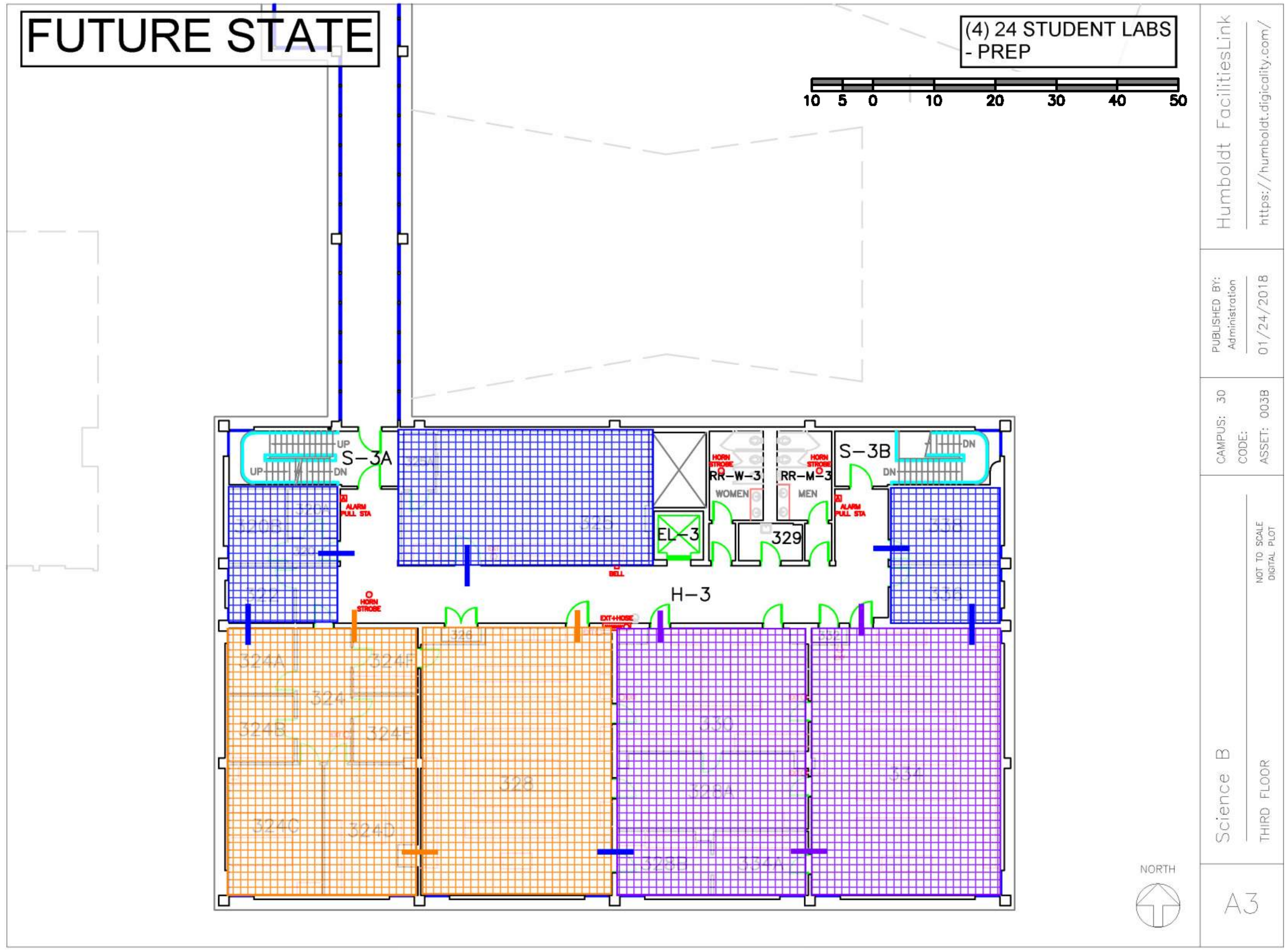
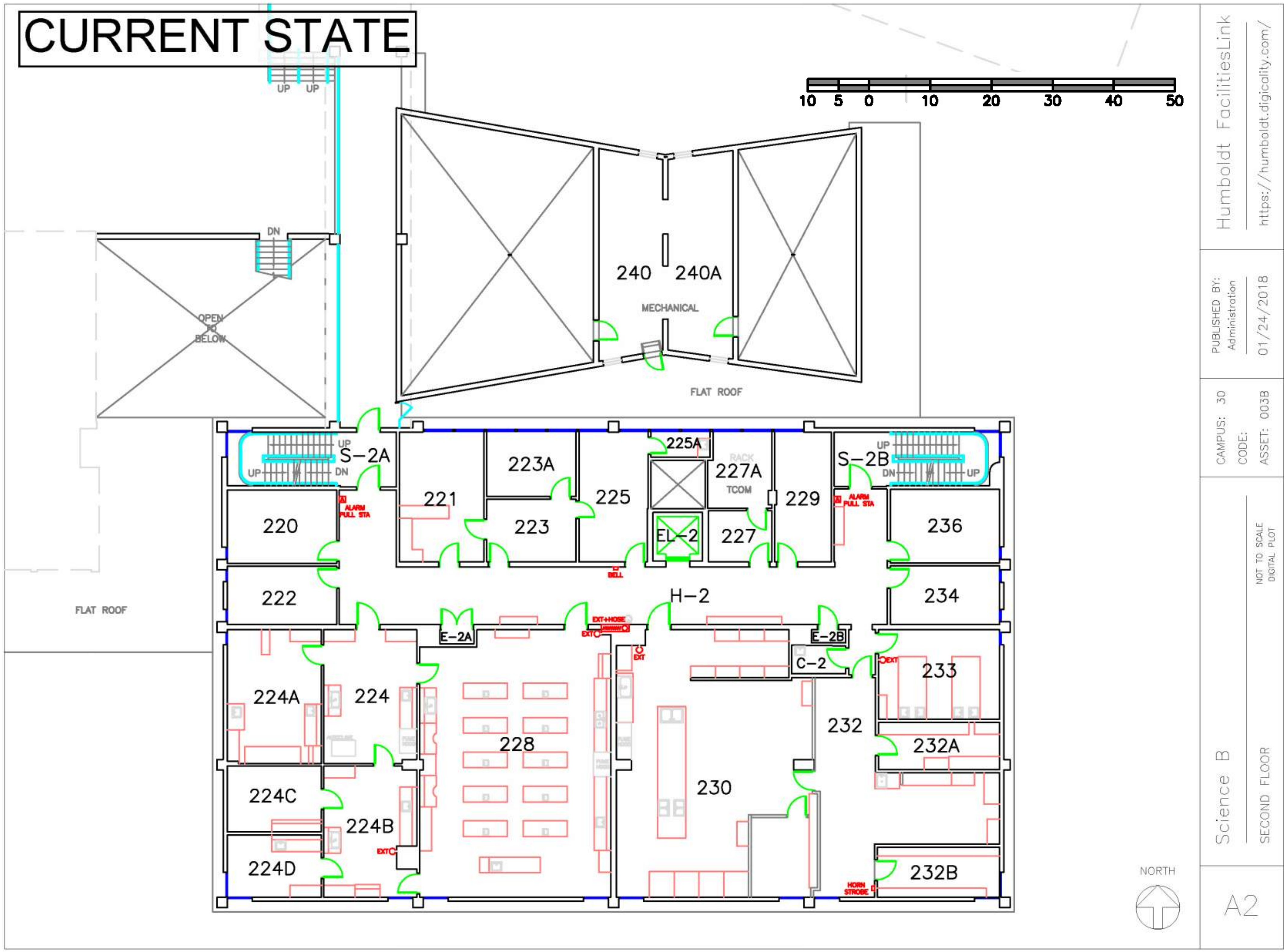
CAMPUS: 30
CODE:
ASSET: 003A
NOT TO SCALE
DIGITAL PLOT
Science A
SECOND FLOOR
A2

7.1 PHASING STRATEGY 1 - FULL BUILDING

7.1.1.2 LAB PLANNING - CURRENT AND FUTURE STATES - SCIENCE B




FUTURE STATE
(4) 24 STUDENT LABS
- PREP
10 5 0 10 20 30 40 50
S-3A
S-3B
RR-W-3
RR-M-3
WOMEN
MEN
EL-3
329
H-3
NORTH
Humboldt FacilitiesLink
https://humboldt.digicality.com/
PUBLISHED BY: Administration
01/24/2018
CAMPUS: 30
CODE:
ASSET: 003B
NOT TO SCALE
DIGITAL PLOT
Science B
THIRD FLOOR
A3


CURRENT STATE
10 5 0 10 20 30 40 50
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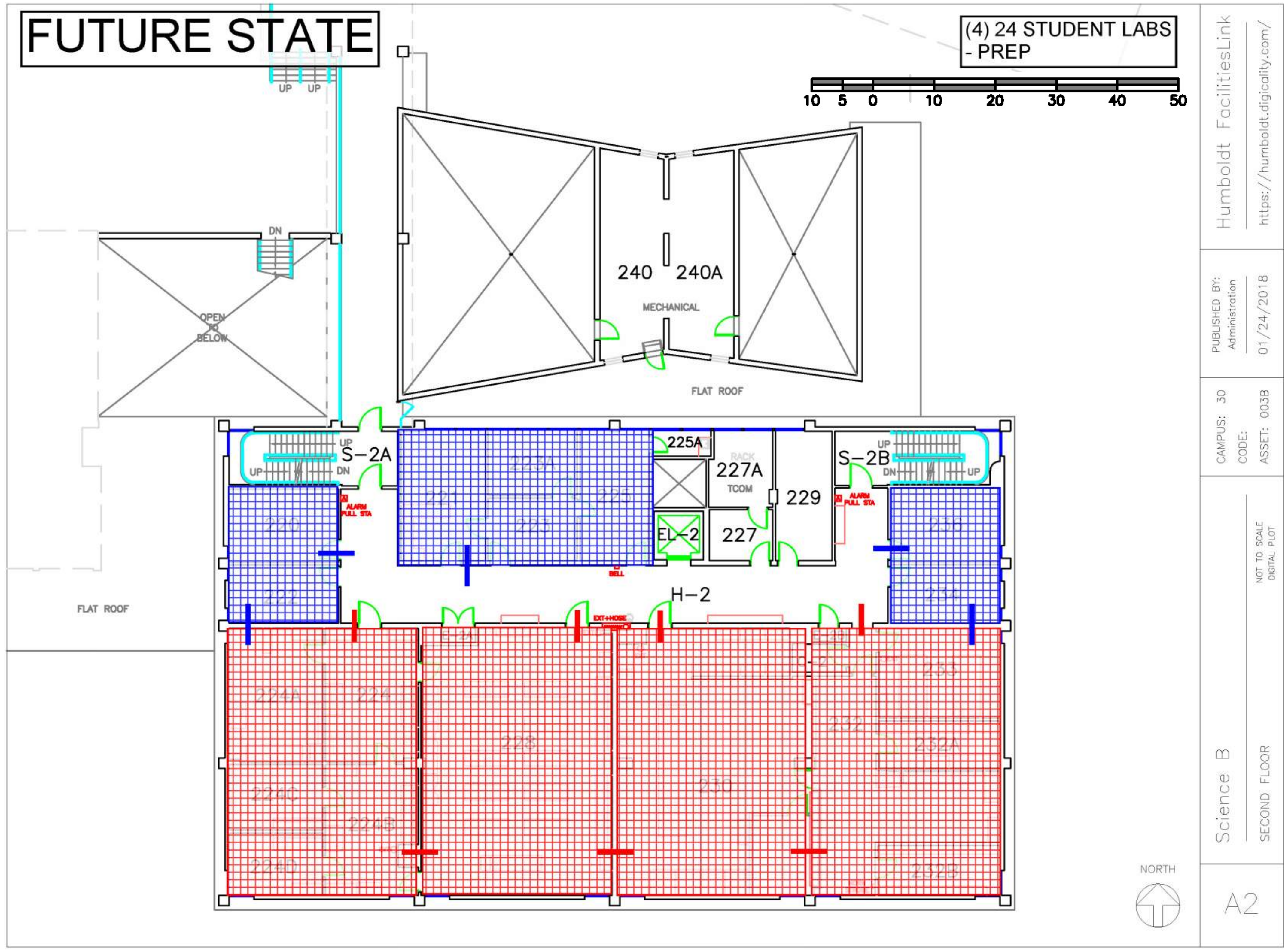
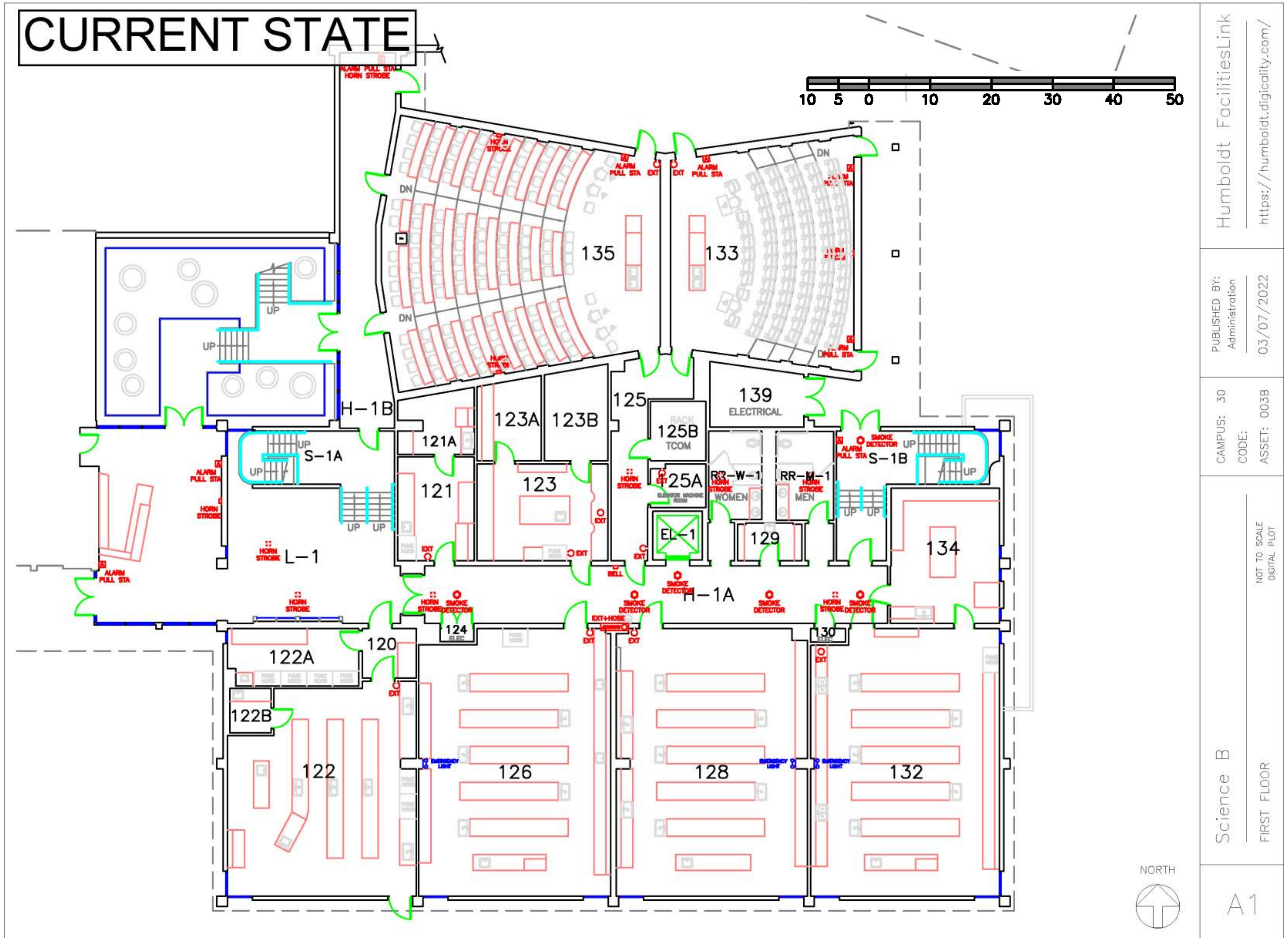
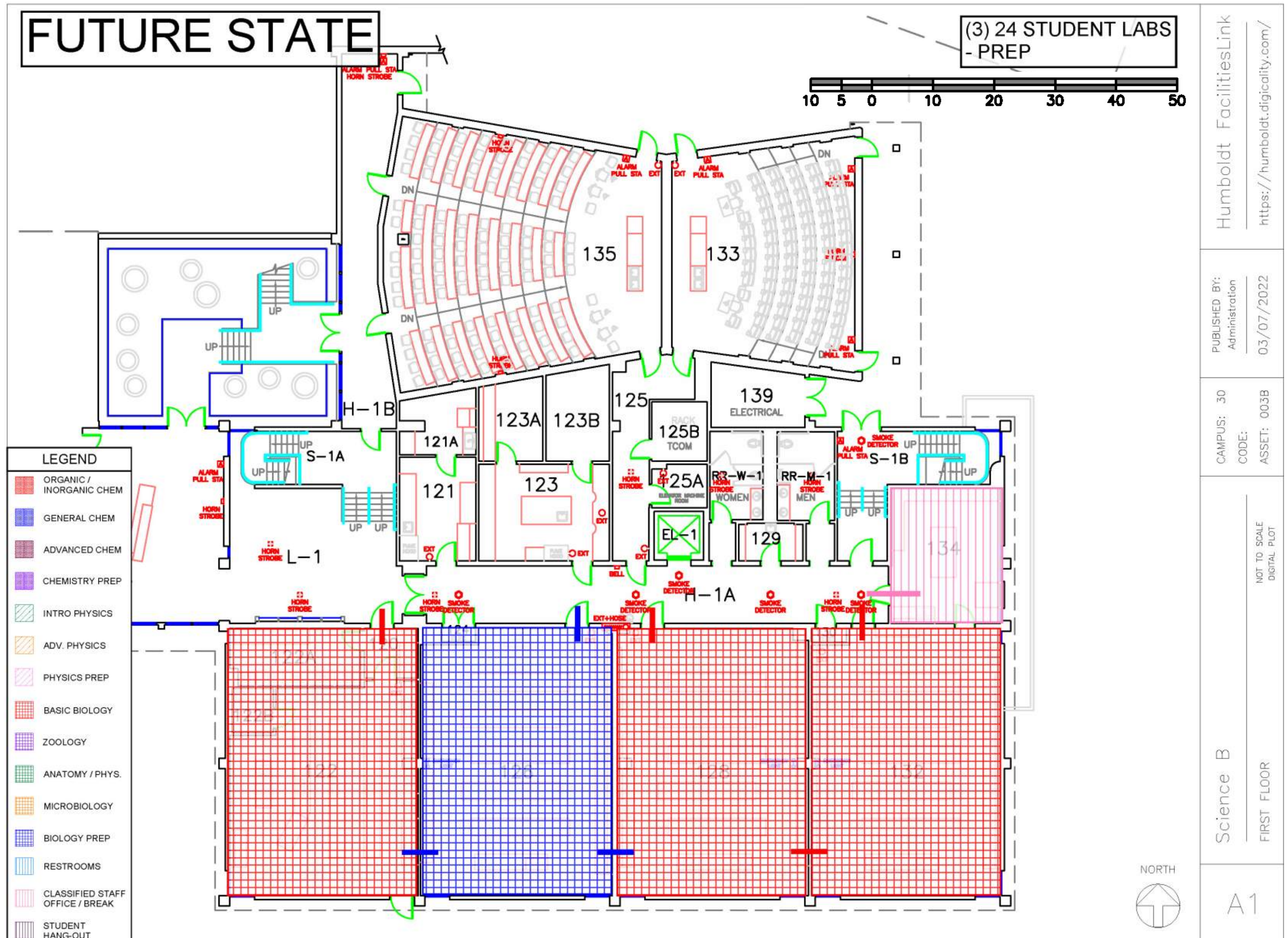
PUBLISHED BY: Administration
01/24/2018
CAMPUS: 30
CODE:
ASSET: 003B
NOT TO SCALE
DIGITAL PLOT
Science B
SECOND FLOOR
A2
NORTH
240
240A
MECHANICAL
FLAT ROOF
OPEN TO BELOW
S-2A
S-2B
220
221
222
223
223A
225
225A
227
227A
TCOM
229
EL-2
H-2
236
234
233
232
232A
232B
230
228
224
224A
224B
224C
224D
E-2A
E-2B
C-2
ALARM PULL STA
UP
DN

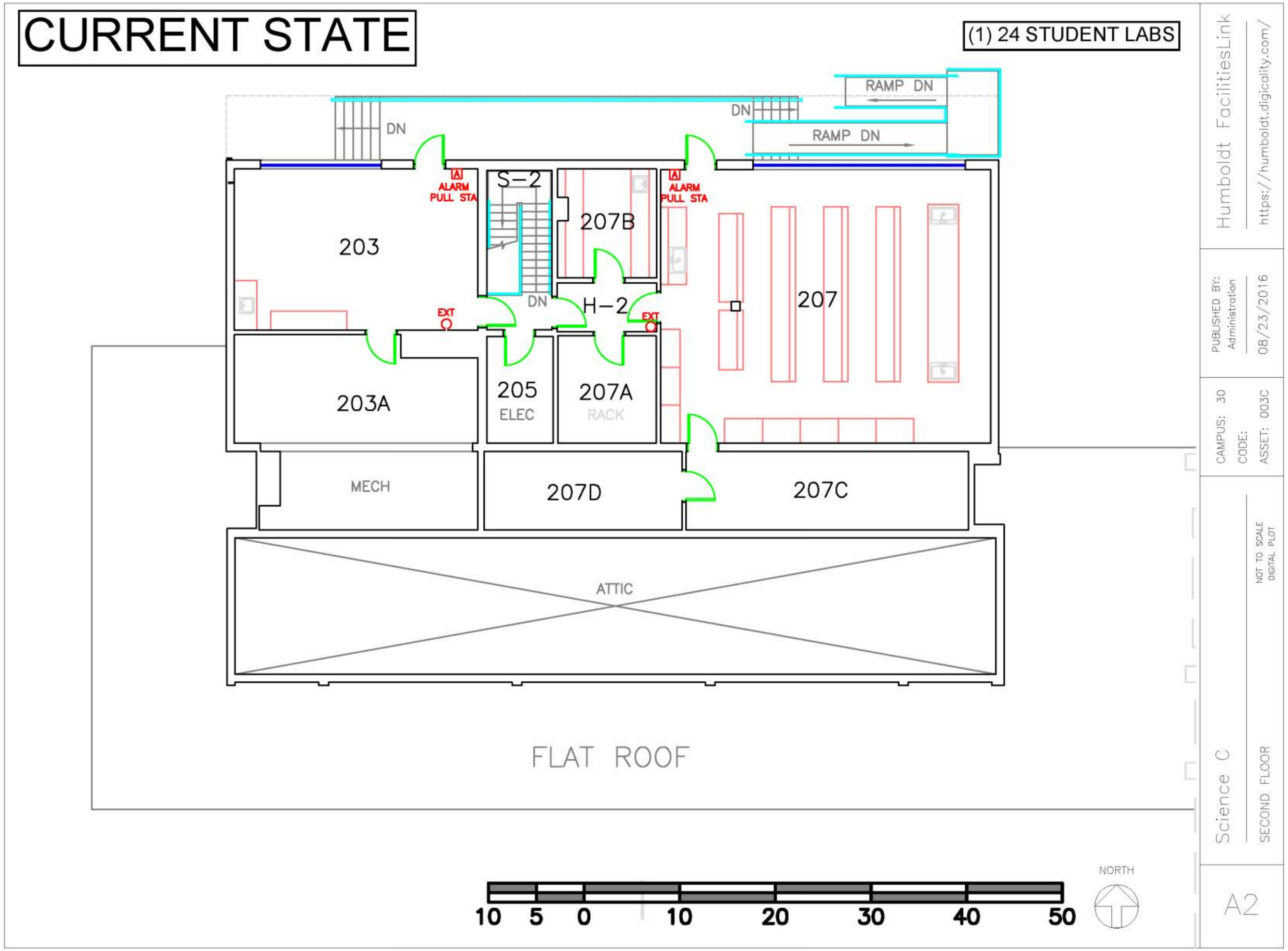

FUTURE STATE
(4) 24 STUDENT LABS
- PREP
10 5 0 10 20 30 40 50
240
240A
MECHANICAL
FLAT ROOF
OPEN TO BELOW
FLAT ROOF
S-2A
S-2B
225A
227A
TCOM
229
EL-2
227
H-2
NORTH
Humboldt FacilitiesLink
https://humboldt.digicality.com/
PUBLISHED BY: Administration
01/24/2018
CAMPUS: 30
CODE:
ASSET: 003B
NOT TO SCALE
DIGITAL PLOT
Science B
SECOND FLOOR
A2

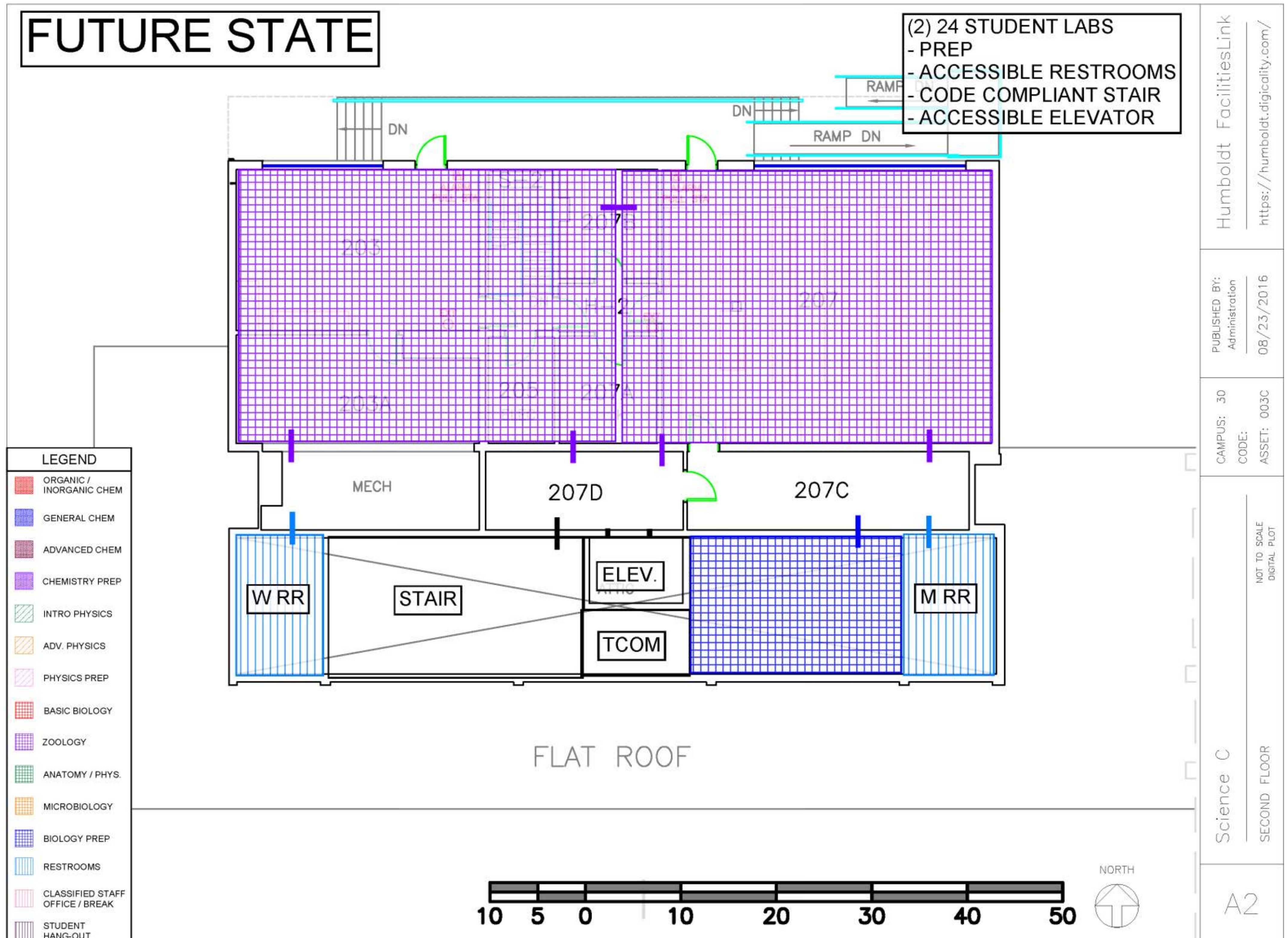

CURRENT STATE
10 5 0 10 20 30 40 50
135
133
139
ELECTRICAL
125
125B
TCOM
125A
RR-W-1
WOMEN
RR-M-1
MEN
129
EL-1
H-1A
H-1B
S-1A
S-1B
L-1
121A
121
123A
123B
123
134
124
120
130
122A
122B
122
126
128
132
NORTH
Humboldt FacilitiesLink
https://humboldt.digicality.com/
PUBLISHED BY:
Administration
03/07/2022
CAMPUS: 30
CODE:
ASSET: 003B
NOT TO SCALE
DIGITAL PLOT
Science B
FIRST FLOOR
A1


FUTURE STATE
(3) 24 STUDENT LABS - PREP
10 5 0 10 20 30 40 50
135
133
139
ELECTRICAL
H-1B
121A
123A
123B
125
125B
TCOM
S-1A
S-1B
121
123
125A
RR-W-1
WOMEN
RR-M-1
MEN
EL-1
129
L-1
H-1A
134
LEGEND
ORGANIC / INORGANIC CHEM
GENERAL CHEM
ADVANCED CHEM
CHEMISTRY PREP
INTRO PHYSICS
ADV. PHYSICS
PHYSICS PREP
BASIC BIOLOGY
ZOOLOGY
ANATOMY / PHYS.
MICROBIOLOGY
BIOLOGY PREP
RESTROOMS
CLASSIFIED STAFF OFFICE / BREAK
STUDENT HANG-OUT
NORTH
Humboldt FacilitiesLink
https://humboldt.digicality.com/
PUBLISHED BY: Administration
03/07/2022
CAMPUS: 30
CODE:
ASSET: 003B
NOT TO SCALE
DIGITAL PLOT
Science B
FIRST FLOOR
A1

7.1 PHASING STRATEGY 1 - FULL BUILDING

7.1.1.3 LAB PLANNING - CURRENT AND FUTURE STATES - SCIENCE C




FUTURE STATE
(2) 24 STUDENT LABS
- PREP
- ACCESSIBLE RESTROOMS
- CODE COMPLIANT STAIR
- ACCESSIBLE ELEVATOR
RAMP DN
RAMP DN
DN
DN
MECH
207D
207C
W RR
STAIR
ELEV.
TCOM
M RR
FLAT ROOF
LEGEND
ORGANIC / INORGANIC CHEM
GENERAL CHEM
ADVANCED CHEM
CHEMISTRY PREP
INTRO PHYSICS
ADV. PHYSICS
PHYSICS PREP
BASIC BIOLOGY
ZOOLOGY
ANATOMY / PHYS.
MICROBIOLOGY
BIOLOGY PREP
RESTROOMS
CLASSIFIED STAFF OFFICE / BREAK
STUDENT HANG-OUT
10 5 0 10 20 30 40 50
NORTH
Humboldt FacilitiesLink
https://humboldt.digicality.com/
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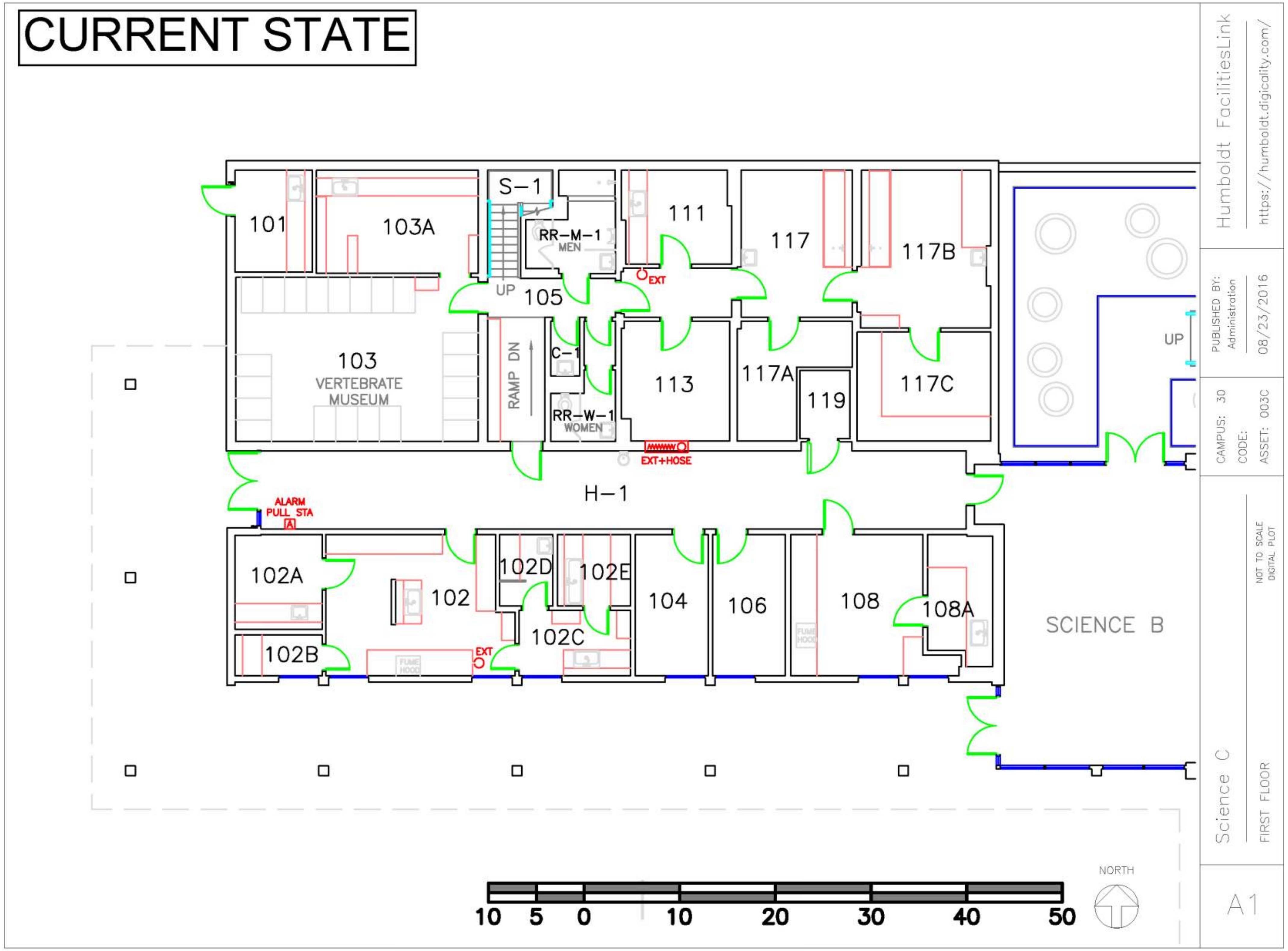
08/23/2016
CAMPUS: 30
CODE:
ASSET: 003C
NOT TO SCALE
DIGITAL PLOT
Science C
SECOND FLOOR
A2


CURRENT STATE
S-1
101
103A
RR-M-1
MEN
111
117
117B
UP
105
EXT
103
VERTEBRATE
MUSEUM
RAMP DN
C-1
113
117A
119
117C
RR-W-1
WOMEN
EXT+HOSE
H-1
ALARM
PULL STA
102A
102
102D
102E
104
106
108
108A
102B
EXT
102C
SCIENCE B
10 5 0 10 20 30 40 50
NORTH
Humboldt FacilitiesLink
https://humboldt.digicality.com/
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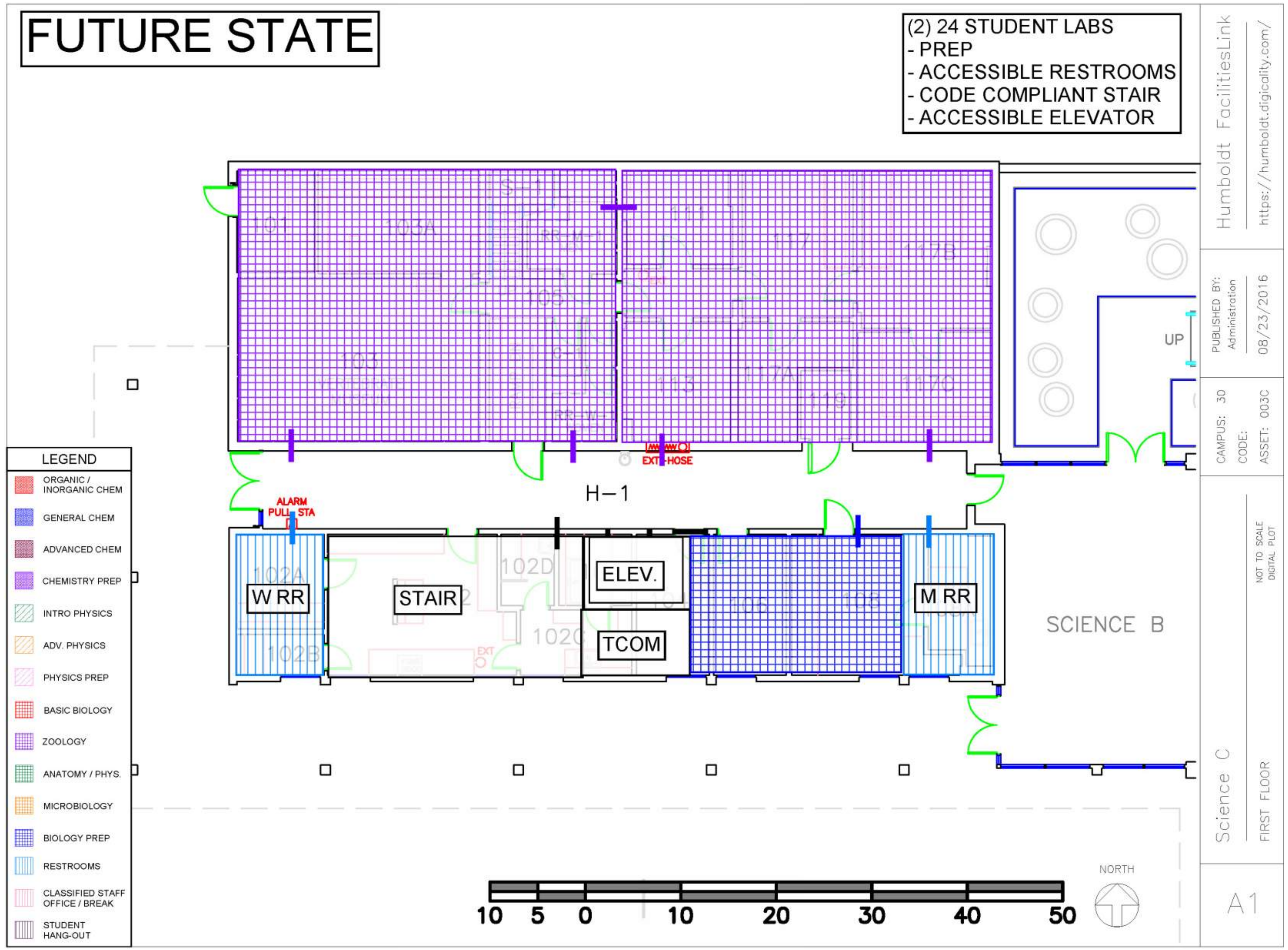
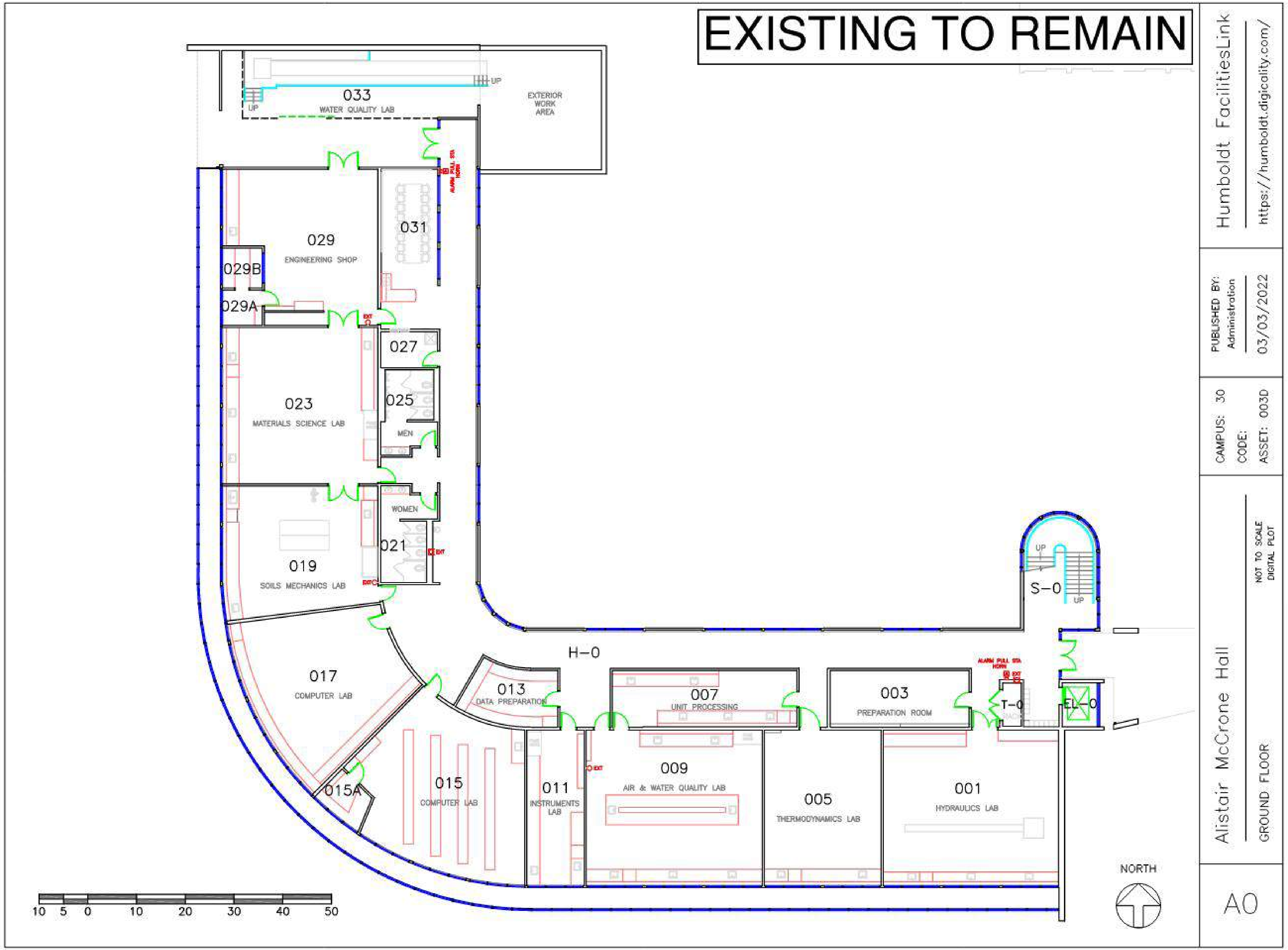
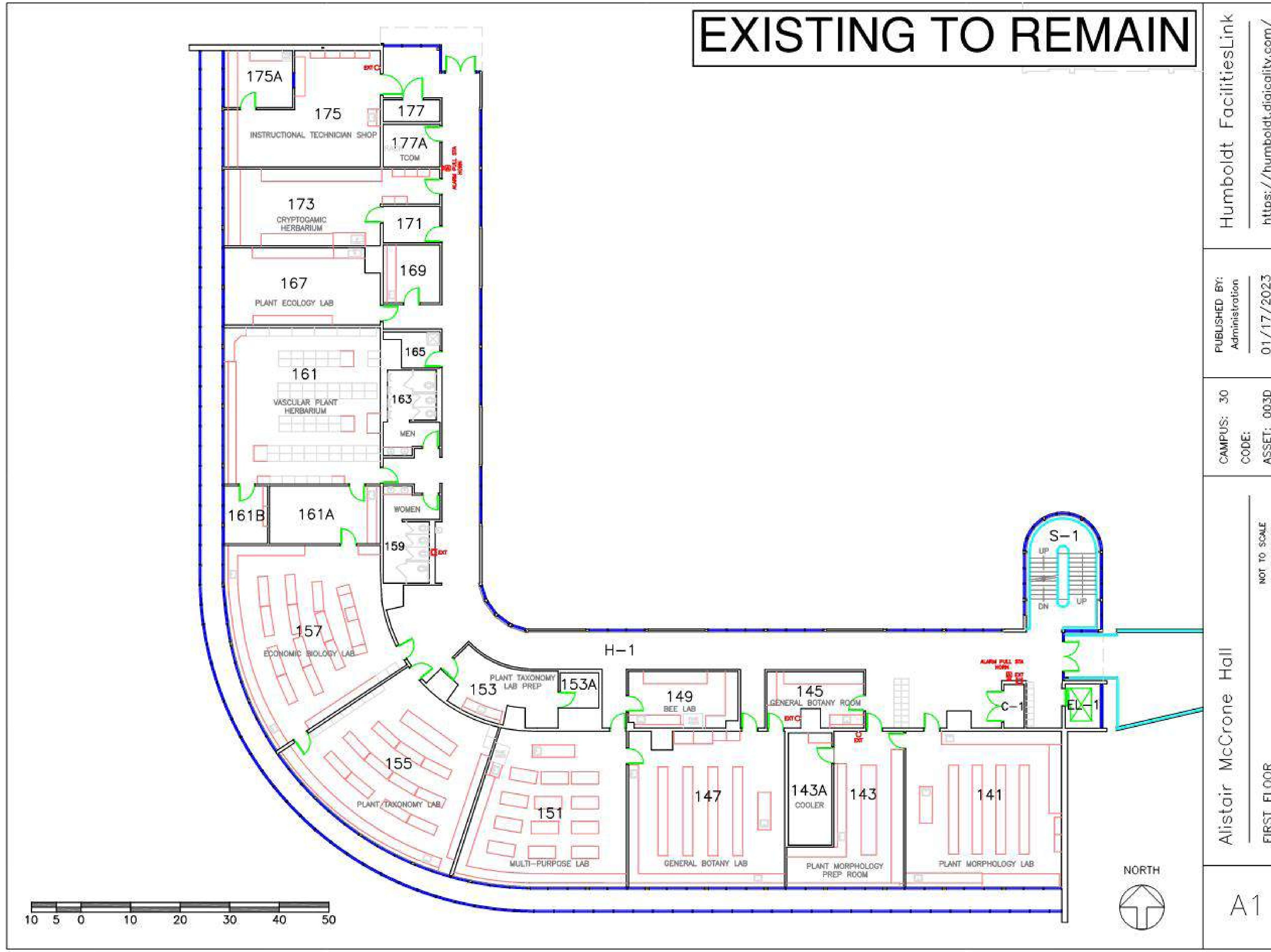
08/23/2016
CAMPUS: 30
CODE:
ASSET: 003C
NOT TO SCALE
DIGITAL PLOT
Science C
FIRST FLOOR
A1


FUTURE STATE
(2) 24 STUDENT LABS
- PREP
- ACCESSIBLE RESTROOMS
- CODE COMPLIANT STAIR
- ACCESSIBLE ELEVATOR
H-1
W RR
STAIR
ELEV.
TCOM
M RR
SCIENCE B
UP
ALARM PULL STA
EXT HOSE
LEGEND
ORGANIC / INORGANIC CHEM
GENERAL CHEM
ADVANCED CHEM
CHEMISTRY PREP
INTRO PHYSICS
ADV. PHYSICS
PHYSICS PREP
BASIC BIOLOGY
ZOOLOGY
ANATOMY / PHYS.
MICROBIOLOGY
BIOLOGY PREP
RESTROOMS
CLASSIFIED STAFF OFFICE / BREAK
STUDENT HANG-OUT
10 5 0 10 20 30 40 50
NORTH
Humboldt FacilitiesLink
https://humboldt.digicality.com/
PUBLISHED BY: Administration
08/23/2016
CAMPUS: 30
CODE:
ASSET: 003C
NOT TO SCALE
DIGITAL PLOT
Science C
FIRST FLOOR
A1

7.1 PHASING STRATEGY 1 - FULL BUILDING

7.1.1.4 LAB PLANNING - CURRENT AND FUTURE STATES - SCIENCE D




EXISTING TO REMAIN
175A
175
INSTRUCTIONAL TECHNICIAN SHOP
177
177A
TCOM
173
CRYPTOGAMIC HERBARIUM
171
169
167
PLANT ECOLOGY LAB
165
161
VASCULAR PLANT HERBARIUM
163
MEN
161B
161A
WOMEN
159
157
ECONOMIC BIOLOGY LAB
155
PLANT TAXONOMY LAB
153
PLANT TAXONOMY LAB PREP
153A
151
MULTI-PURPOSE LAB
H-1
149
BEE LAB
147
GENERAL BOTANY LAB
145
GENERAL BOTANY ROOM
143A
COOLER
143
PLANT MORPHOLOGY PREP ROOM
141
PLANT MORPHOLOGY LAB
C-1
EL-1
S-1
UP
DN
UP
ALARM PULL STA HORN
NORTH
10 5 0 10 20 30 40 50
Humboldt FacilitiesLink
https://humboldt.digicality.com/
PUBLISHED BY: Administration
01/17/2023
CAMPUS: 30
CODE:
ASSET: 003D
Alistair McCrone Hall
FIRST FLOOR
NOT TO SCALE DIGITAL PLOT
A1

7.1 PHASING STRATEGY 1 - FULL BUILDING

7.1.2.1 LAB PLANNING - ZONING DIAGRAMS - SCIENCE COMPLEX (A, B, C, D)

The following Science Complex diagrams note the relationship between the four buildings and showcase both the current state and proposed future state for each floor level. For a more detailed view of current state versus future state refer to the individual building diagrams after the overall Science Complex diagrams.

