Montgomery College

Catherine and Isiah Leggett Math and Science Building
Takoma Park / Silver Spring Campus

SCHEMATIC DESIGN MANUAL

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SMITHGROUP

PROJECT TEAM

OWNER
Montgomery College
9221 Corporate Boulevard
Rockville, MD 20850
Project Manager Sandra Filippi

ARCHITECT, M/E/P/FP ENGINEERS, LAB PLANNING
SmithGroup
1700 New York Avenue, N.W., Suite 100
Washington, DC 20006
202-842-2100
Project Manager Kevin Johnson

CIVIL ENGINEER
AMT Engineering
800 King Farm Boulevard, 4th Floor
Rockville, MD 20850
301-881-2545
Project Manager Mike Wychulis

LANDSCAPE ARCHITECT
Mahan Rykiel
3300 Clipper Mill Road, Suite 200
Baltimore, MD 21211
410-235-6001
Project Manager Steve Kelly

STRUCTURAL ENGINEER
Cagley & Associates
6141 Executive Boulevard
Rockville, MD 20852
301-881-9050
Project Manager Daniel Camp

AV, IT, SECURITY
Spexsys
7257 Parkway Drive, Suite 260
Hanover, MD 21076
410-712-0390
Project Manager Jeff Cohen

ACOUSTICS
Acoustical Design Collaborative
410-821-5930
Project Manager Neil Shade

DOOR HARDWARE
Erbschloe Consulting Services
7820 Carters Run Drive
Marshall, VA 20115
540-351-0553
Project Manager Frank Erbshcloe

ELEVATORS
Vertran
14 Oak Court
Annapolis, MD 21401
410-571-0001
Project Manager Andrew Guest

SPECIALTY LIGHTING
MCLA
1000 Potomac Street NW Suite 121
Washington, DC 20007
202-298-8062
Project Manager Scott Guenther

SIGNAGE
Patricia Hord Graphik Design
119 South Saint Asaph Street
Alexandria, VA 22314
703-549-0857
Project Manager Patricia Hord

PLANETARIUM
Bowen Technovation
7999 East 88th Street
Indianapolis, IN 46256
317-863-0525
Project Manager Jeff Bowen

AIR ENTRAINMENT
RWDI
600 Southgate Drive, Guelph
ON N1G 4P6 Canada
519-823-1311
Project Manager Analene Belanger

GREENHOUSE
Winandy Greenhouse Company
2211 Peacock Rd
Richmond, IN 47374
765-935-2111
Project Manager Michael Doherty

GEOTECHNICAL
Schnabel
9800 Jeb Stuart Parkway Suite 200
Glen Allen VA 23059
804-264-3222
Project Manager Bill Khouri

ESTIMATING
Forella Group LLC
9495 Silver King Court, Suite A
Fairfax, Virginia 22031
703-560-2200
Project Manager Israel Aguero

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Project Overview

The new 3-level 134,600 gross square foot (GSF) Catherine and Isiah Leggett Math and Science Building, “Leggett Building” is the first proposed facility to be constructed as part of the Approved and adopted Montgomery College 2013-2023 Facilities Master Plan on the Takoma Park/Silver Spring Campus. The new facility will increase the space available for math and science programs. The project is planned to be completed in one phase and consolidate and support planned ten-year enrollment and employee growth in science and math academic programs. When completed, the new facility will deliver state of the art laboratories, classrooms, a combined Math and Science Learning Center, planetarium, greenhouse, study spaces, offices, and other support facilities traditional to academic math and science buildings on community college campuses. The project is to be constructed in one phase and seeking LEED Silver Certification.

Site Context and Existing Conditions

Montgomery College was founded in 1946, and the Silver Spring/Takoma Park Campus was established in 1950. The campus expanded into Silver Spring and in the early 2000’s the campus name was changed to the Takoma Park/Silver Spring Campus. The Silver Spring/ Takoma Park Campus is divided by the CSX/WMATA railroad track right-of-ways into east campus and west campus. The pedestrian bridge connects to two campuses and provide easy access to the Jesup Blair Park.