Figure 7.1.2.1.1 - Lab Planning Zoning Diagram - Ground Level

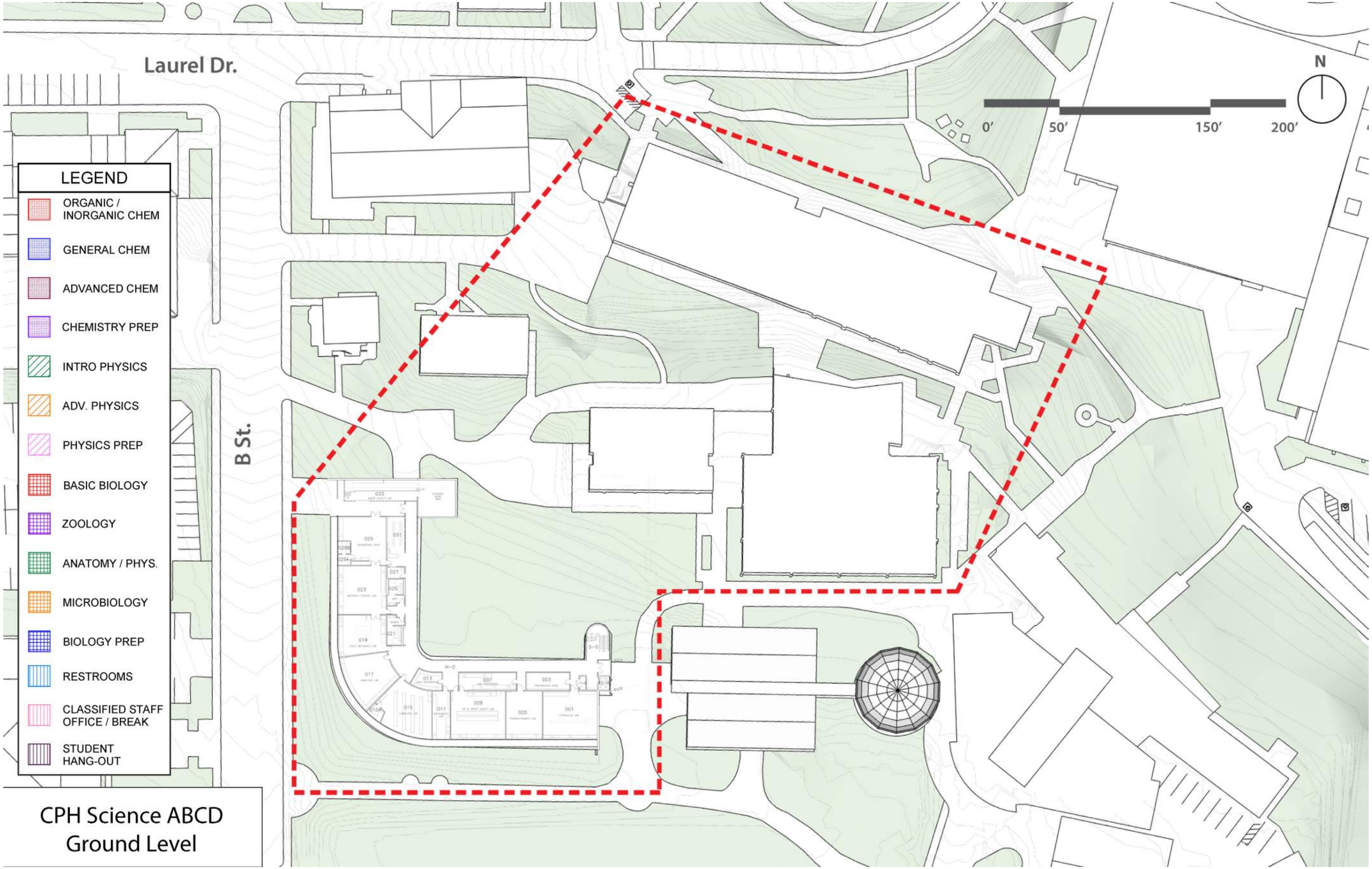


Figure 7.1.2.1.2 - MEP Zoning Diagram - Level 1

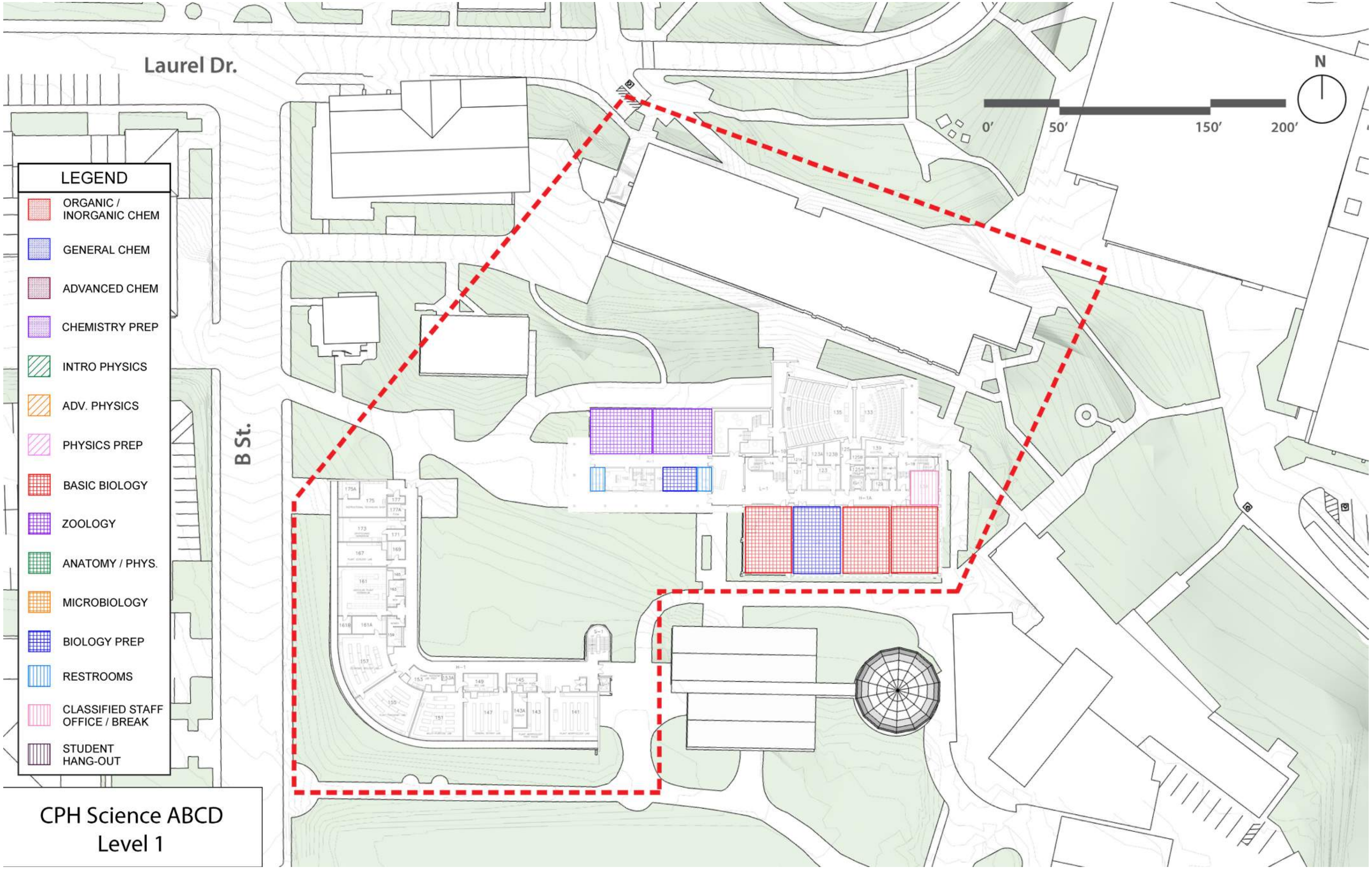


Figure 7.1.2.1.3 - MEP Zoning Diagram - Level 2

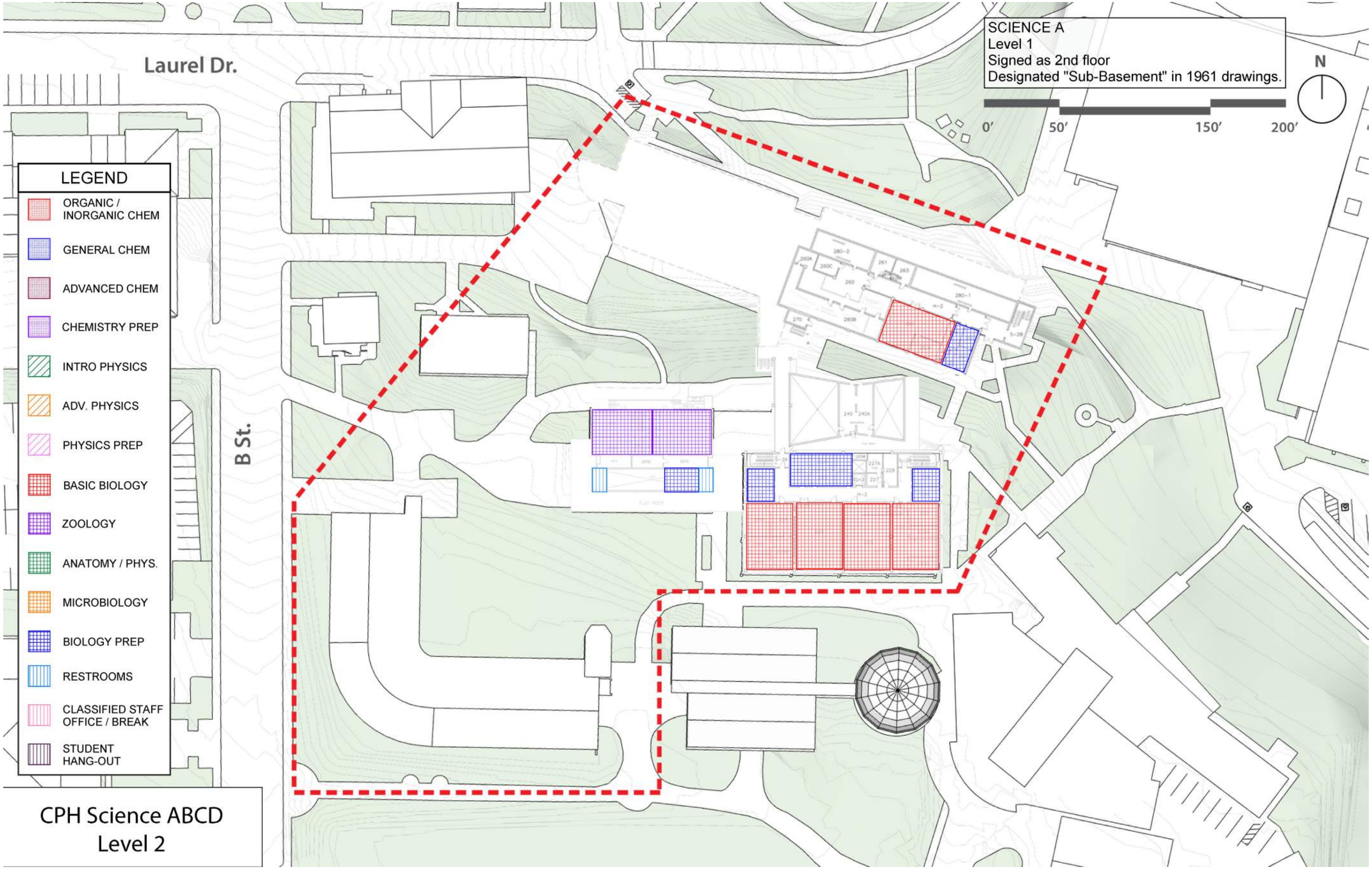


Figure 7.1.2.1.4 - MEP Zoning Diagram - Level 3

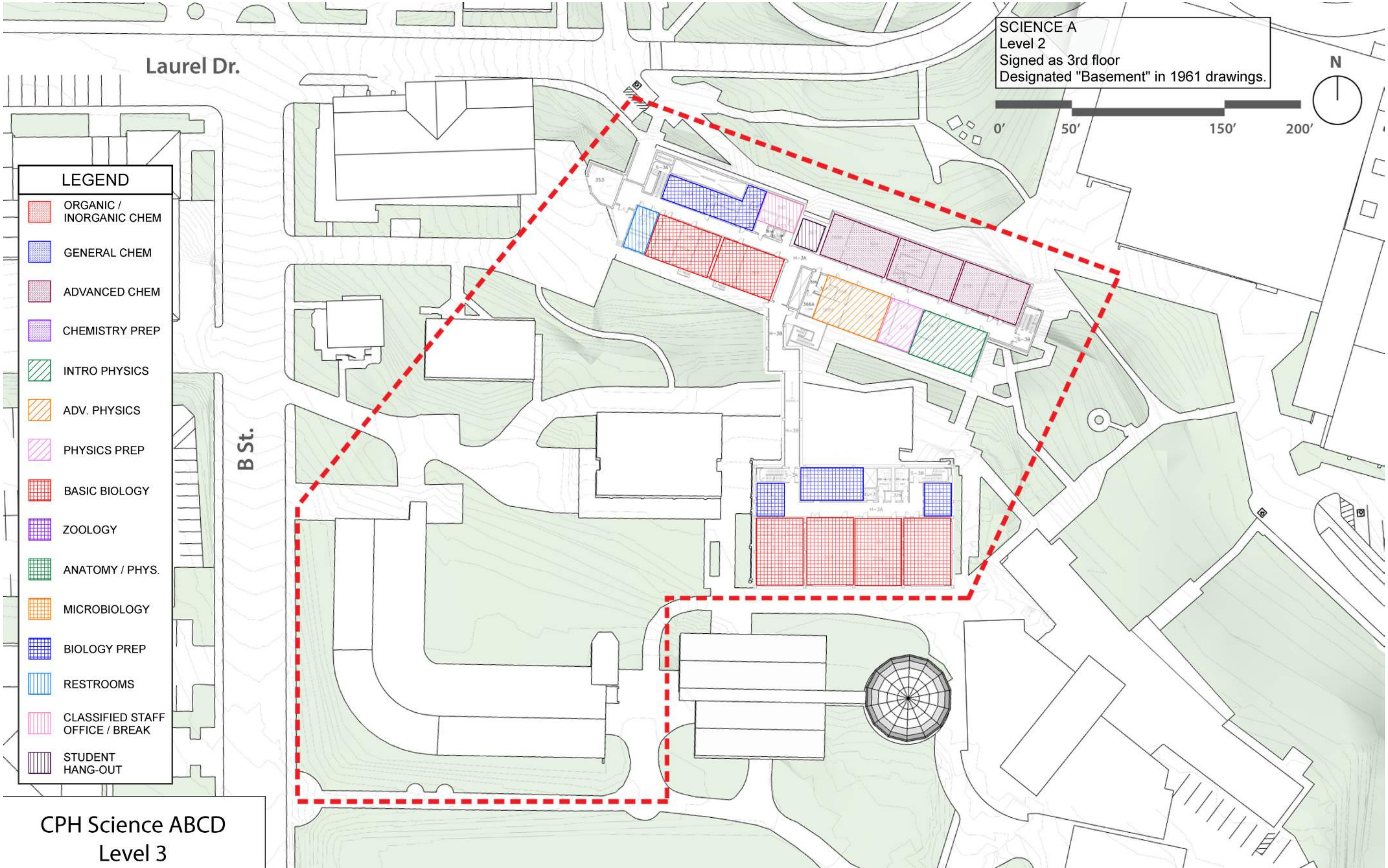


Figure 7.1.2.1.5 - MEP Zoning Diagram - Level 4

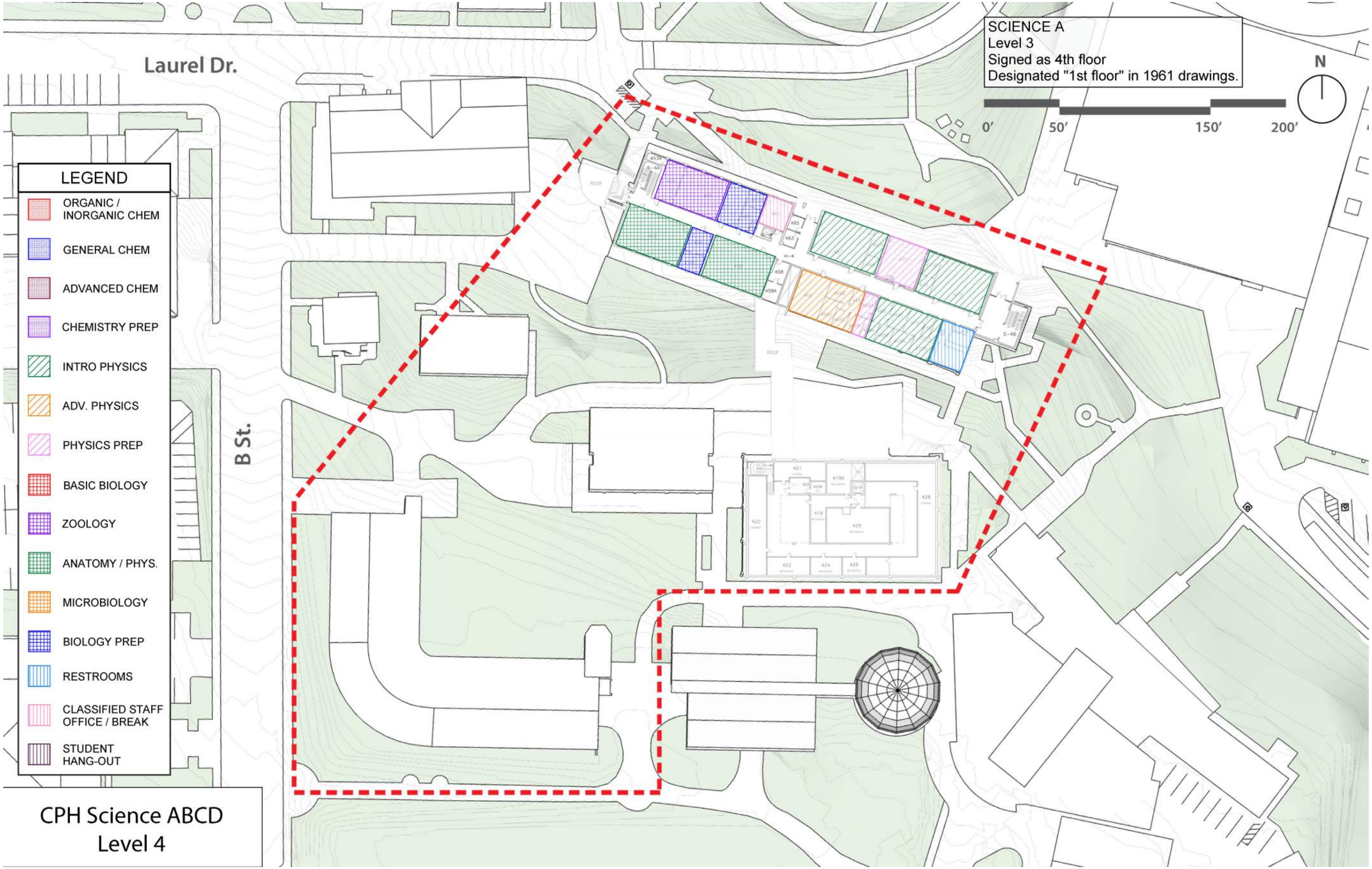


Figure 7.1.2.1.6 - MEP Zoning Diagram - Level 5

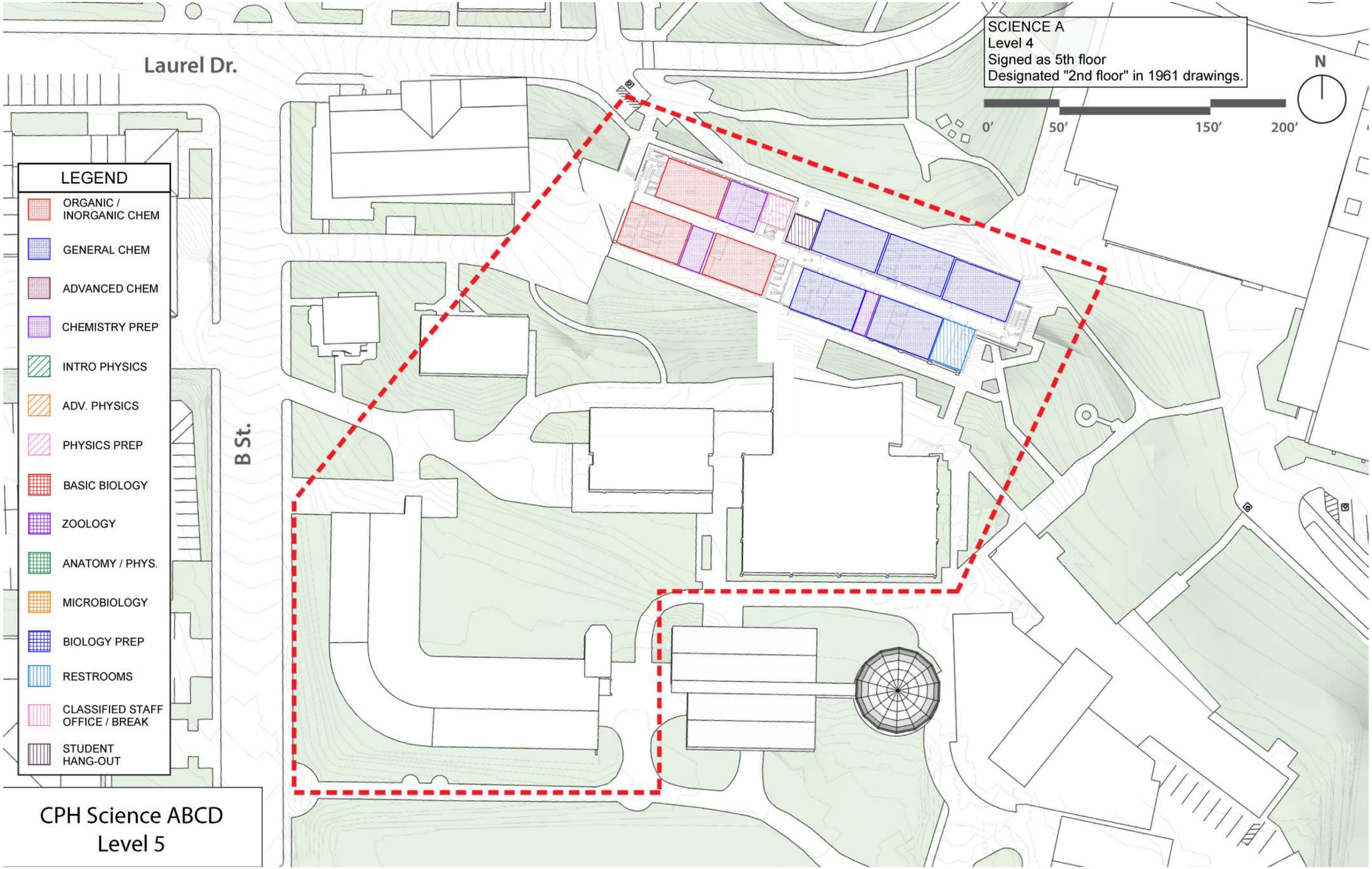
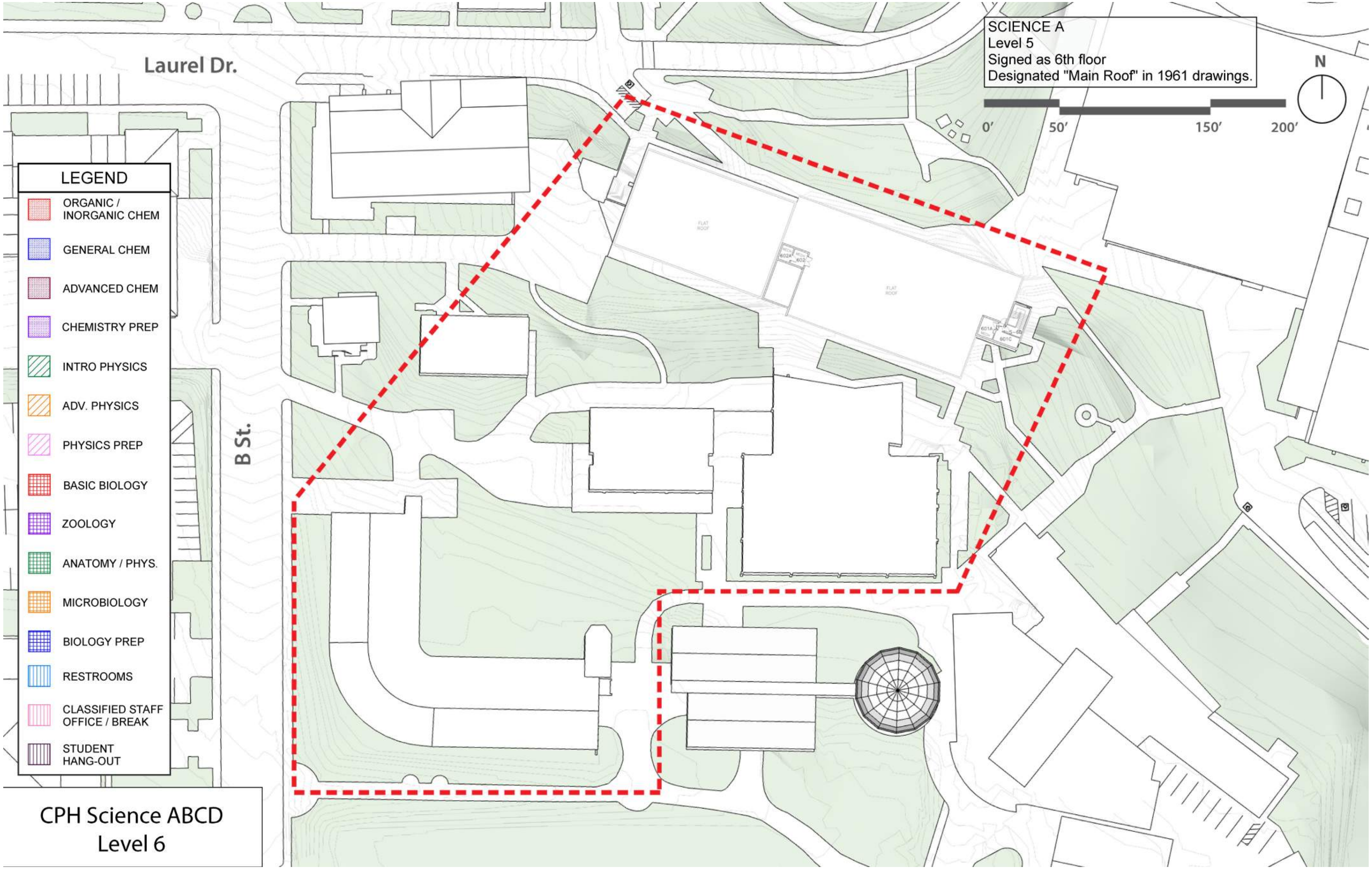


Figure 7.1.2.1.7 - MEP Zoning Diagram - Level 6



7.1 PHASING STRATEGY 1 - FULL BUILDING

7.1.3.1 MEP - ZONING DIAGRAMS - SCIENCE COMPLEX (A, B, C, D)

The following diagrams note the MEP distribution (vertically and horizontally) through the four buildings as well as noting the zones of service for each service. These diagrams were pulled together to assist in the conceptualization of future projects to update the noted buildings. For instance, in the electrical power diagrams, one can see that the electrical branch panels serving the floors of building A are organized so that a set of panels serve the east portion of the building, and another set of panels serve the west. So, a project that impacts one room on the east side of any floor, will impact the other noted rooms in the same zone. The same applies to mechanical and plumbing systems, with plumbing systems also impacting the floors above (vent lines to roof) and below (sanitary lines to site connection).

Figure 7.1.3.1.1 - MEP Zoning Diagram - Ground Level

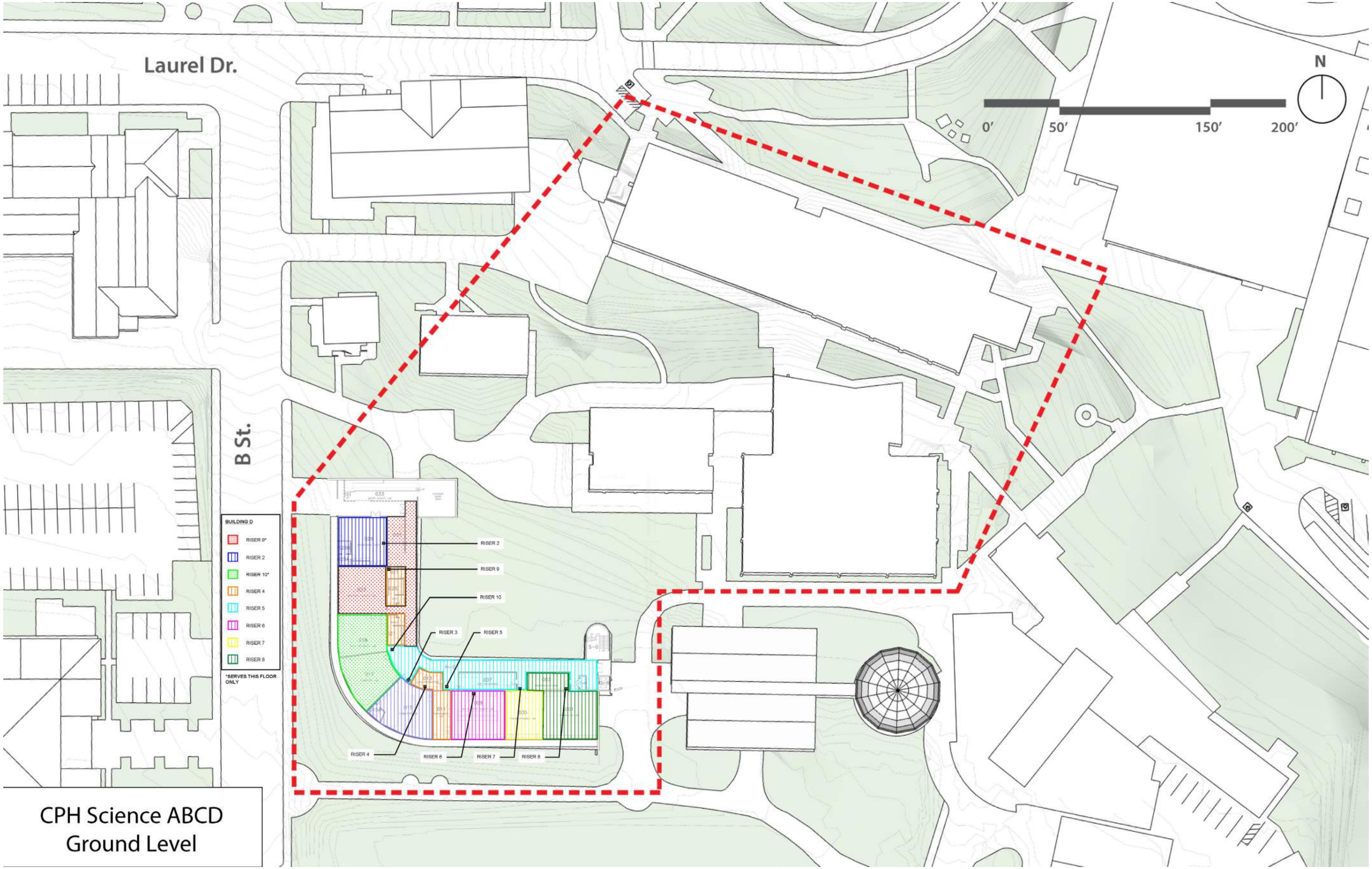


Figure 7.1.3.1.2 - MEP Zoning Diagram - Level 1

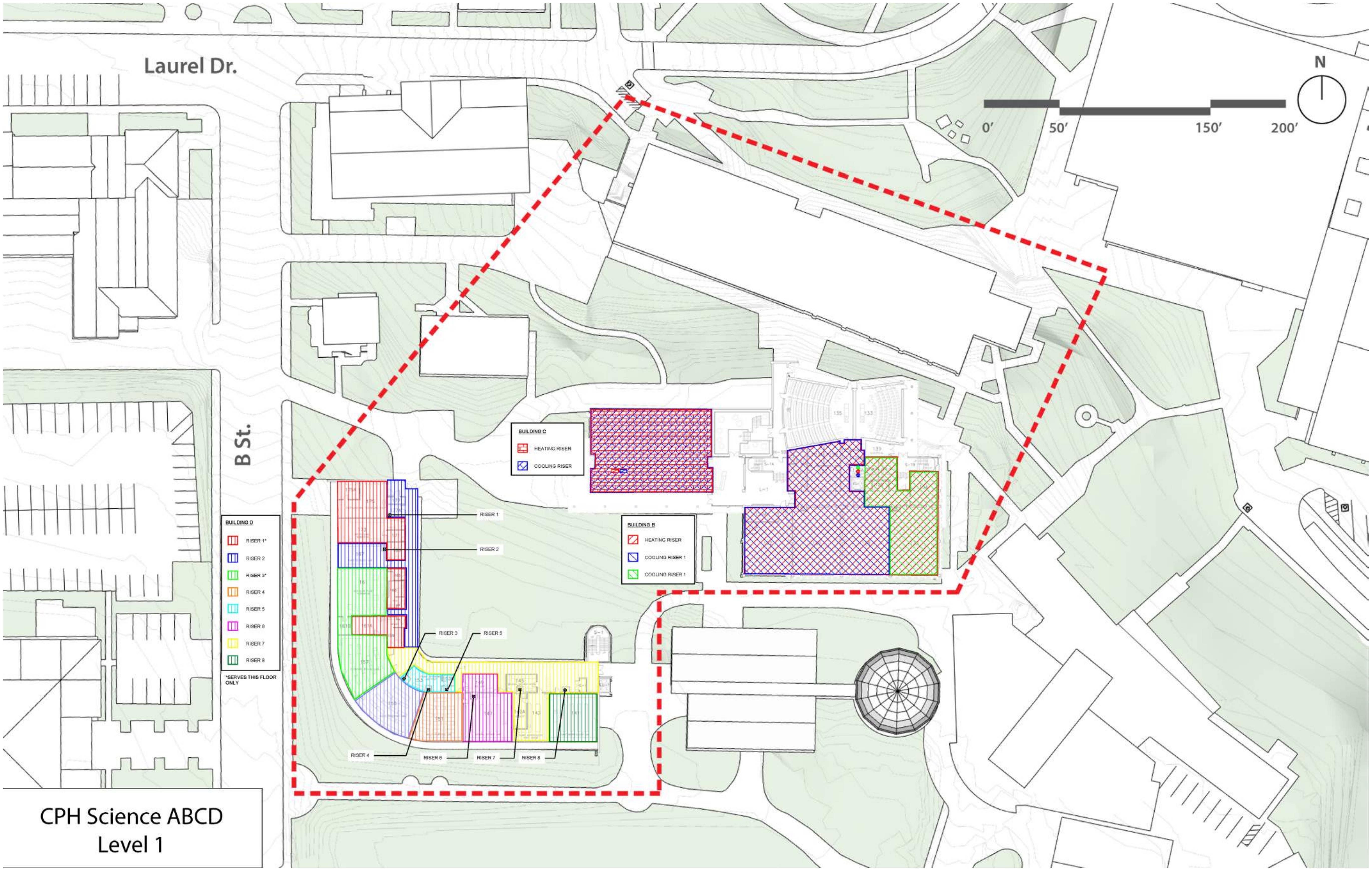


Figure 7.1.3.1.3 - MEP Zoning Diagram - Level 2

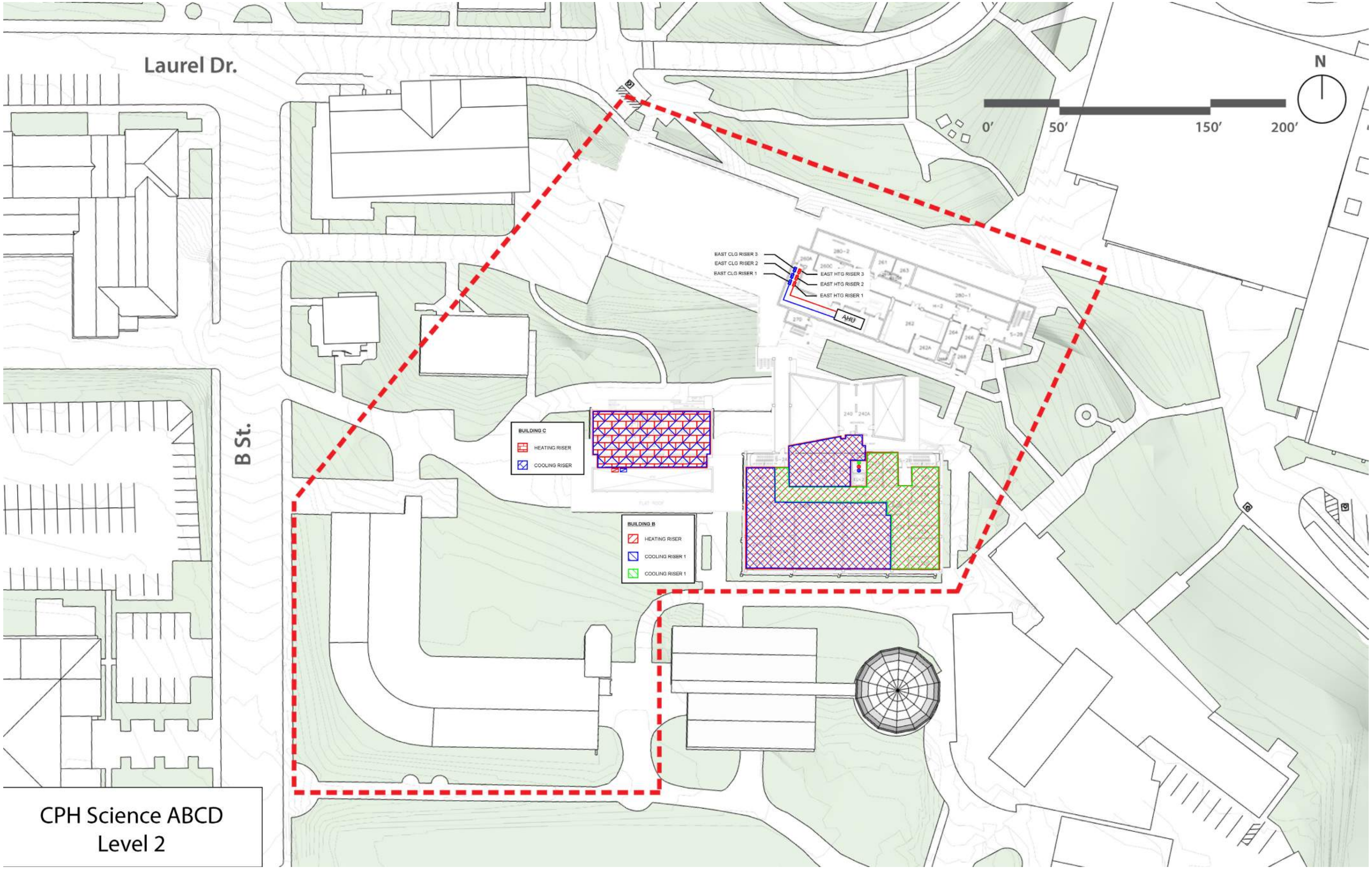


Figure 7.1.3.1.4 - MEP Zoning Diagram - Level 3

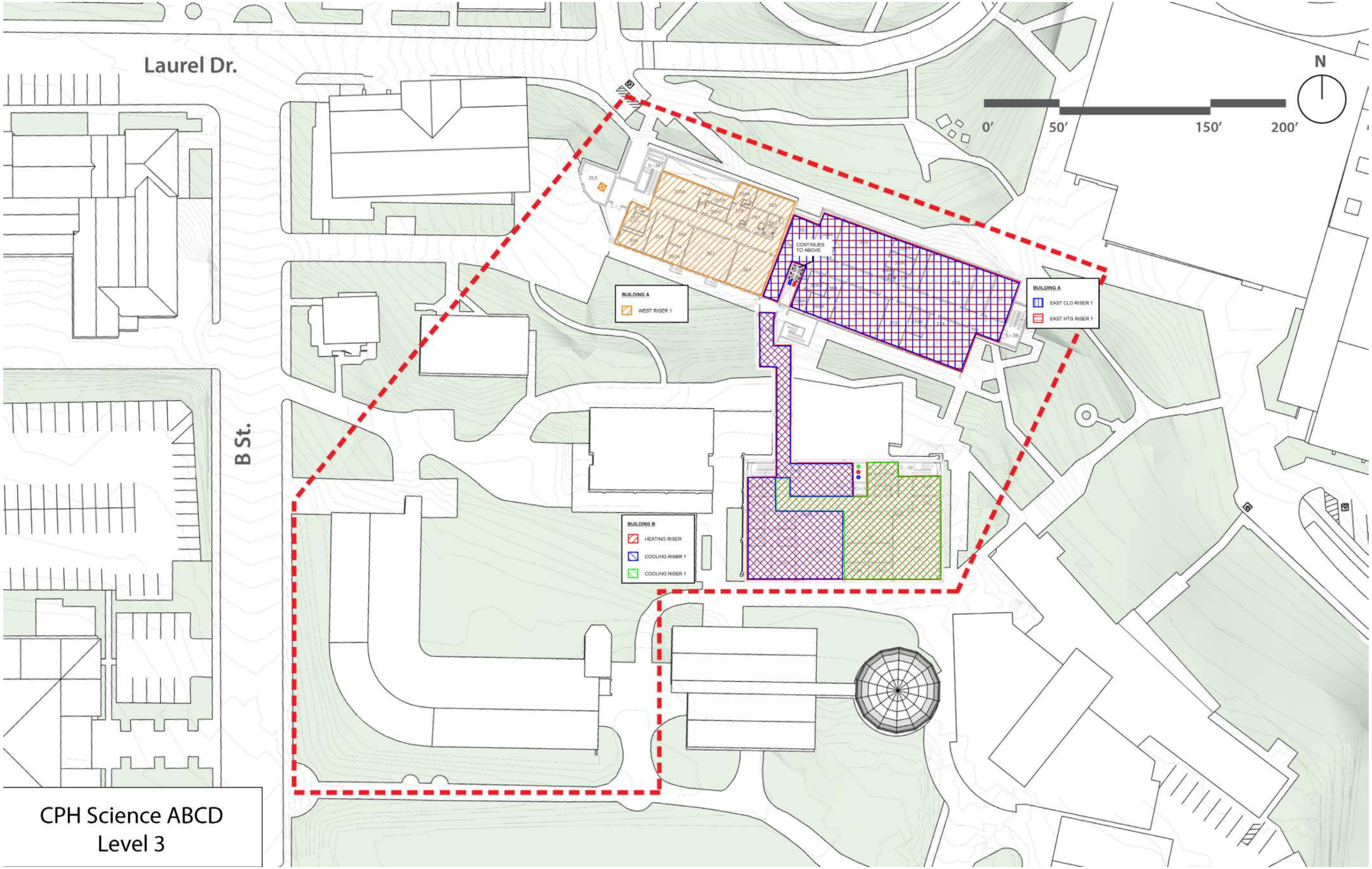


Figure 7.1.3.1.5 - MEP Zoning Diagram - Level 4

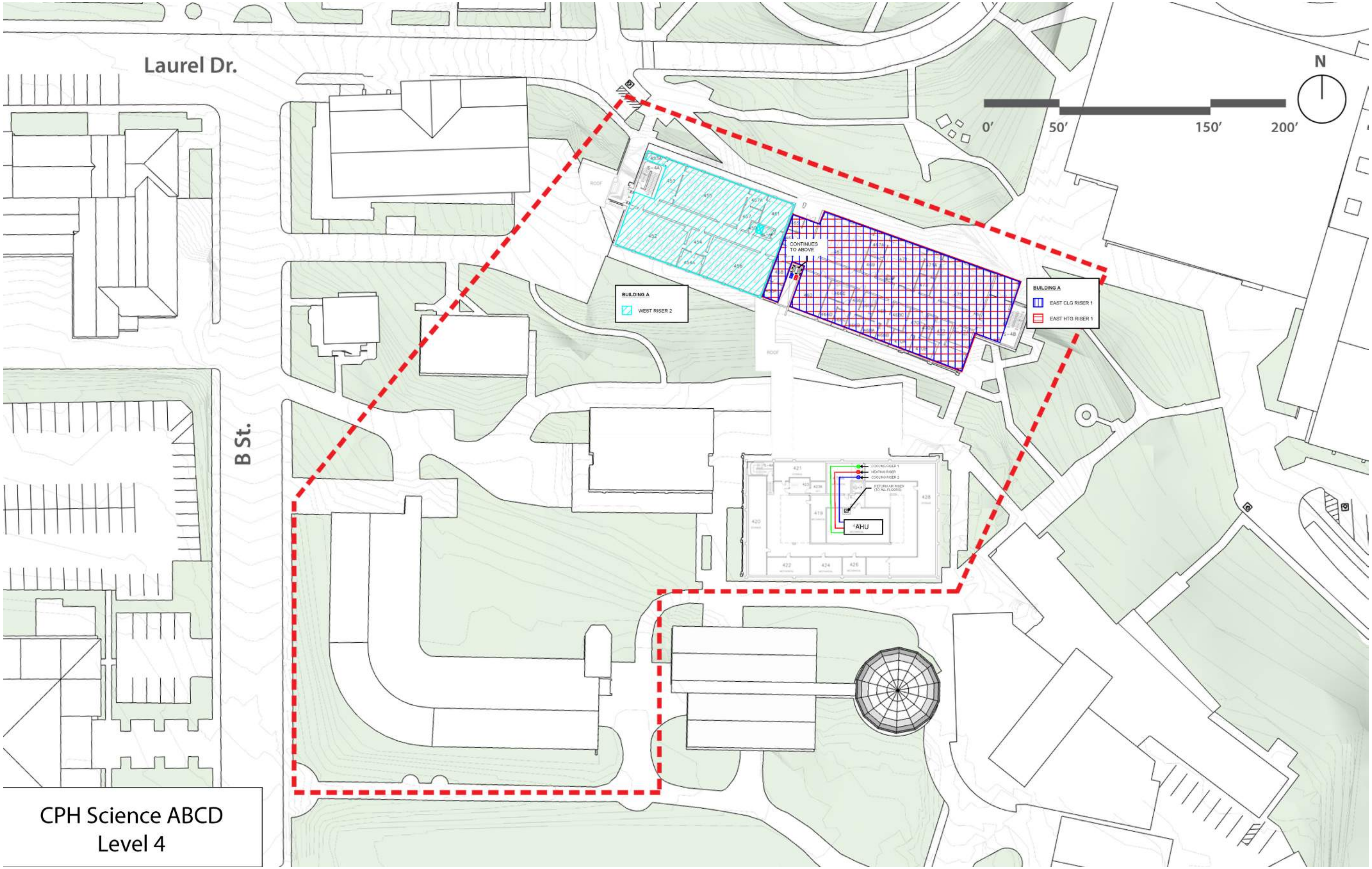


Figure 7.1.3.1.6 - MEP Zoning Diagram - Level 5

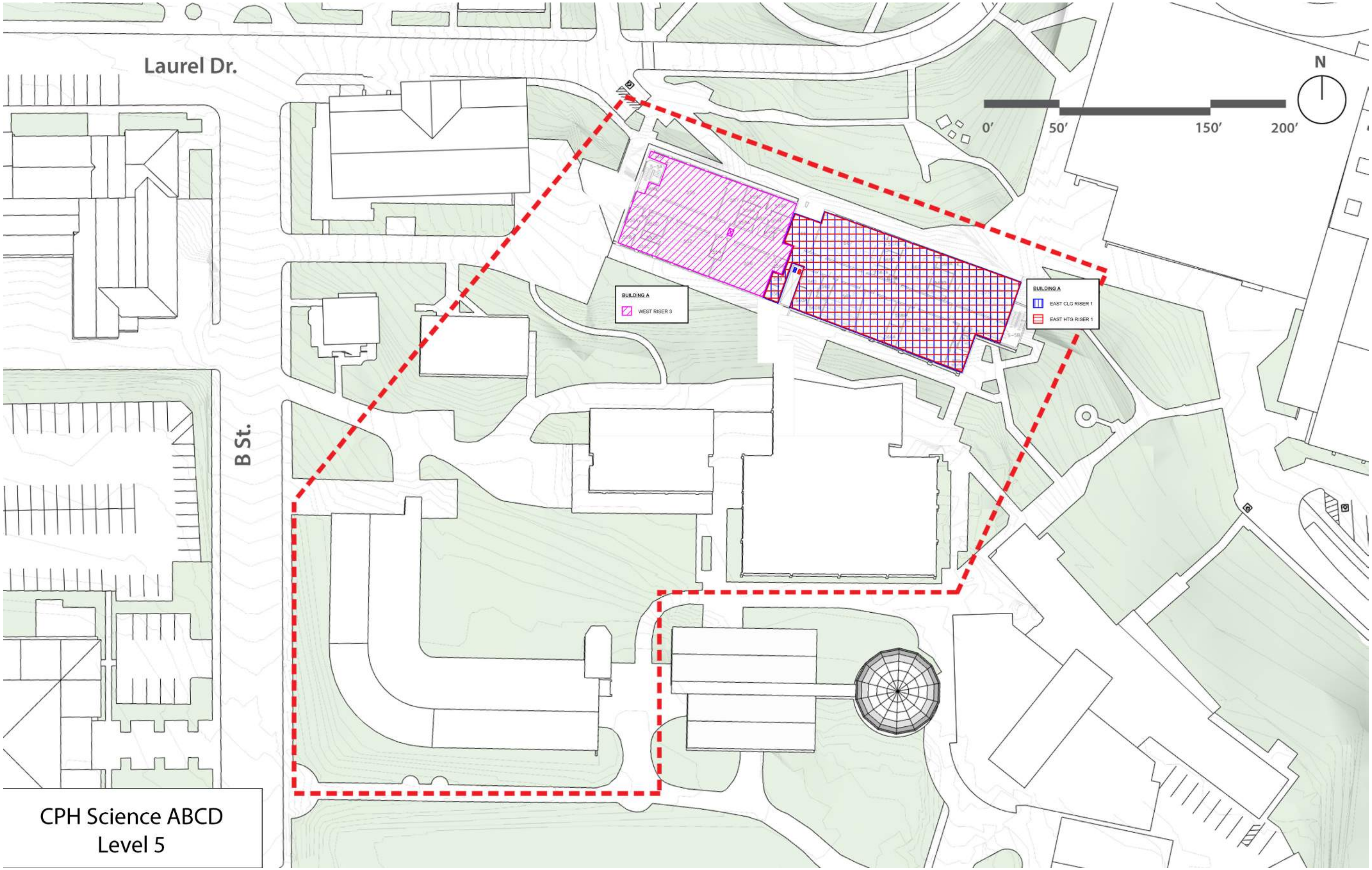
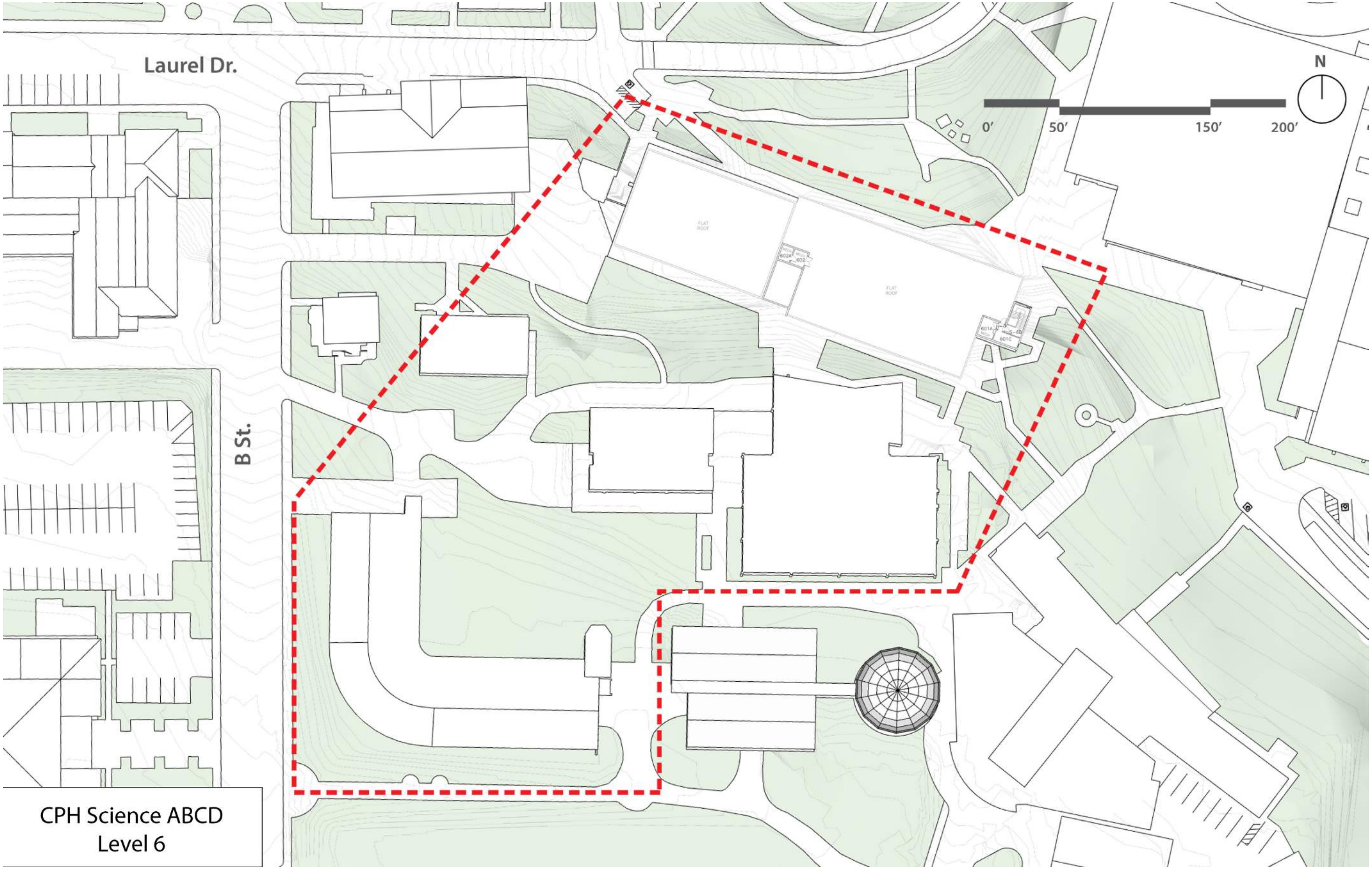