The proposed Leggett Building will be located on southern end the east campus. The east campus is set amid a single-family residential neighborhood of Takoma Park, consisting of mixture of small and large gable roof houses. The existing east campus buildings includes Charlene R. Nunley Student Services Center – built in 2006, North Pavilion – 1975, Math Pavilion – 1975, Resource Center – 1959, Science North – 1978, Science South – 1962 and renovated in 1974 Renovation, Falcon Hall – 1976, Catherine F. Scott Commons – 1975 Phase 1, 1978 Phase 2, and renovation in 2010.

The existing campus buildings with steep sloped roofs are organized around open exterior “corridors” along a park-like spaces running through the center of the campus. Their use of outdoor circulation encourage interaction in the small quad-like courtyard spaces, however the campus lacks a larger organizing quad space for outdoor learning and informal space for interaction with other students.

Buildings to be Demolished

Falcon Hall and Science South will be demolished to provide for the new Leggett Building. Additionally, two outdoor tennis courts are located adjacent to the building that will be demolished. Falcon Hall currently houses the Physical Education Department and includes a gymnasium, a pool, locker rooms, a classroom and racquetball courts. Falcon Hall is generally in poor condition and has a substantial deferred maintenance backlog. Science South houses the Mathematics Interactive Computing Laboratory, biology and physical science departments and laboratories, faculty offices, and a greenhouse. The facility is deficient in providing enough laboratory and laboratory prep space, elevators do not service all floors, classrooms are under-sized and not configured or equipped to provide flexibility for desired teaching pedagogy or support group learning and there is insufficient storage space. The building is in very poor condition and has a substantial deferred maintenance backlog.

Montgomery College Project Design Directives

College President, Dr. DeRionne P. Pollard established the following directives when the current project site was selected as a response to issues important to neighbors expressed during the 2017 Community Conversations discussions. They are listed below in bold, with how the proposed design meets or exceeds each directive:

Directive 1: Keep the current setback of Falcon Hall off of Takoma Avenue
The building sits back between 160' and 260' from Takoma Avenue, where the historic border is shared. This is 50' beyond the existing face of the Falcon Hall building.

Directive 2: Ensure height is no more than two stories along Takoma Avenue
The building ranges between one and two stories along Takoma Avenue, starting 50' farther back than what had been committed for a setback in directive 1. This is more relatable to the immediate homes that are part of the historic district.

Directive 3: Minimize windows along Takoma Avenue
The building mass is broken down and the placement of the planetarium on Takoma provides a large mass with no windows on Takoma Avenue. The other elevation closest to Takoma Avenue has punched windows rather than a glass curtain wall.

Directive 4: Protect park-like green space along Takoma Avenue
The green space is increased by reducing parking by about 50%, providing a greater buffer between the historic district and the replacement facility.

Directive 5: Locate height and rooftop units away from Takoma Avenue.
The rooftop units start between 250' and 260' from Takoma Avenue, with exhaust stacks starting 350' from Takoma Avenue and 400' away from New York Avenue as currently designed.

Directive 6: Maximize building width to lower height
The mechanical rooftop screen wall starts between 250' and 260' from Takoma Avenue, with exhaust stacks starting 350' from Takoma Avenue and 400' away from New York Avenue as currently designed. The proposed replacement facility, while larger than the existing Science North and Falcon Hall, maintains heights that are comparable to adjacent Science North and the Resource Center.

Directive 7: Take advantage of topography to minimize perceived height
Approximately 50% of the lowest floor is buried into the slope of the site, allowing for the mass on Fenton to be one story lower.

2 ARCHITECTURAL DESIGN

SCHEMATIC DESIGN NARRATIVE

ARCHITECTURAL DESIGN

Proposed Design

Site

The building site is located at the south end of block 70, with a cross slope falling about ten feet in elevation from the north to the southeast. One of the project's most transformative elements to the campus will be the new large quad space adjacent to the proposed building. This will replace the tennis courts and extend the existing park-like space from the Charlene R. Nunley Student Services Center beyond the Resource Center to the Catherine F. Scott Commons. The continuous greenspace extending from north to south of the campus will improve wayfinding and circulation. One of the building's first floor entrances will be located adjacent to the Resource Center, with the new quad starting just south of that entrance. The quad will have stepped tiers to accommodate the grade change and provide a space for outdoor classes or informal gathering. Access will also be available to the building's ground floor entrance. Bio-retention will be located along the building and removing the tennis court will reduce impervious paving to help mitigate site runoff from heavy rainfall. The quad's redesign will also include landscaping to accommodate the change in finish grade elevation with new stairs, ADA compliance walkways, seating, site lighting, and stormwater management landscaped areas.