Figure 7.1.3.1.7 - MEP Zoning Diagram - Level 6



7.2 PHASING STRATEGY 2 - LABORATORY PROTOTYPES

7.2.1.0 LAB PLANNING GUIDE PLATES - CURRENT AND FUTURE STATES

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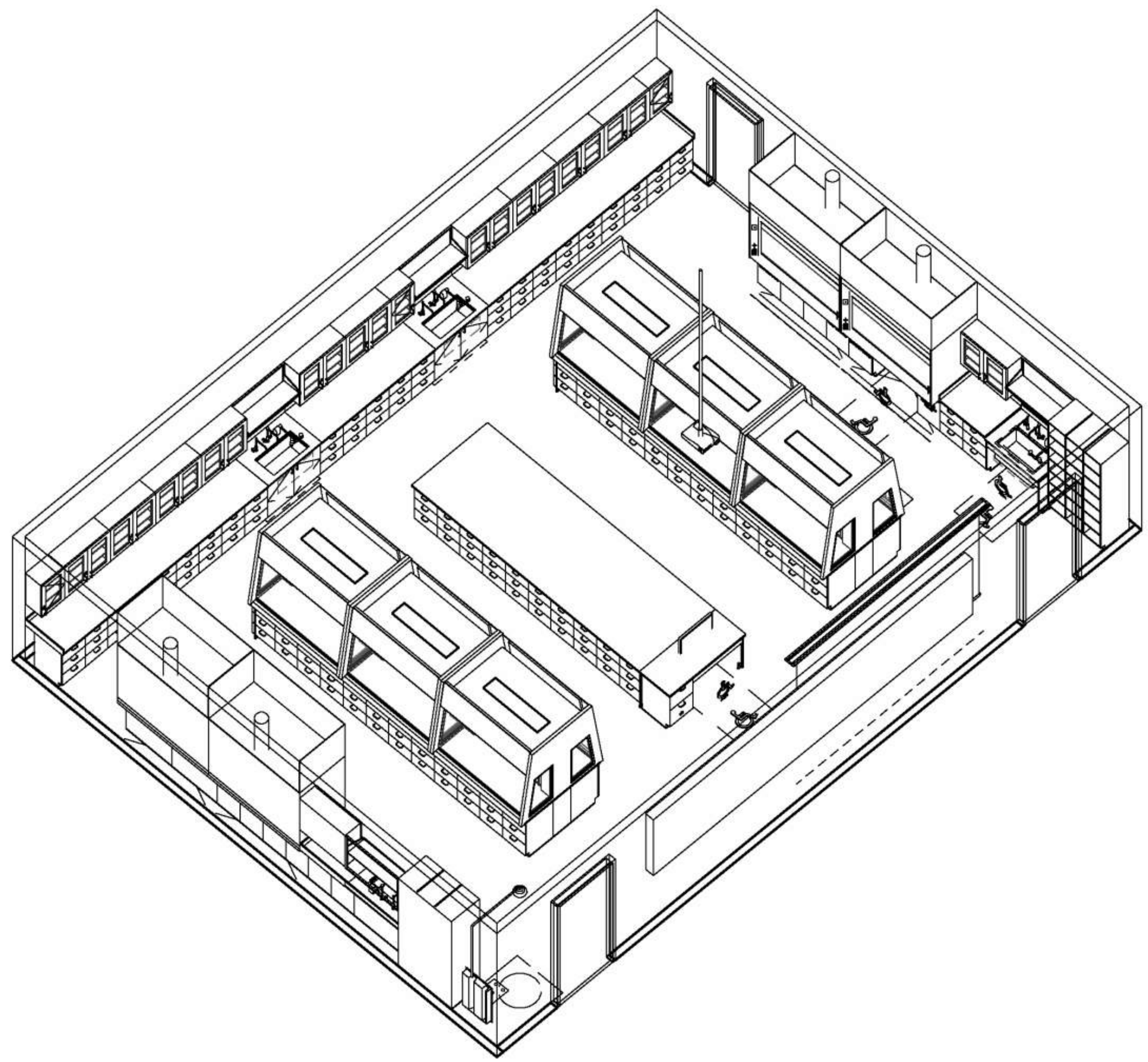
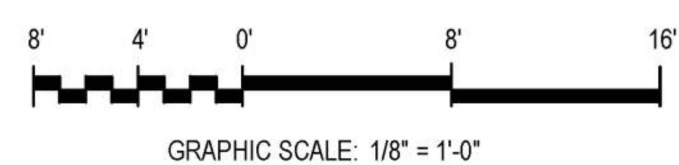
7.2 PHASING STRATEGY 2 - LABORATORY PROTOTYPES

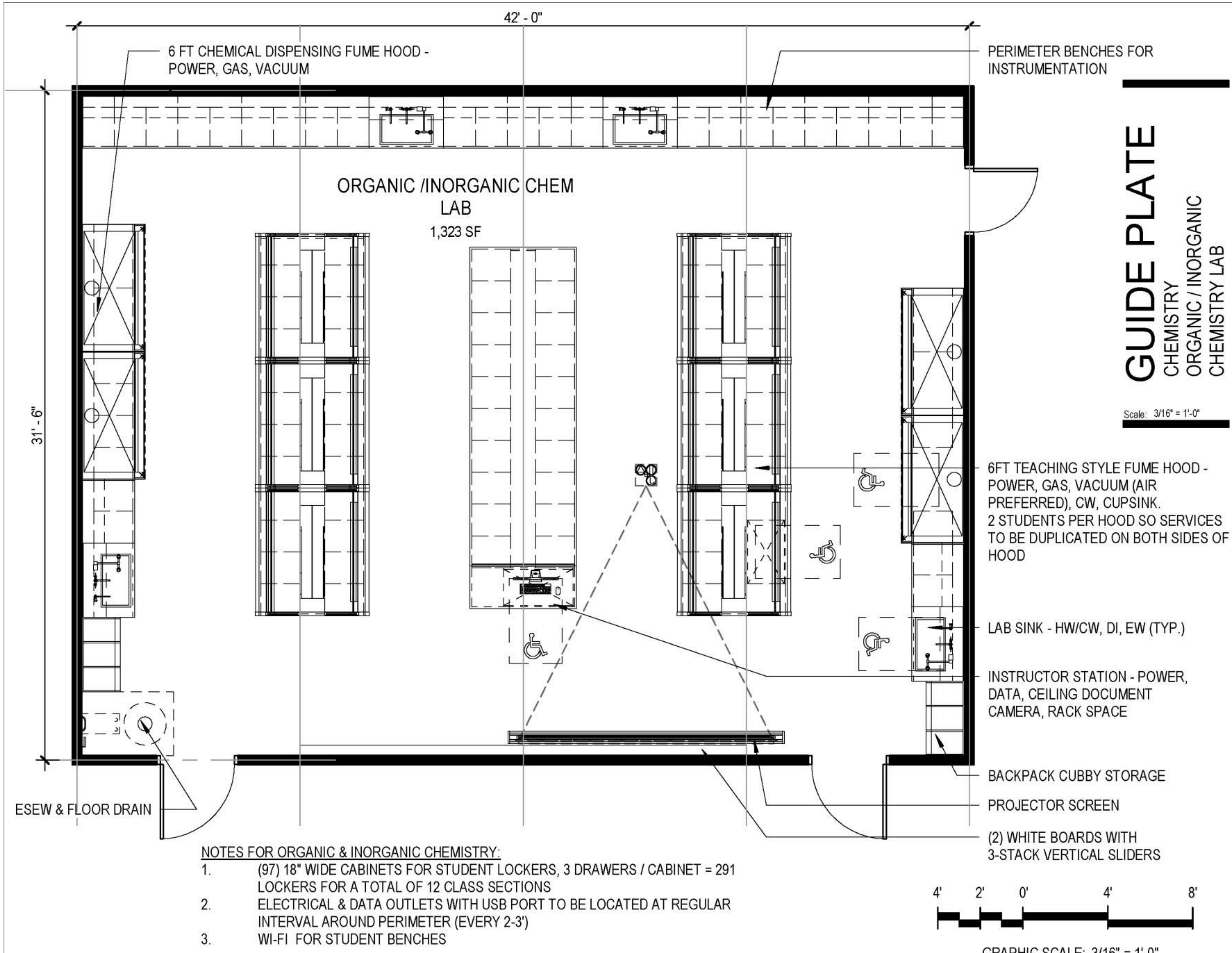
7.2.1.1 LAB PLANNING GUIDE PLATES - CHEMISTRY

GUIDE PLATE
CHEMISTRY
ORGANIC / INORGANIC
CHEMISTRY LAB

Scale:







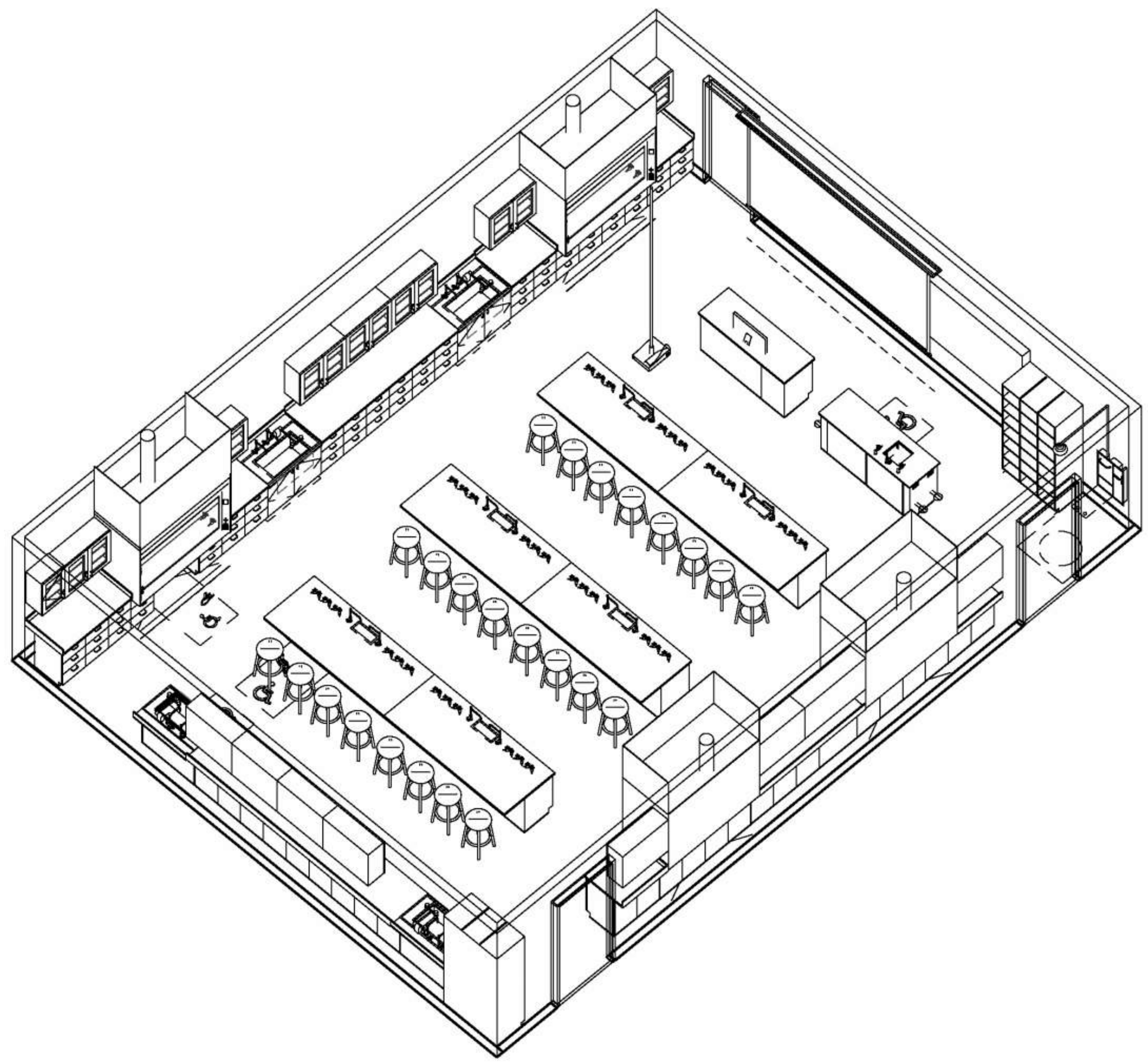
NOTES FOR ORGANIC & INORGANIC CHEMISTRY:

1. (97) 18" WIDE CABINETS FOR STUDENT LOCKERS, 3 DRAWERS / CABINET = 291 LOCKERS FOR A TOTAL OF 12 CLASS SECTIONS
2. ELECTRICAL & DATA OUTLETS WITH USB PORT TO BE LOCATED AT REGULAR INTERVAL AROUND PERIMETER (EVERY 2-3')
3. WI-FI FOR STUDENT BENCHES

GUIDE PLATE

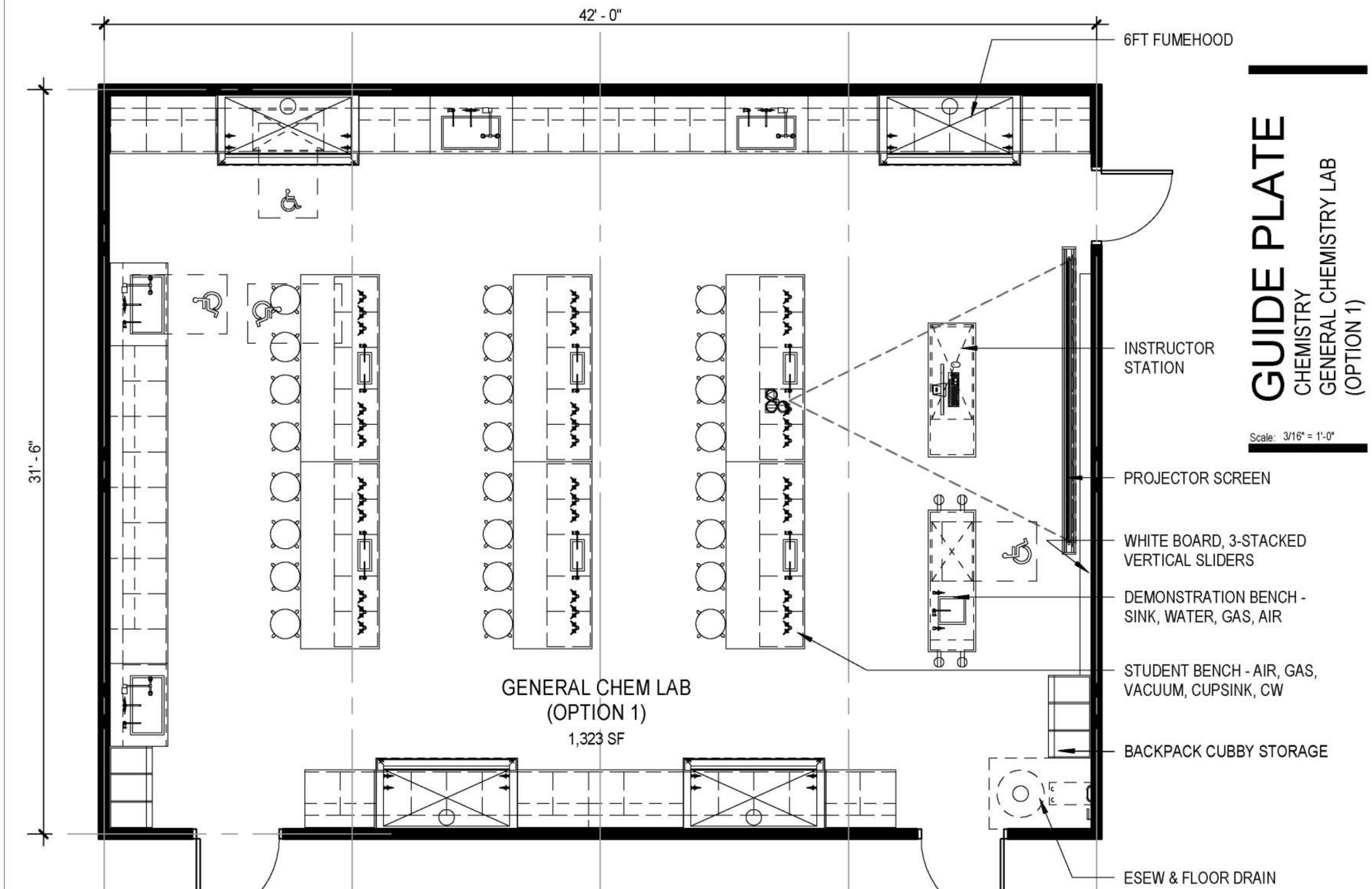
CHEMISTRY
GENERAL CHEMISTRY LAB
(OPTON 1)

Scale:



8' 4' 0' 8' 16'

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



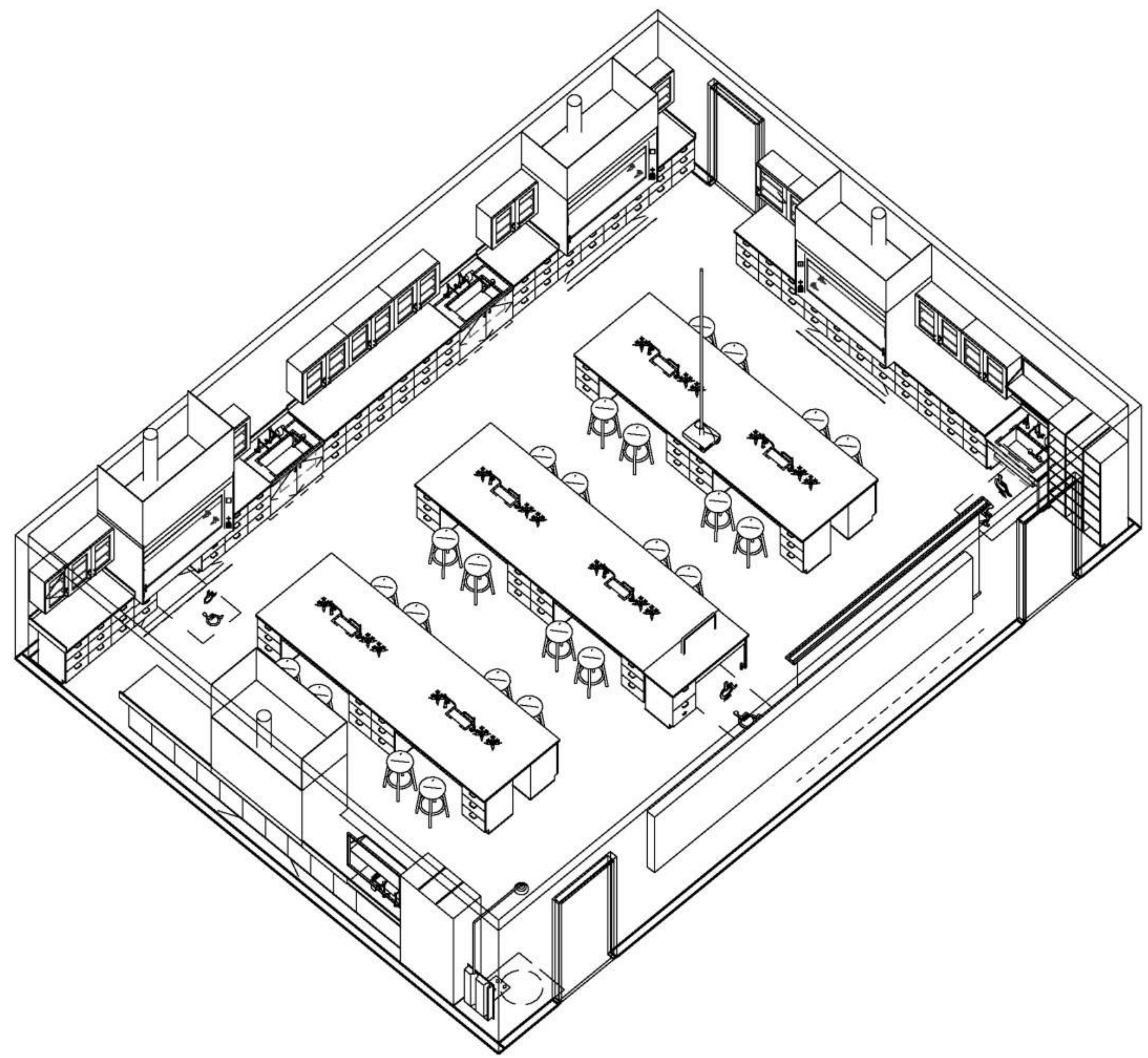
NOTES FOR GENERAL CHEMISTRY:

1. DRAWERS ARE ASSIGNED
2. (43) 18" WIDE CABINETS FOR STUDENT LOCKERS, 3 DRAWERS / CABINET = 129 LOCKERS FOR A TOTAL OF 5 CLASS SECTIONS
3. ELECTRICAL & DATA OUTLETS WITH USB PORT TO BE LOCATED AT REGULAR INTERVAL AROUND PERIMETER (EVERY 2-3')

GUIDE PLATE

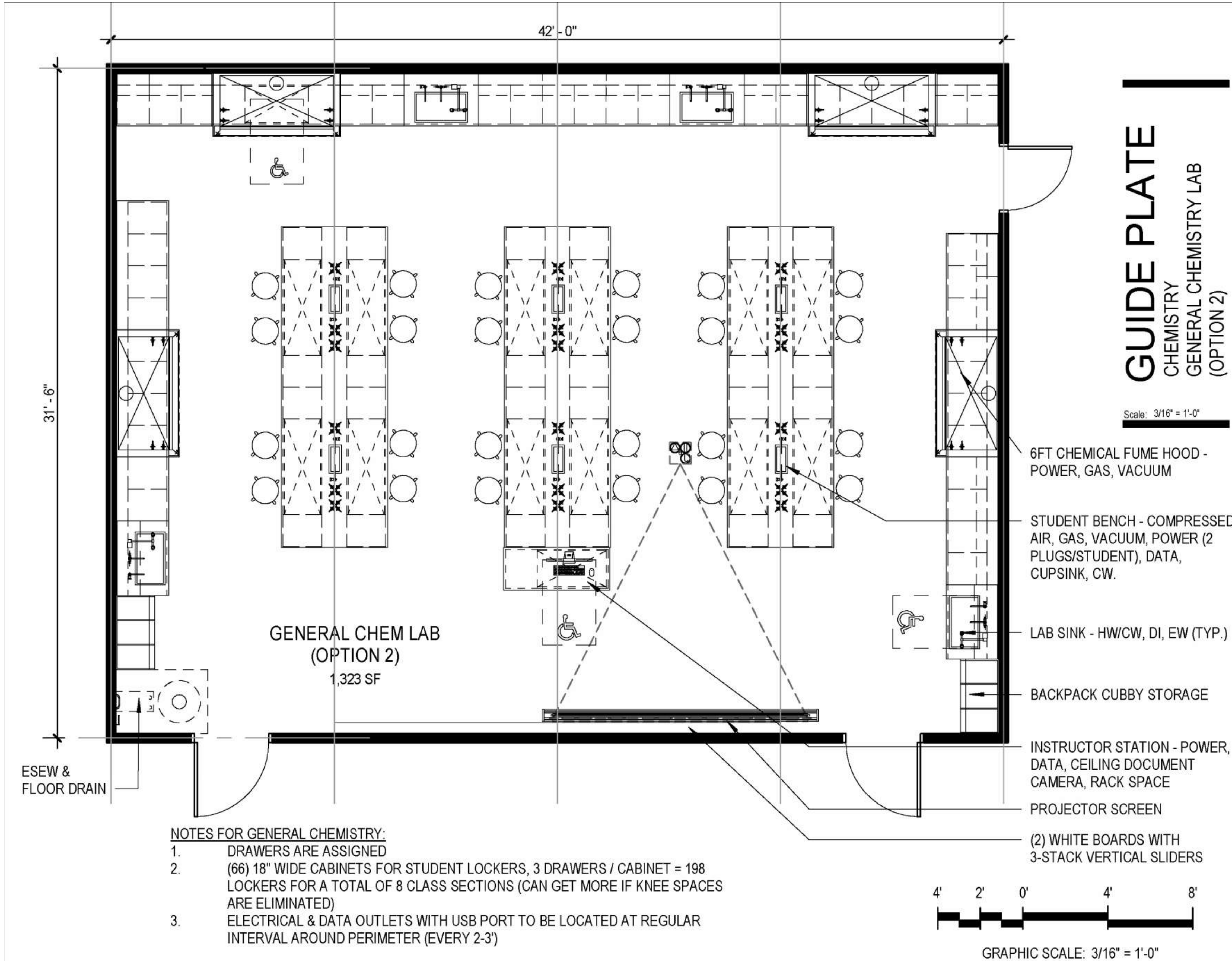
CHEMISTRY
GENERAL CHEMISTRY LAB
(OPTION 2)

Scale:



8' 4' 0' 8' 16'

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



NOTES FOR GENERAL CHEMISTRY:

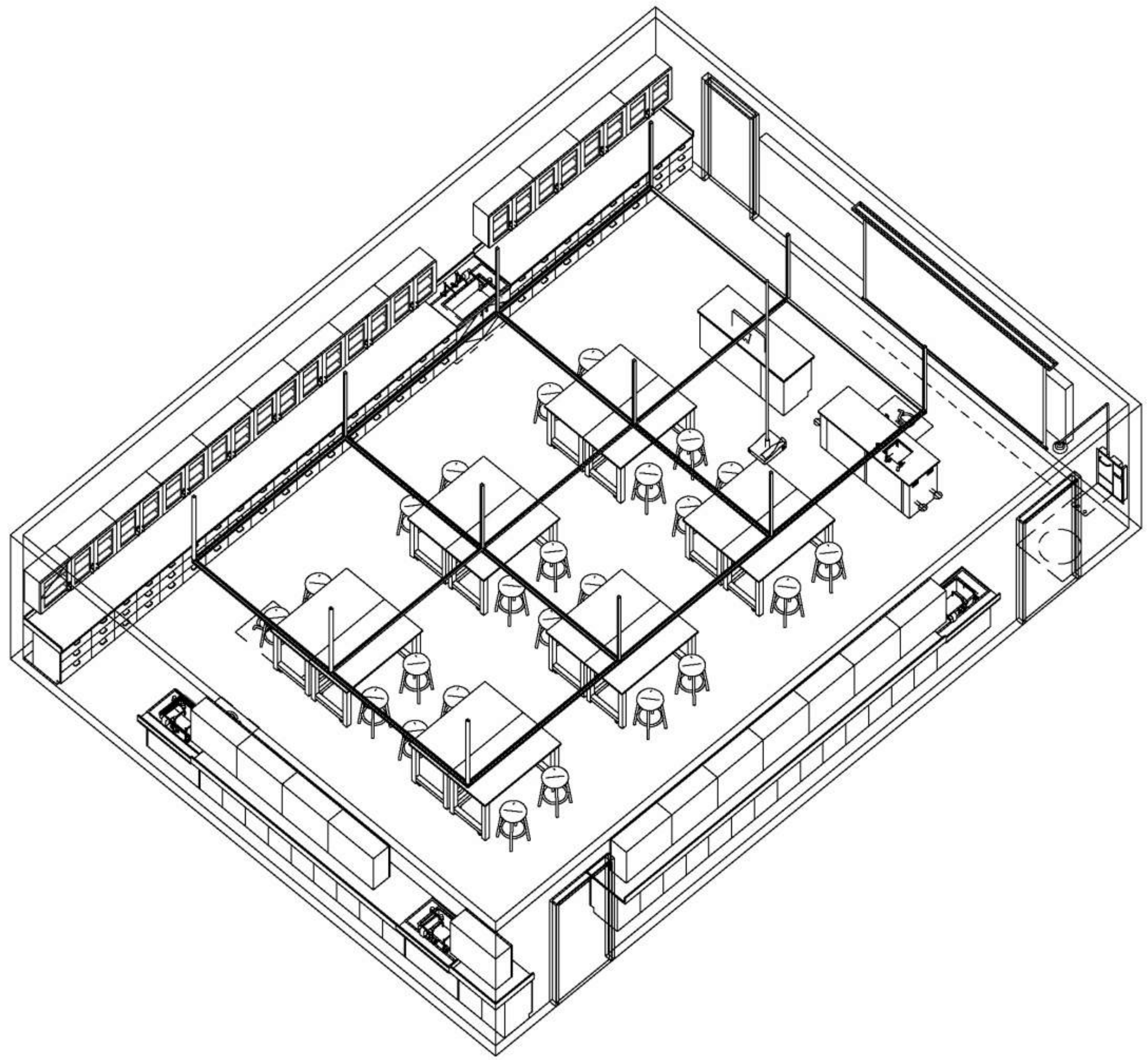
1. DRAWERS ARE ASSIGNED
2. (66) 18" WIDE CABINETS FOR STUDENT LOCKERS, 3 DRAWERS / CABINET = 198 LOCKERS FOR A TOTAL OF 8 CLASS SECTIONS (CAN GET MORE IF KNEE SPACES ARE ELIMINATED)
3. ELECTRICAL & DATA OUTLETS WITH USB PORT TO BE LOCATED AT REGULAR INTERVAL AROUND PERIMETER (EVERY 2-3')

7.2 PHASING STRATEGY 2 - LABORATORY PROTOTYPES

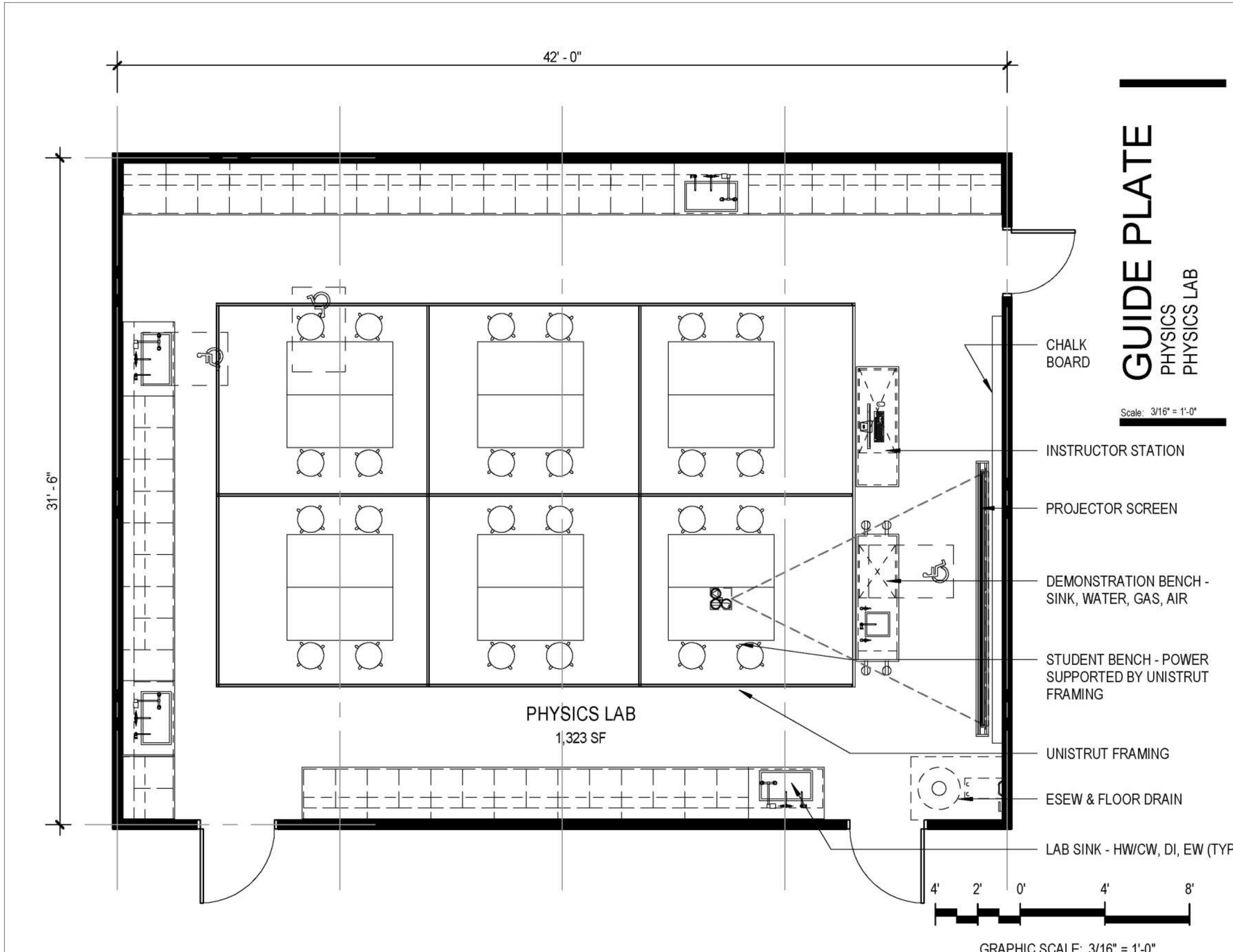
7.2.1.2 LAB PLANNING GUIDE PLATES - PHYSICS

GUIDE PLATE
PHYSICS
PHYSICS LAB

Scale:



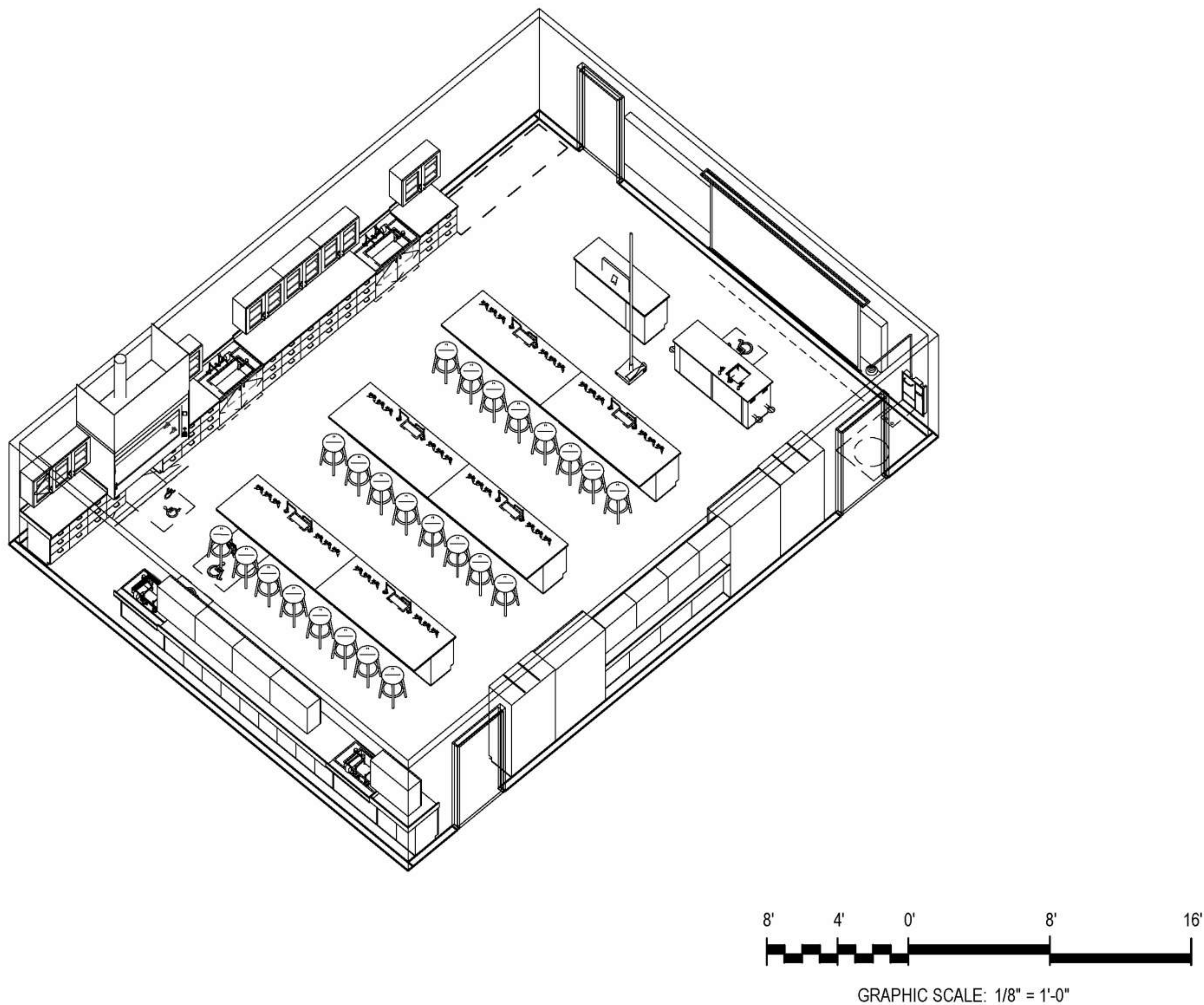
GRAPHIC SCALE: 1/8" = 1'-0"

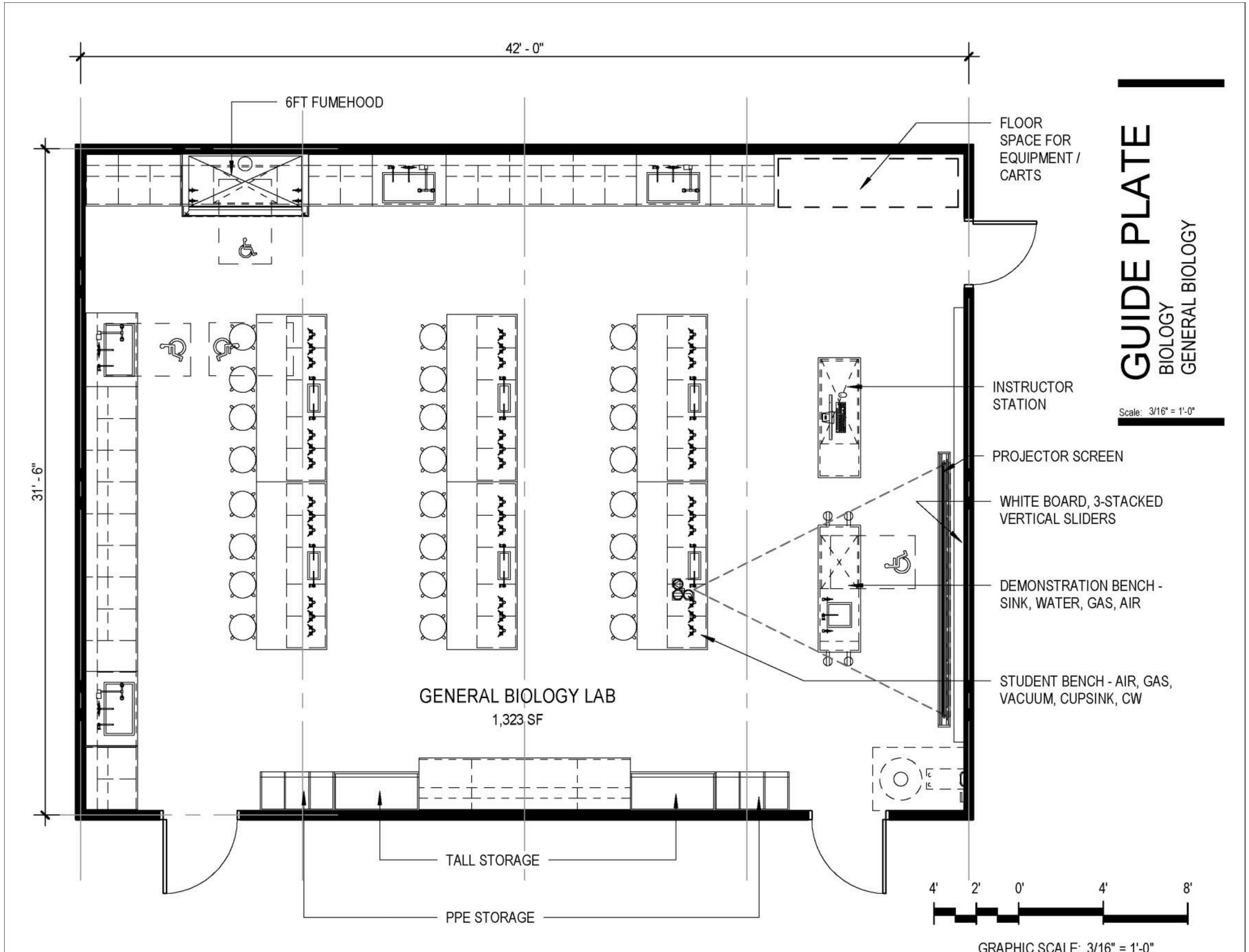

42' - 0"
31' - 6"
GUIDE PLATE
PHYSICS
PHYSICS LAB
Scale: 3/16" = 1'-0"
CHALK BOARD
INSTRUCTOR STATION
PROJECTOR SCREEN
DEMONSTRATION BENCH - SINK, WATER, GAS, AIR
STUDENT BENCH - POWER SUPPORTED BY UNISTRUT FRAMING
UNISTRUT FRAMING
ESEW & FLOOR DRAIN
LAB SINK - HW/CW, DI, EW (TYP)
PHYSICS LAB
1,323 SF
4' 2' 0' 4' 8'
GRAPHIC SCALE: 3/16" = 1'-0"

7.2 PHASING STRATEGY 2 - LABORATORY PROTOTYPES

7.2.1.3 LAB PLANNING GUIDE PLATES - BIOLOGY

GUIDE PLATE
BIOLOGY
GENERAL BIOLOGY
Scale:

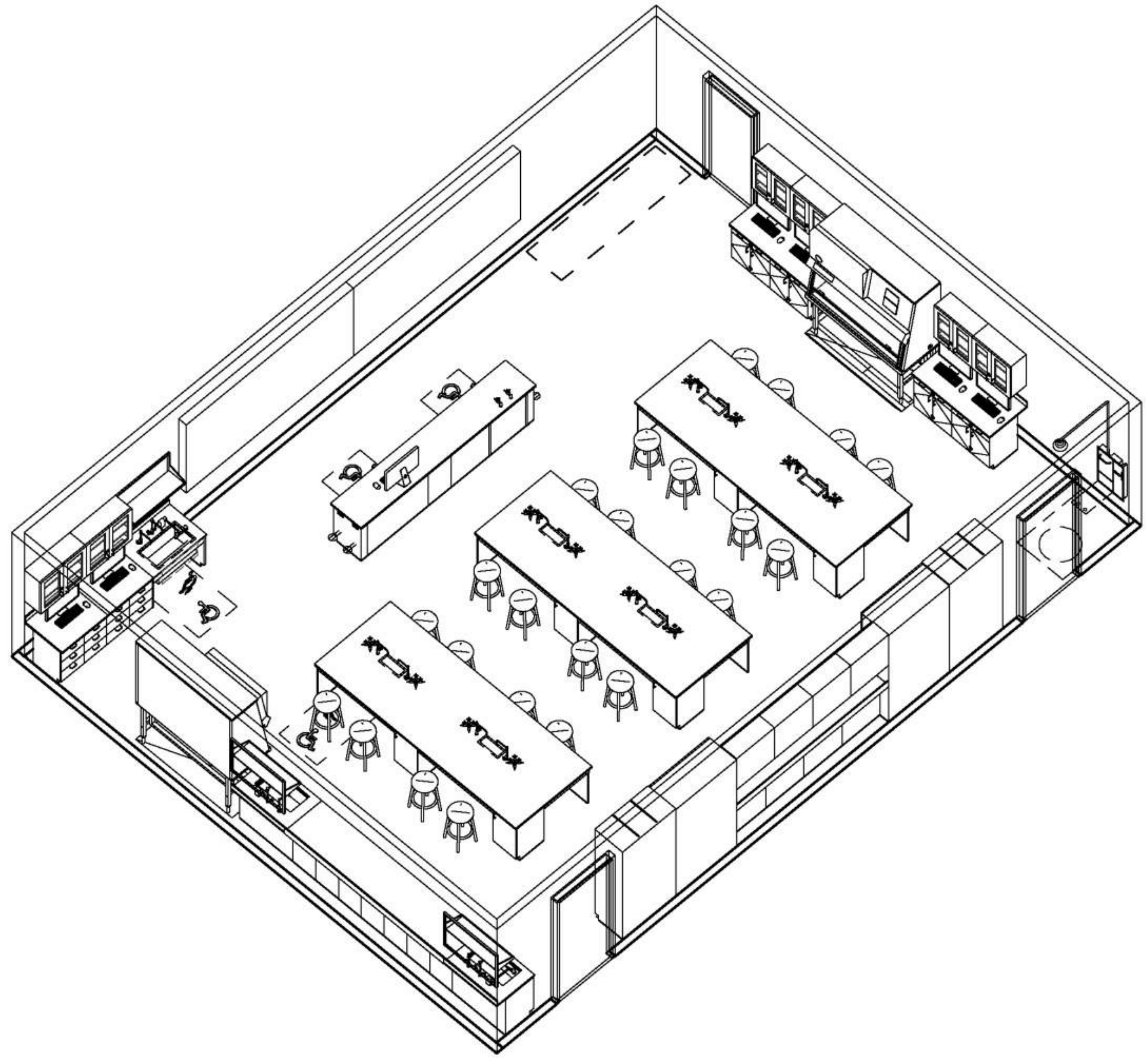


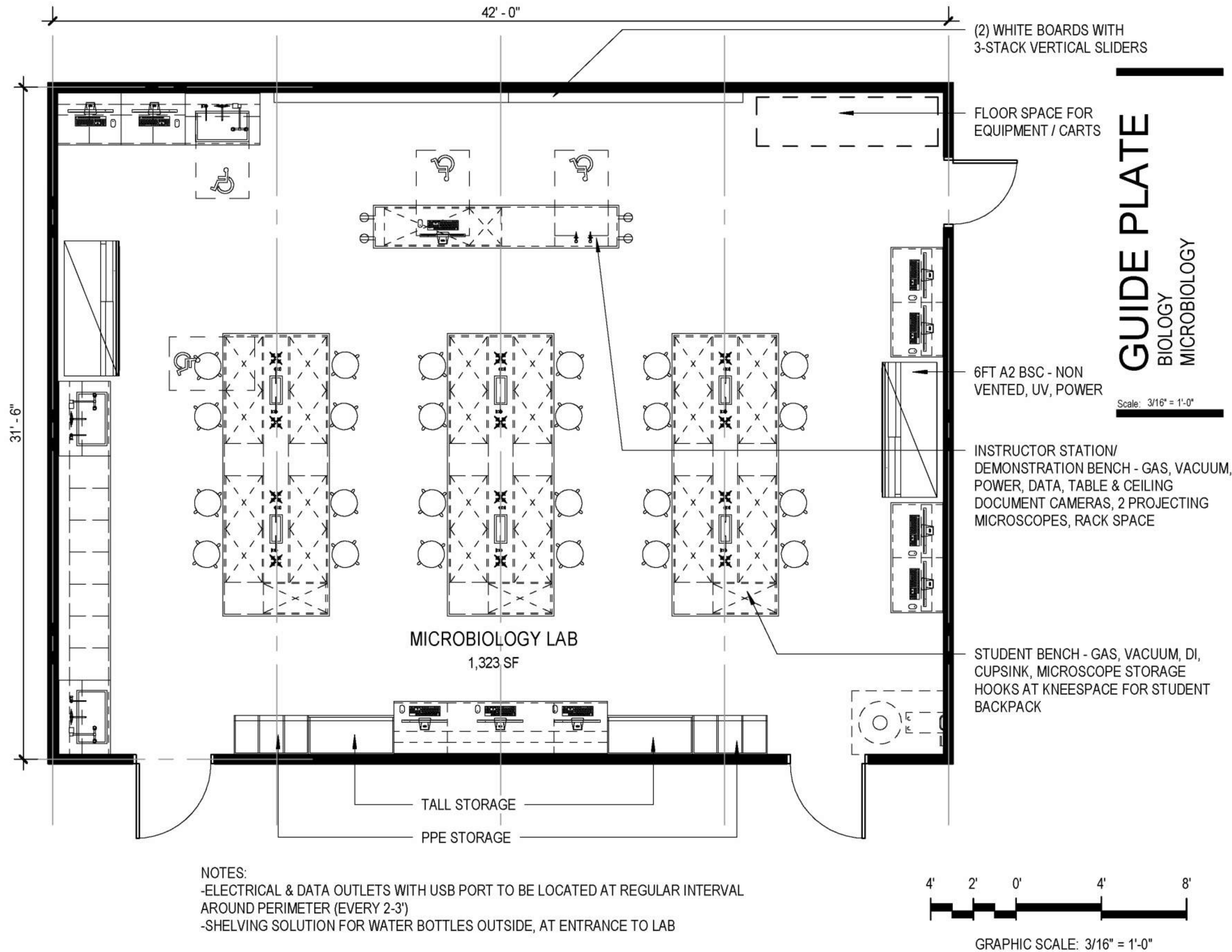

42' - 0"
31' - 6"
6FT FUMEHOOD
FLOOR SPACE FOR EQUIPMENT / CARTS
GUIDE PLATE
BIOLOGY
GENERAL BIOLOGY
Scale: 3/16" = 1'-0"
INSTRUCTOR STATION
PROJECTOR SCREEN
WHITE BOARD, 3-STACKED VERTICAL SLIDERS
DEMONSTRATION BENCH - SINK, WATER, GAS, AIR
STUDENT BENCH - AIR, GAS, VACUUM, CUPSINK, CW
GENERAL BIOLOGY LAB
1,323 SF
TALL STORAGE
PPE STORAGE
4' 2' 0' 4' 8'
GRAPHIC SCALE: 3/16" = 1'-0"

GUIDE PLATE

BIOLOGY
MICROBIOLOGY

Scale:

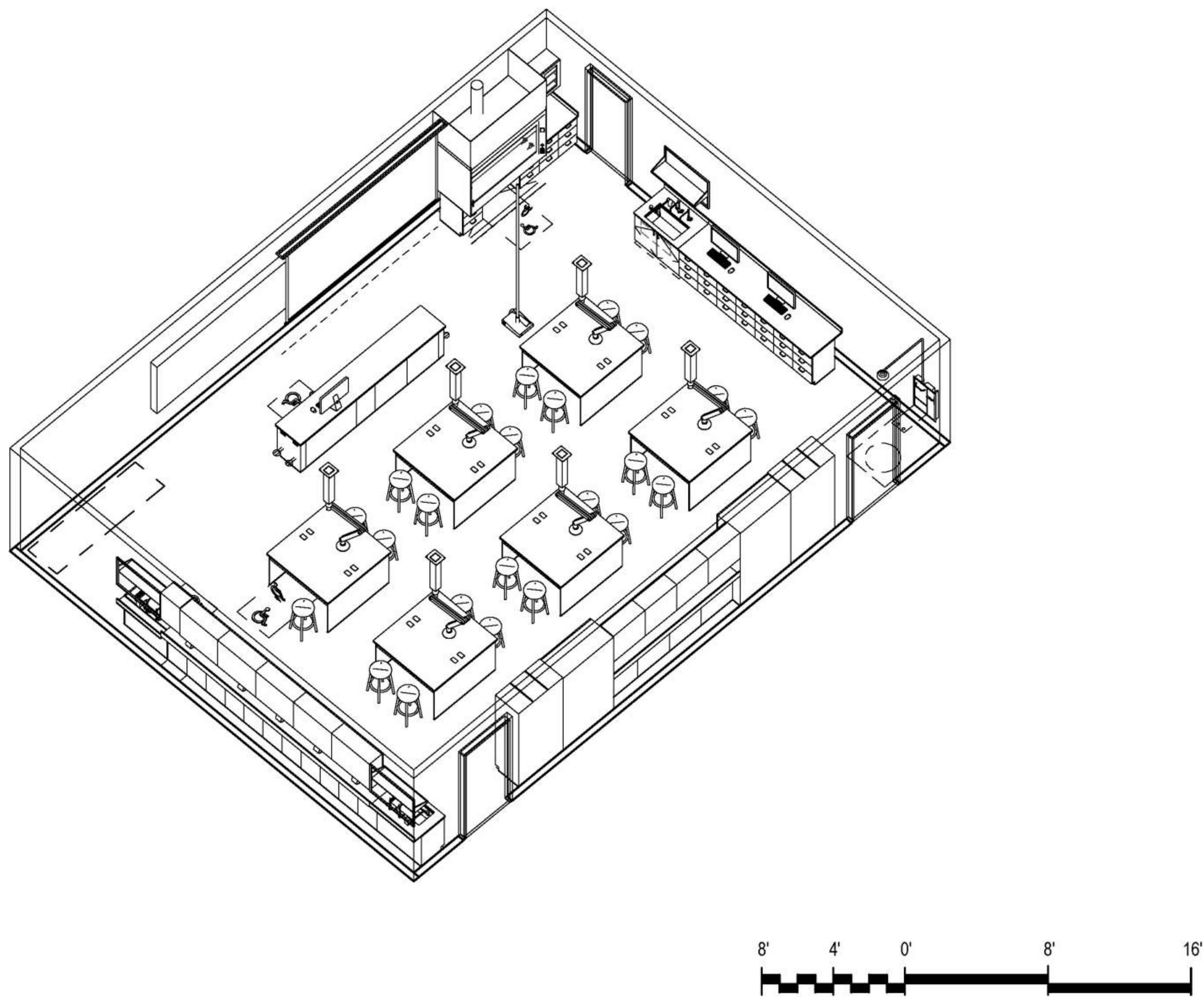


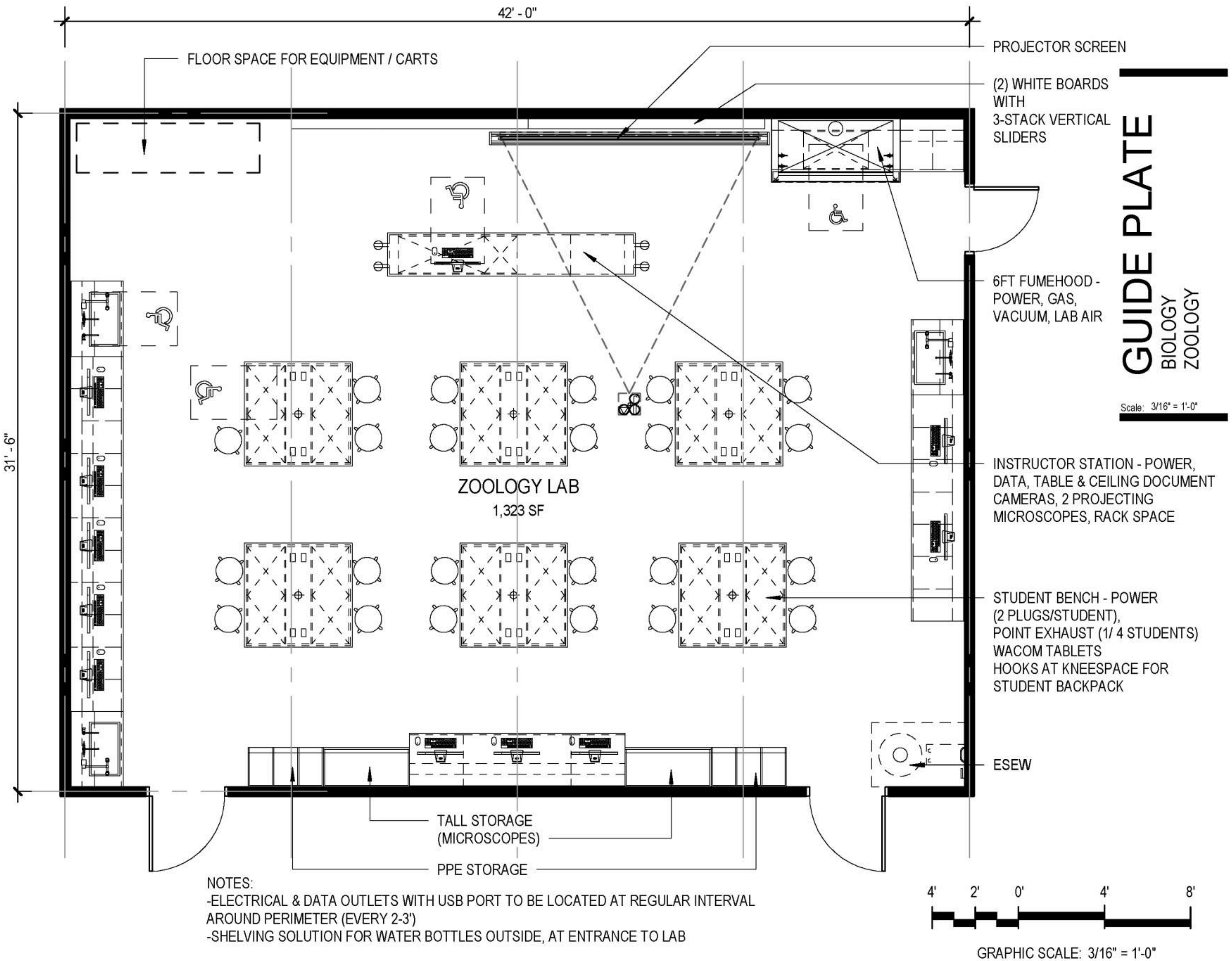


NOTES:
-ELECTRICAL & DATA OUTLETS WITH USB PORT TO BE LOCATED AT REGULAR INTERVAL AROUND PERIMETER (EVERY 2-3')
-SHELVING SOLUTION FOR WATER BOTTLES OUTSIDE, AT ENTRANCE TO LAB

GUIDE PLATE
BIOLOGY
ZOOLOGY

Scale:





NOTES:
-ELECTRICAL & DATA OUTLETS WITH USB PORT TO BE LOCATED AT REGULAR INTERVAL AROUND PERIMETER (EVERY 2-3')
-SHELVING SOLUTION FOR WATER BOTTLES OUTSIDE, AT ENTRANCE TO LAB

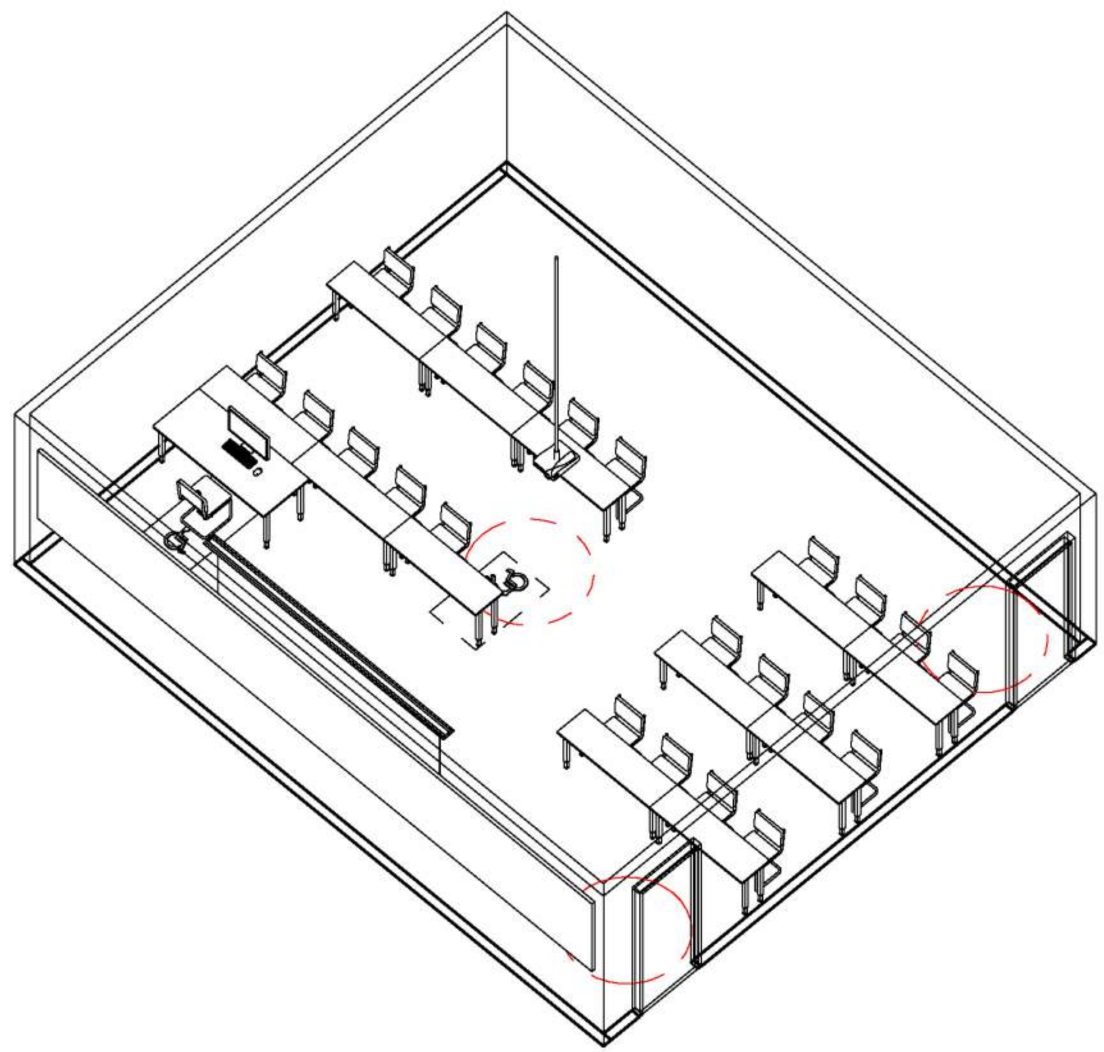
7.2 PHASING STRATEGY 2 - LABORATORY PROTOTYPES

7.2.1.4 LAB PLANNING GUIDE PLATES - CLASSROOM

GUIDE PLATE

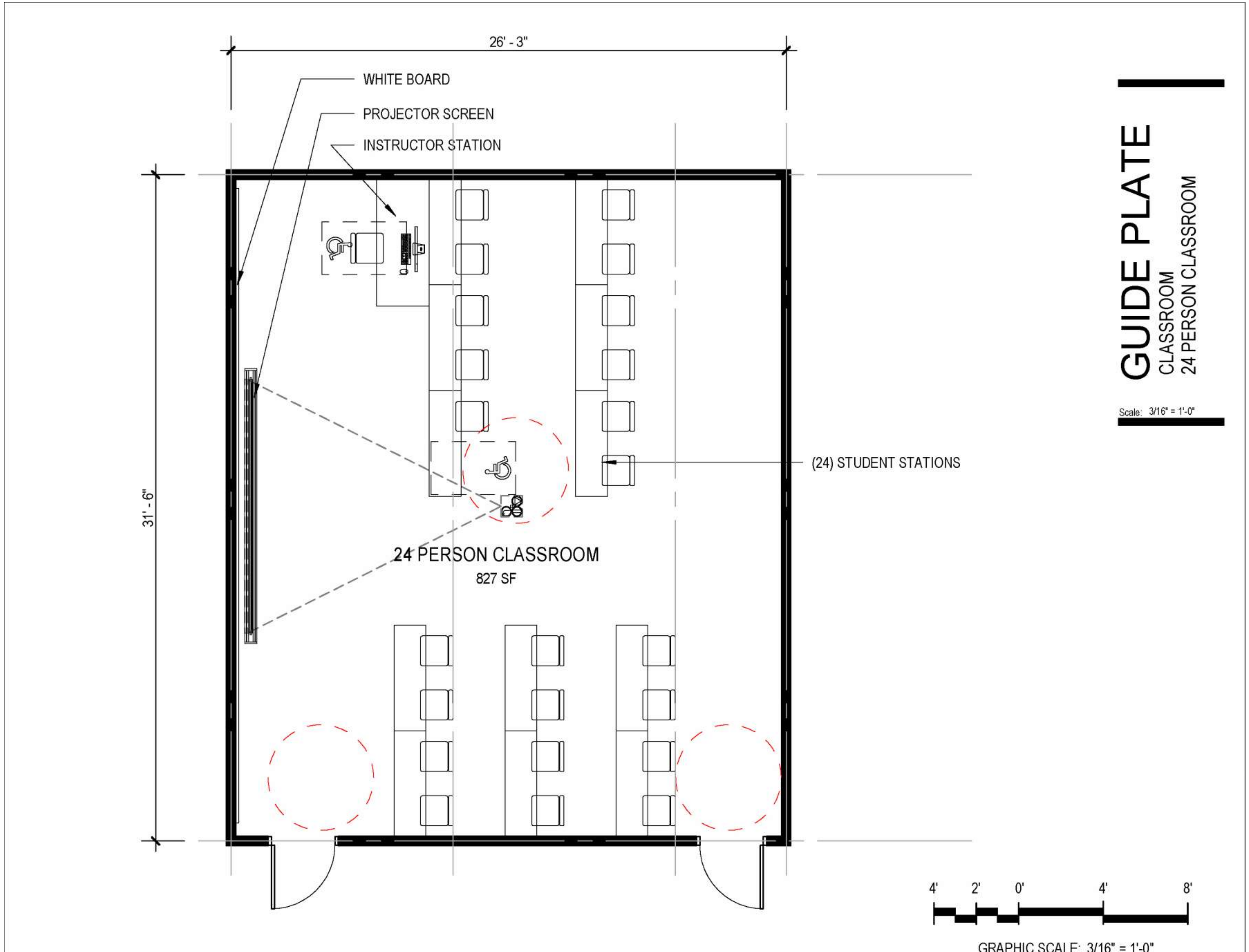
CLASSROOM
24 PERSON CLASSROOM

Scale:



8' 4' 0' 8' 16'

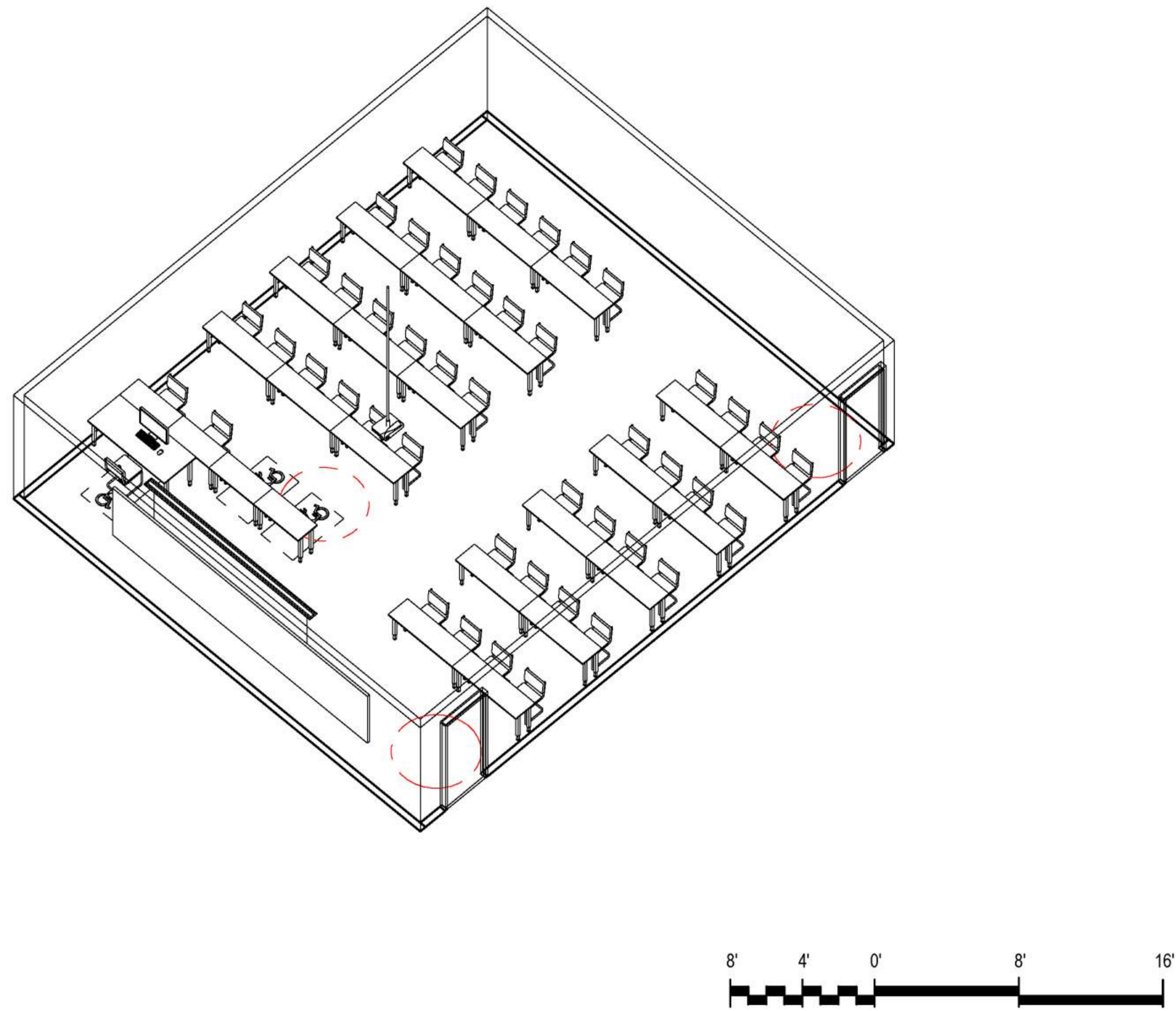
GRAPHIC SCALE: 1/8" = 1'-0"

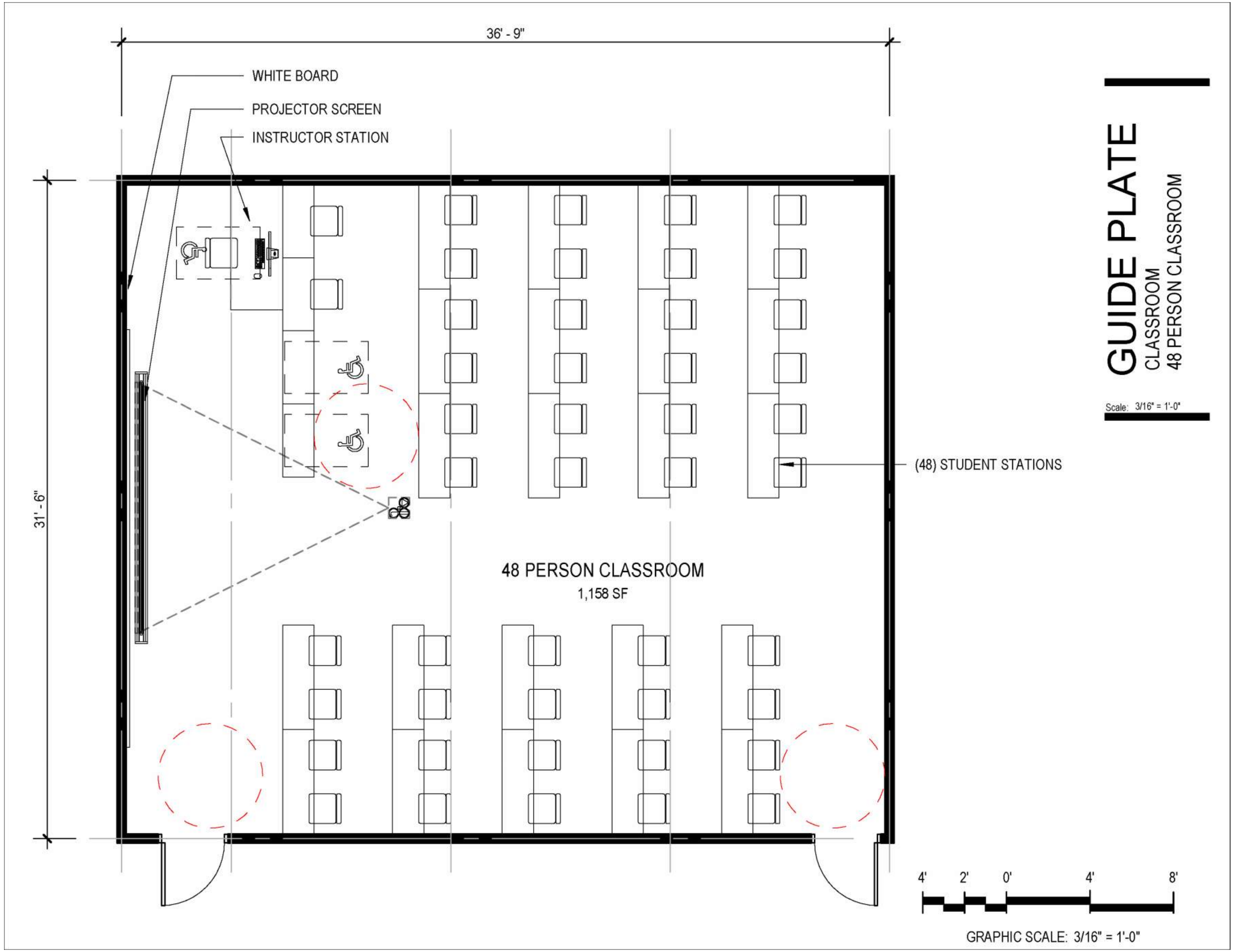

26' - 3"
31' - 6"
WHITE BOARD
PROJECTOR SCREEN
INSTRUCTOR STATION
(24) STUDENT STATIONS
24 PERSON CLASSROOM
827 SF
GUIDE PLATE
CLASSROOM
24 PERSON CLASSROOM
Scale: 3/16" = 1'-0"
4' 2' 0' 4' 8'
GRAPHIC SCALE: 3/16" = 1'-0"

GUIDE PLATE

CLASSROOM
48 PERSON CLASSROOM

Scale:

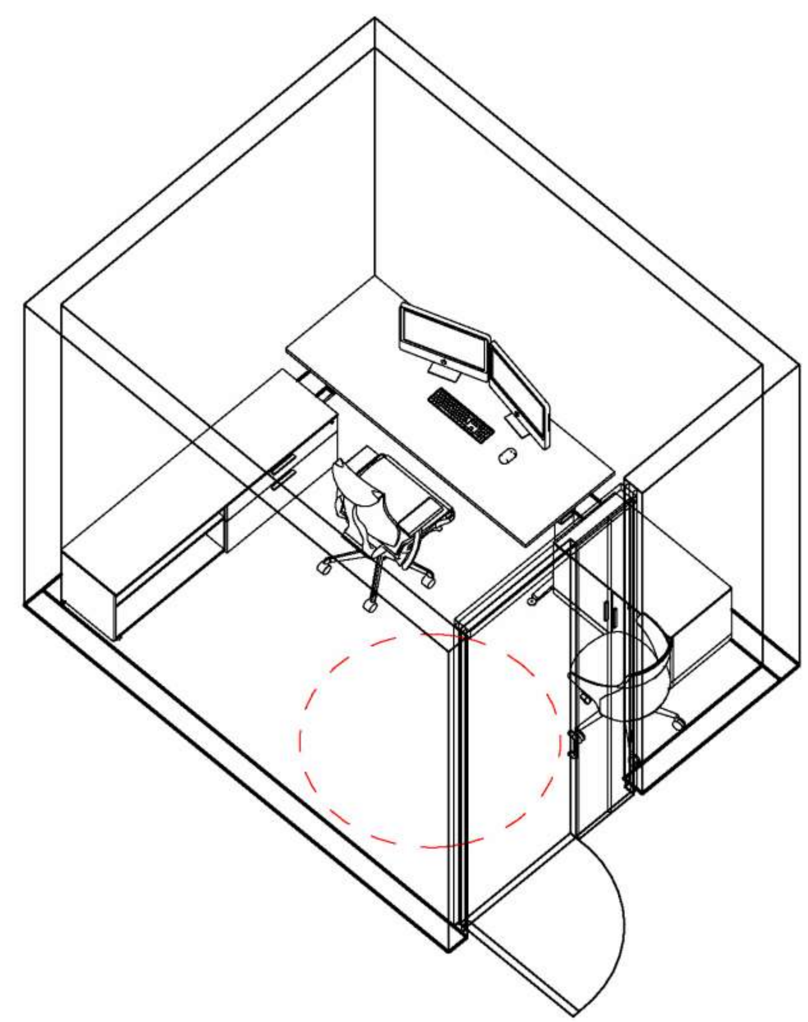



36' - 9"
WHITE BOARD
PROJECTOR SCREEN
INSTRUCTOR STATION
31' - 6"
(48) STUDENT STATIONS
48 PERSON CLASSROOM
1,158 SF
GUIDE PLATE
CLASSROOM
48 PERSON CLASSROOM
Scale: 3/16" = 1'-0"
4' 2' 0' 4' 8'
GRAPHIC SCALE: 3/16" = 1'-0"

7.2 PHASING STRATEGY 2 - LABORATORY PROTOTYPES

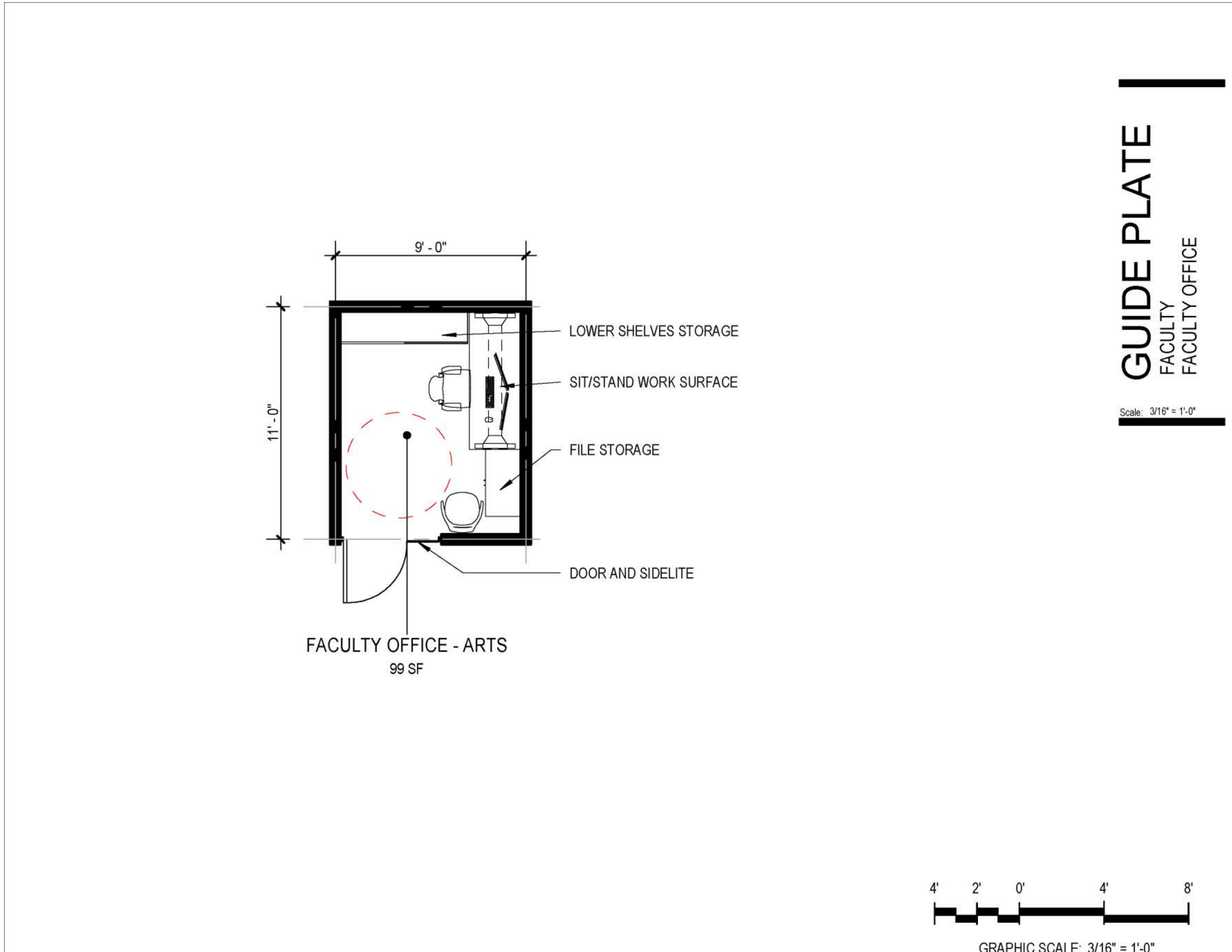
7.2.1.5 LAB PLANNING GUIDE PLATES - FACULTY

GUIDE PLATE
FACULTY
FACULTY OFFICE
Scale:



4' 2' 0' 4' 8'

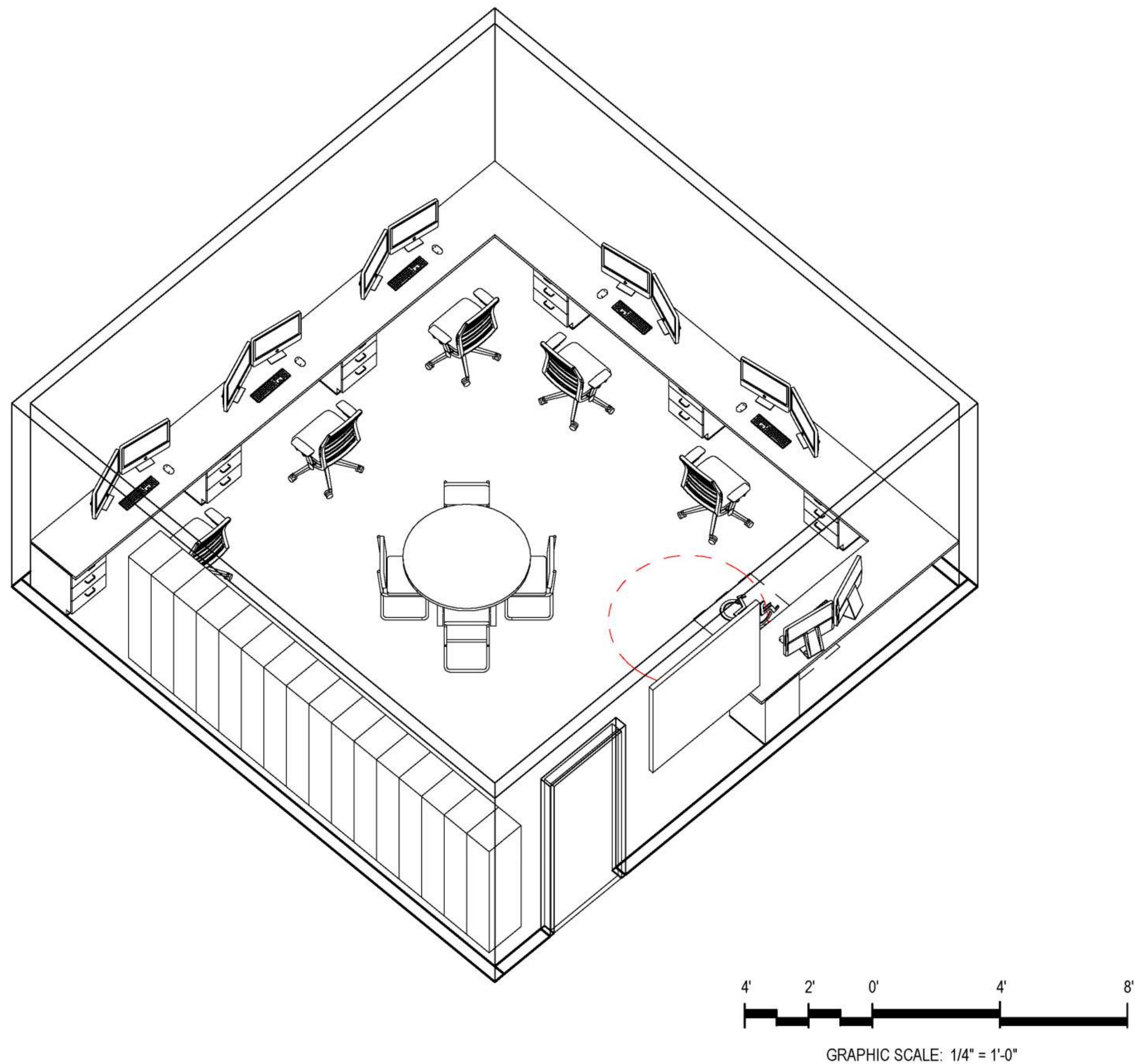
GRAPHIC SCALE: 1/4" = 1'-0"

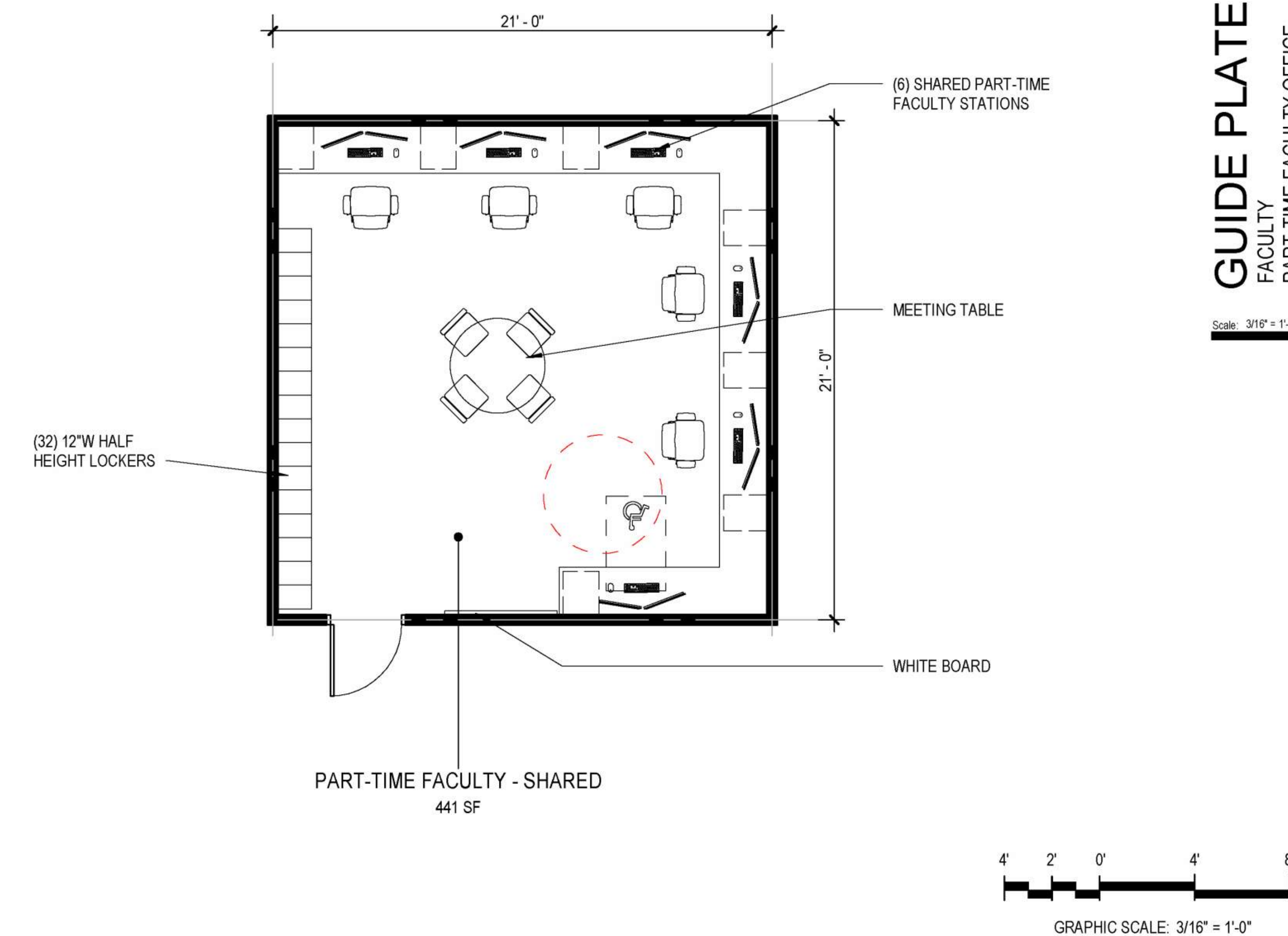

9' - 0"
11' - 0"
LOWER SHELVES STORAGE
SIT/STAND WORK SURFACE
FILE STORAGE
DOOR AND SIDELITE
FACULTY OFFICE - ARTS
99 SF
GUIDE PLATE
FACULTY
FACULTY OFFICE
Scale: 3/16" = 1'-0"
4' 2' 0' 4' 8'
GRAPHIC SCALE: 3/16" = 1'-0"

GUIDE PLATE

FACULTY
PART-TIME FACULTY OFFICE - SHARED

Scale:





GUIDE PLATE

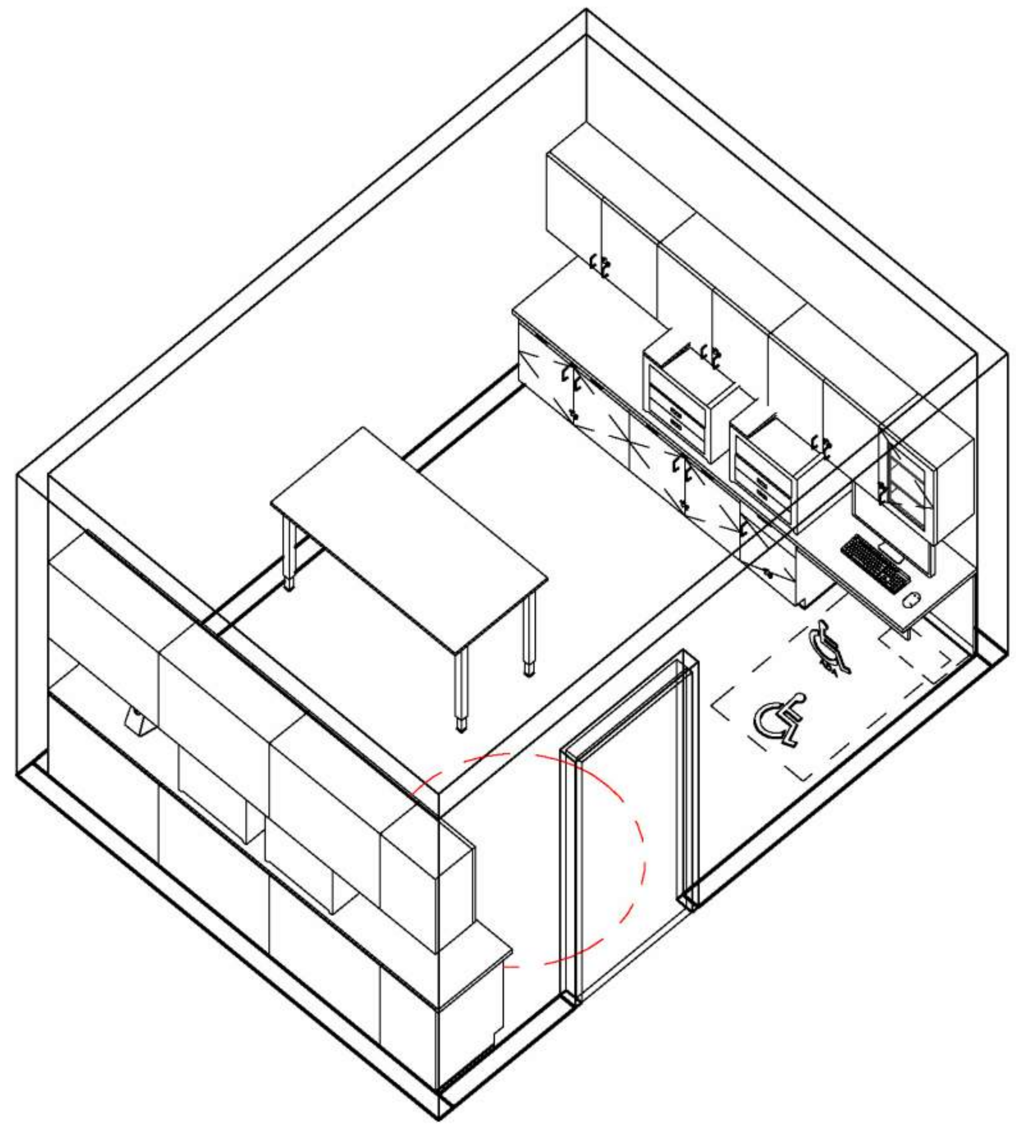
FACULTY
PART-TIME FACULTY OFFICE - SHARED

Scale: 3/16" = 1'-0"

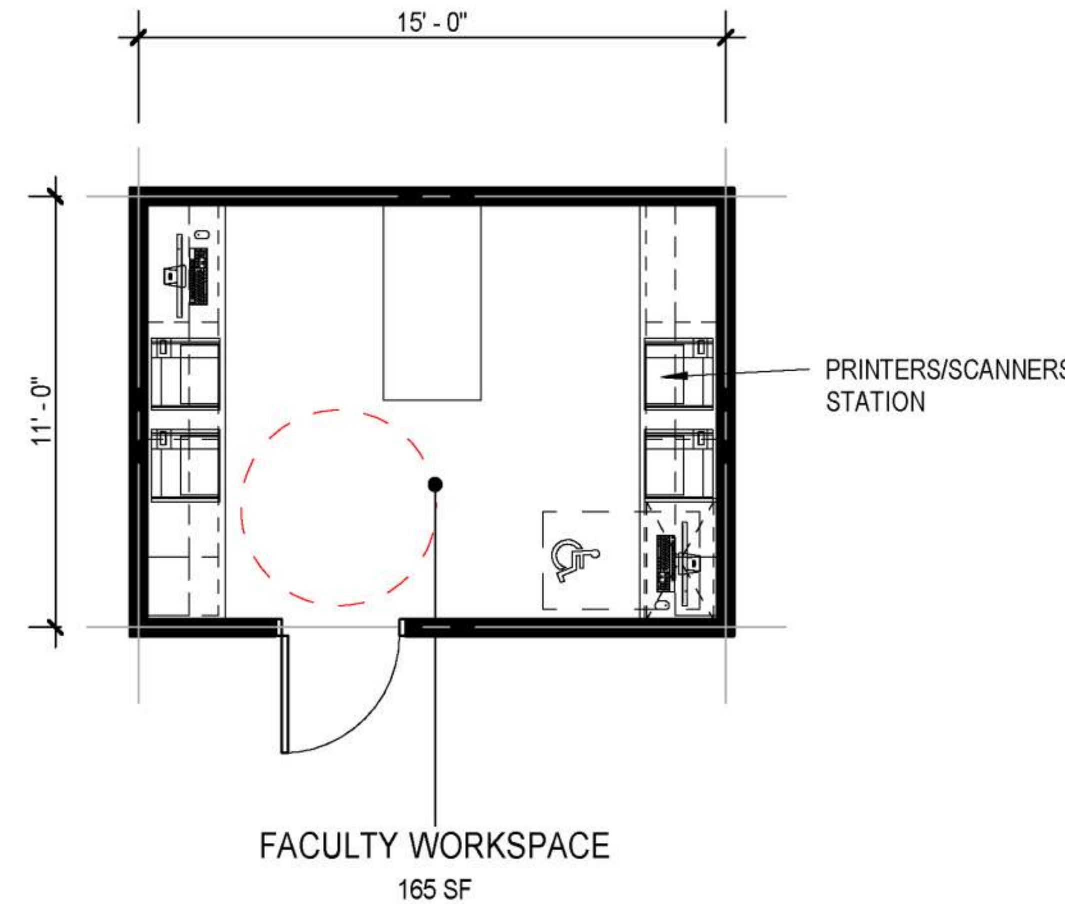
GUIDE PLATE

FACULTY
FACULTY WORKSPACE

Scale:



GRAPHIC SCALE: 1/4" = 1'-0"



GUIDE PLATE

FACULTY
FACULTY WORKSPACE

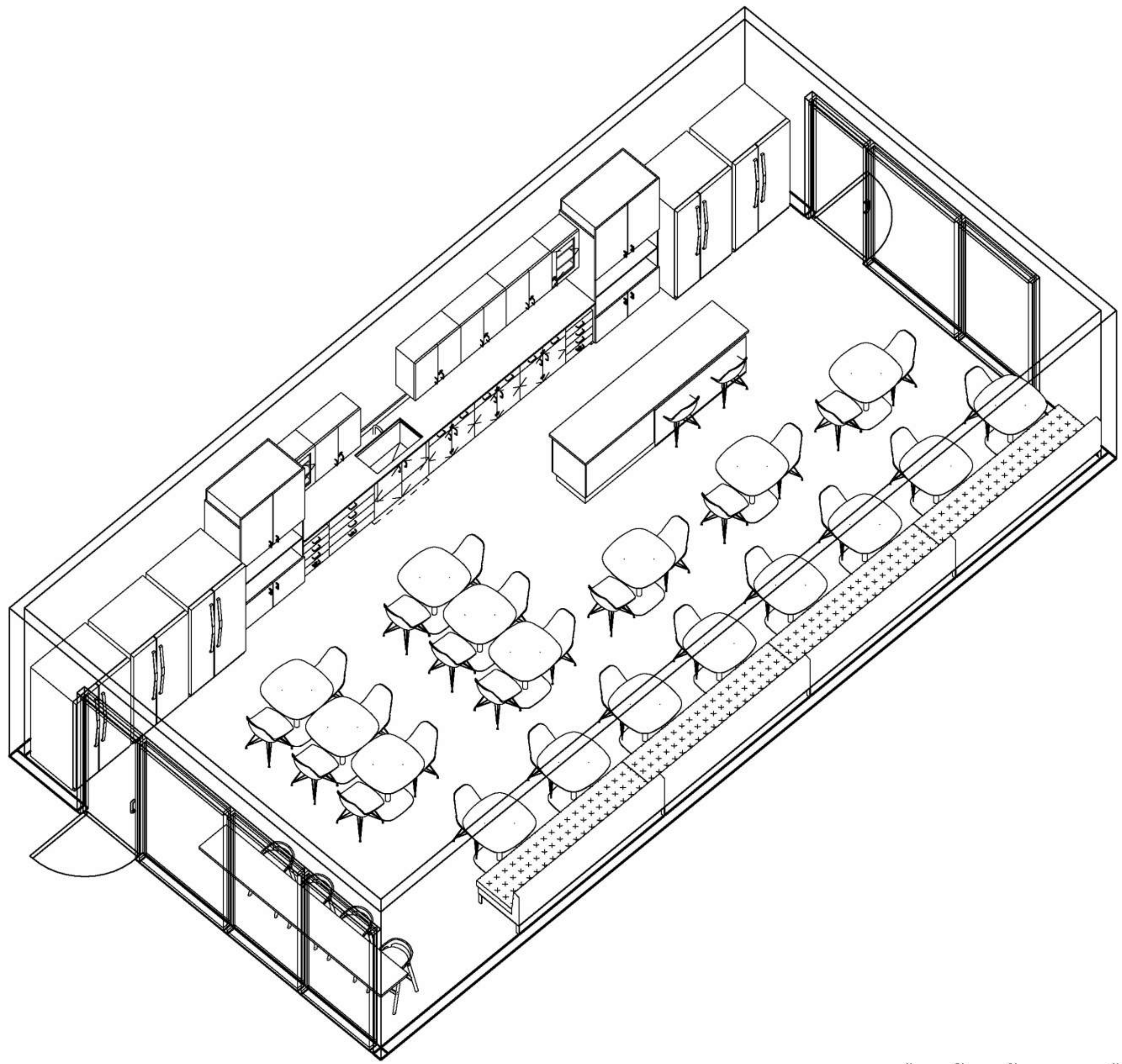
Scale: 3/16" = 1'-0"

GRAPHIC SCALE: 3/16" = 1'-0"