On the west and south sides of the current buildings, the existing parking lot wraps the site along Fenton Street and Takoma Avenue, providing 84 parking spaces, eight of which were ADA spaces. The proposed design separates the employee parking, the drop off area, and service yard entrance. A significant amount of parking will be removed, providing 30 spaces, with 12 designated to be ADA spaces, and 6 spaces for maintenance and delivery vehicles, etc. Twenty-four of the spaces will be reserved for employees only. The employee parking area will be accessible only from Takoma Avenue to the south of the site. This varies slightly from what had been shown during the community design charrettes after requirements made by the Montgomery County Fire Marshal. The drastic reduction in parking and severing the connection between parking and the drop off will reduce the amount of traffic entering and exiting on Takoma Avenue. The reduction in pavement and increased setback of the proposed building creates greater opportunity for vegetation along Takoma Avenue. New bio-retention areas are located to the north and south of the new parking creating two zones between the proposed building and the Takoma Avenue for additional stormwater management from the building and site.

Building Overview

The building form and massing are informed by the site's intersection of the Fenton Street grid and the campus grid. The result is two distinct massing elements. Along Fenton street to the west is a "bar" that has two levels above grade and one level below grade of classroom laboratories, faculty offices and a wide corridor called the "learning concourse" for student and faculty interaction and informal learning. A mechanical penthouse with equipment on the roof is located on top of the bar. East and toward the center of campus is a "pavilion", aligned with the grid of the campus. This pavilion's mass is composed of smaller elements, ranging from one to three levels and expressing a drum form where the Planetarium is located. Also included in the pavilion are a greenhouse, physics and engineering class laboratories, math classrooms and the Math and Science Learning Center.

Ground Floor

A main building entrance is accessible via the proposed quad space on the building's lowest level. The pavilion portion to the east contains the planetarium, student research laboratory, physics and engineering laboratories, a greenhouse and ecology classroom laboratory. The bar portion contains chemistry laboratories, faculty offices and student interaction space.

First Floor

The middle level of the building has two main entrances, entry from the drop off into the bar portion of the building and a campus entry at the northern edge of the pavilion section. Upon entering from the campus, the Math and Science Learning Center and adjacent interdisciplinary classrooms occupy the majority of this volume. This Math and Science Learning Center is a resource for students, providing spaces for tutoring, group study and quiet study. The bar volume contains math laboratories, biology classroom laboratories and faculty offices.

Second Floor

The pavilion provides additional Math and Science Learning Center spaces, interdisciplinary classrooms and math classrooms, cyber competition laboratory and networking, and stem forum open area. The bar portion of the building stacks above the similar spaces below, with biology classroom laboratories and support, math classrooms, and faculty offices.

Exterior Materials

The building's exterior massing and materials are intended to respond to varying contextual scales and conditions on each side of the building. The different facades are connected with a palette of materials and colors that connect to the immediate context of adjacent college buildings while respecting the character of the adjacent residential historic district. There was a considerable amount of discussion during the community charrette process about how the building design can both be institutional in presence and contextual to the adjacent historic district. The design process examined the massing materials in and around the building site. Falcon Hall and other campus buildings' forms derive from a 1970s massing style known as "field theory" where squares are rotated to create complex forms. This was trendy at the time of construction and made little effort to integrate with the historic fabric. The bold form's effect is minimized by mature trees, lush landscaping and earth toned facades that help minimize their presence. The proposed design is constrained by rectilinear forms, except for the Planetarium's expressed drum, which was enthusiastically supported by many community members during the Design Charrette meetings for its ability to reduce the scale along Takoma while also using the unique shape to advertise the community amenity housed within.

Neighborhood materials that are appropriate for an institutional facility were identified and discussed with the community. From the campus: earth tones, masonry brick and expanses of glass that reflect landscape elements. From the historic district: stone from landscape walls, brick masonry from houses on Takoma Avenue, lush vegetation, and wood siding. These create the palette for the facades.