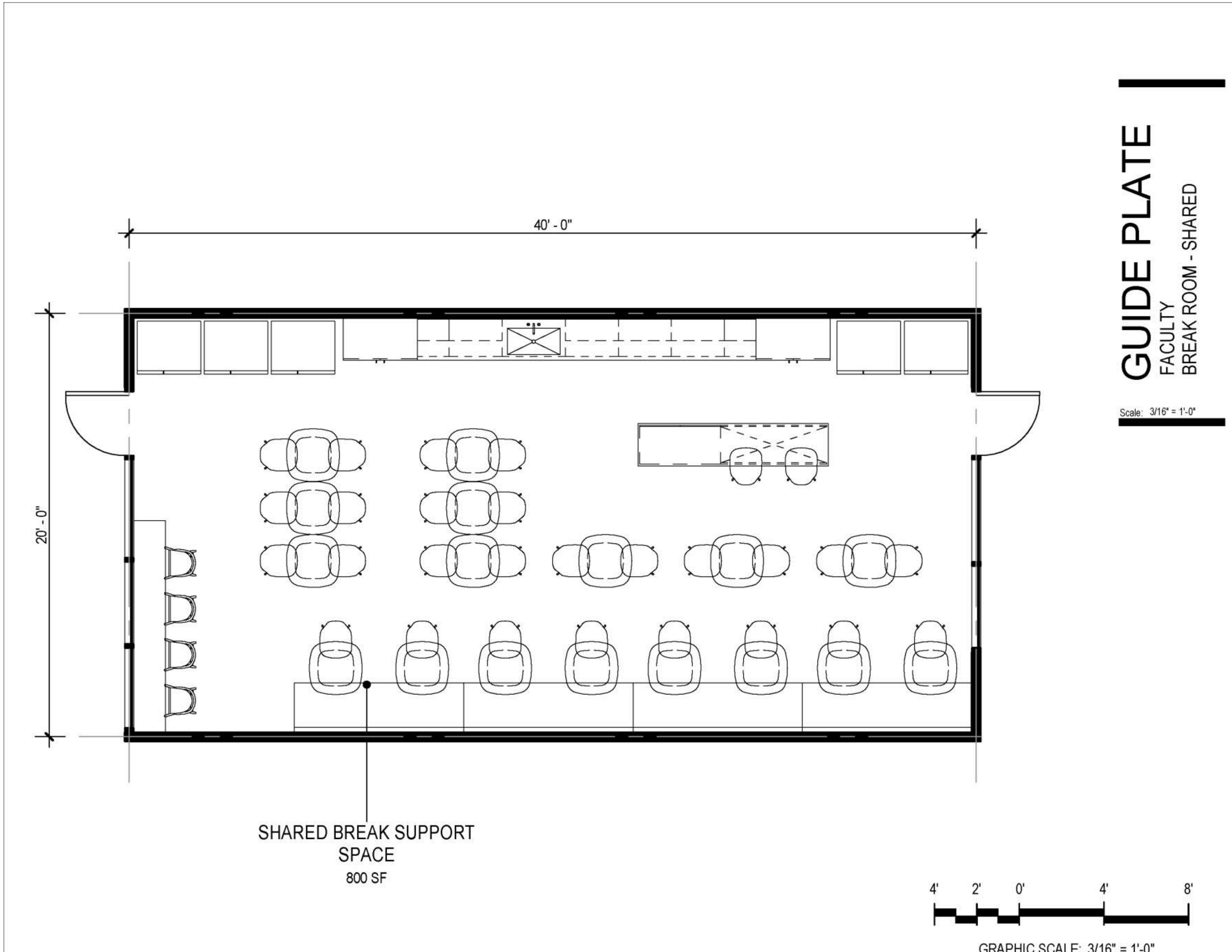
GUIDE PLATE

FACULTY
BREAK ROOM - SHARED

Scale:



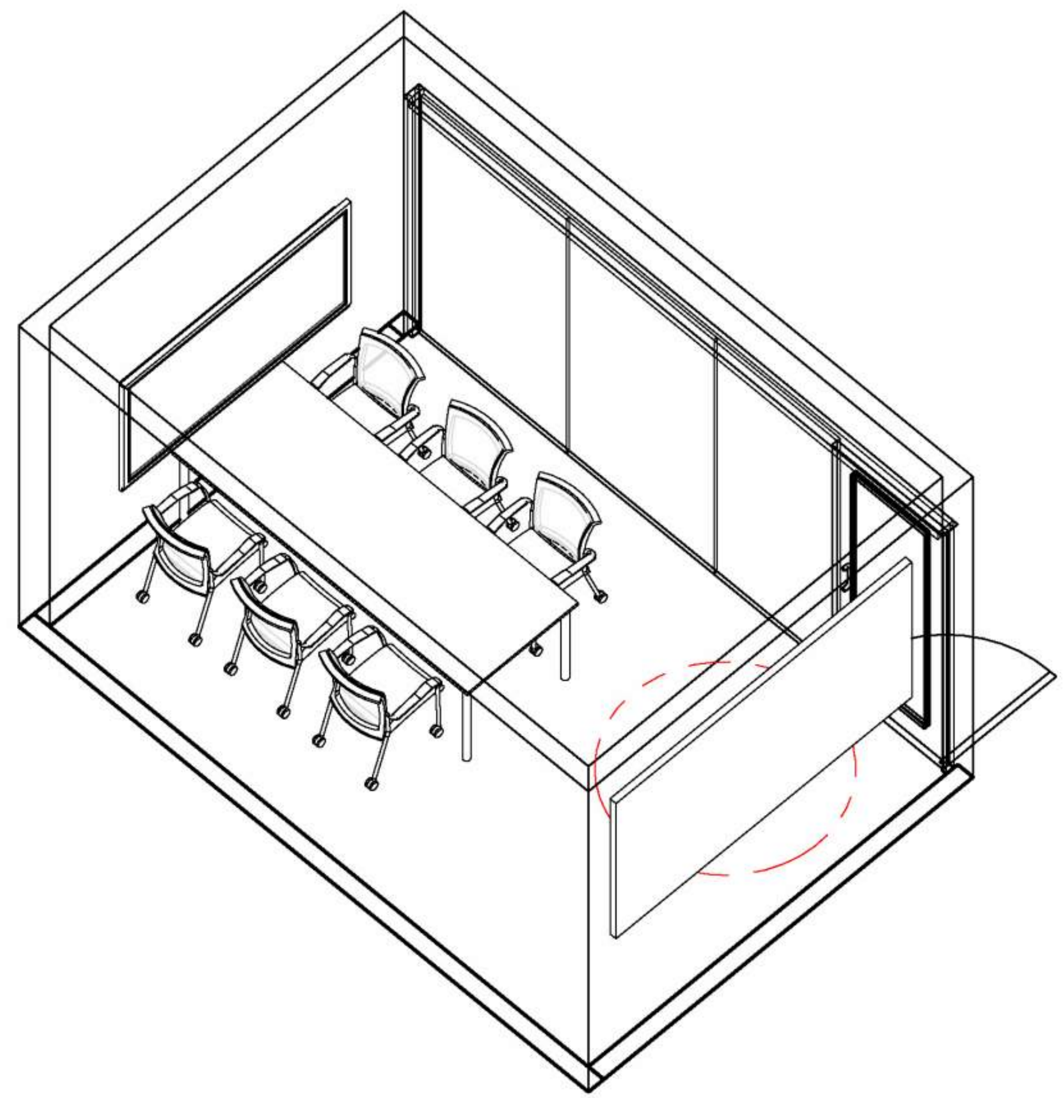
GRAPHIC SCALE: 3/16" = 1'-0"


GUIDE PLATE
FACULTY
BREAK ROOM - SHARED
Scale: 3/16" = 1'-0"
40' - 0"
20' - 0"
SHARED BREAK SUPPORT SPACE
800 SF
4'
2'
0'
4'
8'
GRAPHIC SCALE: 3/16" = 1'-0"

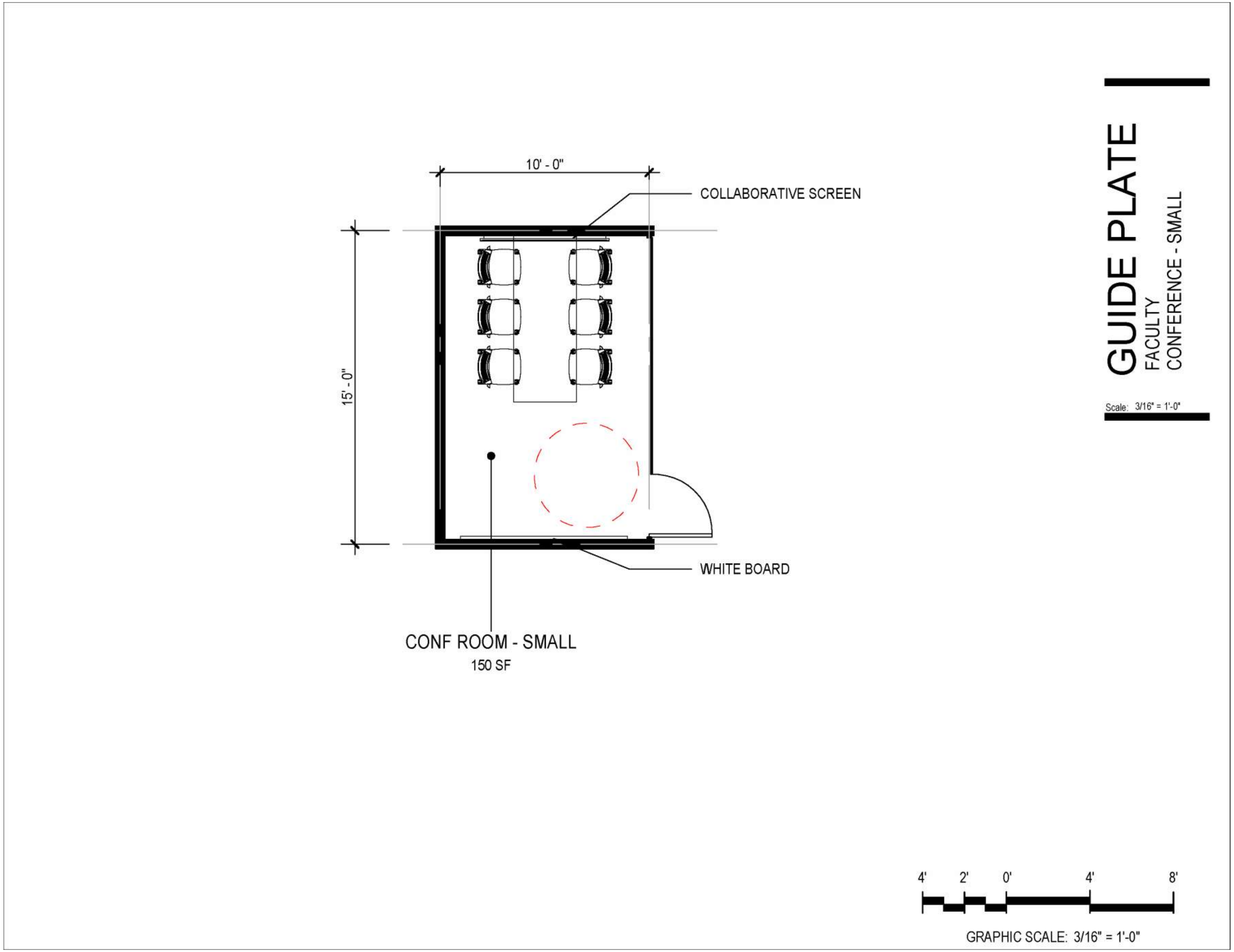
GUIDE PLATE

FACULTY
CONFERENCE - SMALL

Scale:



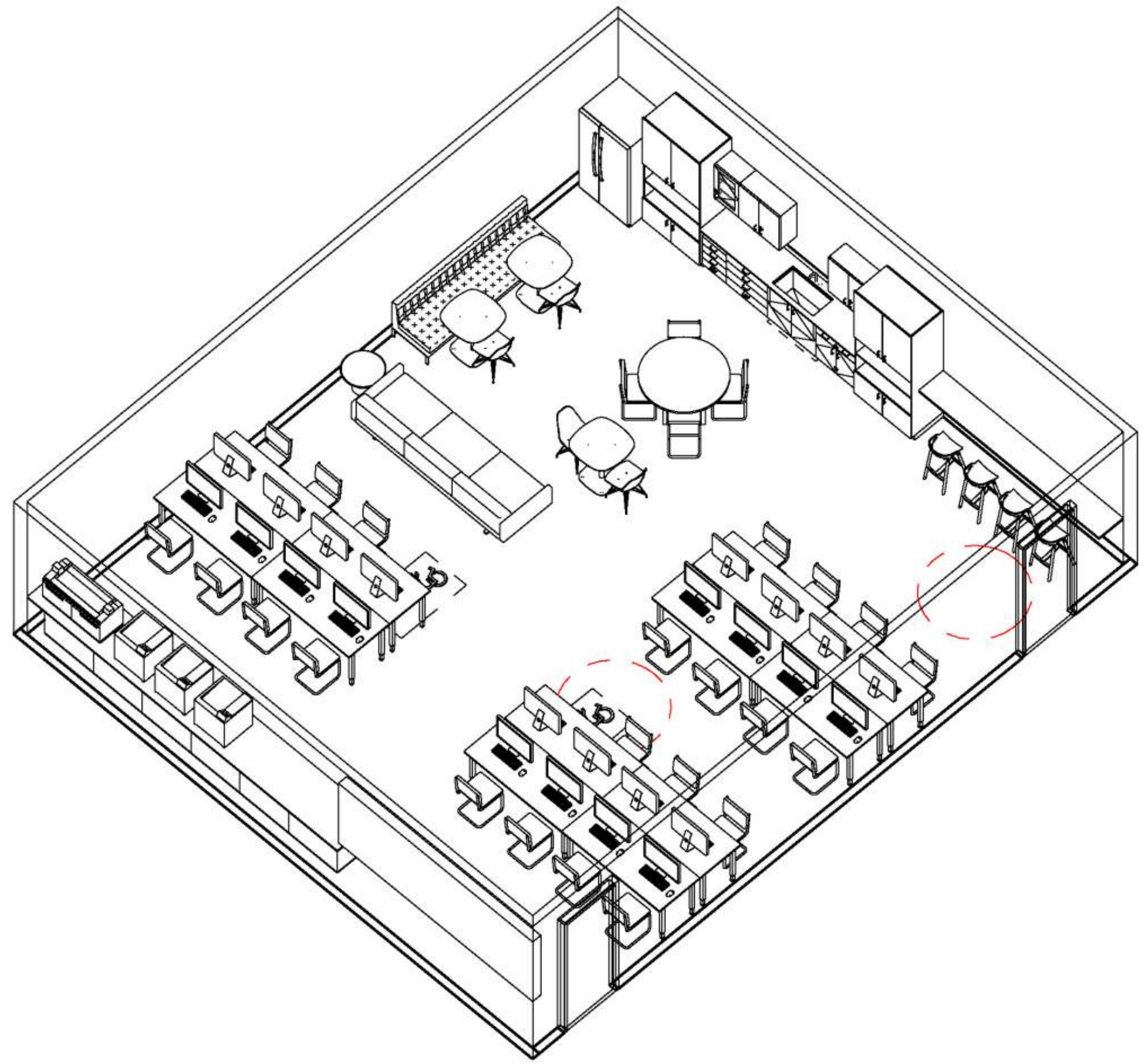
GRAPHIC SCALE: 1/4" = 1'-0"


10' - 0"
15' - 0"
COLLABORATIVE SCREEN
WHITE BOARD
CONF ROOM - SMALL
150 SF
GUIDE PLATE
FACULTY
CONFERENCE - SMALL
Scale: 3/16" = 1'-0"
4' 2' 0' 4' 8'
GRAPHIC SCALE: 3/16" = 1'-0"

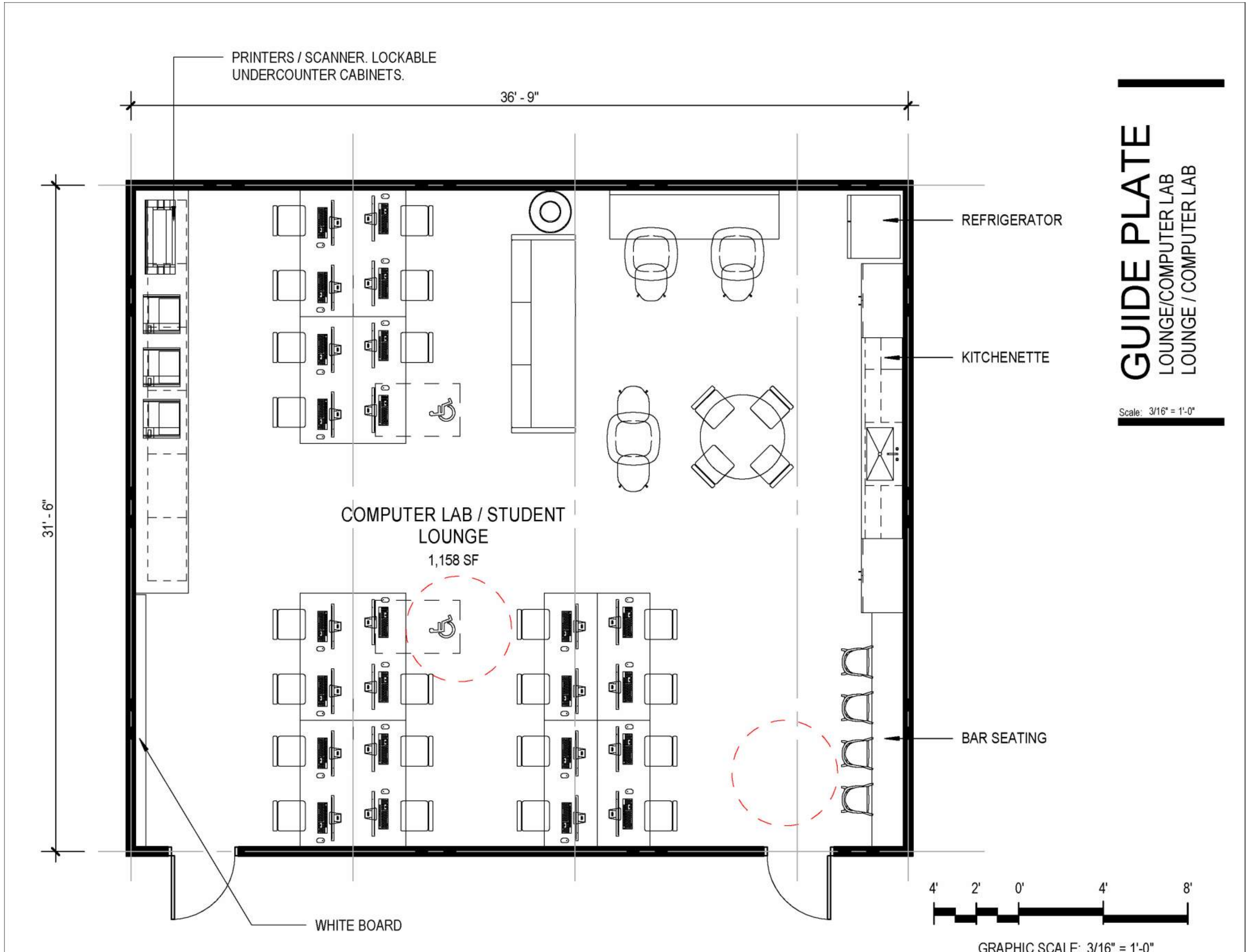
7.2 PHASING STRATEGY 2 - LABORATORY PROTOTYPES

7.2.1.6 LAB PLANNING GUIDE PLATES - LOUNGE - COMPUTER LAB

GUIDE PLATE
LOUNGE/COMPUTER LAB
LOUNGE / COMPUTER LAB
Scale:



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


PRINTERS / SCANNER. LOCKABLE UNDERCOUNTER CABINETS.
36' - 9"
31' - 6"
REFRIGERATOR
KITCHENETTE
COMPUTER LAB / STUDENT LOUNGE
1,158 SF
BAR SEATING
WHITE BOARD
GUIDE PLATE
LOUNGE/COMPUTER LAB
LOUNGE / COMPUTER LAB
Scale: 3/16" = 1'-0"
4'
2'
0'
4'
8'
GRAPHIC SCALE: 3/16" = 1'-0"

7.3 PHASING STRATEGY 3 - TARGETED RENOVATION

7.3.0 LAB PLANNING - SCIENCE A - FLOORS 2, 3, 4 AND 5

The following Science Complex diagrams are individual building diagrams highlighting specific floors with targeted rooms for potential renovation. Refer to the Lab Planning Prototype graphics for further detail.

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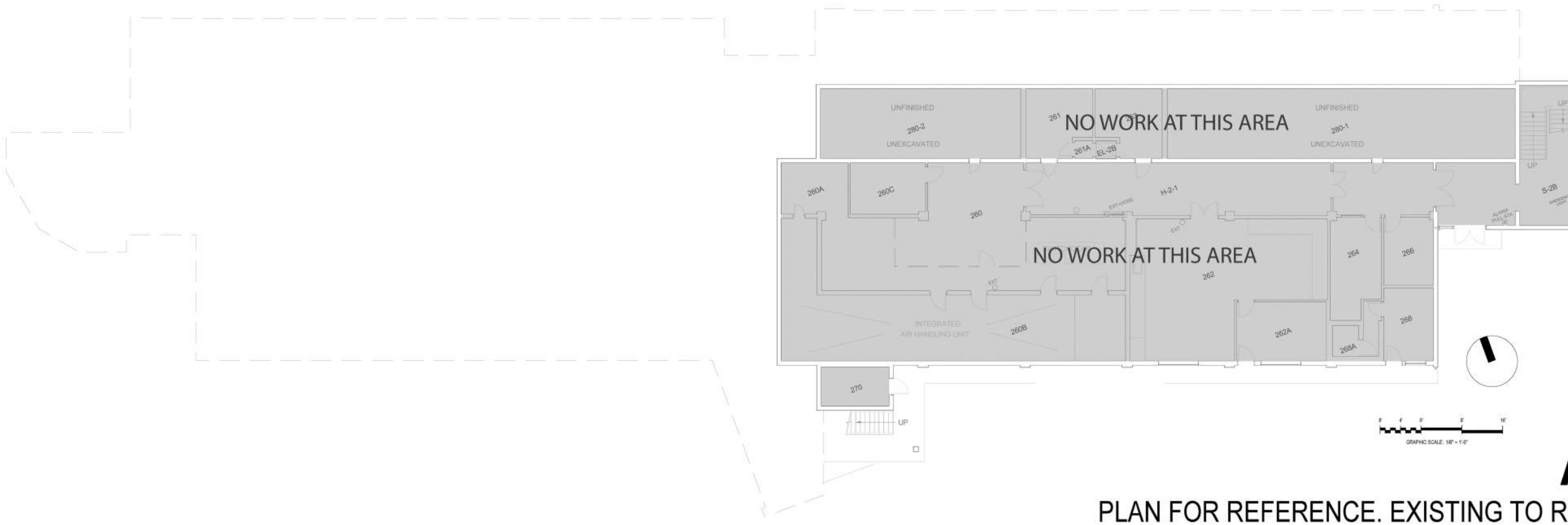
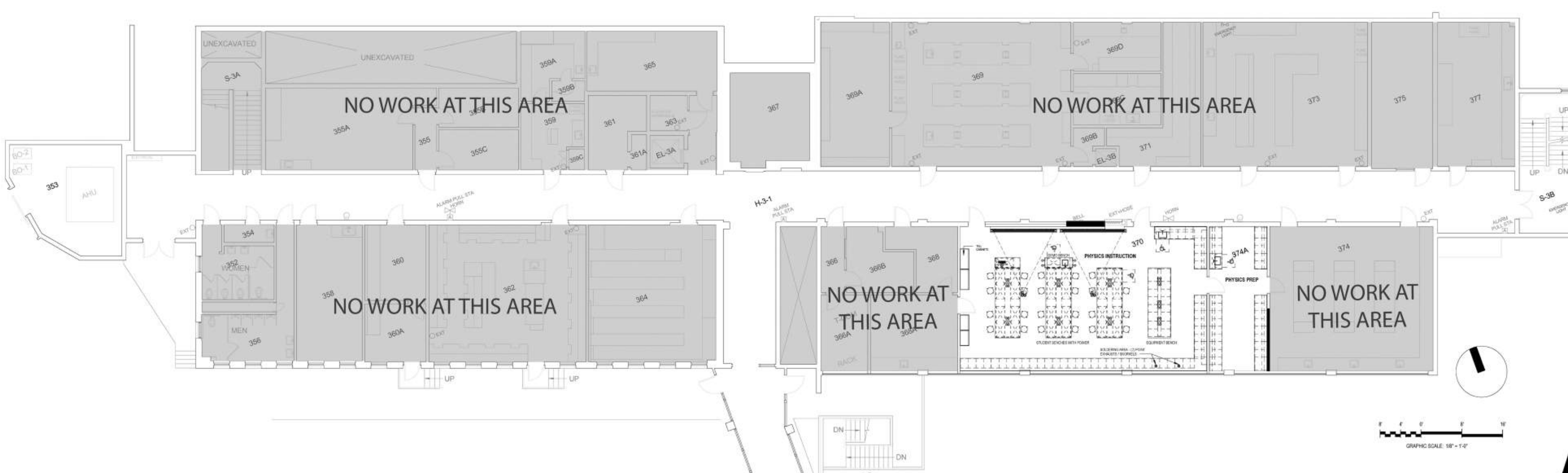
7.3 PHASING STRATEGY 3 - TARGETED RENOVATION

7.3.1 LAB PLANNING - SCIENCE A

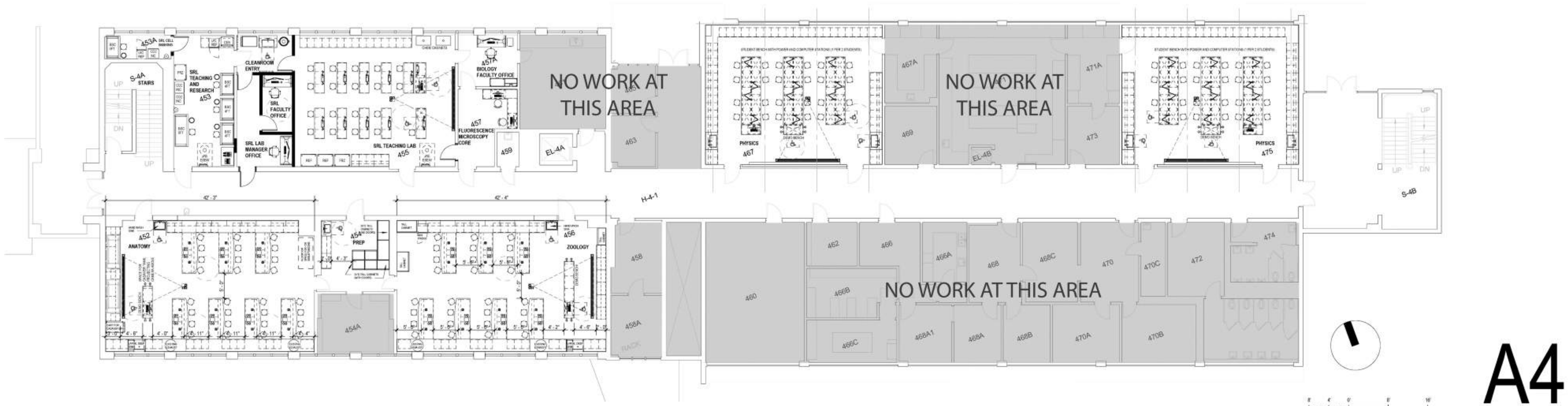


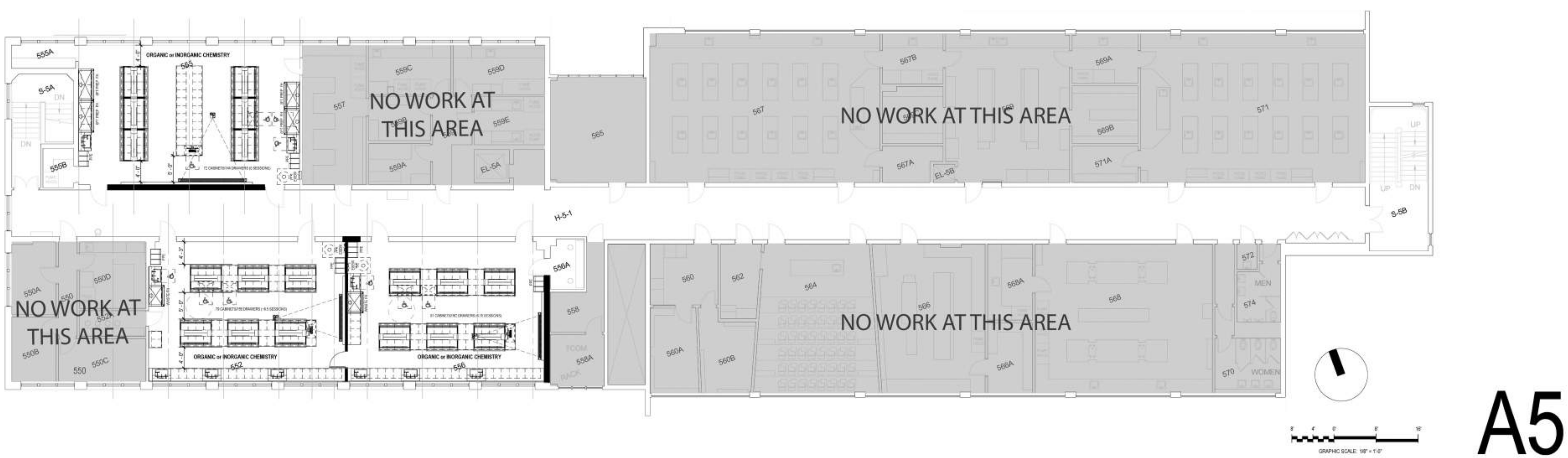
A2

PLAN FOR REFERENCE. EXISTING TO REMAIN



A3

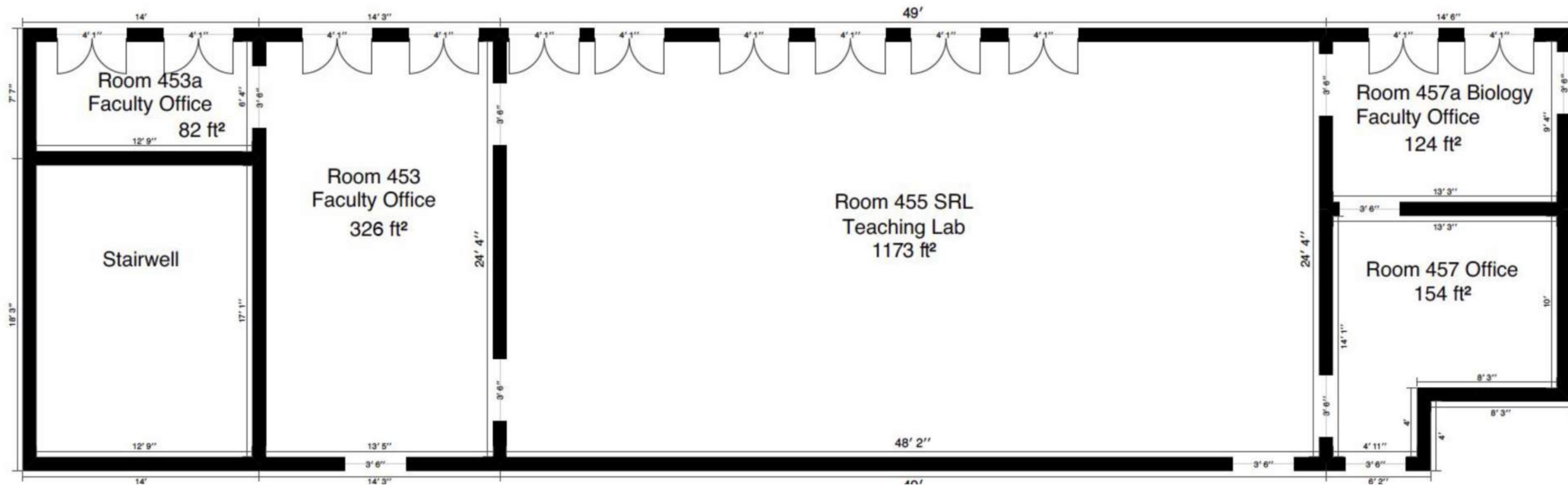

NO WORK AT THIS AREA
NO WORK AT THIS AREA
NO WORK AT THIS AREA
A4


NO WORK AT THIS AREA
NO WORK AT THIS AREA
NO WORK AT THIS AREA
NO WORK AT THIS AREA
A5

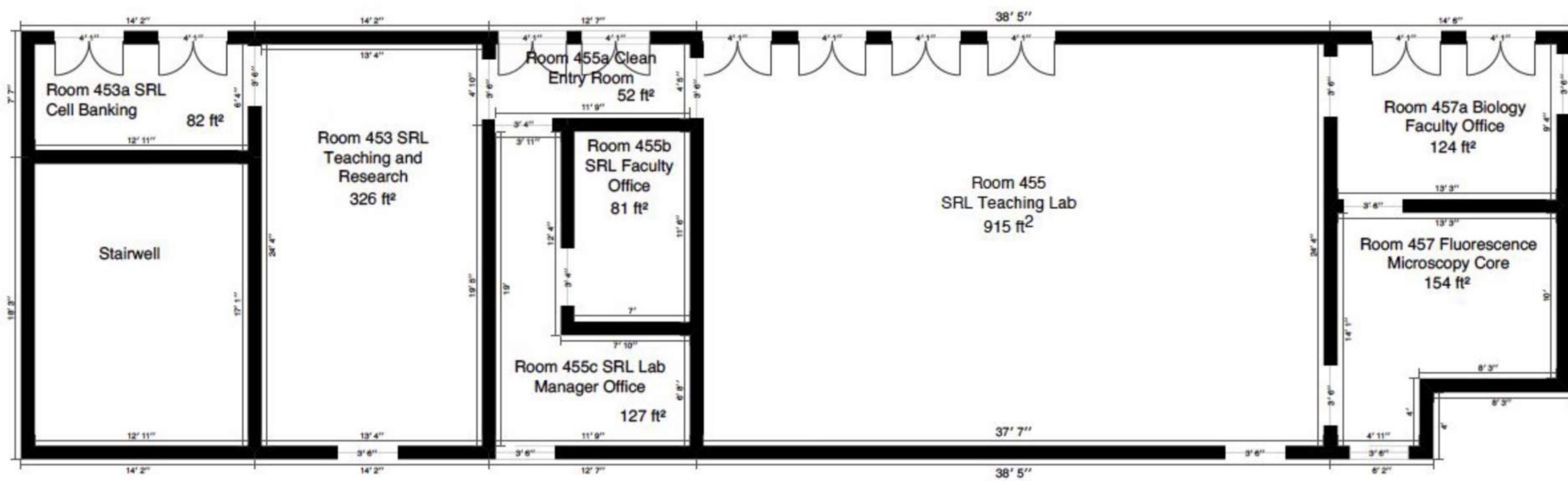
7.4 CIRM - FACILITIES PROPOSAL

The following CiRM Facilities Proposal pages were submitted by the Cal Poly Humboldt for the grant proposal at the CIRM spaces.

7.4.1 EXISTING SPACE - PLAN VIEW



7.4.2 PROPOSED FACILITY - PLAN VIEW



7.4 CIRM - FACILITIES PROPOSAL

7.4.3 PROPOSED FACILITY - 3D VIEW

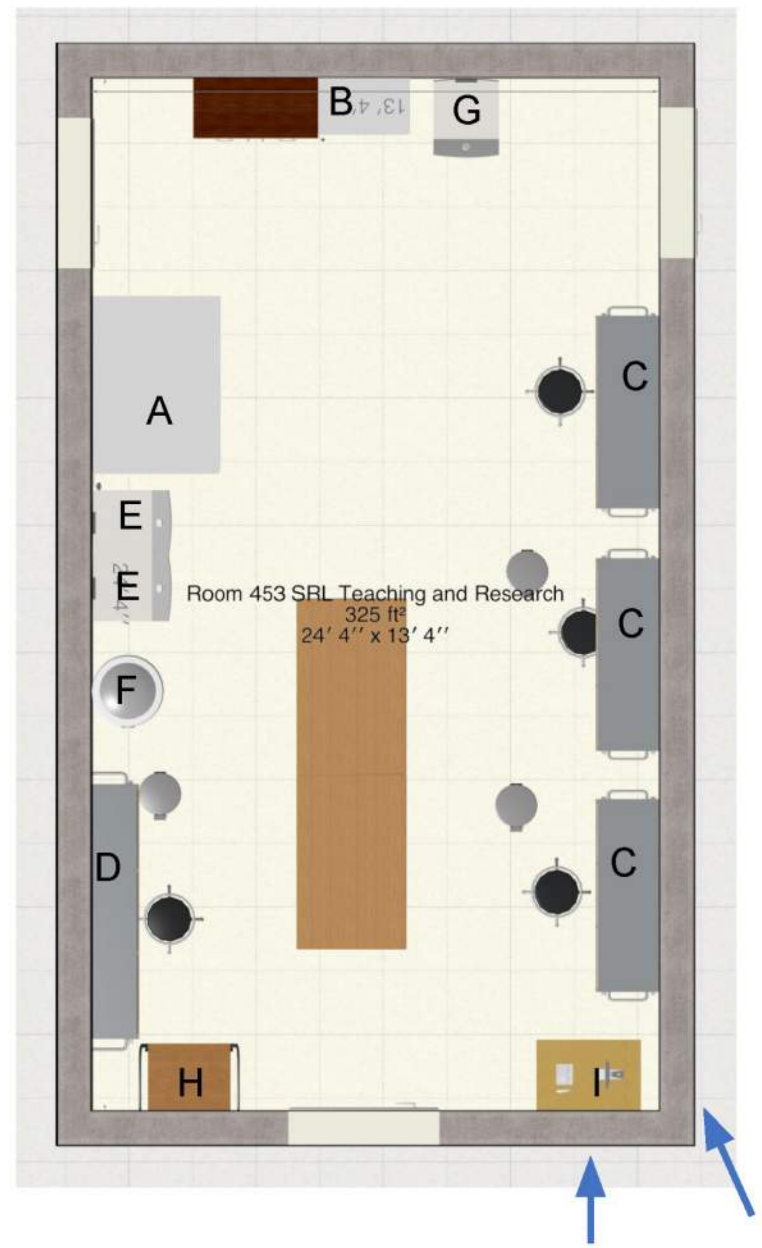
7.4.4 PROPOSED FACILITY - ROOM 453 SRL TEACHING & RESEARCH

Room 453 SRL Teaching and Research

Biol 453 - Biohazard II classification
Backup power will be required
Positive pressure Out
Removal of one door

Equipment list
- Inverted Fluorescent Microscope
- 3 Phase contrast microscopes
- CellLink, BIO X Gen 3 Platform 3D cell printer
- Cell Culture Centrifuge Sorvall ST8
- **(A)** Ultralow freezer
- **(B)** Small undercounter or countertop refrigerator
- **(C)** 3X 4 ft biosafety cabinets*
- **(D)** 1X 6 ft biosafety cabinet*
- **(E)** 2X CO_2 incubators
- **(F)** CO_2 Tank
- **(G)** Beckman™ TL-100 ultracentrifuge
- **(H)** Cart for WolfG2 FACS and cell dispenser
- 1 Malvern™ Zetasizer Advance – Dynamic Light Scattering
- **(I)** Zeiss Axio Z.1 for live fluorescent imaging and computer workstation
- Water bath

* each Biosafety cabinet will contain:
- pipette aid
- vacuum line/erlenmeyer flask for liquid waste
- set of micropipettes
- storage for sterile serological pipettes
- biohazard waste containers



Existing doors removed/blocked

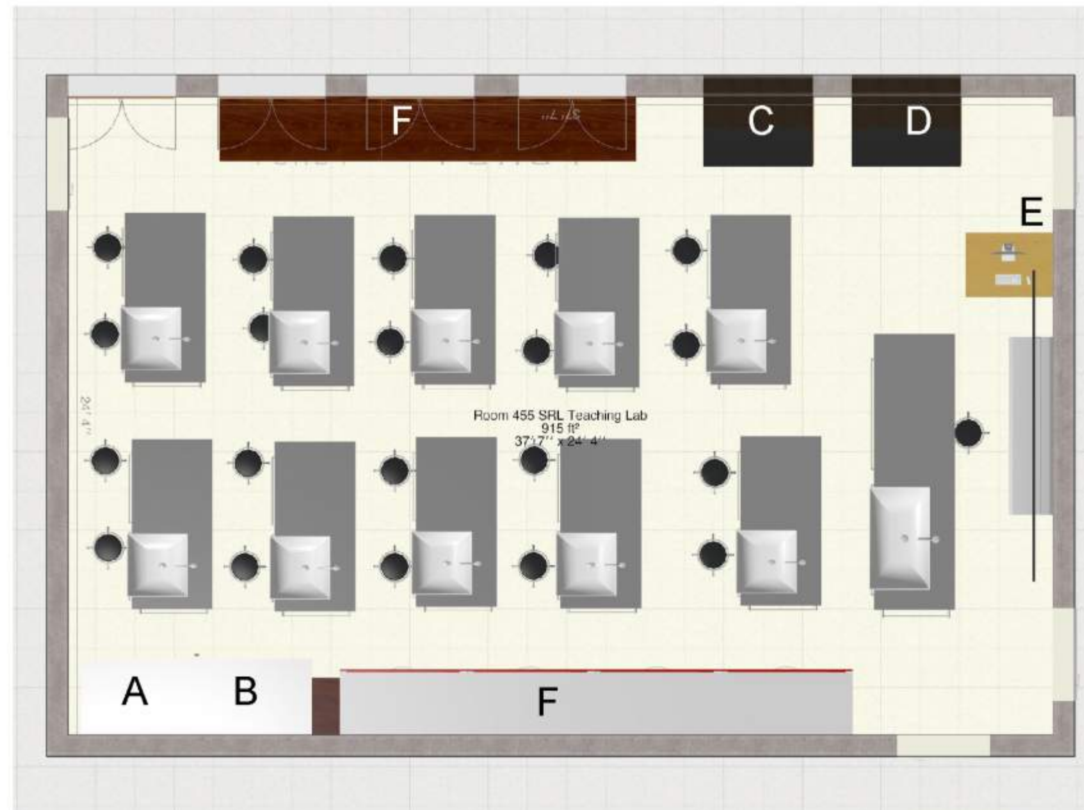
7.4.5 PROPOSED FACILITY - ROOM 455 SRL TEACHING LAB

Room 455 SRL Teaching Lab

Backup power will be required
Add Wall
Removal of 2 lab benches
(E) Smart Classroom capabilities

Equipment list

- 5X Inverted Fluorescent Microscopes
- Bench top refrigerated Centrifuge Sorvall Legend Micro 21R
- **(A)** Two Thermo Scientific™ TSX Series High-Performance Lab Refrigerators
- **(B)** A Thermo Scientific™ TSX Series High-Performance -30°C Auto Defrost Freezer
- **(C & D)** 2X Chemical Cabinets
- **(E)** 1X Computer Workstation
- **(F)** Equipment cabinets and Fluorescent Microscope



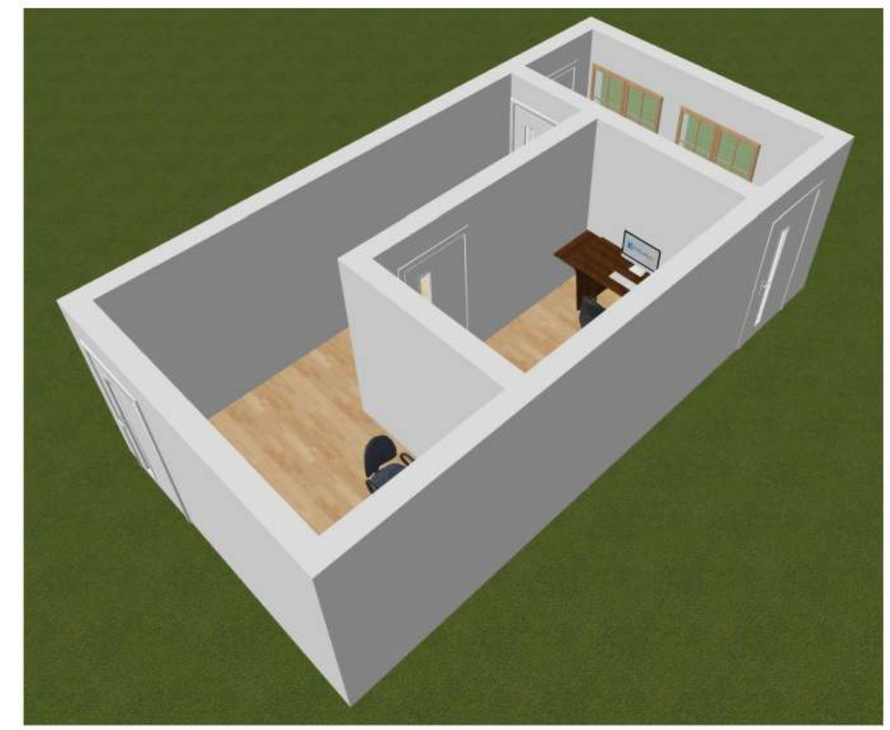
7.4.6 PROPOSED FACILITY - ROOM 455 A, B & C

Room 455a, b and c

455a - Clean Entry room
- Lab coat storage

455b - SRL Faculty Office
1X Computer Workstation

455c - SRL Lab Manager
1X Computer Workstation

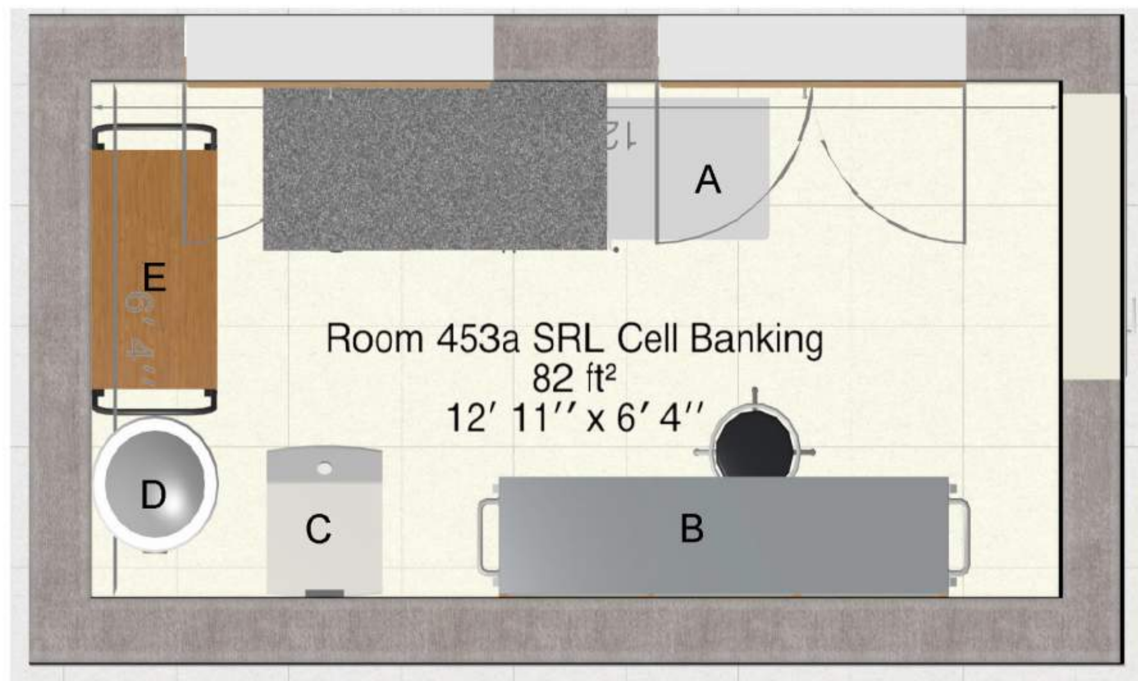


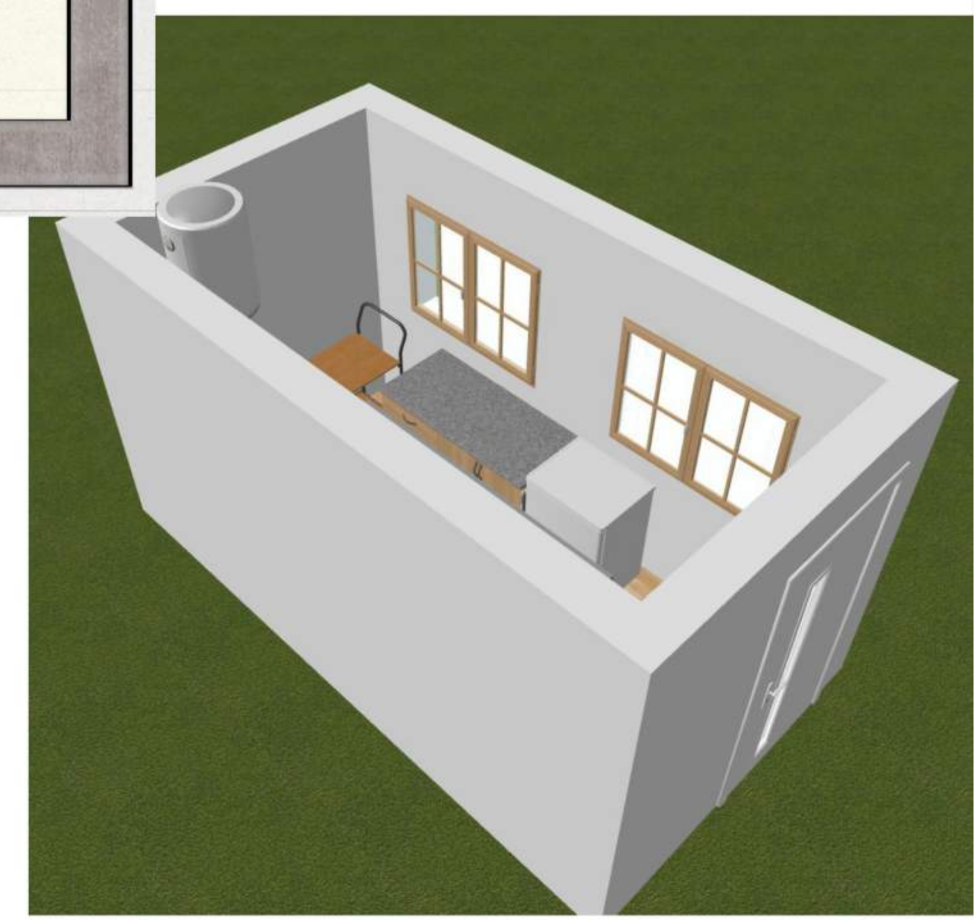
7.4.7 PROPOSED FACILITY - ROOM 453A SRL CELL BANKING

Room 453a SRL Cell Banking

Biol 453a - Biohazard II classification
Backup power will be required
Positive pressure Out

Equipment list
- 1X Phase contrast microscopes
- Bench top centrifuge
- **(A)** Small undercounter or countertop refrigerator
- **(B)** 1X 6 foot biosafety cabinet
- **(C)** 1X CO_2 incubators
- **(D)** CO_2 Tank
- **(E)** Cart Storage
- Water bath





7.4.8 PROPOSED FACILITY - ROOM 457 FLUORESCENCE MICROSCOPY CORE

Room 457 Fluorescence Microscopy Core

Equipment list

- 1X Zeiss LSM 900 Confocal with Airyscan
- Zeiss AxioObserver 7
- 2 Computer Workstations

7.5 SPACE UTILIZATION

The following Space Utilization pages profile the Classroom and Laboratory Utilization Analysis and subsequent analytical categories:

- Section 7.5.1: Classroom Use by day and Hour - By Building
- Section 7.5.2: Classroom Utilization Analysis - By Building
- Section 7.5.3: Classroom Utilization Analysis - By Room with Graph
- Section 7.5.4: Laboratory Use by day and Hour - By Building
- Section 7.5.5: Laboratory Utilization Analysis - By Building
- Section 7.5.6: Laboratory Utilization Analysis - By Room with Graph

7.5.1 CLASSROOM USE BY DAY AND HOUR - BY BUILDING

CAL POLY HUMBOLDT • MAIN CAMPUS

Science A

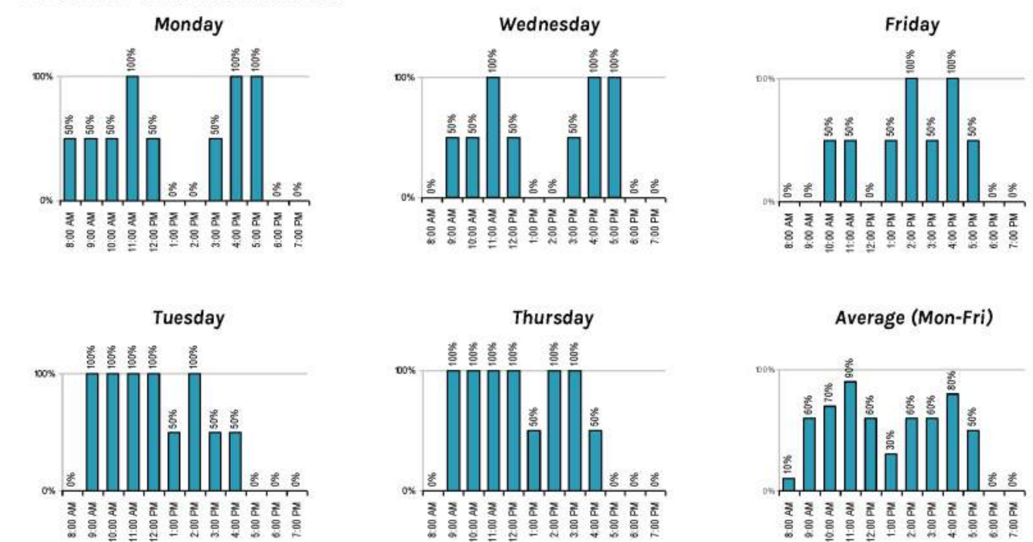
Scheduled Classroom Use by Day and Time *(Fall 2022)*

Time of Day	Monday		Tuesday		Wednesday		Thursday		Friday		Average	
	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use
8:00 AM	1	50%	0	0%	0	0%	0	0%	0	0%	0	10%
9:00 AM	1	50%	2	100%	1	50%	2	100%	0	0%	1	60%
10:00 AM	1	50%	2	100%	1	50%	2	100%	1	50%	1	70%
11:00 AM	2	100%	2	100%	2	100%	2	100%	1	50%	2	90%
12:00 PM	1	50%	2	100%	1	50%	2	100%	0	0%	1	60%
1:00 PM	0	0%	1	50%	0	0%	1	50%	1	50%	1	30%
2:00 PM	0	0%	2	100%	0	0%	2	100%	2	100%	1	60%
3:00 PM	1	50%	1	50%	1	50%	2	100%	1	50%	1	60%
4:00 PM	2	100%	1	50%	2	100%	1	50%	2	100%	2	80%
5:00 PM	2	100%	0	0%	2	100%	0	0%	1	50%	1	50%
6:00 PM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7:00 PM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Total classrooms = 2

(Darker colors indicate a large percentage of rooms are scheduled.)

Percent of Classrooms In Use



Total classrooms = 2

7.5.1 CLASSROOM USE BY DAY AND HOUR - BY BUILDING, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

Science B

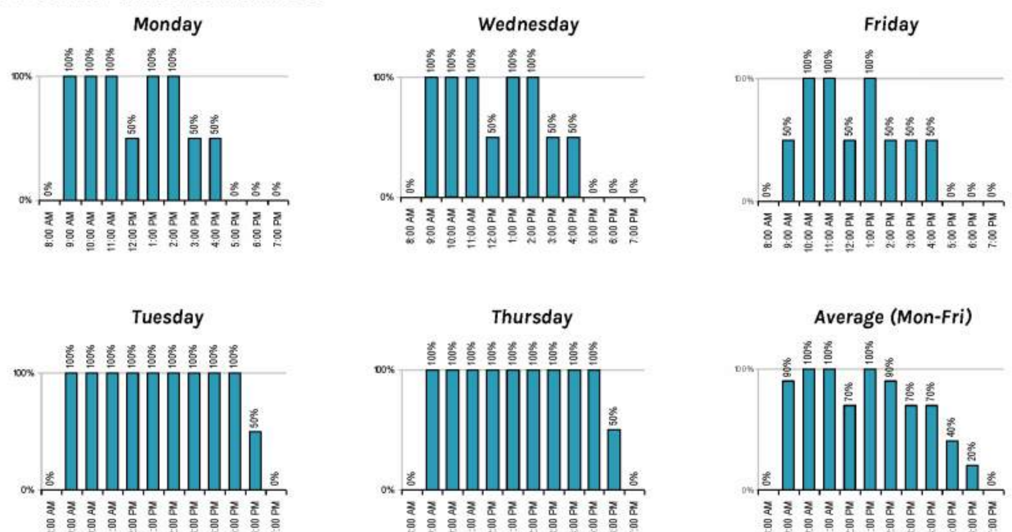
Scheduled Classroom Use by Day and Time *(Fall 2022)*

Time of Day	Monday		Tuesday		Wednesday		Thursday		Friday		Average	
	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use
8:00 AM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
9:00 AM	2	100%	2	100%	2	100%	2	100%	1	50%	2	90%
10:00 AM	2	100%	2	100%	2	100%	2	100%	2	100%	2	100%
11:00 AM	2	100%	2	100%	2	100%	2	100%	2	100%	2	100%
12:00 PM	1	50%	2	100%	1	50%	2	100%	1	50%	1	70%
1:00 PM	2	100%	2	100%	2	100%	2	100%	2	100%	2	100%
2:00 PM	2	100%	2	100%	2	100%	2	100%	1	50%	2	90%
3:00 PM	1	50%	2	100%	1	50%	2	100%	1	50%	1	70%
4:00 PM	1	50%	2	100%	1	50%	2	100%	1	50%	1	70%
5:00 PM	0	0%	2	100%	0	0%	2	100%	0	0%	1	40%
6:00 PM	0	0%	1	50%	0	0%	1	50%	0	0%	0	20%
7:00 PM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Total classrooms = 2

(Darker colors indicate a large percentage of rooms are scheduled.)

Percent of Classrooms In Use



Total classrooms = 2

7.5.2 CLASSROOM UTILIZATION ANALYSIS - BY BUILDING

CAL POLY HUMBOLDT • MAIN CAMPUS

Classroom Utilization Analysis by Building (All) **Fall 2022**

Room ID	Space Use Code	Assignable Sq. Ft.	No. of Stations	Assignable Sq. Ft. Per Station	Average Enroll-ment	Weekly Student Contact Hours	Weekly Seat Hours	Weekly Room Hours	WSCH Max (@36.0)	Utilization Ratio %	Seat Fill Rate
Music A											*No. of Rooms = 1*
MUSA 130	110	903	64	14.1	30	737	11.5	24.0	2,304	0.32	48%
	Average	*903*	*64*	*14.1*	*30*		*11.5*	*24.0*		*0.32*	*48%*
	Total	*903*	*64*			*737*		*24.0*			
Music B											*No. of Rooms = 1*
MUSB 203A	110	718	40	18.0	9	182	4.6	20.0	1,440	0.13	23%
	Average	*718*	*40*	*18.0*	*9*		*4.6*	*20.0*		*0.13*	*23%*
	Total	*718*	*40*			*182*		*20.0*			
Natural Resources											*No. of Rooms = 3*
NR 101	110	923	96	9.6	60	2,037	21.2	33.0	3,456	0.59	64%
NR 201	110	615	30	20.5	18	350	11.7	20.0	1,080	0.32	58%
NR 224	110	871	45	19.4	26	734	16.3	27.0	1,620	0.45	60%
	Average	*803*	*57*	*14.1*	*35*		*18.3*	*26.7*		*0.51*	*61%*
	Total	*2,409*	*171*			*3,121*		*80.0*			
Science A											*No. of Rooms = 2*
SCIA 460	110	566	28	20.2	20	445	15.9	22.7	1,008	0.44	70%
SCIA 564	110	622	48	13.0	29	876	18.3	30.0	1,728	0.51	61%
	Average	*594*	*38*	*15.6*	*25*		*17.4*	*26.3*		*0.48*	*65%*
	Total	*1,188*	*76*			*1,321*		*52.7*			
Science B											*No. of Rooms = 2*
SCIB 133	110	992	85	11.7	57	1,775	20.9	31.0	3,060	0.58	67%
SCIB 135	110	1,618	120	13.5	60	2,009	16.7	34.0	4,320	0.47	49%
	Average	*1,305*	*103*	*12.7*	*59*		*18.5*	*32.5*		*0.51*	*58%*
	Total	*2,610*	*205*			*3,784*		*65.0*			
Siemens Hall											*No. of Rooms = 9*
SH 108	110	1,109	92	12.1	47	805	8.8	16.8	3,312	0.24	52%
SH 109	110	835	48	17.4	28	676	14.1	25.0	1,728	0.39	56%
SH 110	110	924	48	19.3	28	603	12.6	20.3	1,728	0.35	62%
SH 115	110	718	35	20.5	21	676	19.3	32.3	1,260	0.54	60%
SH 116	110	557	27	20.6	21	615	22.8	30.0	972	0.63	76%
SH 117	110	935	48	19.5	22	770	16.0	35.4	1,728	0.45	45%
SH 120	110	433	26	16.7	22	442	17.0	20.0	936	0.47	85%
SH 128	110	580	31	18.7	12	203	6.5	17.0	1,116	0.18	39%
SH 2	110	400	26	15.4	17	132	5.1	8.0	936	0.14	63%
	Average	*721*	*42*	*17.0*	*24*		*12.9*	*22.8*		*0.36*	*60%*
	Total	*6,491*	*381*			*4,922*		*204.9*			

7.5.3 CLASSROOM UTILIZATION ANALYSIS - BY ROOM WITH GRAPH

CAL POLY HUMBOLDT • MAIN CAMPUS

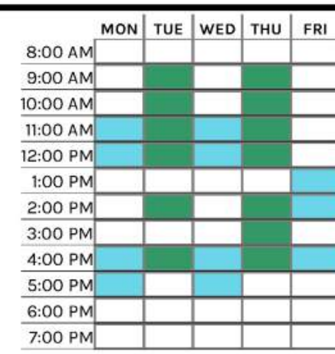
Scheduled Utilization Fall 2022

Science A • SCIA 460

Space Use Code: Classroom

Department: **All School**

Weekly Room Hours:	**23**	Weekly Student Contact Hours:	**445**
Seat Fill Rate:	**70%**	Average Enrollment:	**20**
Assignable Sq.Ft. / Station:	**20**	Capacity:	**28**
		Assignable Square Feet:	**566**



Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
9:00 AM	10:50 AM	TR	SW 350 1	Human Behavior & Soc Env I	LEC	4	17	4	17	68	61%
11:00 AM	11:50 AM	MW	CHEM 361 10	Physical Chemistry I	LEC	2	14	2	14	28	50%
11:00 AM	11:50 AM	TR	BIOL 180A 1	Selected Topics in Biology Act	LAB	2	21	2	21	42	75%
12:00 PM	12:50 PM	MW	ENGR 371 10	Energy Systems and Technolo	LEC	2	10	2	10	20	36%
12:00 PM	12:20 PM	TR	BIOL 180 1	Selected Topics in Biology	LEC	0.7	21	0.7	21	14	75%
1:00 PM	1:50 PM	F	BIOL 180 3	Among Giants BOG	LEC	1	23	1	23	23	82%
2:00 PM	2:50 PM	F	SCI 100 22	Among Giants	LEC	1	23	1	23	23	82%
2:00 PM	2:50 PM	R	MATH 102 21	Algebra & Elementary Functio	LEC	1	21	1	21	21	75%
2:00 PM	2:50 PM	T	CHEM 109 25	General Chemistry I	LEC	1	24	1	24	24	86%
3:00 PM	3:50 PM	R	MATH 102 22	Algebra & Elementary Functio	LEC	1	26	1	26	26	93%
4:00 PM	4:50 PM	MWF	MATH 101I 8	College Algebra IS	LEC	3	24	3	24	72	86%
4:00 PM	4:50 PM	TR	MATH 1 80	Support for MATH 101I	LAB	2	24	2	24	48	86%
5:00 PM	5:50 PM	MW	BOT 198 22	BOT 105 Supplemental Instruc	LAB	2	18	2	18	36	64%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

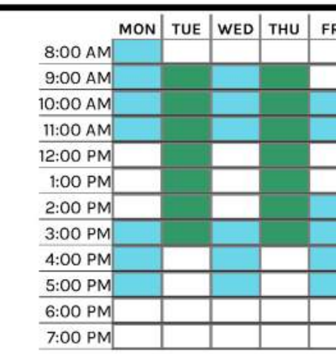
Scheduled Utilization Fall 2022

Science A • SCIA 564

Space Use Code: Classroom

Department: **All School**

Weekly Room Hours:	**30**	Weekly Student Contact Hours:	**876**
Seat Fill Rate:	**61%**	Average Enrollment:	**29**
Assignable Sq.Ft. / Station:	**13**	Capacity:	**48**
		Assignable Square Feet:	**622**



Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	8:50 AM	M	FOR 223 10	Introduction to Wildland Fire	LEC	1	41	1	41	41	85%
9:00 AM	9:50 AM	MW	PHYX 211 10	General Physics C	LEC	2	28	2	28	56	58%
9:00 AM	10:20 AM	TR	PHYX 304 10	Cosmos	LEC	3	11	3	11	33	23%
10:00 AM	10:50 AM	MWF	CHEM 438 10	Introductory Biochemistry	LEC	3	24	3	24	72	50%
11:00 AM	11:50 AM	MWF	CHEM 324 1	Organic Chemistry I	LEC	3	35	3	35	105	73%
11:00 AM	12:20 PM	TR	PSYC 322 1	Learning & Motivation	LEC	3	46	3	46	138	96%
1:00 PM	2:20 PM	TR	PHIL 100 1	Logic	LEC	3	45	3	45	135	94%
2:00 PM	2:50 PM	F	CHEM 485 1	Seminar in Chemistry	LEC	1	5	1	5	5	10%
3:00 PM	3:50 PM	MWF	PSYC 300 2	Psychology of Gender	LEC	3	46	3	46	138	96%
3:00 PM	3:50 PM	TR	ZOOL 370 10	Comp Anatomy of Vertebrates	LEC	2	33	2	33	66	69%
4:00 PM	4:50 PM	MWF	PHIL 371 1	Contmpry Soc & Political Phil	LEC	3	12	3	12	36	25%
5:00 PM	5:50 PM	MWF	PHIL 210 1	Ancient Philosophy	LEC	3	17	3	17	51	35%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.3 CLASSROOM UTILIZATION ANALYSIS - BY ROOM WITH GRAPH, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

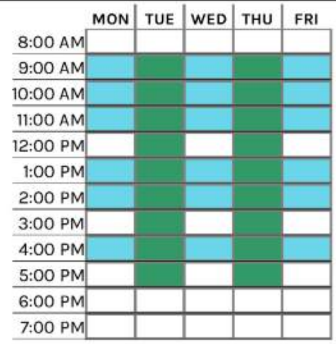
Scheduled Utilization Fall 2022

Science B • SCIB 133

Space Use Code: *Classroom*

Department: **All School**

Weekly Room Hours:	**31**	Weekly Student Contact Hours:	**1,775**
Seat Fill Rate:	**67%**	Average Enrollment:	**57**
Assignable Sq.Ft. / Station:	**12**	Capacity:	**85**
		Assignable Square Feet:	**992**



Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
9:00 AM	9:50 AM	MWF	CHEM 109 10	General Chemistry I	LEC	3	64	3	64	192	75%
9:00 AM	10:20 AM	TR	FOR 210 10	Forest Measurements & Biom	LEC	3	79	3	79	237	93%
10:00 AM	10:50 AM	MWF	BIOL 340 20	Genetics	LEC	3	72	3	72	216	85%
11:00 AM	11:50 AM	MWF	CHEM 110 10	General Chemistry II	LEC	3	44	3	44	132	52%
11:00 AM	12:20 PM	TR	CHEM 109 20	General Chemistry I	LEC	3	70	3	70	210	82%
1:00 PM	1:50 PM	MWF	CHEM 109 30	General Chemistry I	LEC	3	65	3	65	195	76%
1:00 PM	2:20 PM	TR	PSYC 336 1	Social Influence & Persuasion	LEC	3	31	3	31	93	36%
2:00 PM	2:50 PM	MWF	PHYX 107 10	Col Phyx: Electromag, Mod Phy	LEC	3	35	3	35	105	41%
3:00 PM	4:20 PM	TR	CS 309 1	Computers and Social Change	LEC	3	56	3	56	168	66%
4:00 PM	4:50 PM	MWF	CHEM 110 20	General Chemistry II	LEC	3	57	3	57	171	67%
5:00 PM	5:50 PM	TR	PHYX 118 1	College Phyx:Biologic Applictn	LEC	1	56	1	56	56	66%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.3 CLASSROOM UTILIZATION ANALYSIS - BY ROOM WITH GRAPH, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

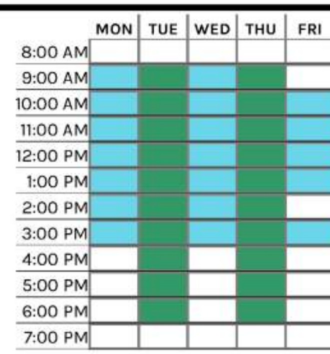
Scheduled Utilization Fall 2022

Science B • SCIB 135

Space Use Code: *Classroom*

Department: **All School**

Weekly Room Hours:	**34**	Weekly Student Contact Hours:	**2,009**
Seat Fill Rate:	**49%**	Average Enrollment:	**60**
Assignable Sq.Ft. / Station:	**13**	Capacity:	**120**
		Assignable Square Feet:	**1,618**



Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
9:00 AM	9:50 AM	MW	BOT 350 10	Plant Taxonomy	LEC	2	100	2	100	200	83%
9:00 AM	10:20 AM	TR	BIOL 434 10	Population & Community Ecol	LEC	3	14	3	27	81	23%
9:00 AM	10:20 AM	TR	BIOL 534 10	Population & Community Ecol	LEC	3	13				
10:00 AM	10:50 AM	MWF	BOT 105 30	General Botany	LEC	3	127	3	127	381	106%
11:00 AM	11:50 AM	MWF	PHYX 104 10	Descriptive Astronomy	LEC	3	35	3	35	105	29%
11:00 AM	12:20 PM	TR	PSYC 489S 1	Community Psychology	LEC	3	26	3	26	78	22%
12:00 PM	12:50 PM	MWF	CHEM 228 10	Brief Organic Chemistry	LEC	3	38	3	38	114	32%
1:00 PM	1:50 PM	MWF	CHEM 107 10	Fundamentals of Chemistry	LEC	3	69	3	69	207	58%
1:00 PM	2:20 PM	TR	SW 101 1	Intro to SW & SW Institutions	LEC	3	76	3	76	228	63%
2:00 PM	2:50 PM	MW	WLDF 430 10	Ecol/Mgmt Wetland Habitats	LEC	2	51	2	51	102	43%
3:00 PM	3:50 PM	MWF	PHYX 106 10	Col Phyx: Mechanics & Heat	LEC	3	103	3	103	309	86%
3:00 PM	4:20 PM	TR	NAS 104 4	Intro to Nat American Studies	LEC	3	41	3	41	123	34%
5:00 PM	6:20 PM	TR	CHEM 370 1	Earth System Chemistry	LEC	3	27	3	27	81	23%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.4 LABORATORY USE BY DAY AND HOUR - BY BUILDING

CAL POLY HUMBOLDT • MAIN CAMPUS

Science A

Scheduled Laboratory Use by Day and Time *(Fall 2022)*

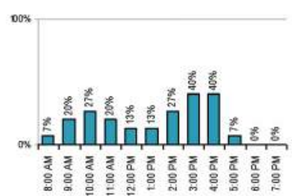
(Darker colors indicate a large percentage of rooms are scheduled.)

Time of Day	Monday		Tuesday		Wednesday		Thursday		Friday		Average	
	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use
8:00 AM	1	7%	5	33%	0	0%	6	40%	2	13%	3	19%
9:00 AM	3	20%	6	40%	2	13%	7	47%	3	20%	4	28%
10:00 AM	4	27%	6	40%	2	13%	8	53%	4	27%	5	32%
11:00 AM	3	20%	10	67%	3	20%	10	67%	3	20%	6	39%
12:00 PM	2	13%	11	73%	3	20%	11	73%	3	20%	6	40%
1:00 PM	2	13%	11	73%	3	20%	11	73%	2	13%	6	39%
2:00 PM	4	27%	8	53%	7	47%	8	53%	2	13%	6	39%
3:00 PM	6	40%	8	53%	8	53%	8	53%	3	20%	7	44%
4:00 PM	6	40%	8	53%	6	40%	8	53%	2	13%	6	40%
5:00 PM	1	7%	0	0%	1	7%	1	7%	0	0%	1	4%
6:00 PM	0	0%	0	0%	1	7%	1	7%	0	0%	0	3%
7:00 PM	0	0%	0	0%	1	7%	1	7%	0	0%	0	3%

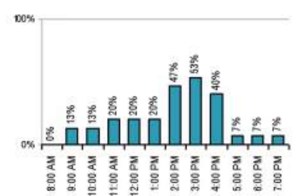
Total laboratories = 15

Percent of Laboratories In Use

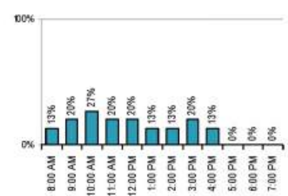
Monday



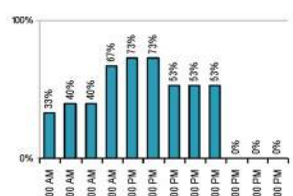
Wednesday



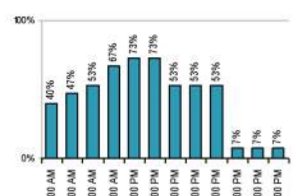
Friday



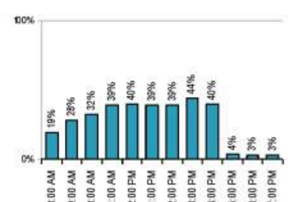
Tuesday



Thursday



Average (Mon-Fri)



7.5.4 LABORATORY USE BY DAY AND HOUR - BY BUILDING, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

Science B

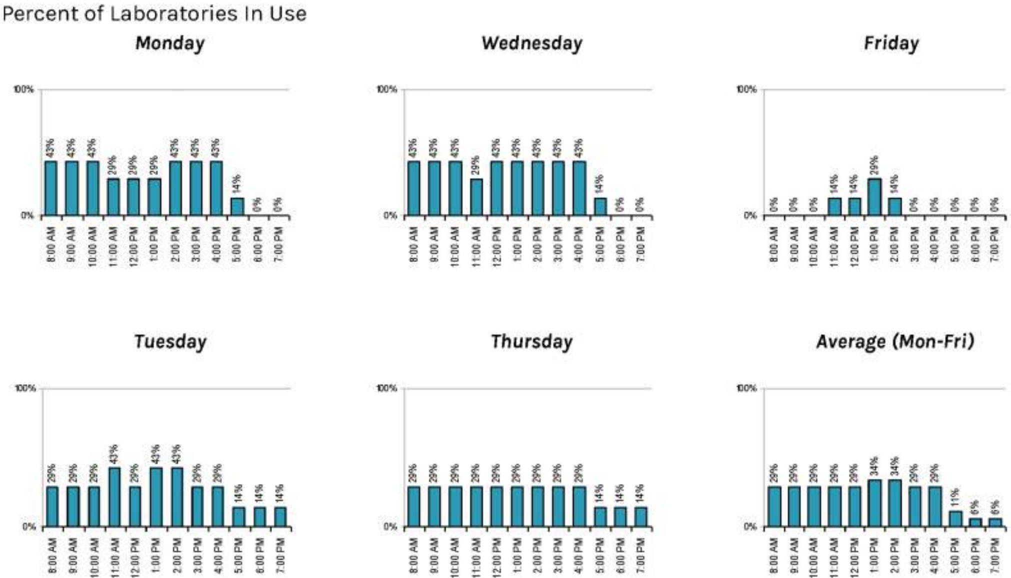
Scheduled Laboratory Use by Day and Time *(Fall 2022)*

(Darker colors indicate a large percentage of rooms are scheduled.)

Time of Day	Monday		Tuesday		Wednesday		Thursday		Friday		Average	
	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use
8:00 AM	3	43%	2	29%	3	43%	2	29%	0	0%	2	29%
9:00 AM	3	43%	2	29%	3	43%	2	29%	0	0%	2	29%
10:00 AM	3	43%	2	29%	3	43%	2	29%	0	0%	2	29%
11:00 AM	2	29%	3	43%	2	29%	2	29%	1	14%	2	29%
12:00 PM	2	29%	2	29%	3	43%	2	29%	1	14%	2	29%
1:00 PM	2	29%	3	43%	3	43%	2	29%	2	29%	2	34%
2:00 PM	3	43%	3	43%	3	43%	2	29%	1	14%	2	34%
3:00 PM	3	43%	2	29%	3	43%	2	29%	0	0%	2	29%
4:00 PM	3	43%	2	29%	3	43%	2	29%	0	0%	2	29%
5:00 PM	1	14%	1	14%	1	14%	1	14%	0	0%	1	11%
6:00 PM	0	0%	1	14%	0	0%	1	14%	0	0%	0	6%
7:00 PM	0	0%	1	14%	0	0%	1	14%	0	0%	0	6%

Total laboratories = 7

Percent of Laboratories In Use



CAL POLY HUMBOLDT • MAIN CAMPUS

Science C

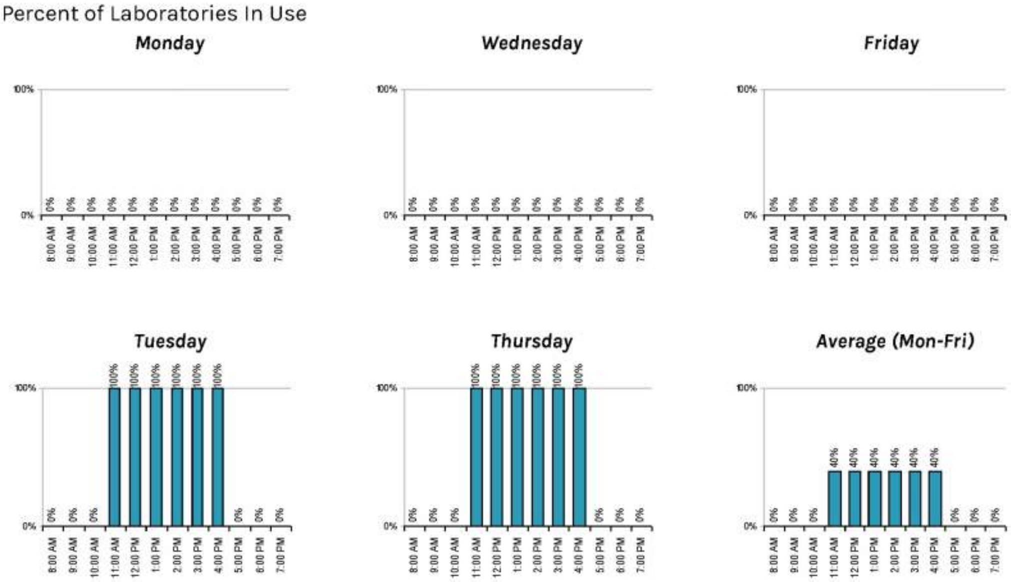
Scheduled Laboratory Use by Day and Time *(Fall 2022)*

(Darker colors indicate a large percentage of rooms are scheduled.)

Time of Day	Monday		Tuesday		Wednesday		Thursday		Friday		Average	
	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use	Rooms in Use	% In Use
8:00 AM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
9:00 AM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
10:00 AM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
11:00 AM	0	0%	1	100%	0	0%	1	100%	0	0%	0	40%
12:00 PM	0	0%	1	100%	0	0%	1	100%	0	0%	0	40%
1:00 PM	0	0%	1	100%	0	0%	1	100%	0	0%	0	40%
2:00 PM	0	0%	1	100%	0	0%	1	100%	0	0%	0	40%
3:00 PM	0	0%	1	100%	0	0%	1	100%	0	0%	0	40%
4:00 PM	0	0%	1	100%	0	0%	1	100%	0	0%	0	40%
5:00 PM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
6:00 PM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7:00 PM	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Total laboratories = 1

Percent of Laboratories In Use



7.5.5 LABORATORY UTILIZATION ANALYSIS - BY BUILDING

CAL POLY HUMBOLDT • MAIN CAMPUS

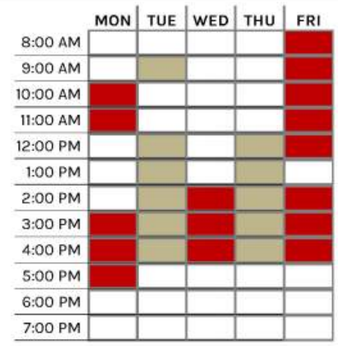
Teaching Laboratory Utilization Analysis by Building (All) **Fall 2022**

Room ID	Space Use Code	Assignable Sq. Ft.	No. of Stations	Assignable Sq. Ft. Per Station	Average Enroll-ment	Weekly Student Contact Hours	Weekly Seat Hours	Weekly Room Hours	WSCH Max (@24.0)	Utilization Ratio %	Seat Fill Rate
Science A											No. of Rooms = 15
SCIA 364	210	669	24	27.9	16	410	17.1	27.0	576	0.71	63%
SCIA 369	211	991	24	41.3	12	136	5.7	11.3	576	0.24	50%
SCIA 370	211	897	16	56.1	14	42	2.6	3.0	384	0.11	88%
SCIA 374	210	938	24	39.1	13	215	9.0	17.0	576	0.37	53%
SCIA 452	211	1,107	24	46.1	14	312	13.0	22.7	576	0.54	57%
SCIA 455	210	1,173	24	48.9	0	0	0.0	0.0	576	0	0%
SCIA 456	210	1,118	24	46.6	24	282	11.8	12.0	576	0.49	98%
SCIA 467	210	1,009	28	36.0	19	527	18.8	27.0	672	0.78	70%
SCIA 475	210	1,009	36	28.0	13	297	8.3	22.0	864	0.34	38%
SCIA 552	210	930	24	38.8	17	193	8.0	11.3	576	0.33	71%
SCIA 555	211	1,120	20	56.0	18	414	20.7	23.3	480	0.86	89%
SCIA 556	210	959	24	40.0	22	380	15.8	17.0	576	0.66	93%
SCIA 567	210	1,234	24	51.4	22	396	16.5	18.0	576	0.69	92%
SCIA 568	211	952	16	59.5	8	91	5.7	11.3	384	0.24	50%
SCIA 571	210	1,206	24	50.3	23	408	17.0	18.0	576	0.71	94%
Average		*1,021*	*24*	*43.0*	*16*		*11.5*	*16.1*		*0.48*	*70%*
Total		*15,312*	*356*			*4,103*		*241.1*			
Science B											No. of Rooms = 7
SCIB 122	211	951	18	52.8	10	57	3.2	5.7	432	0.13	56%
SCIB 126	211	1,285	25	51.4	21	224	9.0	13.7	600	0.37	66%
SCIB 128	211	1,294	25	51.8	20	151	6.0	7.7	600	0.25	79%
SCIB 132	210	1,273	25	50.9	18	429	17.2	24.0	600	0.72	72%
SCIB 228	211	1,280	20	64.0	12	36	1.8	3.0	480	0.08	60%
SCIB 328	211	1,280	30	42.7	14	254	8.5	22.0	720	0.35	38%
SCIB 334	211	1,274	24	53.1	13	227	9.5	17.0	576	0.39	56%
Average		*1,234*	*24*	*51.7*	*15*		*8.2*	*13.3*		*0.34*	*59%*
Total		*8,637*	*167*			*1,377*		*93.0*			
Science C											No. of Rooms = 1
SCIC 207	211	968	23	42.1	18	213	9.3	12.0	552	0.39	77%
Average		*968*	*23*	*42.1*	*18*		*9.3*	*12.0*		*0.39*	*77%*
Total		*968*	*23*			*213*		*12.0*			
Sculpture Lab											No. of Rooms = 1
SCLPT 102	211	1,956	24	81.5	20	454	18.9	22.7	576	0.79	83%
Average		*1,956*	*24*	*81.5*	*20*		*18.9*	*22.7*		*0.79*	*83%*
Total		*1,956*	*24*			*454*		*22.7*			
Telonicher Marine Lab											No. of Rooms = 2
TML 112	211	1,228	24	51.2	18	169	7.1	8.7	576	0.29	81%
TML 121	211	1,446	24	60.3	17	381	15.9	23.3	576	0.66	68%
Average		*1,337*	*24*	*55.7*	*18*		*11.5*	*16.0*		*0.48*	*72%*
Total		*2,674*	*48*			*550*		*32.0*			

7.5.6 LABORATORY UTILIZATION ANALYSIS - BY ROOM WITH GRAPH

CAL POLY HUMBOLDT • MAIN CAMPUS

Scheduled Utilization



Science A • SCIA 364

Space Use Code: *Teaching Lab L/D*

Department: **All School**

Weekly Room Hours:	**27**	Weekly Student Contact Hours:	**410**
Seat Fill Rate:	**63%**	Average Enrollment:	**16**
Assignable Sq.Ft. / Station:	**28**	Capacity:	**24**
		Assignable Square Feet:	**669**

:ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	10:50 AM	F	WLDF 478 11	Ecology Wildlife Populations	LAB	3.00	23	3.00	23	69	96%
9:00 AM	9:50 AM	T	CHEM 109 37	General Chemistry I	LEC	1.00	20	1.00	20	20	83%
10:00 AM	10:50 AM	M	CHEM 109 35	General Chemistry I	LEC	1.00	22	1.00	22	22	92%
11:00 AM	12:50 PM	F	CHEM 361 11	Physical Chemistry I	LAB	2.00	14	2.00	14	28	58%
11:00 AM	11:50 AM	M	CHEM 109 36	General Chemistry I	LEC	1.00	23	1.00	23	23	96%
12:00 PM	1:50 PM	R	BIOL 433D 1	Microbial Ecology Discussion	LAB	2.00	11	2.00	12	24	50%
12:00 PM	1:50 PM	R	BIOL 533D 1	Microbial Ecology Discussion	LAB	2.00	1				
12:00 PM	1:50 PM	T	FISH 314 11	Fishery Science Communicati	LAB	2.00	16	2.00	16	32	67%
2:00 PM	4:50 PM	F	WLDF 478 12	Ecology Wildlife Populations	LAB	3.00	7	3.00	7	21	29%
2:00 PM	4:50 PM	R	WSHD 310 13	Hydrology & Watershed Mgmt	LAB	3.00	21	3.00	21	63	88%
2:00 PM	4:50 PM	T	BIOL 480L 1	Bioinformatics Lab	LAB	3.00	8	3.00	19	57	79%
2:00 PM	4:50 PM	T	BIOL 580L 1	Bioinformatics Lab	LAB	3.00	11				
2:00 PM	4:50 PM	W	OCN 370 11	Library Research/Rpt Writing	LAB	3.00	8	3.00	8	24	33%
3:00 PM	5:50 PM	M	OCN 496 1	Field Cruise II	LAB	3.00	9	3.00	9	27	38%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.6 LABORATORY UTILIZATION ANALYSIS - BY ROOM WITH GRAPH, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

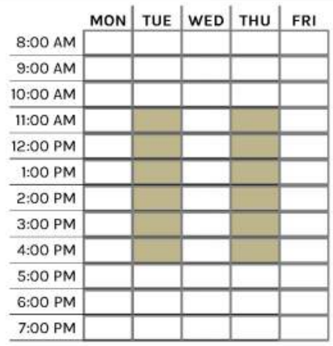
Scheduled Utilization

Science A • SCIA 369

Space Use Code: *Teaching Lab U/D*

Department: **Chemistry**

Weekly Room Hours:	11	Weekly Student Contact Hours:	136
Seat Fill Rate:	50%	Average Enrollment:	12
Assignable Sq.Ft. / Station:	41	Capacity:	24
		Assignable Square Feet:	991



;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
11:00 AM	1:50 PM	TR	CHEM 341 11	Quantitative Analysis	LAB	5.67	13	5.67	13	74	54%
2:00 PM	4:50 PM	TR	CHEM 341 12	Quantitative Analysis	LAB	5.67	11	5.67	11	62	46%

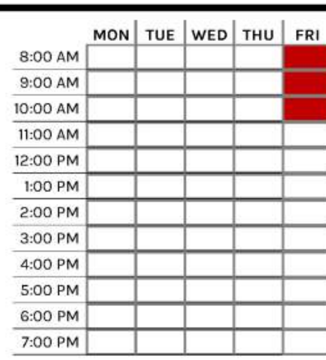
NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

Science A • SCIA 370

Space Use Code: *Teaching Lab U/D*

Department: **Physics and Astronomy**

Weekly Room Hours:	3	Weekly Student Contact Hours:	42
Seat Fill Rate:	88%	Average Enrollment:	14
Assignable Sq.Ft. / Station:	56	Capacity:	16
		Assignable Square Feet:	897



;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	10:50 AM	F	PHYX 315 11	Intro to Electronics	LAB	3.00	14	3.00	14	42	88%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

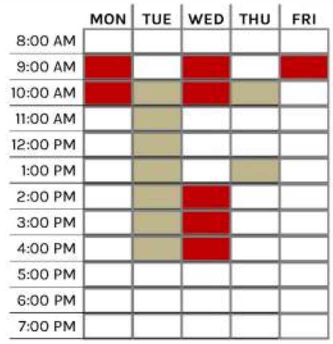
Scheduled Utilization

Science A • SCIA 374

Space Use Code: *Teaching Lab L/D*

Department: **Physics and Astronomy**

Weekly Room Hours:	17	Weekly Student Contact Hours:	215
Seat Fill Rate:	53%	Average Enrollment:	13
Assignable Sq.Ft. / Station:	39	Capacity:	24
		Assignable Square Feet:	938



:ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	Seat Fill Rate
9:00 AM	9:50 AM	MWF	PHYX 441 1	Electricity and Magnetism I	LEC	3.00	8	3.00	8	24	33%
10:00 AM	10:50 AM	MTWR	PHYX 450 1	Quantum Physics I	LEC	4.00	6	4.00	6	24	25%
11:00 AM	12:50 PM	T	PHYX 304 11	Cosmos	LAB	2.00	11	2.00	11	22	46%
1:00 PM	1:50 PM	TR	PHYX 109 10	General Physics A	LEC	2.00	20	2.00	20	40	83%
2:00 PM	4:50 PM	T	PHYX 104 11	Descriptive Astronomy	LAB	3.00	21	3.00	21	63	88%
2:00 PM	4:50 PM	W	PHYX 104 12	Descriptive Astronomy	LAB	3.00	14	3.00	14	42	58%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

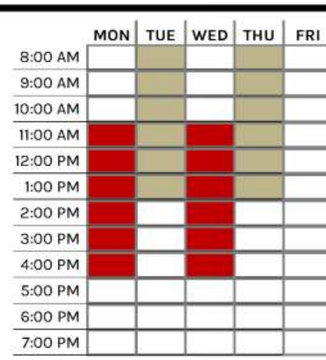
Scheduled Utilization

Science A • SCIA 452

Space Use Code: *Teaching Lab U/D*

Department: **Biological Sciences**

Weekly Room Hours:	23	Weekly Student Contact Hours:	312
Seat Fill Rate:	57%	Average Enrollment:	14
Assignable Sq.Ft. / Station:	46	Capacity:	24
		Assignable Square Feet:	1,107



:ents most popular start times and each block does not represent the same amount of time

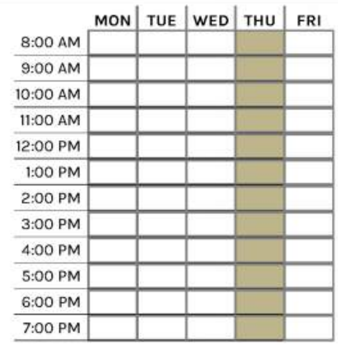
Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	Seat Fill Rate
8:00 AM	10:50 AM	TR	ZOOL 270 11	Human Anatomy	LAB	5.67	10	5.67	10	57	42%
11:00 AM	1:50 PM	MW	ZOOL 370 11	Comp Anatomy of Vertebrates	LAB	5.67	13	5.67	13	74	54%
11:00 AM	1:50 PM	TR	ZOOL 270 12	Human Anatomy	LAB	5.67	12	5.67	12	68	50%
2:00 PM	4:50 PM	MW	ZOOL 370 12	Comp Anatomy of Vertebrates	LAB	5.67	20	5.67	20	113	83%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.6 LABORATORY UTILIZATION ANALYSIS - BY ROOM WITH GRAPH, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

Scheduled Utilization



Science A • SCIA 456

Space Use Code: *Teaching Lab L/D*

Department: **Biological Sciences**

Weekly Room Hours:	**12**	Weekly Student Contact Hours:	**282**
Seat Fill Rate:	**98%**	Average Enrollment:	**24**
Assignable Sq.Ft. / Station:	**47**	Capacity:	**24**
		Assignable Square Feet:	**1,118**

;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	10:50 AM	R	ZOOL 110 11	Introductory Zoology	LAB	3.00	24	3.00	24	72	100%
11:00 AM	1:50 PM	R	ZOOL 110 12	Introductory Zoology	LAB	3.00	24	3.00	24	72	100%
2:00 PM	4:50 PM	R	ZOOL 110 13	Introductory Zoology	LAB	3.00	24	3.00	24	72	100%
5:00 PM	7:50 PM	R	ZOOL 110 14	Introductory Zoology	LAB	3.00	22	3.00	22	66	92%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

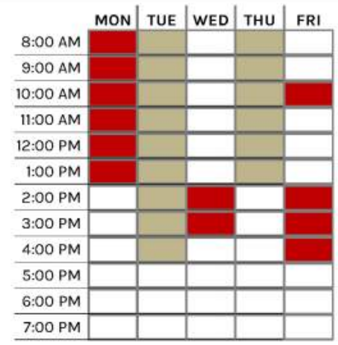
Scheduled Utilization

Science A • SCIA 467

Space Use Code: *Teaching Lab L/D*

Department: **Physics and Astronomy**

Weekly Room Hours:	**27**	Weekly Student Contact Hours:	**527**
Seat Fill Rate:	**70%**	Average Enrollment:	**19**
Assignable Sq.Ft. / Station:	**36**	Capacity:	**28**
		Assignable Square Feet:	**1,009**



:ents most popular start times and each block does not represent the same amount of time

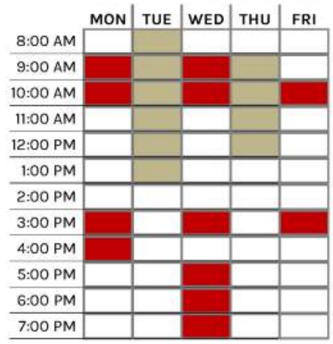
Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	Seat Fill Rate
8:00 AM	10:50 AM	M	PHYX 106 11	Col Phyx: Mechanics & Heat	LAB	3.00	14	3.00	14	42	50%
8:00 AM	10:50 AM	R	PHYX 107 11	Col Phyx: Electromag, Mod Phy	LAB	3.00	19	3.00	19	57	68%
8:00 AM	10:50 AM	T	PHYX 106 13	Col Phyx: Mechanics & Heat	LAB	3.00	20	3.00	20	60	71%
10:00 AM	10:50 AM	F	SCI 100 62	Stars to Rocks	LEC	1.00	13	1.00	13	13	46%
11:00 AM	1:50 PM	M	PHYX 106 12	Col Phyx: Mechanics & Heat	LAB	3.00	23	3.00	23	69	82%
11:00 AM	1:50 PM	R	PHYX 107 12	Col Phyx: Electromag, Mod Phy	LAB	3.00	16	3.00	16	48	57%
11:00 AM	1:50 PM	T	PHYX 106 14	Col Phyx: Mechanics & Heat	LAB	3.00	23	3.00	23	69	82%
2:00 PM	4:50 PM	F	PHYX 109 11	General Physics A	LAB	3.00	20	3.00	20	60	71%
2:00 PM	4:50 PM	T	PHYX 106 15	Col Phyx: Mechanics & Heat	LAB	3.00	23	3.00	23	69	82%
2:00 PM	3:50 PM	W	PHYX 109 15	General Physics A	LAB	2.00	20	2.00	20	40	71%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.6 LABORATORY UTILIZATION ANALYSIS - BY ROOM WITH GRAPH, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

Scheduled Utilization



Science A • SCIA 475

Space Use Code: *Teaching Lab L/D*

Department: **Physics and Astronomy**

Weekly Room Hours:	**22**	Weekly Student Contact Hours:	**297**
Seat Fill Rate:	**38%**	Average Enrollment:	**13**
Assignable Sq.Ft. / Station:	**28**	Capacity:	**36**
		Assignable Square Feet:	**1,009**

;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	Seat Fill Rate
8:00 AM	10:50 AM	T	PHYX 211 11	General Physics C	LAB	3.00	7	3.00	7	21	19%
9:00 AM	9:50 AM	MW	PHYX 315 10	Intro to Electronics	LEC	2.00	14	2.00	14	28	39%
9:00 AM	10:50 AM	R	PHYX 211 15	General Physics C	LAB	2.00	15	2.00	15	30	42%
10:00 AM	10:50 AM	F	SCI 100 61	Stars to Rocks	LEC	1.00	13	1.00	13	13	36%
10:00 AM	10:50 AM	MW	SCI 100 60	Stars to Rocks	LEC	2.00	26	2.00	26	52	72%
11:00 AM	12:50 PM	R	PHYX 211 16	General Physics C	LAB	2.00	13	2.00	13	26	36%
11:00 AM	1:50 PM	T	PHYX 211 12	General Physics C	LAB	3.00	21	3.00	21	63	58%
3:00 PM	3:50 PM	MWF	PHYX 360 10	Physics of Stars & Planets	LEC	3.00	10	3.00	10	30	28%
4:00 PM	4:50 PM	M	PHYX 484 1	Physics Seminar I	LEC	1.00	4	1.00	4	4	11%
5:00 PM	7:50 PM	W	PHYX 360 11	Physics of Stars & Planets	LAB	3.00	10	3.00	10	30	28%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

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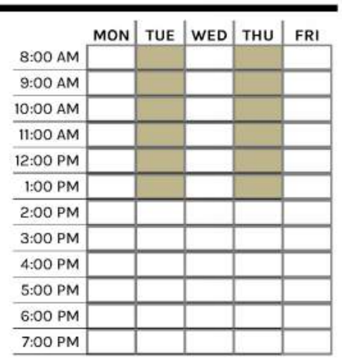
Scheduled Utilization



Science A • SCIA 552

Space Use Code: *Teaching Lab L/D*

Department: **Chemistry**

Weekly Room Hours:	**11**	Weekly Student Contact Hours:	**193**
Seat Fill Rate:	**71%**	Average Enrollment:	**17**
Assignable Sq.Ft. / Station:	**39**	Capacity:	**24**
		Assignable Square Feet:	**930**

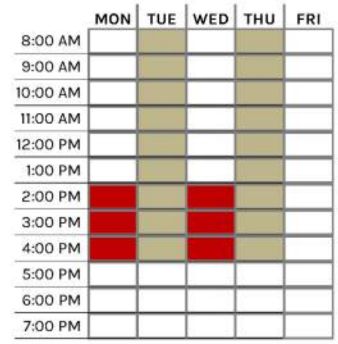
;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	Seat Fill Rate
8:00 AM	10:50 AM	TR	CHEM 110 21	General Chemistry II	LAB	5.67	15	5.67	15	85	63%
11:00 AM	1:50 PM	TR	CHEM 110 22	General Chemistry II	LAB	5.67	19	5.67	19	108	79%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

Scheduled Utilization



Science A • SCIA 555

Space Use Code: *Teaching Lab U/D*

Department: **Chemistry**

Weekly Room Hours:	**23**	Weekly Student Contact Hours:	**414**
Seat Fill Rate:	**89%**	Average Enrollment:	**18**
Assignable Sq.Ft. / Station:	**56**	Capacity:	**20**
		Assignable Square Feet:	**1,120**

;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	10:50 AM	R	CHEM 228 22	Brief Organic Chemistry	LAB	3.00	18	3.00	18	54	90%
8:00 AM	10:50 AM	T	CHEM 228 12	Brief Organic Chemistry	LAB	3.00	18	3.00	18	54	90%
11:00 AM	1:50 PM	TR	CHEM 324L 1	Organic Chemistry I Laborator	LAB	5.67	17	5.67	17	96	85%
2:00 PM	4:50 PM	M	CHEM 228 11	Brief Organic Chemistry	LAB	3.00	20	3.00	20	60	100%
2:00 PM	4:50 PM	TR	CHEM 324L 2	Organic Chemistry I Laborator	LAB	5.67	18	5.67	18	102	90%
2:00 PM	4:50 PM	W	CHEM 228 21	Brief Organic Chemistry	LAB	3.00	16	3.00	16	48	80%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

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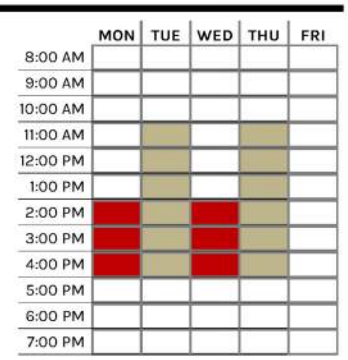
Scheduled Utilization



Science A • SCIA 556

Space Use Code: *Teaching Lab L/D*

Department: **Chemistry**

Weekly Room Hours:	**17**	Weekly Student Contact Hours:	**380**
Seat Fill Rate:	**93%**	Average Enrollment:	**22**
Assignable Sq.Ft. / Station:	**40**	Capacity:	**24**
		Assignable Square Feet:	**959**

;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
11:00 AM	1:50 PM	TR	CHEM 110 12	General Chemistry II	LAB	5.67	23	5.67	23	130	96%
2:00 PM	4:50 PM	MW	CHEM 110 11	General Chemistry II	LAB	5.67	21	5.67	21	119	88%
2:00 PM	4:50 PM	TR	CHEM 110 23	General Chemistry II	LAB	5.67	23	5.67	23	130	96%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.6 LABORATORY UTILIZATION ANALYSIS - BY ROOM WITH GRAPH, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