The west façade faces Fenton Street and the CSX/WMATA railroad tracks and has no adjacent residential neighbors. An earth toned wall system with horizontal louvers and punched window openings sit on top of a masonry base. The wood soffit above the entry creates a front porch, providing shadow and depth. The mechanical equipment sits back from the face of the building, obscured behind a screen wall. The south façade has a volume with a mixture of masonry with vertical punched windows sitting on top of a masonry base, to break down the overall height. The planetarium's volume is expressed as a drum and similar in width to that of the large residential homes across Takoma Avenue and clad as a living wall with vegetation attached to a screen or lattice system. The east façade sees the continuation of the masonry, creating a deep porch with wood soffit at the quad building entrance. A fritted glass curtain wall sits on top of the base at the north end of the façade, in an effort to minimize the appearance of the building. Instead, the glass will reflect the mature trees and sky located within the landscaped quad facing New York Avenue. This façade is the farthest away of any from a road bordering the project site. The north façade is only visible from the interior of campus has a blend of glass and masonry.

EXTERIOR ELEMENTS

1. Exterior Walls
    a. Option 1: 4" Random length brick rainscreen walls with 3" mineral wool cavity insulation, fluid applied non permeable air barrier, 8" reinforced CMU, and interior metal studs and gypsum board.
    b. Option 2: 1 5/8" Terra cotta rainscreen walls with 3" mineral wool cavity insulation, fluid applied non permeable air barrier, 8" reinforced lightweight CMU, and interior metal studs and gypsum board.
2. Exterior Glazing Systems
    a. Exterior curtainwall systems will be thermally broken, extruded aluminum framing, fluoropolymer coating finish, with high performance low-E insulated glazing units.
    b. Glazing acoustical performance and design to achieve the following:
        i. West façade- STC 45-50
        ii. East façade- STC 35- 40
        iii. North and south façade- STC 40-45
    c. Provide a minimum of one small operable window for each office, classroom and computer classroom and in other occupiable spaces.
    d. Entrance doors shall have a medium stile and ¼" tempered glazing.
3. Waterproofing

a. Provide below grade foundation wall waterproofing membrane, protection board, rigid insulation, and drainage board to drainage pipe with granular fill wrapped in filter fabric.

b. Under-slab drainage system to be provide per Geotechnical Report. Concrete slab on grade to include protection board, and 2 layers of 6 mil polyethylene on 4” gravel. Under-slab drainage system to be within filter material wrapped in permeable geotextile fabric.

c. All penetrations through below grade walls and slabs are to be sealed.

4. Roofing

a. Roof systems shall be a two-ply, modified bituminous roofing system with a white, high albedo granules on top exposed surface, over cover board, polyisocyanurate board insulation, and a vapor barrier on the roof deck. Provide a minimum slope of ¼” per foot. Provide walkway pads.

b. Green roofing system.

i. 12” depth for meadow planting.

INTERIOR ELEMENTS

1. Partitions

a. Typical partition type will be 3 5/8” inch metal studs with, a single layer 5/8” gypsum wallboard on the other side. Wall system shall extend to structural deck above.

b. Offices, huddle rooms, and restrooms will have sound attenuation batts. Wall system shall extend to structural deck above.

c. Laboratories, Classrooms, Conference rooms, or any spaces with audio-visual systems, suite demising walls, and other areas requiring additional sound attenuation will receive an additional layer of 5/8” gypsum wall board each side, plus sound attenuation batts. Wall system shall extend to structural deck above.

d. Sound attenuation batts are to fill the wall cavity and be the full height of partition to meet MC Design Standards.

e. All partitions will extend full height to underside of floor or roof deck.

f. Partitions will be fire-rated where required by code.

g. Supplemental metal or wood in-wall blocking will be required to support shelving, lab equipment, accessories, and AV systems.

h. High impact gypsum wallboard is required at high traffic areas (corridors and public spaces) for 4’-0” minimum above the finished floor.

i. Level IV finish on gypsum board will be required at walls to receive wallcoverings.

j. Concrete masonry unit (CMU) partitions will be 8” nominal. At finished locations CMU partitions will be covered by a furred gypsum wallboard partition.