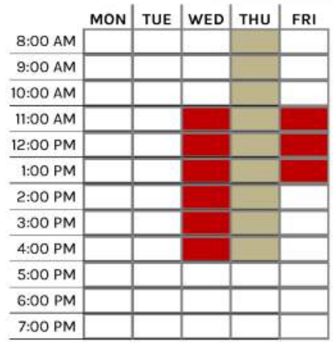
Scheduled Utilization

Science A • SCIA 567

Space Use Code: *Teaching Lab L/D*

Department: **Chemistry**

Weekly Room Hours:	**18**	Weekly Student Contact Hours:	**396**
Seat Fill Rate:	**92%**	Average Enrollment:	**22**
Assignable Sq.Ft. / Station:	**51**	Capacity:	**24**
		Assignable Square Feet:	**1,234**



;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	10:50 AM	R	CHEM 109 31	General Chemistry I	LAB	3.00	23	3.00	23	69	96%
11:00 AM	1:50 PM	F	CHEM 109 23	General Chemistry I	LAB	3.00	24	3.00	24	72	100%
11:00 AM	1:50 PM	R	CHEM 109 32	General Chemistry I	LAB	3.00	23	3.00	23	69	96%
11:00 AM	1:50 PM	W	CHEM 109 12	General Chemistry I	LAB	3.00	22	3.00	22	66	92%
2:00 PM	4:50 PM	R	CHEM 109 13	General Chemistry I	LAB	3.00	21	3.00	21	63	88%
2:00 PM	4:50 PM	W	CHEM 109 33	General Chemistry I	LAB	3.00	19	3.00	19	57	79%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

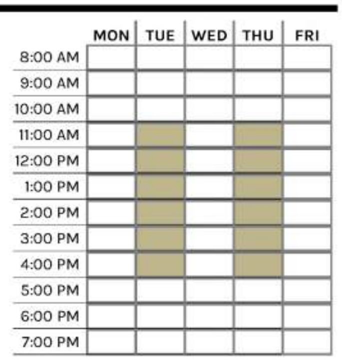
Scheduled Utilization

Science A • SCIA 568

Space Use Code: *Teaching Lab U/D*

Department: **Chemistry**

Weekly Room Hours:	**11**	Weekly Student Contact Hours:	**91**
Seat Fill Rate:	**50%**	Average Enrollment:	**8**
Assignable Sq.Ft. / Station:	**60**	Capacity:	**16**
		Assignable Square Feet:	**952**



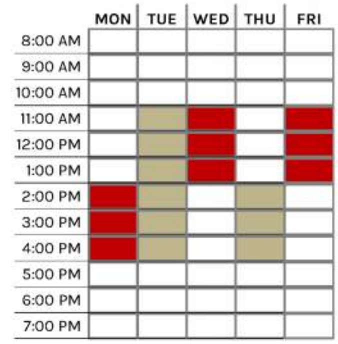
;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
11:00 AM	1:50 PM	TR	CHEM 434L 1	Biochemistry I Lab	LAB	5.67	4	5.67	4	23	25%
2:00 PM	4:50 PM	TR	CHEM 434L 2	Biochemistry I Lab	LAB	5.67	12	5.67	12	68	75%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

Scheduled Utilization



Science A • SCIA 571

Space Use Code: *Teaching Lab L/D*

Department: **Chemistry**

Weekly Room Hours:	**18**	Weekly Student Contact Hours:	**408**
Seat Fill Rate:	**94%**	Average Enrollment:	**23**
Assignable Sq.Ft. / Station:	**50**	Capacity:	**24**
		Assignable Square Feet:	**1,206**

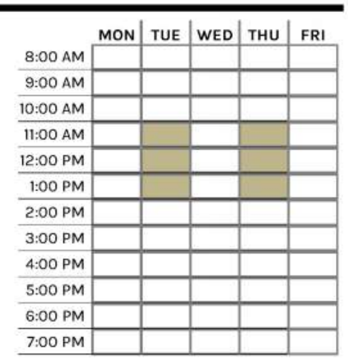
ents most popular start times and each block does not represent the same amount of time

					COURSE			SECTION			
Start Time	End Time	Days	Course		TYPE	WRH	Enroll-ment	WRH	Enroll -	WSCH	Seat Fill Rate
11:00 AM	1:50 PM	F	CHEM 109 22	General Chemistry I	LAB	3.00	22	3.00	22	66	92%
11:00 AM	1:50 PM	T	CHEM 107 12	Fundamentals of Chemistry	LAB	3.00	24	3.00	24	72	100%
11:00 AM	1:50 PM	W	CHEM 109 11	General Chemistry I	LAB	3.00	21	3.00	21	63	88%
2:00 PM	4:50 PM	M	CHEM 107 11	Fundamentals of Chemistry	LAB	3.00	23	3.00	23	69	96%
2:00 PM	4:50 PM	R	CHEM 109 21	General Chemistry I	LAB	3.00	24	3.00	24	72	100%
2:00 PM	4:50 PM	T	CHEM 107 13	Fundamentals of Chemistry	LAB	3.00	22	3.00	22	66	92%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

Scheduled Utilization



Science B • SCIB 122

Space Use Code: *Teaching Lab U/D*

Department: **Biological Sciences**

Weekly Room Hours:	**6**	Weekly Student Contact Hours:	**57**
Seat Fill Rate:	**56%**	Average Enrollment:	**10**
Assignable Sq.Ft. / Station:	**53**	Capacity:	**18**
		Assignable Square Feet:	**951**

ents most popular start times and each block does not represent the same amount of time

					COURSE			SECTION			
Start Time	End Time	Days	Course		TYPE	WRH	Enroll-ment	WRH	Enroll -	WSCH	Seat Fill Rate
11:00 AM	1:50 PM	TR	BIOL 450 1	Cell Biology Lab	LAB	5.67	10	5.67	10	57	56%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.6 LABORATORY UTILIZATION ANALYSIS - BY ROOM WITH GRAPH, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

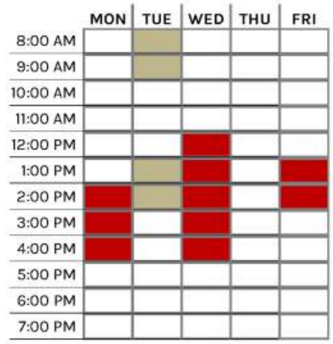
Scheduled Utilization

Science B • SCIB 126

Space Use Code: *Teaching Lab U/D*

Department: **Biological Sciences**

Weekly Room Hours:	14	Weekly Student Contact Hours:	224
Seat Fill Rate:	66%	Average Enrollment:	21
Assignable Sq.Ft. / Station:	51	Capacity:	25
		Assignable Square Feet:	1,285



;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	9:50 AM	T	BIOL 340 21	Genetics	LAB	2.00	24	2.00	24	48	96%
12:00 PM	1:50 PM	W	BIOL 340 22	Genetics	LAB	2.00	25	2.00	25	50	100%
1:00 PM	1:50 PM	F	BIOL 180 2	Among Giants BOG	LEC	1.00	23	1.00	23	23	92%
1:00 PM	2:50 PM	T	BIOL 340 23	Genetics	LAB	2.00	23	2.00	23	46	92%
2:00 PM	2:50 PM	F	SCI 100 21	Among Giants	LEC	1.00	23	1.00	23	23	92%
2:00 PM	4:50 PM	MW	BIOL 440 1	Molecular Genetics Lab	LAB	5.67	6	5.67	6	34	24%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

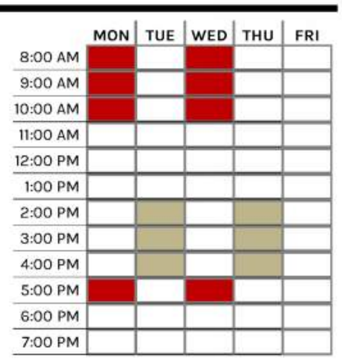
Scheduled Utilization

Science B • SCIB 128

Space Use Code: *Teaching Lab U/D*

Department: **Biological Sciences**

Weekly Room Hours:	8	Weekly Student Contact Hours:	151
Seat Fill Rate:	79%	Average Enrollment:	20
Assignable Sq.Ft. / Station:	52	Capacity:	25
		Assignable Square Feet:	1,294



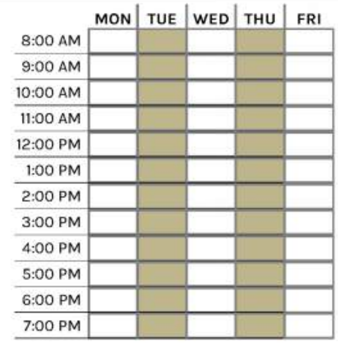
;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	10:50 AM	MW	BOT 360L 1	Biol of the Fleshy Fungi Lab	LAB	2.84	19	2.84	19	54	76%
2:00 PM	4:50 PM	TR	BOT 358 11	Biology of the Microfungi	LAB	2.84	20	2.84	20	57	80%
5:00 PM	5:50 PM	MW	BOT 360 1	Biology of the Fleshy Fungi	LEC	2.00	20	2.00	20	40	80%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

Scheduled Utilization



Science B • SCIB 132

Space Use Code: *Teaching Lab L/D*

Department: **Biological Sciences**

Weekly Room Hours:	**24**	Weekly Student Contact Hours:	**429**
Seat Fill Rate:	**72%**	Average Enrollment:	**18**
Assignable Sq.Ft. / Station:	**51**	Capacity:	**25**
		Assignable Square Feet:	**1,273**

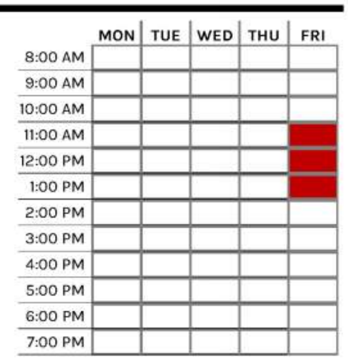
;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	Seat Fill Rate
8:00 AM	10:50 AM	R	BIOL 105 21	Principles of Biology	LAB	3.00	24	3.00	24	72	96%
8:00 AM	10:50 AM	T	BIOL 105 11	Principles of Biology	LAB	3.00	12	3.00	12	36	48%
11:00 AM	1:50 PM	R	BIOL 105 22	Principles of Biology	LAB	3.00	23	3.00	23	69	92%
11:00 AM	1:50 PM	T	BIOL 105 12	Principles of Biology	LAB	3.00	16	3.00	16	48	64%
2:00 PM	4:50 PM	R	BIOL 105 23	Principles of Biology	LAB	3.00	22	3.00	22	66	88%
2:00 PM	4:50 PM	T	BIOL 105 13	Principles of Biology	LAB	3.00	9	3.00	9	27	36%
5:00 PM	7:50 PM	R	BIOL 105 24	Principles of Biology	LAB	3.00	23	3.00	23	69	92%
5:00 PM	7:50 PM	T	BIOL 105 14	Principles of Biology	LAB	3.00	14	3.00	14	42	56%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

Scheduled Utilization



Science B • SCIB 228

Space Use Code: *Teaching Lab U/D*

Department: **Biological Sciences**

Weekly Room Hours:	**3**	Weekly Student Contact Hours:	**36**
Seat Fill Rate:	**60%**	Average Enrollment:	**12**
Assignable Sq.Ft. / Station:	**64**	Capacity:	**20**
		Assignable Square Feet:	**1,280**

;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	Seat Fill Rate
11:00 AM	1:50 PM	F	BIOL 433 11	Microbial Ecology	LAB	3.00	11	3.00	12	36	60%
11:00 AM	1:50 PM	F	BIOL 533 11	Microbial Ecology	LAB	3.00	1				

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.5.6 LABORATORY UTILIZATION ANALYSIS - BY ROOM WITH GRAPH, CONTINUED

CAL POLY HUMBOLDT • MAIN CAMPUS

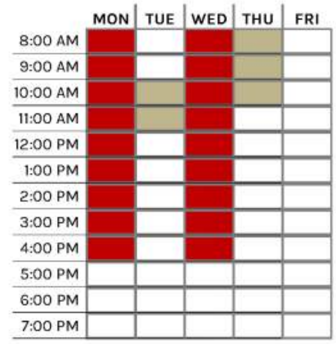
Scheduled Utilization

Science B • SCIB 328

Space Use Code: *Teaching Lab U/D*

Department: **Biological Sciences**

Weekly Room Hours:	22	Weekly Student Contact Hours:	254
Seat Fill Rate:	38%	Average Enrollment:	14
Assignable Sq.Ft. / Station:	43	Capacity:	30
		Assignable Square Feet:	1,280



;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	10:50 AM	MW	ZOOL 310 11	Animal Physiology	LAB	5.67	10	5.67	10	57	33%
8:00 AM	10:50 AM	R	ZOOL 113 11	Human Physiology	LAB	3.00	12	3.00	12	36	40%
10:00 AM	10:50 AM	T	BIOL 307 11	Evolution	LEC	1.00	21	1.00	21	21	70%
11:00 AM	1:50 PM	MW	ZOOL 310 12	Animal Physiology	LAB	5.67	9	5.67	9	51	30%
11:00 AM	11:50 AM	T	BIOL 307 12	Evolution	LEC	1.00	21	1.00	21	21	70%
2:00 PM	4:50 PM	MW	ZOOL 310 13	Animal Physiology	LAB	5.67	12	5.67	12	68	40%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

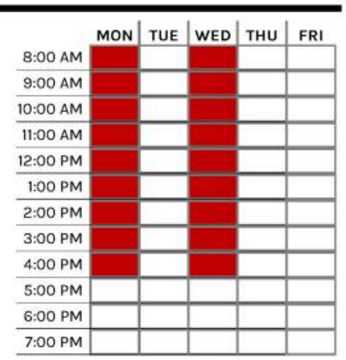
Scheduled Utilization

Science B • SCIB 334

Space Use Code: *Teaching Lab U/D*

Department: **Biological Sciences**

Weekly Room Hours:	17	Weekly Student Contact Hours:	227
Seat Fill Rate:	56%	Average Enrollment:	13
Assignable Sq.Ft. / Station:	53	Capacity:	24
		Assignable Square Feet:	1,274



;ents most popular start times and each block does not represent the same amount of time

Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
8:00 AM	10:50 AM	MW	BOT 310 11	General Plant Physiology	LAB	5.67	5	5.67	5	28	21%
11:00 AM	1:50 PM	MW	BOT 310 12	General Plant Physiology	LAB	5.67	15	5.67	15	85	63%
2:00 PM	4:50 PM	MW	BOT 310 13	General Plant Physiology	LAB	5.67	20	5.67	20	113	83%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

CAL POLY HUMBOLDT • MAIN CAMPUS

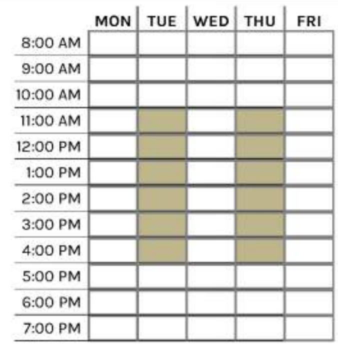
Scheduled Utilization

Science C • SCIC 207

Space Use Code: *Teaching Lab U/D*

Department: **Biological Sciences**

Weekly Room Hours:	**12**	Weekly Student Contact Hours:	**213**
Seat Fill Rate:	**77%**	Average Enrollment:	**18**
Assignable Sq.Ft. / Station:	**42**	Capacity:	**23**
		Assignable Square Feet:	**968**

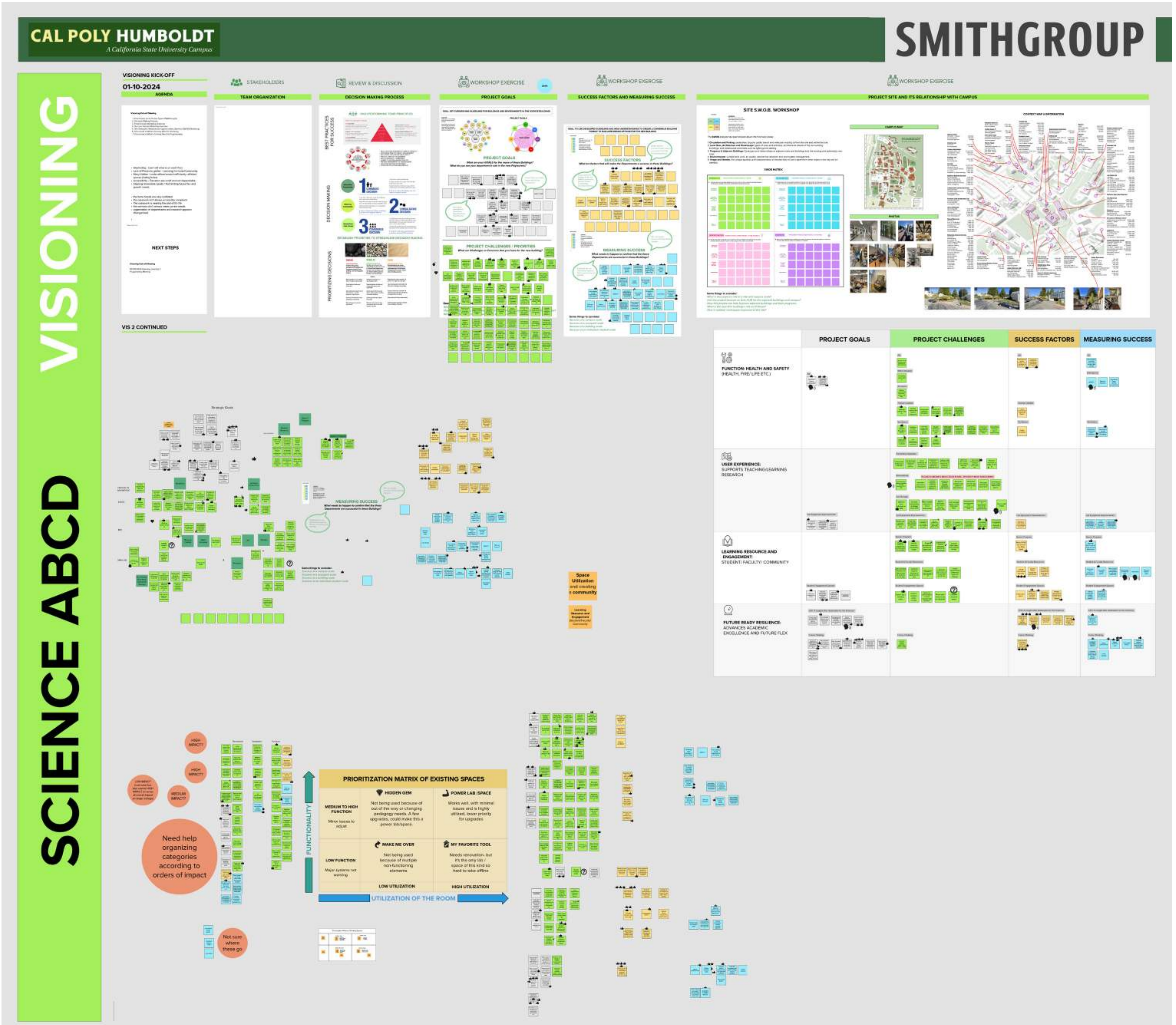


;ents most popular start times and each block does not represent the same amount of time

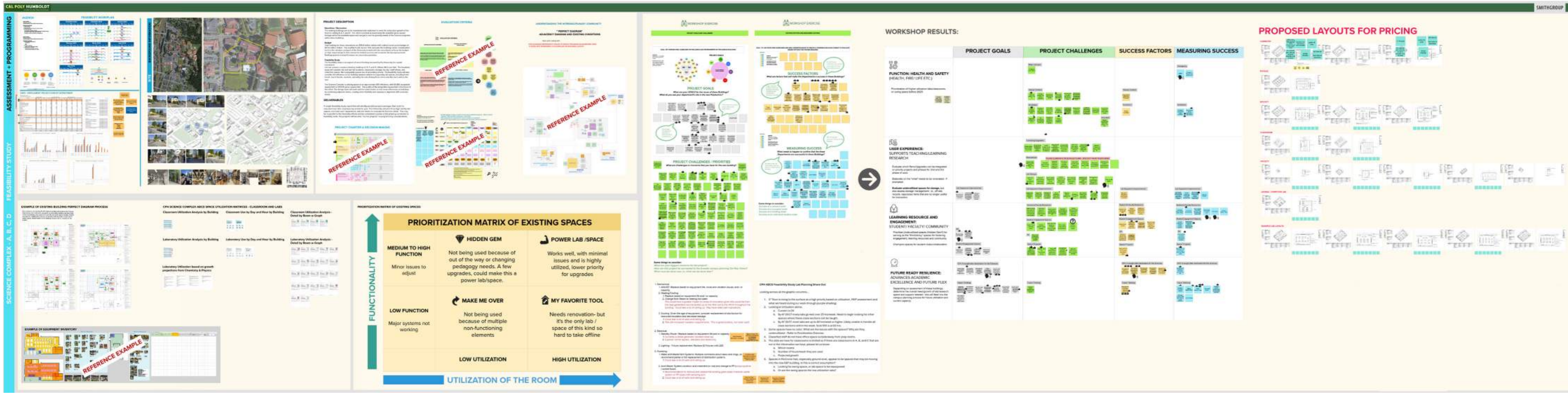
Start Time	End Time	Days	Course		COURSE TYPE	COURSE WRH	COURSE Enroll-ment	SECTION WRH	SECTION Enroll -	SECTION WSCH	SECTION Seat Fill Rate
11:00 AM	1:50 PM	R	ZOOL 356 13	Mammalogy	LAB	3.00	15	3.00	15	45	65%
11:00 AM	1:50 PM	T	ZOOL 356 11	Mammalogy	LAB	3.00	21	3.00	21	63	91%
2:00 PM	4:50 PM	R	ZOOL 356 14	Mammalogy	LAB	3.00	14	3.00	14	42	61%
2:00 PM	4:50 PM	T	ZOOL 356 12	Mammalogy	LAB	3.00	21	3.00	21	63	91%

NOTE: Concurrent sessions are counted as one section; WRH = Weekly Room Hours; WSCH = Weekly Student Contact Hours

7.6.1 VISIONING BOARD



7.6.2 PROGRAM AND ASSESSMENT BOARD



7.7 FINAL COST ESTIMATE

DIRECTIONAL LOGIC

Cal Poly Humboldt
Science Complex ABCD

Feasibility Cost Plan
January 20, 2025

Cal Poly Humboldt Science Complex ABCD

Feasibility Cost Plan
January 20, 2025

Prepared for:

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Project Reference: 2024-0240.111

Cal Poly Humboldt
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Basis of Estimate

Basis

This estimate is based on the following documents:

1 Science Complex ABCD Feasibility Study Final Report Draft dated December 11, 2024.

2 Discussions with the design team during September, October and December 2024.

Basis of Unit Costs

1 This estimate is based on adjusted historical unit costs and current bid prices obtained in the project locality. Pricing reflects probable construction costs obtainable on the date of this statement of probable costs.

2 All unit rates relevant to subcontractor work include the subcontractor's overhead and profit unless otherwise stated. The mark-ups cover the costs of field overhead, home office overhead and profit and range from 15-30% of the cost for a particular item of work.

3 General contractor general conditions, overhead and profit are shown separately on the overall summary.

4 Pricing assumes competitive bidding for every portion of the construction work for all subcontractors and general contractors, with a minimum of 3 bidders for all items of subcontracted work.

5 Since Directional Logic has no control over the cost of labor, material, equipment, or over the contractor's method of determining prices, or over the competitive bidding or market conditions at the time of bid, the statement of probable construction cost is based on industry practice, professional experience and qualifications, and represents Directional Logic's best judgment as professional construction consultant familiar with the construction industry. However, Directional Logic cannot and does not guarantee that the proposals, bids, or the construction cost will not vary from opinions of probable cost prepared by them.

Assumptions and Clarifications

This estimate is based on the following assumptions and clarifications:

1 This estimate should be read in conjunction with the Feasibility Report referenced above, from which it was prepared. In particular, refer to sections 5.1 - 5.3 for a description of the approach and intent for each section of this report.

2 All costs presented in this report are based on unit costs in November 2024. Escalation has not been included, and should be assessed from date of this estimate to start date of any construction.

3 All estimates include a 15% design contingency and 5% construction contingency, based on the level of information provided.

4 Costs in this report should be considered Order of Magnitude only, for use in preliminary assessment of various scopes of work. Final budgets should not be prepared based on these estimates.

5 All estimates assume Bio-safety cabinets, fume hoods, chemical cabinets, benches and casework are part of the construction cost. All other lab equipment is assumed to be Owner Furnished and Installed as part of a separate budget.

Full Building Renovations

6 The first section of this report is for the full renovation of buildings A-C, and accessibility and code changes for Building D. No program changes for Building D are included.

7 The scope of work for each building renovation includes reprogramming of the majority of Buildings A-C assuming optimal sized modules similar to the Lab Prototypes priced in Section 2 of this report. In addition, related infrastructure improvements are priced. This section includes MEP equipment required for the new program, deferred maintenance items, accessibility upgrades and other codes required upgrades. An allowance for seismic upgrade of each building as this will likely be triggered by the scope of work described. This allowance is simply based on past experience of the cost of upgrading similar buildings, and is not based on any engineered solution or assessment of the seismic condition of each building. It is highly recommended that the University study the seismic deficiencies and appropriate solutions before proceeding with a scope of work that triggered the need for a seismic upgrade.

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Basis of Estimate

Lab Prototypes

8 This section of the report is general pricing for typical protypes plans for various lab, classroom and office spaces.

9 The intent of this section is to provide general guidance on the cost for each program type.

10 Costs provided do not include any work outside of the boundaries indicated for each prototype. Additional costs would be necessary for MEP equipment, accessibility and other code triggered scopes of work.

11 The costs of work could vary considerably depending on the scope of work (one lab, one floor, one building etc.), the location of the program space within the building, and necessary temporary work, phasing and protection required during construction.

Targeted Renovation Scenario

12 This section of the report is intended to provide an Order of Magnitude cost for a potential scope of work that could represent a first phase of renovation.

13 The scope of work is largely limited to the enclosed area of each program, with additional MEP equipment as required on the roof, and allowances for minor patch repair of corridors impacted by the adjacent renovation.

14 The scope of work excludes accessibility improvements outside the program boundaries.

15 The scope of work excludes all code upgrades, deferred maintenance and seismic upgrades not directly related to the renovation.

Other Costs Not Included In This Estimate

The following additional costs have been identified as being required to complete this project, and are not included in this cost plan.

1 Disposal of hazardous materials and excavation.

2 Owner supplied and installed furniture, fixtures, and equipment except as specifically identified

3 Loose furniture and equipment except as specifically identified

4 Compression of schedule, premium or shift work and restrictions on the contractors working hours.

5 Testing and inspection fees

6 Architectural, design, or project management fees

7 Scope change contingencies

8 Assessments, taxes, finance, legal, and development charges

9 Environmental impact mitigation

10 Builder's risk, project wrap-up, and other owner provided insurance program

11 Land and easement acquisition

12 Site utility connection charges and fees

13 Additional capital contributions to third parties or authorities

14 Any necessary improvement or off site utilities and services infrastructure

15 Independent third party commissioning

16 Cost escalation beyond a construction start date of October 2026

DIRECTIONAL LOGIC

Full Building Renovations

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Full Building Renovations

	GSF	$/SF	TOTAL
			$x1,000
Full Renovation Cost By Building			
Science A	63,231	2,052.49	129,781
Science B	44,717	1,598.61	71,485
Science C	9,727	2,069.39	20,129
Science D Alistair McCrone Hall (Infrastructure Only)	33,545	104.28	3,498
TOTAL RENOVATION CONSTRUCTION	151,220	1,487.19	224,893
Escalation			
Escalation to Start Date (Allowance to Midpoint Assuming Fall 2026 Start Date)	15.00%		33,734
TOTAL ESCALATED CONSTRUCTION COST			**258,627**

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Full Building Renovations

Scope	Quantity	Unit	Rate Incl GC Mrkup & Contingency	Total Current Construction Cost
Science A	**63,231**	**GSF**	**2,052.49**	**129,781,000**
Fifth Floor	17,540	GSF	1,755.28	30,787,625
Organic Chemistry (3 labs)	3,750	SF	2,555.00	9,581,250
General Chemistry (4 labs)	6,650	SF	2,070.00	13,765,500
Chemistry Prep	1,500	SF	2,070.00	3,105,000
Staff Office / Break	350	SF	930.00	325,500
Student Hangout	375	SF	895.00	335,625
Restrooms	800	SF	1,250.00	1,000,000
Circulation	3,125	SF	650.00	2,031,250
Other Spaces	990	SF	650.00	643,500
Fourth Floor	17,779	GSF	1,328.07	23,611,790
Anatomy	2,646	SF	1,810.00	4,789,260
Zoology	1,323	SF	1,490.00	1,971,270
Biology Prep	1,270	SF	1,810.00	2,298,700
Physics	5,292	SF	1,530.00	8,096,760
Physics Prep	1,270	SF	1,530.00	1,943,100
Staff Office / Break	350	SF	930.00	325,500
Student Hangout	200	SF	895.00	179,000
Restrooms	800	SF	1,250.00	1,000,000
Circulation	3,650	SF	650.00	2,372,500
Other Spaces	978	SF	650.00	635,700
Third Floor	18,767	GSF	1,480.98	27,793,610
Biology	2,646	SF	1,810.00	4,789,260
Biology Prep	1,490	SF	1,810.00	2,696,900
Chemistry	3,969	SF	2,070.00	8,215,830
Physics	2,646	SF	2,070.00	5,477,220
Physics Prep	700	SF	2,070.00	1,449,000
Staff Office / Break	350	SF	840.00	294,000
Student Hangout	300	SF	895.00	268,500
Restrooms	450	SF	1,250.00	562,500
Circulation	3,650	SF	650.00	2,372,500
Other Spaces	2,566	SF	650.00	1,667,900
Second Floor	8,242	GSF	1,041.93	8,587,615
Organic Chemistry	1,323	SF	2,555.00	3,380,265
Chemistry Prep	500	SF	2,070.00	1,035,000
Circulation	1,450	SF	650.00	942,500

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Full Building Renovations

Scope	Quantity	Unit	Rate Incl GC Mrkup & Contingency	Total Current Construction Cost
Other Spaces	4,969	SF	650.00	3,229,850
Infrastructure	63,231	GSF	616.80	39,000,635
Roof Replacement	18,767	SF	65.00	1,219,855
Exterior glazing replacement	14,850	SF	280.00	4,158,000
Exterior cladding replacement and insulation	34,650	SF	200.00	6,930,000
Exterior door replacement	11	LV	15,000.00	165,000
Accessibility Upgrades	63,231	SF	10.00	632,310
Elevator Replacement	1	LS	1,000,000.00	1,000,000
New Elevator Serving Level 1 and Level 2	1	LS	1,000,000.00	1,000,000
Plumbing Infrastructure	63,231	SF	5.00	316,155
Mechanical Equipment Replacment (Incl assoc. electrical)	63,231	SF	80.00	5,058,480
Electrical Main Service Replacment	63,231	SF	25.00	1,580,775
Electrical Emergency Generator	63,231	SF	10.00	632,310
Seismic Upgrade (Allowance)	63,231	SF	250.00	15,807,750
Exterior Accessibility Improvements	1	LS	500,000.00	500,000

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Full Building Renovations

Scope	Quantity	Unit	Rate Incl GC Mrkup & Contingency	Total Corrent Construction Cost
Science B	**44,717**	**GSF**	**1,598.61**	**71,485,000**
Fourth Floor	9,516	GSF	250.00	2,379,000
Other Spaces Impacted By Renovations Below (Minor)	9,516	SF	250.00	2,379,000
Third Floor	10,042	GSF	1,405.60	14,115,050
Microbiology	2,850	SF	1,645.00	4,688,250
Zoology	2,850	SF	1,490.00	4,246,500
Biology Prep	1,800	SF	1,810.00	3,258,000
Restroom Upgrades	450	SF	1,250.00	562,500
Circulation	1,650	SF	650.00	1,072,500
Other Spaces	442	SF	650.00	287,300
Second Floor	10,757	GSF	1,458.78	15,692,050
Biology	5,700	SF	1,810.00	10,317,000
Biology Prep	1,800	SF	1,810.00	3,258,000
Circulation	1,650	SF	650.00	1,072,500
Other Spaces	1,607	SF	650.00	1,044,550
First Floor	14,402	GSF	945.90	13,622,850
Biology	4,275	SF	1,810.00	7,737,750
Biology Prep	1,425	SF	1,810.00	2,579,250
Staff Office / Break	425	SF	930.00	395,250
Restroom Upgrades	450	SF	1,250.00	562,500
Other Spaces - Minor	7,827	SF	300.00	2,348,100
Infrastructure	44,717	GSF	406.07	25,676,040
Roof Repairs - minor	14,402	SF	10.00	144,020
Exterior glazing replacement	9,207	SF	280.00	2,577,960
Exterior cladding replacement and insulation	21,483	SF	200.00	4,296,600
Exterior door replacement	11	LV	15,000.00	165,000
Accessibility Upgrades	44,717	SF	10.00	447,170
Elevator Replacement	1	LS	1,000,000.00	1,000,000
Plumbing Infrastructure	44,717	SF	5.00	223,585
Mechanical Equipment Replacment (Incl assoc. electrical)	44,717	SF	80.00	3,577,360
Electrical Main Service Replacment	44,717	SF	25.00	1,117,925
Electrical Emergency Generator	44,717	SF	10.00	447,170
Seismic Upgrade (Allowance)	44,717	SF	250.00	11,179,250
Exterior Accessibility Improvements	1	LS	500,000.00	500,000

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Full Building Renovations

Scope	Quantity	Unit	Rate Incl GC Mrkup & Contingency	Total Corrent Construction Cost
Science C	**9,727**	**GSF**	**2,069.39**	**20,129,000**
Second Floor	3,622	GSF	1,734.48	6,282,300
Chemistry	350	SF	2,070.00	724,500
Chemistry Prep	2,300	SF	2,070.00	4,761,000
Restroom Upgrades	275	SF	1,250.00	343,750
Circulation	425	SF	650.00	276,250
Other Spaces	272	SF	650.00	176,800
First Floor	6,105	GSF	1,125.46	6,870,950
Chemistry	350	SF	1,810.00	633,500
Chemistry Prep	2,300	SF	1,810.00	4,163,000
Restroom Upgrades	275	SF	1,250.00	343,750
Circulation	1,065	SF	930.00	990,450
Other Spaces	377	SF	350.00	131,950
Covered Area	1,738	SF	350.00	608,300
Infrastructure	9,727	GSF	110.32	6,975,580
Low Slope Roof Repair	6,105	SF	10.00	61,050
Exterior glazing replacement	1,650	SF	280.00	462,000
Exterior cladding replacement and insulation	6,420	SF	200.00	1,284,000
Exterior door replacement	5	LV	15,000.00	75,000
Accessibility Upgrades	9,727	SF	20.00	194,540
New 2-Story Elevator	1	LS	1,000,000.00	1,000,000
Plumbing Infrastructure	9,727	SF	5.00	48,635
Mechanical Equipment Replacment (Incl assoc. electrical)	9,727	SF	80.00	778,160
Electrical Main Service Replacment	9,727	SF	25.00	243,175
Electrical Emergency Generator	9,727	SF	10.00	97,270
Seismic Upgrade (Allowance)	9,727	SF	250.00	2,431,750
Exterior Accessibility Improvements	1	LS	300,000.00	300,000

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Full Building Renovations

Scope	Quantity	Unit	Rate Incl GC Mrkup & Contingency	Total Current Construction Cost
Science D Alistair McCrone Hall	**33,545**	**GSF**	**104.28**	**3,498,000**
First Floor	17,204	SF		*existing to remain*
Ground Floor	16,341	SF		*existing to remain*
Infrastructure	33,545	GSF	55.32	3,497,825
Roof Repairs - minor	6,105	SF	10.00	61,050
Exterior glazing replacement				*existing to remain*
Exterior cladding repair and repaint	1	LS	100,000.00	100,000
Exterior door replacement	10	LV	15,000.00	150,000
Accessibility Upgrades	33,545	SF	15.00	503,175
Elevator Replacement				*existing to remain*
Plumbing Infrastructure				*existing to remain*
Mechanical Equipment Replacment (Incl assoc. electrical)	33,545	GSF	80.00	2,683,600
Electrical Main Service Replacment				*existing to remain*
Electrical Emergency Generator				*existing to remain*
Seismic Upgrade (Allowance)				*existing to remain*

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Lab Prototypes

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Lab Prototypes

	NSF	$/SF	TOTAL
			$x1,000
Prototype Cost			
Organic / Inorganic Chemistry	1,323	2,555.00	3,381
General Chemistry	1,323	2,070.00	2,737
Physics	1,323	1,530.00	2,022
Biology	1,323	1,810.00	2,392
Microbiology	1,323	1,645.00	2,179
Zoology	1,323	1,490.00	1,969
Classroom - 24 Person	1,323	785.00	1,038
Classroom - 12 Person	662	935.00	620
Faculty Office / Break	350	930.00	325

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Organic / Inorganic Chemistry				
Demolition				
Allowance for demolition of existing space	1,323	SF	30.00	39,690
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,323	SF	15.00	19,845
Miscellaneous metals	1,323	SF	8.00	10,584
Rough carpentry	1,323	SF	2.00	2,646
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Roof patch and repair associated with new MEP systems	1	LS	50,000.00	50,000
Interior partitions				
Interior partitions				
Demising	32	LF	350.00	11,200
Corridor	42	LF	350.00	14,700
Patch repair walls	42	LF	250.00	10,500
MEP enclosures and furring	1	LS	5,000.00	5,000
New hollow metal door and frame	3	EA	5,000.00	15,000
Interior finishes				
Allowance for floor prep and leveling	1,323	SF	10.00	13,230
Sheet vinyl flooring	1,323	SF	16.00	21,168
Cove base	148	LF	16.00	2,368
Epoxy paint	1,702	SF	5.00	8,510
ACT ceiling and bulkheads	1,323	SF	25.00	33,075
Specialties				
Signage	1,323	SF	2.00	2,646
Window shades	1	LS	3,000.00	3,000
Projector screen	1	EA	5,000.00	5,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,323	SF	5.00	6,615

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Equipment				
Fume hood, recirculation, 6'-0"	12	EA	15,000.00	180,000
Chemical fumehood, ducted, 4'-0"	1	EA	20,000.00	20,000
Lab base cabinetry, steel with epoxy countertop	183	LF	2,500.00	457,500
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	40	LF	1,000.00	40,000
Backpack cubbies	4	LF	5,000.00	20,000
Lab sinks - supply only	4	EA	3,500.00	14,000
Cup sinks - supply only	24	EA	1,500.00	36,000
Installation of OFCI items	1,323	SF	2.00	2,646
Equipment anchorage and restraints	1,323	SF	1.00	1,323
AV equipment	1,323	SF	8.00	10,584
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	4	EA	7,000.00	28,000
Cup sink	24	EA	6,500.00	156,000
Lab waste and vent system	1,323	SF	50.00	66,150
Compressed air	25	PT	1,000.00	25,000
Vacuum	25	PT	1,000.00	25,000
Gas	25	PT	1,000.00	25,000
RO/DI	4	PT	1,000.00	4,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,323	SF	5.00	6,615
Domestic water pipework replacement	1,323	SF	5.00	6,615
Water meter, backflow preventers, etc.	1,323	SF	0.25	331
Water heaters and associated tanks and pumps	1,323	SF	2.50	3,308
RO/DI system	1,323	SF	15.00	19,845
Roof and surface water drainage pipework	1,323	SF	4.00	5,292
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	37,500.00	37,500

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Description	Quantity	Unit	Rate	Total
HVAC				
HVAC distribution, including 7.6CFM/SF exhaust air and ventilation, 10,000CFM roof mounted AHU, CW&HHW loop connection, (2) 10,000CFM supply and exhaust fans, dedicated venturi exhaust air at each fume hood, sash control at each fume hood, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,323	SF	225.00	297,675
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,323	SF	25.00	33,075
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,323	SF	10.00	13,230
Machine and equipment power	1,323	SF	12.50	16,538
User convenience power	1,323	SF	15.00	19,845
Lighting and controls	1,323	SF	35.00	46,305
Power specialties	1,323	SF	0.50	662
Low voltage				
Data outlets, conduit and wire	1,323	SF	12.00	15,876
Fire alarm	1,323	SF	7.00	9,261
Security	1,323	SF	6.00	7,938
AV rough-in and infrastructure	1,323	SF	2.00	2,646
Trade project requirements	1	LS	20,000.00	20,000
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**1,323**	**SF**	**1,497.38**	**1,981,035**
Contingency for Completion of Design	15.00%			297,155
Construction Contingency	5.00%			113,910
Phasing / Temporary Work	3.00%			71,763
General Requirements	5.00%			123,193
General Conditions	8.00%			206,964
Insurances and Bond	2.50%			69,851
Contractor Fee	3.50%			100,235
Escalation to Midpoint (Oct 2027)	14.06%			416,900
	1,323	**SF**	**2,555.00**	**3,381,007**

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Description	Quantity	Unit	Rate	Total
General Chemistry				
Demolition				
Allowance for demolition of existing space	1,323	SF	30.00	39,690
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,323	SF	15.00	19,845
Miscellaneous metals	1,323	SF	8.00	10,584
Rough carpentry	1,323	SF	5.00	6,615
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Interior partitions				
Interior partitions				
Demising	32	LF	350.00	11,200
Corridor	42	LF	350.00	14,700
MEP enclosures and furring	1	LS	5,000.00	5,000
Patch repair walls	42	LF	250.00	10,500
New hollow metal door and frame	3	EA	5,000.00	15,000
Interior finishes				
Allowance for floor prep and leveling	1,323	SF	10.00	13,230
Sheet vinyl flooring	1,323	SF	16.00	21,168
Cove base	148	LF	16.00	2,368
Epoxy paint	1,702	SF	5.00	8,510
ACT ceiling and bulkheads	1,323	SF	25.00	33,075
Specialties				
Signage	1,323	SF	2.00	2,646
Window shades	1	LS	3,000.00	3,000
Projector screen	1	EA	5,000.00	5,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,323	SF	5.00	6,615

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Equipment				
Fume hood, ducted, 6'-0"	4	EA	27,000.00	108,000
Lab base cabinetry, steel with epoxy countertop	87	LF	2,500.00	217,500
Lab bench	6	EA	15,000.00	90,000
Demonstration bench	1	EA	12,500.00	12,500
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	87	LF	1,000.00	87,000
Backpack cubbies	7	LF	5,000.00	35,000
Lab sinks - supply only	4	EA	3,500.00	14,000
Demonstration bench sink	1	EA	3,000.00	3,000
Bench sinks	6	EA	3,500.00	21,000
Cup sinks - supply only	8	EA	1,500.00	12,000
Installation of OFCI items	1,323	SF	2.00	2,646
Equipment anchorage and restraints	1,323	SF	1.00	1,323
AV equipment	1,323	SF	8.00	10,584
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	5	EA	7,000.00	35,000
Cup sink	10	EA	6,500.00	65,000
Lab waste and vent system	1,323	SF	50.00	66,150
Compressed air	13	PT	1,000.00	13,000
Vacuum	12	PT	1,000.00	12,000
Gas	13	PT	1,000.00	13,000
RO/DI	4	PT	1,000.00	4,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,323	SF	5.00	6,615
Domestic water pipework replacement	1,323	SF	5.00	6,615
Water meter, backflow preventers, etc.	1,323	SF	0.25	331
Water heaters and associated tanks and pumps	1,323	SF	2.50	3,308
RO/DI system	1,323	SF	15.00	19,845
Roof and surface water drainage pipework	1,323	SF	4.00	5,292

DIRECTIONAL LOGIC

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	27,500.00	27,500
HVAC				
HVAC distribution, including 2.4CFM/SF exhaust air and ventilation, 10,000CFM roof mounted AHU, CW&HHW loop connection, (2) 10,000CFM supply and exhaust fans, dedicated venturi exhaust air at each fume hood, sash control at each fume hood, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,323	SF	200.00	264,600
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,323	SF	25.00	33,075
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,323	SF	10.00	13,230
Machine and equipment power	1,323	SF	12.50	16,538
User convenience power	1,323	SF	15.00	19,845
Lighting and controls	1,323	SF	35.00	46,305
Power specialties	1,323	SF	0.50	662
Low voltage				
Data outlets, conduit and wire	1,323	SF	12.00	15,876
Fire alarm	1,323	SF	7.00	9,261
Security	1,323	SF	6.00	7,938
AV rough-in and infrastructure	1,323	SF	2.00	2,646
Trade project requirements	1	LS	20,000.00	20,000
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**1,323**	**SF**	**1,211.96**	**1,603,429**
Contingency for Completion of Design	15.00%			240,514
Construction Contingency	5.00%			92,197
Phasing / Temporary Work	3.00%			58,084
General Requirements	5.00%			99,711
General Conditions	8.00%			167,515
Insurances and Bond	2.50%			56,536
Contractor Fee	3.50%			81,130

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Escalation to Midpoint (Oct 2027)	14.06%			337,435
	1,323	**SF**	**2,070.00**	**2,736,552**
Physics				
Demolition				
Allowance for demolition of existing space	1,323	SF	30.00	39,690
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,323	SF	15.00	19,845
Miscellaneous metals	1,323	SF	8.00	10,584
Rough carpentry	1,323	SF	5.00	6,615
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Interior partitions				
Interior partitions				
Demising	32	LF	350.00	11,200
Corridor	42	LF	350.00	14,700
MEP enclosures and furring	1	LS	5,000.00	5,000
Patch repair walls	42	LF	250.00	10,500
New hollow metal door and frame	3	EA	5,000.00	15,000
Interior finishes				
Allowance for floor prep and leveling	1,323	SF	10.00	13,230
Carpet	1,323	SF	10.00	13,230
Robber base	148	LF	10.00	1,480
Paint	1,702	SF	3.00	5,106
ACT ceiling and bulkheads	1,323	SF	25.00	33,075
Specialties				
Signage	1,323	SF	2.00	2,646
Window shades	1	LS	3,000.00	3,000
Projector screen	1	EA	5,000.00	5,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Other specialties	1,323	SF	5.00	6,615
Equipment				
Lab base cabinetry, steel with epoxy countertop	87	LF	2,500.00	217,500
Lab bench	12	EA	5,000.00	60,000
Demonstration bench	1	EA	12,500.00	12,500
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	87	LF	1,000.00	87,000
Backpack cubbies	7	LF	5,000.00	35,000
Lab sinks - supply only	4	EA	3,500.00	14,000
Demonstration bench sink	1	EA	3,000.00	3,000
Unistrut framing	6	EA	5,000.00	30,000
Installation of OFCI items	1,323	SF	2.00	2,646
Equipment anchorage and restraints	1,323	SF	1.00	1,323
AV equipment	1,323	SF	8.00	10,584
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	5	EA	7,000.00	35,000
Lab waste and vent system	1,323	SF	50.00	66,150
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,323	SF	5.00	6,615
Domestic water pipework replacement	1,323	SF	5.00	6,615
Water meter, backflow preventers, etc.	1,323	SF	0.25	331
Water heaters and associated tanks and pumps	1,323	SF	2.50	3,308
Roof and surface water drainage pipework	1,323	SF	4.00	5,292
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	12,500.00	12,500

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
HVAC				
HVAC distribution, including 1.0 CFM/SF exhaust air and ventilation, supply and exhaust fans, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,323	SF	100.00	132,300
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,323	SF	25.00	33,075
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,323	SF	10.00	13,230
Machine and equipment power	1,323	SF	15.00	19,845
User convenience power	1,323	SF	17.00	22,491
Lighting and controls	1,323	SF	35.00	46,305
Power specialties	1,323	SF	0.50	662
Low voltage				
Data outlets, conduit and wire	1,323	SF	12.00	15,876
Fire alarm	1,323	SF	7.00	9,261
Security	1,323	SF	6.00	7,938
AV rough-in and infrastructure	1,323	SF	2.00	2,646
Trade project requirements	1	LS	22,500.00	22,500
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**1,323**	**SF**	**895.32**	**1,184,508**
Contingency for Completion of Design	15.00%			177,676
Construction Contingency	5.00%			68,109
Phasing / Temporary Work	3.00%			42,909
General Requirements	5.00%			73,660
General Conditions	8.00%			123,749
Insurances and Bond	2.50%			41,765
Contractor Fee	3.50%			59,933
Escalation to Midpoint (Oct 2027)	14.06%			249,275
	1,323	**SF**	**1,530.00**	**2,021,584**

DIRECTIONAL LOGIC

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Biology				
Demolition				
Allowance for demolition of existing space	1,323	SF	30.00	39,690
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,323	SF	15.00	19,845
Miscellaneous metals	1,323	SF	8.00	10,584
Rough carpentry	1,323	SF	5.00	6,615
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Interior partitions				
Interior partitions				
Demising	32	LF	350.00	11,200
Corridor	42	LF	350.00	14,700
MEP enclosures and furring	1	LS	5,000.00	5,000
Patch repair walls	42	LF	250.00	10,500
New hollow metal door and frame	3	EA	5,000.00	15,000
Interior finishes				
Allowance for floor prep and leveling	1,323	SF	10.00	13,230
Sheet vinyl	1,323	SF	16.00	21,168
Robber base	148	LF	10.00	1,480
Epoxy paint	1,702	SF	5.00	8,510
ACT ceiling and bulkheads	1,323	SF	25.00	33,075
Specialties				
Signage	1,323	SF	2.00	2,646
Window shades	1	LS	3,000.00	3,000
Projector screen	1	EA	5,000.00	5,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,323	SF	5.00	6,615
Equipment				
Fume hood, ducted, 6'-0"	4	EA	27,000.00	108,000
Lab base cabinetry, steel with epoxy countertop	66	LF	2,500.00	165,000

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Lab bench	6	EA	12,500.00	75,000
Demonstration bench	1	EA	12,500.00	12,500
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	66	LF	1,000.00	66,000
Tall storage	8	LF	5,000.00	40,000
PPR storage	7	LF	4,000.00	28,000
Lab sinks - supply only	4	EA	3,500.00	14,000
Demonstration bench sink	1	EA	3,000.00	3,000
Bench sinks	6	EA	3,000.00	18,000
Cup sink	1	EA	1,600.00	1,600
Installation of OFCI items	1,323	SF	2.00	2,646
Equipment anchorage and restraints	1,323	SF	1.00	1,323
AV equipment	1,323	SF	8.00	10,584
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	5	EA	7,000.00	35,000
Bench / cup sinks	7	EA	6,500.00	45,500
Lab waste and vent system	1,323	SF	50.00	66,150
Compressed air	13	PT	1,000.00	13,000
Vacuum	12	PT	1,000.00	12,000
Gas	13	PT	1,000.00	13,000
RO/DI	4	PT	1,000.00	4,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,323	SF	5.00	6,615
Domestic water pipework replacement	1,323	SF	5.00	6,615
Water meter, backflow preventers, etc.	1,323	SF	0.25	331
Water heaters and associated tanks and pumps	1,323	SF	2.50	3,308
RO/DI system	1,323	SF	15.00	19,845
Roof and surface water drainage pipework	1,323	SF	4.00	5,292
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	25,000.00	25,000

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
HVAC				
HVAC distribution, including 1.0CFM/SF exhaust air and ventilation, supply and exhaust fans, dedicated venturi exhaust air at each fume hood, sash control at each fume hood, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,323	SF	110.00	145,530
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,323	SF	25.00	33,075
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,323	SF	10.00	13,230
Machine and equipment power	1,323	SF	12.50	16,538
User convenience power	1,323	SF	15.00	19,845
Lighting and controls	1,323	SF	40.00	52,920
Power specialties	1,323	SF	0.50	662
Low voltage				
Data outlets, conduit and wire	1,323	SF	12.00	15,876
Fire alarm	1,323	SF	7.00	9,261
Security	1,323	SF	6.00	7,938
AV rough-in and infrastructure	1,323	SF	2.00	2,646
Trade project requirements	1	LS	22,500.00	22,500
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**1,323**	**SF**	**1,059.48**	**1,401,686**
Contingency for Completion of Design	15.00%			210,253
Construction Contingency	5.00%			80,597
Phasing / Temporary Work	3.00%			50,776
General Requirements	5.00%			87,166
General Conditions	8.00%			146,438
Insurances and Bond	2.50%			49,423
Contractor Fee	3.50%			70,922
Escalation to Midpoint (Oct 2027)	14.06%			294,979
	1,323	**SF**	**1,810.00**	**2,392,240**

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Microbiology				
Demolition				
Allowance for demolition of existing space	1,323	SF	30.00	39,690
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,323	SF	15.00	19,845
Miscellaneous metals	1,323	SF	8.00	10,584
Rough carpentry	1,323	SF	5.00	6,615
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Interior partitions				
Interior partitions				
Demising	32	LF	350.00	11,200
Corridor	42	LF	350.00	14,700
MEP enclosures and furring	1	LS	5,000.00	5,000
Patch repair walls	42	LF	250.00	10,500
New hollow metal door and frame	3	EA	5,000.00	15,000
Interior finishes				
Allowance for floor prep and leveling	1,323	SF	10.00	13,230
Sheet vinyl	1,323	SF	16.00	21,168
Robber base	148	LF	10.00	1,480
Epoxy paint	1,702	SF	5.00	8,510
ACT ceiling and bulkheads	1,323	SF	25.00	33,075
Specialties				
Signage	1,323	SF	2.00	2,646
Window shades	1	LS	3,000.00	3,000
Projector screen	1	EA	5,000.00	5,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,323	SF	5.00	6,615

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Equipment				
Biosafety cabinet, A2, Non-vented	2	EA	12,000.00	24,000
Lab base cabinetry, steel with phenolic resin countertop	45	LF	2,500.00	112,500
Lab bench	3	EA	45,000.00	135,000
Demonstration bench	1	EA	12,500.00	12,500
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	45	LF	1,000.00	45,000
Tall storage	8	LF	5,000.00	40,000
PPR storage	7	LF	4,000.00	28,000
Lab sinks - supply only	3	EA	3,500.00	10,500
Demonstration bench sink	1	EA	3,000.00	3,000
Bench sinks	6	EA	3,000.00	18,000
Installation of OFCI items	1,323	SF	2.00	2,646
Equipment anchorage and restraints	1,323	SF	1.00	1,323
AV equipment	1,323	SF	8.00	10,584
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	3	EA	7,000.00	21,000
Bench / cup sinks	6	EA	6,500.00	39,000
Lab waste and vent system	1,323	SF	50.00	66,150
Compressed air	13	PT	1,000.00	13,000
Vacuum	13	PT	1,000.00	13,000
Gas	13	PT	1,000.00	13,000
RO/DI	17	PT	1,000.00	17,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,323	SF	5.00	6,615
Domestic water pipework replacement	1,323	SF	5.00	6,615
Water meter, backflow preventers, etc.	1,323	SF	0.25	331
Water heaters and associated tanks and pumps	1,323	SF	2.50	3,308
RO/DI system	1,323	SF	15.00	19,845
Roof and surface water drainage pipework	1,323	SF	4.00	5,292
Trade project requirements	1	LS	22,500.00	22,500

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
HVAC				
HVAC distribution, including 1.0 CFM/SF exhaust air and ventilation, supply and exhaust fans, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,323	SF	100.00	132,300
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,323	SF	25.00	33,075
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,323	SF	10.00	13,230
Machine and equipment power	1,323	SF	12.50	16,538
User convenience power	1,323	SF	15.00	19,845
Lighting and controls	1,323	SF	40.00	52,920
Power specialties	1,323	SF	0.50	662
Low voltage				
Data outlets, conduit and wire	1,323	SF	12.00	15,876
Fire alarm	1,323	SF	7.00	9,261
Security	1,323	SF	6.00	7,938
AV rough-in and infrastructure	1,323	SF	2.00	2,646
Trade project requirements	1	LS	22,500.00	22,500
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**1,323**	**SF**	**965.12**	**1,276,856**
Contingency for Completion of Design	15.00%			191,528
Construction Contingency	5.00%			73,419
Phasing / Temporary Work	3.00%			46,254
General Requirements	5.00%			79,403
General Conditions	8.00%			133,397
Insurances and Bond	2.50%			45,021
Contractor Fee	3.50%			64,606
Escalation to Midpoint (Oct 2027)	14.06%			268,709
	1,323	**SF**	**1,645.00**	**2,179,194**

DIRECTIONAL LOGIC

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Zoology				
Demolition				
Allowance for demolition of existing space	1,323	SF	30.00	39,690
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,323	SF	15.00	19,845
Miscellaneous metals	1,323	SF	8.00	10,584
Rough carpentry	1,323	SF	5.00	6,615
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Interior partitions				
Interior partitions				
Demising	32	LF	350.00	11,200
Corridor	42	LF	350.00	14,700
MEP enclosures and furring	1	LS	5,000.00	5,000
Patch repair walls	42	LF	250.00	10,500
New hollow metal door and frame	3	EA	5,000.00	15,000
Interior finishes				
Allowance for floor prep and leveling	1,323	SF	10.00	13,230
Sealed concrete exposed slab	1,323	SF	5.00	6,615
Robber base	148	LF	10.00	1,480
Epoxy paint	1,702	SF	5.00	8,510
ACT ceiling and bulkheads	1,323	SF	25.00	33,075
Specialties				
Signage	1,323	SF	2.00	2,646
Window shades	1	LS	3,000.00	3,000
Projector screen	1	EA	5,000.00	5,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,323	SF	5.00	6,615
Equipment				
Fumehood, ducted, 6'-0"	1	EA	27,000.00	27,000

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Lab base cabinetry, steel with phenolic resin countertop	48	LF	2,500.00	120,000
Lab bench	6	EA	20,000.00	120,000
Demonstration bench	1	EA	12,500.00	12,500
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	48	LF	1,000.00	48,000
Tall storage	8	LF	5,000.00	40,000
PPR storage	7	LF	4,000.00	28,000
Lab sinks - supply only	3	EA	3,500.00	10,500
Installation of OFCI items	1,323	SF	2.00	2,646
Equipment anchorage and restraints	1,323	SF	1.00	1,323
AV equipment	1,323	SF	8.00	10,584
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	3	EA	7,000.00	21,000
Lab waste and vent system	1,323	SF	50.00	66,150
Compressed air	1	PT	1,000.00	1,000
Vacuum	1	PT	1,000.00	1,000
Gas	1	PT	1,000.00	1,000
Point exhaust	6	EA	1,000.00	6,000
RO/DI	3	PT	1,000.00	3,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,323	SF	5.00	6,615
Domestic water pipework replacement	1,323	SF	5.00	6,615
Water meter, backflow preventers, etc.	1,323	SF	0.25	331
Water heaters and associated tanks and pumps	1,323	SF	2.50	3,308
RO/DI system	1,323	SF	15.00	19,845
Roof and surface water drainage pipework	1,323	SF	4.00	5,292
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	15,000.00	15,000

DIRECTIONAL LOGIC

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
HVAC				
HVAC distribution, including 1.0CFM/SF exhaust air and ventilation, supply and exhaust fans, dedicated venturi exhaust air at each fume hood, sash control at each fume hood, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,323	SF	110.00	145,530
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,323	SF	25.00	33,075
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,323	SF	10.00	13,230
Machine and equipment power	1,323	SF	12.50	16,538
User convenience power	1,323	SF	15.00	19,845
Lighting and controls	1,323	SF	35.00	46,305
Power specialties	1,323	SF	0.50	662
Low voltage				
Data outlets, conduit and wire	1,323	SF	12.00	15,876
Fire alarm	1,323	SF	7.00	9,261
Security	1,323	SF	6.00	7,938
AV rough-in and infrastructure	1,323	SF	2.00	2,646
Trade project requirements	1	LS	20,000.00	20,000
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**1,323**	**SF**	**871.82**	**1,153,418**
Contingency for Completion of Design	15.00%			173,013
Construction Contingency	5.00%			66,322
Phasing / Temporary Work	3.00%			41,783
General Requirements	5.00%			71,727
General Conditions	8.00%			120,501
Insurances and Bond	2.50%			40,669
Contractor Fee	3.50%			58,360
Escalation to Midpoint (Oct 2027)	14.06%			242,732
	1,323	**SF**	**1,490.00**	**1,968,524**

DIRECTIONAL LOGIC

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Classroom - 24 Person				
Demolition				
Allowance for demolition of existing space	1,323	SF	30.00	39,690
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,323	SF	15.00	19,845
Miscellaneous metals	1,323	SF	8.00	10,584
Rough carpentry	1,323	SF	5.00	6,615
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Interior partitions				
Interior partitions				
Demising	32	LF	350.00	11,200
Corridor	42	LF	350.00	14,700
Patch repair walls	42	LF	250.00	10,500
New hollow metal door and frame	3	EA	5,000.00	15,000
Interior finishes				
Allowance for floor prep and leveling	1,323	SF	10.00	13,230
Carpet	1,323	SF	10.00	13,230
Robber base	148	LF	10.00	1,480
Paint	1,702	SF	3.00	5,106
ACT ceiling and bulkheads	1,323	SF	25.00	33,075
Specialties				
Signage	1,323	SF	2.00	2,646
Window shades	1	LS	3,000.00	3,000
Projector screen	1	EA	5,000.00	5,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,323	SF	5.00	6,615
Equipment				
Instructor station	1	EA	12,500.00	12,500
Allowance for casework	7	LF	5,000.00	35,000

DIRECTIONAL LOGIC

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Installation of OFCI items	1,323	SF	1.00	1,323
Equipment anchorage and restraints	1,323	SF	1.00	1,323
AV equipment	1,323	SF	8.00	10,584
Plumbing				
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,323	SF	5.00	6,615
Domestic water pipework replacement	1,323	SF	5.00	6,615
Water meter, backflow preventers, etc.	1,323	SF	0.25	331
Water heaters and associated tanks and pumps	1,323	SF	2.50	3,308
Roof and surface water drainage pipework	1,323	SF	4.00	5,292
Trade project requirements	1	LS	2,500.00	2,500
HVAC				
HVAC distribution, including 1.0 CFM/SF exhaust air and ventilation, supply and exhaust fans, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,323	SF	90.00	119,070
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,323	SF	20.00	26,460
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,323	SF	10.00	13,230
Machine and equipment power	1,323	SF	15.00	19,845
User convenience power	1,323	SF	17.00	22,491
Lighting and controls	1,323	SF	35.00	46,305
Power specialties	1,323	SF	0.50	662
Low voltage				
Data outlets, conduit and wire	1,323	SF	12.00	15,876
Fire alarm	1,323	SF	7.00	9,261
Security	1,323	SF	6.00	7,938
AV rough-in and infrastructure	1,323	SF	2.00	2,646
Trade project requirements	1	LS	20,000.00	20,000
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**1,323**	**SF**	**459.71**	**608,190**

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Contingency for Completion of Design	15.00%			91,228
Construction Contingency	5.00%			34,971
Phasing / Temporary Work	3.00%			22,032
General Requirements	5.00%			37,821
General Conditions	8.00%			63,539
Insurances and Bond	2.50%			21,445
Contractor Fee	3.50%			30,773
Escalation to Midpoint (Oct 2027)	14.06%			127,991
	1,323	**SF**	**785.00**	**1,037,990**
Classroom - 12 Person				
Demolition				
Allowance for demolition of existing space	662	SF	30.00	19,845
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	662	SF	15.00	9,923
Miscellaneous metals	662	SF	8.00	5,292
Rough carpentry	662	SF	5.00	3,308
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Interior partitions				
Interior partitions				
Demising	32	LF	350.00	11,200
Corridor	42	LF	350.00	14,700
Patch repair walls	42	LF	250.00	10,500
New hollow metal door and frame	3	EA	5,000.00	15,000
Interior finishes				
Allowance for floor prep and leveling	662	SF	10.00	6,615
Carpet	662	SF	10.00	6,615
Robber base	148	LF	10.00	1,480
Paint	1,702	SF	3.00	5,106
ACT ceiling and bulkheads	662	SF	25.00	16,538

DIRECTIONAL LOGIC

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Specialties				
Signage	662	SF	2.00	1,323
Window shades	1	LS	2,000.00	2,000
Projector screen	1	EA	5,000.00	5,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	662	SF	5.00	3,308
Equipment				
Instructor station	1	EA	12,500.00	12,500
Allowance for casework	7	LF	5,000.00	35,000
Installation of OFCI items	662	SF	1.00	662
Equipment anchorage and restraints	662	SF	1.00	662
AV equipment	662	SF	8.00	5,292
Plumbing				
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	662	SF	5.00	3,308
Domestic water pipework replacement	662	SF	5.00	3,308
Water meter, backflow preventers, etc.	662	SF	0.25	165
Water heaters and associated tanks and pumps	662	SF	2.50	1,654
Roof and surface water drainage pipework	662	SF	4.00	2,646
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	1,000.00	1,000
HVAC				
HVAC distribution, including 1.0 CFM/SF exhaust air and ventilation, supply and exhaust fans, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	662	SF	90.00	59,535
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	662	SF	20.00	13,230
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	662	SF	10.00	6,615
Machine and equipment power	662	SF	15.00	9,923
User convenience power	662	SF	17.00	11,246

DIRECTIONAL LOGIC

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Lighting and controls	662	SF	35.00	23,153
Power specialties	662	SF	0.50	331
Low voltage				
Data outlets, conduit and wire	662	SF	12.00	7,938
Fire alarm	662	SF	7.00	4,631
Security	662	SF	6.00	3,969
AV rough-in and infrastructure	662	SF	2.00	1,323
Trade project requirements	1	LS	10,000.00	10,000
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**662**	**SF**	**549.26**	**363,338**
Contingency for Completion of Design	15.00%			54,501
Construction Contingency	5.00%			20,892
Phasing / Temporary Work	3.00%			13,162
General Requirements	5.00%			22,595
General Conditions	8.00%			37,959
Insurances and Bond	2.50%			12,811
Contractor Fee	3.50%			18,384
Escalation to Midpoint (Oct 2027)	14.06%			76,463
	662	**SF**	**935.00**	**620,104**
Faculty Office / Break				
Demolition				
Allowance for demolition of existing space	350	SF	30.00	10,500
Allowance for abatement of hazardous materials				*excluded*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	350	SF	15.00	5,250
Miscellaneous metals	350	SF	8.00	2,800
Rough carpentry	350	SF	5.00	1,750
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
Interior partitions				
Interior partitions	42	LF	350.00	14,700
Patch repair walls	20	LF	250.00	5,000
New hollow metal door and frame	2	EA	5,000.00	10,000
Interior finishes				
Allowance for floor prep and leveling	350	SF	10.00	3,500
Carpet	350	SF	10.00	3,500
Robber base	104	LF	10.00	1,040
Paint	1,196	SF	3.00	3,588
ACT ceiling and bulkheads	350	SF	25.00	8,750
Specialties				
Signage	350	SF	2.00	700
Window shades	1	LS	1,000.00	1,000
Whiteboards	1	LS	1,500.00	1,500
Other specialties	350	SF	10.00	3,500
Equipment				
Breakroom casework	7	LF	2,000.00	14,000
Breakroom appliances	1	LS	2,500.00	2,500
Equipment anchorage and restraints	350	SF	0.50	175
AV equipment	350	SF	0.50	175
Plumbing				
Plumbing fixtures				
Breakroom sink	1	EA	3,500.00	3,500
Sanitary waste, vent and service local connection piping	1	FX	4,000.00	4,000
Domestic water pipework	1	FX	4,000.00	4,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	350	SF	5.00	1,750
Domestic water pipework replacement	350	SF	5.00	1,750
Water meter, backflow preventers, etc.	350	SF	0.25	88
Water heaters and associated tanks and pumps	350	SF	2.50	875
Roof and surface water drainage pipework	350	SF	4.00	1,400
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	1,000.00	1,000

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Lab Prototypes

Description	Quantity	Unit	Rate	Total
HVAC				
HVAC distribution, including 1.0 CFM/SF exhaust air and ventilation, supply and exhaust fans, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	350	SF	85.00	29,750
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	350	SF	20.00	7,000
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	350	SF	10.00	3,500
Machine and equipment power	350	SF	15.00	5,250
User convenience power	350	SF	17.00	5,950
Lighting and controls	350	SF	35.00	12,250
Power specialties	350	SF	0.50	175
Low voltage				
Data outlets, conduit and wire	350	SF	12.00	4,200
Fire alarm	350	SF	7.00	2,450
Security	350	SF	6.00	2,100
AV rough-in and infrastructure	350	SF	2.00	700
Trade project requirements	1	LS	5,000.00	5,000
Fire protection				
Fire sprinklers				*not included*
Alternate Cost Before Markups	**350**	**SF**	**544.62**	**190,616**
Contingency for Completion of Design	15.00%			28,592
Construction Contingency	5.00%			10,960
Phasing / Temporary Work	3.00%			6,905
General Requirements	5.00%			11,854
General Conditions	8.00%			19,914
Insurances and Bond	2.50%			6,721
Contractor Fee	3.50%			9,645
Escalation to Midpoint (Oct 2027)	14.06%			40,114
	350	**SF**	**930.00**	**325,321**

DIRECTIONAL LOGIC

Targeted Renovation Scenario

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Targeted Renovation Scenario

	NSF	$/SF	TOTAL $x1,000
Base Scope			
Organic / Inorganic Chemistry 552, 555, 556	3,330	3,030.00	10,082
Corridor H-5-1 Patch Repair	900	250.00	225
All-Gender Restroom Gut Renovation 574	375	1,000.00	375
Zoology 456	1,110	2,060.00	2,286
Anatomy 452	1,110	2,045.00	2,273
Anatomy & Zoology Prep 454	205	3,045.00	624
SRL Suite 453-457	1,843	1,760.00	3,243
Corridor H-4-1 Patch Repair	900	250.00	225
All-Gender Restroom Gut Renovation 474	450	1,000.00	450
Physics Instruction & Prep 370 / 374A	1,700	2,010.00	3,415
Corridor H-3-1 Patch Repair	1,170	250.00	293
All-Gender Restroom Gut Renovation 352/356	480	1,500.00	720
East Stair Handrails and Guardrails	1,200	150.00	180
Roof Replacment (Complete,based on MEP impacts)	18,767	65.00	1,220
New DDC Front End Control System	63,231	50.00	3,162
Asbestos and Hazardous Materials Abatement - Allow	14,773	25.00	369
TOTAL BUILDING CONSTRUCTION	14,773	1,972.54	29,140
Escalation			
Escalation to Start Date (Allowance to Midpoint Assuming Fall 2026 Start Date)	15.00%		4,371
TOTAL ESCALATED CONSTRUCTION COST			**33,511**
Additional Scope			
Physics 467 & 475	2,010	2,000.00	4,015
Corridor H-4-1 Patch Repair	1,420	250.00	355
Asbestos and Hazardous Materials Abatement - Allow	3,430	25.00	86
Escalation to Start Date (Allowance to Midpoint Assuming Fall 2026 Start Date)	15.00%		668
TOTAL ADDITIONAL SCOPE			**5,124**

DIRECTIONAL LOGIC

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
LEVEL 5				
Organic / Inorganic Chemistry 552, 555, 556				
Demolition				
Allowance for selective demolition of existing space	3,330	SF	30.00	99,900
Allowance for abatement of hazardous materials			*see Overall Summary*	
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	3,330	SF	15.00	49,950
Miscellaneous metals	3,330	SF	8.00	26,640
Rough carpentry	3,330	SF	2.00	6,660
Housekeeping pads and curbs	1	LS	30,000.00	30,000
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements			*see Overall Summary*	
Roof replacement			*see Overall Summary*	
Roof modifications for new HVAC equipment	1	LS	150,000.00	150,000
Interior partitions				
Interior partitions				
Demising	51	LF	350.00	17,850
Corridor	38	LF	350.00	13,300
MEP enclosures and furring	1	LS	15,000.00	15,000
Patch repair walls	287	LF	250.00	71,750
New hollow metal door and frame	10	EA	5,000.00	50,000
Interior finishes				
Allowance for floor prep and leveling	3,330	SF	10.00	33,300
Sheet vinyl flooring	3,330	SF	16.00	53,280
Cove base	414	LF	16.00	6,624
Epoxy paint	4,761	SF	5.00	23,805
ACT ceiling and bulkheads	3,330	SF	25.00	83,250
Specialties				
Signage	3,330	SF	2.00	6,660
Window shades	95	LF	150.00	14,250
Projector screen, motorized	3	EA	10,000.00	30,000
Projector mount	3	EA	2,500.00	7,500
Whiteboards	1	LS	15,000.00	15,000
Other specialties	3,330	SF	5.00	16,650

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Equipment				
Fume hood, recirculation, 6'-0"	36	EA	15,000.00	540,000
Chemical fumehood, ducted, 4'-0"	2	EA	20,000.00	40,000
Prep fumehood, ducted, 5'-0"	2	EA	25,000.00	50,000
Prep fumehood, ducted, 6'-0"	2	EA	27,000.00	54,000
Lab base cabinetry, steel with epoxy countertop	422	LF	2,500.00	1,055,000
Instructor station	3	EA	12,500.00	37,500
Lab wall cabinets	40	LF	1,000.00	40,000
Backpack cubbies	12	LF	5,000.00	60,000
Lab sinks - supply only	10	EA	3,500.00	35,000
Cup sinks - supply only	72	EA	1,500.00	108,000
Installation of OFCI items	3,330	SF	2.00	6,660
Equipment anchorage and restraints	3,330	SF	1.00	3,330
AV equipment	3,330	SF	8.00	26,640
Plumbing				
Plumbing fixtures				
Floor drain	3	EA	2,000.00	6,000
Sanitary waste, vent and service local connection piping	3	FX	3,500.00	10,500
Domestic water pipework	3	FX	3,500.00	10,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash station	3	EA	10,000.00	30,000
Institutional fixtures installation and local connection				
Lab sink	10	EA	7,000.00	70,000
Cup sink	72	EA	6,500.00	468,000
Lab waste and vent system	3,330	SF	50.00	166,500
Compressed air	72	PT	1,000.00	72,000
Vacuum	78	PT	1,000.00	78,000
Gas	78	PT	1,000.00	78,000
RO/DI	12	PT	1,000.00	12,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	3,330	SF	5.00	16,650
Domestic water pipework replacement	3,330	SF	5.00	16,650
Water meter, backflow preventers, etc.	3,330	SF	0.25	833
Water heaters and associated tanks and pumps	3,330	SF	2.50	8,325
RO/DI system	3,330	SF	15.00	49,950
Roof and surface water drainage pipework	3,330	SF	4.00	13,320
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	110,000.00	110,000

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
HVAC				
HVAC distribution, including 7.6CFM/SF exhaust air and ventilation, 33,000CFM roof mounted AHU, CW&HHW loop connection, (6 10,000CFM supply and exhaust fans, dedicated venturi exhaust air at each fume hood, sash control at each fume hood, variable volume, pressure independent terminal boxes, new BMS controls, testing, balancing and commissioning	3,330	SF	600.00	1,998,000
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	3,330	SF	50.00	166,500
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	3,330	SF	10.00	33,300
Machine and equipment power	3,330	SF	25.00	83,250
User convenience power	3,330	SF	15.00	49,950
Lighting and controls	3,330	SF	35.00	116,550
Power specialties	3,330	SF	0.50	1,665
Low voltage				
Data outlets, conduit and wire	3,330	SF	12.00	39,960
Fire alarm	3,330	SF	7.00	23,310
Security	3,330	SF	6.00	19,980
AV rough-in and infrastructure	3,330	SF	2.00	6,660
Trade project requirements	1	LS	67,500.00	67,500
Fire protection				
Fire sprinkler modifications	3,330	SF	11.00	36,630
Construction Cost Before Markups	**3,330**	**SF**	**2,023.42**	**6,737,982**
Contingency for Completion of Design	15.00%			1,010,697
Construction Contingency	5.00%			387,434
Phasing / Temporary Work	3.00%			244,083
General Requirements	5.00%			419,010
General Conditions	8.00%			703,936
Insurances and Bond	2.50%			237,579
Contractor Fee	3.50%			340,925
Escalation to Midpoint (Oct 2027)				*see Overall Summary*
	3,330	**SF**	**3,030.00**	**10,081,646**

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
LEVEL 4				
Zoology 456				
Demolition				
Allowance for selective demolition of existing space	1,110	SF	30.00	33,300
Allowance for abatement of hazardous materials				*see Overall Summary*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,110	SF	15.00	16,650
Miscellaneous metals	1,110	SF	8.00	8,880
Rough carpentry	1,110	SF	5.00	5,550
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*see Overall Summary*
Roof replacement				*see Overall Summary*
Interior partitions				
Interior partitions				
Demising				*existing to remain*
Corridor				*existing to remain*
MEP enclosures and furring	1	LS	5,000.00	5,000
Patch repair walls	138	LF	250.00	34,500
New hollow metal door and frame	2	EA	5,000.00	10,000
Interior finishes				
Allowance for floor prep and leveling	1,110	SF	10.00	11,100
Sealed concrete exposed slab	1,110	SF	5.00	5,550
Robber base	138	LF	10.00	1,380
Epoxy paint	1,587	SF	5.00	7,935
ACT ceiling and bulkheads	1,110	SF	25.00	27,750
Specialties				
Signage	1,110	SF	2.00	2,220
Window shades	33	LF	250.00	8,250
Projector screen, motorized	1	EA	10,000.00	10,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,110	SF	5.00	5,550
Equipment				

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Point exhaust snorkels, ducted	14	EA	10,000.00	140,000
Lab base cabinetry, steel with phenolic resin countertop	100	LF	2,500.00	250,000
Student bench	7	EA	25,000.00	175,000
Demonstration bench	12	EA	2,500.00	30,000
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	41	LF	1,000.00	41,000
Tall storage	9	LF	5,000.00	45,000
Lab sinks - supply only	2	EA	3,500.00	7,000
Installation of OFCI items	1,110	SF	2.00	2,220
Equipment anchorage and restraints	1,110	SF	1.00	1,110
AV equipment	1,110	SF	8.00	8,880
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	2	EA	7,000.00	14,000
Lab waste and vent system	1,110	SF	50.00	55,500
Compressed air				*not required*
Vacuum				*not required*
Gas				*not required*
Point exhaust	2	EA	1,000.00	2,000
RO/DI				*not required*
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,110	SF	5.00	5,550
Domestic water pipework replacement	1,110	SF	5.00	5,550
Water meter, backflow preventers, etc.	1,110	SF	0.25	278
Water heaters and associated tanks and pumps	1,110	SF	2.50	2,775
RO/DI system				*not required*
Roof and surface water drainage pipework	1,110	SF	4.00	4,440
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	10,000.00	10,000
HVAC				

DIRECTIONAL LOGIC

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
HVAC distribution, including 1.7CFM/SF exhaust air and ventilation, supply and exhaust fans, reconfigure existing low wall exhaust, provide 100CFM downdraft slot exhaust at each bench, variable volume, pressure independent terminal boxes, new BMS controls, testing, balancing and commissioning	1,110	SF	300.00	333,000
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,110	SF	25.00	27,750
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,110	SF	10.00	11,100
Machine and equipment power	1,110	SF	12.50	13,875
User convenience power	1,110	SF	15.00	16,650
Lighting and controls	1,110	SF	35.00	38,850
Power specialties	1,110	SF	0.50	555
Low voltage				
Data outlets, conduit and wire	1,110	SF	12.00	13,320
Fire alarm	1,110	SF	7.00	7,770
Security	1,110	SF	6.00	6,660
AV rough-in and infrastructure	1,110	SF	2.00	2,220
Trade project requirements	1	LS	17,500.00	17,500
Fire protection				
Fire sprinklers	1,110	SF	11.00	12,210
Construction Cost Before Markups	**1,110**	**SF**	**1,376.47**	**1,527,878**
Contingency for Completion of Design	15.00%			229,182
Construction Contingency	5.00%			87,853
Phasing / Temporary Work	3.00%			55,347
General Requirements	5.00%			95,013
General Conditions	8.00%			159,622
Insurances and Bond	2.50%			53,872
Contractor Fee	3.50%			77,307
Escalation to Midpoint (Oct 2027)				*see Overall Summary*
	1,110	**SF**	**2,060.00**	**2,286,073**

DIRECTIONAL LOGIC

Cal Poly Humboldt
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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Anatomy 452				
Demolition				
Allowance for selective demolition of existing space	1,110	SF	30.00	33,300
Allowance for abatement of hazardous materials				*see Overall Summary*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,110	SF	15.00	16,650
Miscellaneous metals	1,110	SF	8.00	8,880
Rough carpentry	1,110	SF	5.00	5,550
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*see Overall Summary*
Roof replacement				*see Overall Summary*
Interior partitions				
Interior partitions				
Demising				*existing to remain*
Corridor				*existing to remain*
MEP enclosures and furring	1	LS	5,000.00	5,000
Patch repair walls	138	LF	250.00	34,500
New hollow metal door and frame	2	EA	5,000.00	10,000
Interior finishes				
Allowance for floor prep and leveling	1,110	SF	10.00	11,100
Sealed concrete exposed slab	1,110	SF	5.00	5,550
Robber base	138	LF	10.00	1,380
Epoxy paint	1,587	SF	5.00	7,935
ACT ceiling and bulkheads	1,110	SF	25.00	27,750
Specialties				
Signage	1,110	SF	2.00	2,220
Window shades	33	LF	250.00	8,250
Projector screen, motorized	1	EA	10,000.00	10,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,110	SF	5.00	5,550

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Equipment				
Point exhaust snorkels, ducted	14	EA	10,000.00	140,000
Lab base cabinetry, steel with phenolic resin countertop	90	LF	2,500.00	225,000
Student bench	8	EA	25,000.00	200,000
Demonstration bench	6	EA	2,500.00	15,000
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	92	LF	1,000.00	92,000
Tall storage				*none shown*
Lab sinks - supply only	2	EA	3,500.00	7,000
Installation of OFCI items	1,110	SF	2.00	2,220
Equipment anchorage and restraints	1,110	SF	1.00	1,110
AV equipment	1,110	SF	8.00	8,880
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	2	EA	7,000.00	14,000
Lab waste and vent system	1,110	SF	50.00	55,500
Compressed air				*not required*
Vacuum				*not required*
Gas				*not required*
Point exhaust	2	EA	1,000.00	2,000
RO/DI				*not required*
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,110	SF	5.00	5,550
Domestic water pipework replacement	1,110	SF	5.00	5,550
Water meter, backflow preventers, etc.	1,110	SF	0.25	278
Water heaters and associated tanks and pumps	1,110	SF	2.50	2,775
RO/DI system				*not required*
Roof and surface water drainage pipework	1,110	SF	4.00	4,440
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	10,000.00	10,000

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
HVAC				
HVAC distribution, including 1.7CFM/SF exhaust air and ventilation, supply and exhaust fans, reconfigure existing low wall exhaust, provide 100CFM downdraft slot exhaust at each bench, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,110	SF	300.00	333,000
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,110	SF	25.00	27,750
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,110	SF	10.00	11,100
Machine and equipment power	1,110	SF	12.50	13,875
User convenience power	1,110	SF	15.00	16,650
Lighting and controls	1,110	SF	35.00	38,850
Power specialties	1,110	SF	0.50	555
Low voltage				
Data outlets, conduit and wire	1,110	SF	12.00	13,320
Fire alarm	1,110	SF	7.00	7,770
Security	1,110	SF	6.00	6,660
AV rough-in and infrastructure	1,110	SF	2.00	2,220
Trade project requirements	1	LS	17,500.00	17,500
Fire protection				
Fire sprinklers	1,110	SF	11.00	12,210
Construction Cost Before Markups	**1,110**	**SF**	**1,368.36**	**1,518,878**
Contingency for Completion of Design	15.00%			227,832
Construction Contingency	5.00%			87,335
Phasing / Temporary Work	3.00%			55,021
General Requirements	5.00%			94,453
General Conditions	8.00%			158,682
Insurances and Bond	2.50%			53,555
Contractor Fee	3.50%			76,851
Escalation to Midpoint (Oct 2027)				*see Overall Summary*
	1,110	**SF**	**2,045.00**	**2,272,607**

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Anatomy & Zoology Prep 454				
Demolition				
Allowance for selective demolition of existing space	205	SF	30.00	6,150
Allowance for abatement of hazardous materials			*see Overall Summary*	
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	205	SF	15.00	3,075
Miscellaneous metals	205	SF	8.00	1,640
Rough carpentry	205	SF	5.00	1,025
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements			*see Overall Summary*	
Roof replacement			*see Overall Summary*	
Interior partitions				
Interior partitions				
Demising			*existing to remain*	
Corridor			*existing to remain*	
Patch repair walls	60	LF	250.00	15,000
New hollow metal door and frame	4	EA	5,000.00	20,000
Interior finishes				
Allowance for floor prep and leveling	205	SF	10.00	2,050
Sealed concrete exposed slab	205	SF	5.00	1,025
Robber base	60	LF	10.00	600
Epoxy paint	690	SF	5.00	3,450
ACT ceiling and bulkheads	205	SF	25.00	5,125
Specialties				
Signage	205	SF	2.00	410
Other specialties	205	SF	5.00	1,025
Equipment				
Lab base cabinetry, steel with phenolic resin countertop	10	LF	2,500.00	25,000
Lab wall cabinets	10	LF	1,000.00	10,000
Tall storage	30	LF	5,000.00	150,000
Lab sinks - supply only	1	EA	3,500.00	3,500
Installation of OFCI items	205	SF	2.00	410
Equipment anchorage and restraints	205	SF	1.00	205

DIRECTIONAL LOGIC

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Plumbing				
Plumbing fixtures				
Floor drain	1	EA	2,000.00	2,000
Sanitary waste, vent and service local connection piping	1	FX	3,500.00	3,500
Domestic water pipework	1	FX	3,500.00	3,500
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab sink	1	EA	7,000.00	7,000
Lab waste and vent system	205	SF	50.00	10,250
Compressed air				*not required*
Vacuum				*not required*
Gas				*not required*
Point exhaust				*not required*
RO/DI				*not required*
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	205	SF	5.00	1,025
Domestic water pipework replacement	205	SF	5.00	1,025
Water meter, backflow preventers, etc.	205	SF	0.25	51
Water heaters and associated tanks and pumps	205	SF	2.50	513
RO/DI system				*not required*
Roof and surface water drainage pipework	205	SF	4.00	820
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	2,500.00	2,500
HVAC				
HVAC distribution, including 1.0CFM/SF exhaust air and ventilation, supply and exhaust fans, dedicated venturi exhaust air at each fume hood, sash control at each fume hood, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	205	SF	500.00	102,500
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	205	SF	20.00	4,100
PV and BESS systems				*excluded*
Emergency power generation				*excluded*

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Emergency power distribution	205	SF	10.00	2,050
Machine and equipment power	205	SF	12.50	2,563
User convenience power	205	SF	15.00	3,075
Lighting and controls	205	SF	35.00	7,175
Power specialties	205	SF	0.50	103
Low voltage				
Data outlets, conduit and wire	205	SF	12.00	2,460
Fire alarm	205	SF	7.00	1,435
Security	205	SF	6.00	1,230
AV rough-in and infrastructure	205	SF	2.00	410
Trade project requirements	1	LS	2,500.00	2,500
Fire protection				
Fire sprinklers	205	SF	11.00	2,255
Construction Cost Before Markups	**205**	**SF**	**2,035.26**	**417,229**
Contingency for Completion of Design	15.00%			62,584
Construction Contingency	5.00%			23,991
Phasing / Temporary Work	3.00%			15,114
General Requirements	5.00%			25,946
General Conditions	8.00%			43,589
Insurances and Bond	2.50%			14,711
Contractor Fee	3.50%			21,111
Escalation to Midpoint (Oct 2027)				*see Overall Summary*
	205	**SF**	**3,045.00**	**624,275**
SRL Suite 453-457				
Demolition				
Allowance for selective demolition of existing space	1,843	SF	30.00	55,290
Allowance for abatement of hazardous materials				*see Overall Summary*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,843	SF	15.00	27,645
Miscellaneous metals	1,843	SF	8.00	14,744
Rough carpentry	1,843	SF	5.00	9,215
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
ADA improvements				*see Overall Summary*
Roof replacement				*see Overall Summary*
Interior partitions				
Interior partitions				
Demising	55	LF	350.00	19,250
Corridor				*existing to remain*
Patch repair walls	470	LF	250.00	117,500
New hollow metal door and frame	12	EA	5,000.00	60,000
Clean room door	1	EA	25,000.00	25,000
Interior finishes				
Allowance for floor prep and leveling	1,843	SF	10.00	18,430
Sheet vinyl	1,843	SF	16.00	29,488
Robber base	470	LF	10.00	4,700
Epoxy paint	5,405	SF	5.00	27,025
ACT ceiling and bulkheads	1,843	SF	25.00	46,075
Specialties				
Signage	1,843	SF	2.00	3,686
Window shades	66	LF	250.00	16,500
Projector screen, motorized	1	EA	10,000.00	10,000
Projector mount	1	EA	2,500.00	2,500
Whiteboards	1	LS	5,000.00	5,000
Other specialties	1,843	SF	5.00	9,215
Equipment				
Biosafety cabinet, A2, Non-vented				
4'-0"	4	EA	12,000.00	48,000
6'-0"	1	EA	12,000.00	12,000
Chemical cabinets	2	EA	7,500.00	15,000
Lab base cabinetry, steel with phenolic resin countertop	71	LF	2,500.00	177,500
Student benches	10	EA	15,000.00	150,000
Demonstration bench	6	LF	2,500.00	15,000
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	8	LF	1,000.00	8,000
Tall storage				*none shown*
Lab sinks - supply only	10	EA	3,500.00	35,000
Demonstration bench sink	1	EA	3,000.00	3,000
Bench sinks	6	EA	3,000.00	18,000
Installation of OFCI items	1,843	SF	2.00	3,686

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Equipment anchorage and restraints	1,843	SF	1.00	1,843
AV equipment	1,843	SF	8.00	14,744
Plumbing				
Plumbing fixtures				
Floor drain	2	EA	2,000.00	4,000
Sanitary waste, vent and service local connection piping	2	FX	3,500.00	7,000
Domestic water pipework	2	FX	3,500.00	7,000
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	2	EA	3,500.00	7,000
Institutional fixtures installation and local connection				
Lab sink	1	EA	7,000.00	7,000
Bench / cup sinks	7	EA	6,500.00	45,500
Lab waste and vent system	1,843	SF	50.00	92,150
Compressed air	15	PT	1,000.00	15,000
Vacuum	15	PT	1,000.00	15,000
Gas	15	PT	1,000.00	15,000
RO/DI	15	PT	1,000.00	15,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,843	SF	5.00	9,215
Domestic water pipework replacement	1,843	SF	5.00	9,215
Water meter, backflow preventers, etc.	1,843	SF	0.25	461
Water heaters and associated tanks and pumps	1,843	SF	2.50	4,608
RO/DI system	1,843	SF	15.00	27,645
Roof and surface water drainage pipework	1,843	SF	4.00	7,372
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	30,000.00	30,000
HVAC				
HVAC distribution, including 1.0 CFM/SF exhaust air and ventilation, supply and exhaust fans, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,843	SF	300.00	552,900
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,843	SF	20.00	36,860
PV and BESS systems				*excluded*

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Description	Quantity	Unit	Rate	Total
Emergency power generation				*excluded*
Emergency power distribution	1,843	SF	10.00	18,430
Machine and equipment power	1,843	SF	12.50	23,038
User convenience power	1,843	SF	15.00	27,645
Lighting and controls	1,843	SF	40.00	73,720
Power specialties	1,843	SF	0.50	922
Low voltage				
Data outlets, conduit and wire	1,843	SF	12.00	22,116
Fire alarm	1,843	SF	7.00	12,901
Security	1,843	SF	6.00	11,058
AV rough-in and infrastructure	1,843	SF	2.00	3,686
Trade project requirements	1	LS	30,000.00	30,000
Fire protection				
Fire sprinklers	1,843	SF	11.00	20,273
Construction Cost Before Markups	**1,843**	**SF**	**1,175.94**	**2,167,249**
Contingency for Completion of Design	15.00%			325,087
Construction Contingency	5.00%			124,617
Phasing / Temporary Work	3.00%			78,509
General Requirements	5.00%			134,773
General Conditions	8.00%			226,419
Insurances and Bond	2.50%			76,416
Contractor Fee	3.50%			109,657
Escalation to Midpoint (Oct 2027)				*see Overall Summary*
	1,843	**SF**	**1,760.00**	**3,242,728**
Physics Instruction & Prep 370 / 374A				
Demolition				
Allowance for selective demolition of existing space	1,700	SF	30.00	51,000
Allowance for abatement of hazardous materials				*see Overall Summary*
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	1,700	SF	15.00	25,500
Miscellaneous metals	1,700	SF	8.00	13,600
Rough carpentry	1,700	SF	5.00	8,500

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Description	Quantity	Unit	Rate	Total
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*see Overall Summary*
Roof replacement				*see Overall Summary*
Interior partitions				
Interior partitions				
Demising				*existing to remain*
Corridor	8	LF	500.00	4,000
MEP enclosures and furring	1	LS	5,000.00	5,000
Patch repair walls	235	LF	250.00	58,750
New hollow metal door and frame	6	EA	5,000.00	30,000
Interior finishes				
Allowance for floor prep and leveling	1,700	SF	10.00	17,000
Carpet	1,700	SF	10.00	17,000
Robber base	235	LF	10.00	2,350
Paint	2,703	SF	3.00	8,108
ACT ceiling and bulkheads	1,700	SF	25.00	42,500
Specialties				
Signage	1,700	SF	2.00	3,400
Window shades	60	LF	250.00	15,000
Projector screen, motorized	2	EA	10,000.00	20,000
Projector mount	2	EA	2,500.00	5,000
Whiteboards	1	LS	10,000.00	10,000
Other specialties	1,700	SF	5.00	8,500
Equipment				
Lab base cabinetry	78	LF	2,500.00	195,000
Student benches	3	EA	70,000.00	210,000
Equipment bench	3	EA	70,000.00	210,000
Demonstration bench	1	EA	12,500.00	12,500
Instructor station	1	EA	12,500.00	12,500
Lab wall cabinets	30	LF	1,000.00	30,000
Tall cabinets	14	LF	5,000.00	70,000
Prep base cabinets	46	LF	2,500.00	115,000
Prep wall cabinets	46	LF	1,000.00	46,000
Lab sinks - supply only	1	EA	3,500.00	3,500
Prep sinks - supply only	1	EA	3,500.00	3,500
Demonstration bench sink	1	EA	3,000.00	3,000

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Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
Unistrut framing	1	LS	50,000.00	50,000
Snorkel exhaust	2	EA	5,000.00	10,000
Installation of OFCI items	1,700	SF	2.00	3,400
Equipment anchorage and restraints	1,700	SF	1.00	1,700
AV equipment	1,700	SF	8.00	13,600
Plumbing				
Plumbing fixtures				
Floor drain	2	EA	2,000.00	4,000
Sanitary waste, vent and service local connection piping	2	FX	3,500.00	7,000
Domestic water pipework	2	FX	3,500.00	7,000
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	1	EA	3,500.00	3,500
Institutional fixtures installation and local connection				
Lab and prep sinks	3	EA	7,000.00	21,000
Lab waste and vent system	1,700	SF	50.00	85,000
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	1,700	SF	5.00	8,500
Domestic water pipework replacement	1,700	SF	5.00	8,500
Water meter, backflow preventers, etc.	1,700	SF	0.25	425
Water heaters and associated tanks and pumps	1,700	SF	2.50	4,250
Roof and surface water drainage pipework	1,700	SF	4.00	6,800
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	15,000.00	15,000
HVAC				
HVAC distribution, including 1.0 CFM/SF exhaust air and ventilation, supply and exhaust fans, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	1,700	SF	300.00	510,000
Main equipment and infrastructure				*excluded*
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	1,700	SF	25.00	42,500
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	1,700	SF	10.00	17,000
Machine and equipment power	1,700	SF	15.00	25,500

DIRECTIONAL LOGIC

Cal Poly Humboldt
Science Complex ABCD
Feasibility Cost Plan
January 20, 2025

Targeted Renovation Scenario

Description	Quantity	Unit	Rate	Total
User convenience power	1,700	SF	17.00	28,900
Lighting and controls	1,700	SF	35.00	59,500
Power specialties	1,700	SF	0.50	850
Low voltage				
Data outlets, conduit and wire	1,700	SF	12.00	20,400
Fire alarm	1,700	SF	7.00	11,900
Security	1,700	SF	6.00	10,200
AV rough-in and infrastructure	1,700	SF	2.00	3,400
Trade project requirements	1	LS	27,500.00	27,500
Fire protection				
Fire sprinklers	1,700	SF	11.00	18,700
Construction Cost Before Markups	**1,700**	**SF**	**1,342.49**	**2,282,233**
Contingency for Completion of Design	15.00%			342,335
Construction Contingency	5.00%			131,228
Phasing / Temporary Work	3.00%			82,674
General Requirements	5.00%			141,923
General Conditions	8.00%			238,431
Insurances and Bond	2.50%			80,471
Contractor Fee	3.50%			115,475
Escalation to Midpoint (Oct 2027)				*see Overall Summary*
	1,700	**SF**	**2,010.00**	**3,414,770**

DIRECTIONAL LOGIC

Cal Poly Humboldt
Science Complex ABCD
Feasibility Cost Plan
January 20, 2025

Targeted Renovation Add Alternate

Description	Quantity	Unit	Rate	Total
LEVEL 4				
Physics 467 & 475				
Demolition				
Allowance for demolition of existing space	2,010	SF	30.00	60,300
Allowance for abatement of hazardous materials			*see Overall Summary*	
Floor and roof structure				
Miscellaneous patch repair of slab and infill of openings	2,010	SF	15.00	30,150
Miscellaneous metals	2,010	SF	8.00	16,080
Rough carpentry	2,010	SF	5.00	10,050
Exterior enclosure				
Improvements to existing exterior cladding				*excluded*
ADA improvements				*excluded*
Roof replacement				*excluded*
Interior partitions				
Interior partitions				
Demising				*existing to remain*
Corridor				*existing to remain*
Patch repair walls	510	LF	250.00	127,500
New hollow metal door and frame	6	EA	5,000.00	30,000
Interior finishes				
Allowance for floor prep and leveling	2,010	SF	10.00	20,100
Carpet	2,010	SF	10.00	20,100
Robber base	510	LF	10.00	5,100
Paint	5,865	SF	3.00	17,595
ACT ceiling and bulkheads	2,010	SF	25.00	50,250
Specialties				
Signage	2,010	SF	2.00	4,020
Window shades	50	LF	250.00	12,500
Projector screen, motorized	2	EA	10,000.00	20,000
Projector mount	2	EA	2,500.00	5,000
Whiteboards	1	LS	10,000.00	10,000
Other specialties	2,010	SF	5.00	10,050
Equipment				
Lab base cabinetry, steel with epoxy countertop	156	LF	2,500.00	390,000
Student beches	6	EA	70,000.00	420,000

DIRECTIONAL LOGIC

Cal Poly Humboldt
Science Complex ABCD
Feasibility Cost Plan
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Targeted Renovation Add Alternate

Description	Quantity	Unit	Rate	Total
Demonstration bench	2	EA	12,500.00	25,000
Instructor station	2	EA	12,500.00	25,000
Lab wall cabinets	90	LF	1,000.00	90,000
Backpack cubbies	14	LF	5,000.00	70,000
Lab sinks - supply only	4	EA	3,500.00	14,000
Demonstration bench sink	2	EA	3,000.00	6,000
Unistrut framing	12	EA	5,000.00	60,000
Installation of OFCI items	2,010	SF	2.00	4,020
Equipment anchorage and restraints	2,010	SF	1.00	2,010
AV equipment	2,010	SF	8.00	16,080
Plumbing				
Plumbing fixtures				
Floor drain	2	EA	2,000.00	4,000
Sanitary waste, vent and service local connection piping	2	FX	3,500.00	7,000
Domestic water pipework	2	FX	3,500.00	7,000
Institutional fixtures and service piping				
Emergency Shower / Eyewash stations; allow	2	EA	3,500.00	7,000
Institutional fixtures installation and local connection				
Lab sink	4	EA	7,000.00	28,000
Lab waste and vent system	2,010	SF	50.00	100,500
Apportioned infrastructure costs				
Sanitary waste, vent and service piping replacement	2,010	SF	5.00	10,050
Domestic water pipework replacement	2,010	SF	5.00	10,050
Water meter, backflow preventers, etc.	2,010	SF	0.25	503
Water heaters and associated tanks and pumps	2,010	SF	2.50	5,025
Roof and surface water drainage pipework	2,010	SF	4.00	8,040
Trade project requirements, testing and sterilization, seismic bracing, etc.	1	LS	17,500.00	17,500
HVAC				
HVAC distribution, including 1.0 CFM/SF exhaust air and ventilation, supply and exhaust fans, variable volume, pressure independent terminal boxes, BMS controls, testing, balancing and commissioning	2,010	SF	300.00	603,000
Main equipment and infrastructure				*excluded*

DIRECTIONAL LOGIC

Cal Poly Humboldt
Science Complex ABCD
Feasibility Cost Plan
January 20, 2025

Targeted Renovation Add Alternate

Description	Quantity	Unit	Rate	Total
Electrical				
Main power equipment switchboard, transformer, etc.				*excluded*
Main power distribution, panelboards, feeders	2,010	SF	20.00	40,200
PV and BESS systems				*excluded*
Emergency power generation				*excluded*
Emergency power distribution	2,010	SF	10.00	20,100
Machine and equipment power	2,010	SF	15.00	30,150
User convenience power	2,010	SF	17.00	34,170
Lighting and controls	2,010	SF	35.00	70,350
Power specialties	2,010	SF	0.50	1,005
Low voltage				
Data outlets, conduit and wire	2,010	SF	12.00	24,120
Fire alarm	2,010	SF	7.00	14,070
Security	2,010	SF	6.00	12,060
AV rough-in and infrastructure	2,010	SF	2.00	4,020
Trade project requirements	1	LS	32,500.00	32,500
Fire protection				
Fire sprinklers	2,010	SF	11.00	22,110
Alternate Cost Before Markups	**2,010**	**SF**	**1,335.04**	**2,683,428**
Contingency for Completion of Design	15.00%			402,514
Construction Contingency	5.00%			154,297
Phasing / Temporary Work	3.00%			97,207
General Requirements	5.00%			166,872
General Conditions	8.00%			280,345
Insurances and Bond	2.50%			94,617
Contractor Fee	3.50%			135,775
Escalation to Midpoint (Oct 2027)				*see Overall Summary*
	2,010	**SF**	**2,000.00**	**4,015,055**

DIRECTIONAL LOGIC