2. Doors, Windows, Frames
    a. Interior doors will be primarily solid-core wood doors with wood veneer finish in hollow metal frames.
    b. Doors at utility and service spaces will be painted hollow metal in hollow metal frames.
    c. Door hardware will be lever handle type, except where panic hardware is required.
    d. Doors at storage rooms, equipment rooms, restrooms, and janitor’s closets will receive kick plates.
    e. Doors at the loading dock and other large material and equipment storage will receive armor plates.
    f. See Section 14 for door hardware.
3. Floor Finishes
    a. Carpet
        i. Modular carpet tile.
    b. Resilient Flooring
        i. Static- Dissipative Resilient tile flooring.
        ii. Resilient sheet flooring will have welded seams.
        iii. Vinyl Composition Tile.
    c. Epoxy Floor
        i. Chem resistant epoxy flooring and base.
    d. Access Flooring
        i. Access flooring (TBD).
    e. Traffic Coating
        i. Traffic-bearing, seamless, high solids content, cold liquid-applied, elastomeric, waterproofing membrane system with integral wearing surface for pedestrian traffic.
    f. Terrazzo (All high impact areas)
        i. Terrazzo to be monolithic, epoxy terrazzo.

ii. Terrazzo base to be cast terrazzo.

g. Typical Wall Base

i. Rubber base to be 4” high.

ii. Painted wood wall base to be 4” high, MDF or solid softwood for opaque finish.

iii. Stained wood wall base to be 4” high, solid hardwood for transparent finish.

4. Wall Finishes

a. Paint

i. All paints to be low-VOC.

ii. Finishes to provide for a monolithic, scrubbable surface, free of cracks or ridges.

b. Acoustic Wall Panels

i. Panels will be 1" thick tackable and acoustic core, wrapped with acoustically transparent fabric.

c. Tile

i. Restrooms. All wall tiles to be installed at a min. height of 7’-0”.

ii. Large format wall tiles, porcelain, 12x24 or similar.

5. Ceilings

a. Gypsum Board Ceilings-

i. All gypsum ceilings to be painted-

ii. Gypsum board ceilings will be hung from a drywall suspension system or as required.

b. Acoustical Ceiling Tiles-

i. Acoustical ceiling tiles to be Fine Fissured square lay-in, medium texture by Armstrong World Industries or approved by MC. Ceiling suspension track is to be Donn DX/DXL Series in white, by USG.

ii. Sizes: 2’ x 2’ and 2’ x 4’.

c. Specialty Ceiling Systems

i. To be determined.

6. Window Treatments

a. Offices will receive manual roller window shades.

b. Laboratories will receive manual roller window shades.

c. Blackout shades locations to be determined at selected locations.

7. Millwork at non-laboratory locations

    a. All millwork will be custom grade, frameless, flush-overlay construction.

    b. Materials

        i. Plastic laminates will be color-core

        ii. Solid surface materials will be engineered quartz or similar

        iii. Stone surface materials will be slab, not dimensional stone

8. Casework at laboratory locations

    a. Casework: Painted Steel or Painted Steel with Wood Fronts (TBD)
    b. Lab Benchtop: Modified epoxy resin countertops – standard color selection
    c. Lab Sink: Modified epoxy resin countertops – standard color selection
    d. Autoclave Sink: Stainless Steel Scullery Sink
    e. Shop Sink: Stainless Steel Scullery Sink
    f. Greenhouse Sink: Stainless Steel Scullery Sink with mud trap
    g. Lab Table Tops: Modified epoxy resin or phenolic resin – standard color selection. Shop Table tops – Maple butcherblock

9. Vertical Transportation

    a. Egress stairs shall be of steel and concrete filled pans or concrete with painted metal guardrails with stainless steel handrails. Treads and landings shall receive a rubber covering.

    b. Elevators – See Vertical Transportation Report

DESCRIPTIVE FINISH SCHEDULE

1. Entry Lobbies and Main Corridors

    a. Floor: Terrazzo with terrazzo base

       Walk-off metal grilles and carpet

    b. Walls: Painted. Acoustical wall panels to be determined

    c. Ceiling: Gypsum wallboard and acoustic ceiling at main entries and corridors

2. Classrooms/ Recitation Rooms

    a. Floor: Carpet Tiles

    b. Walls: Paint and acoustic wall panels

    c. Ceiling: Acoustical ceiling tile

3. Active Learning and Tutoring

a. Floor: Carpet tile

b. Walls: Paint, acoustic wall panels

c. Ceiling: Acoustic ceiling tile

4. Instructional Laboratories

   a. Floor: Chem Resistant epoxy flooring

   b. Walls: Paint

   c. Ceiling: Scrubbable Acoustical ceiling tile

5. Laboratory Prep Areas

   a. Floor: Chem resistant Epoxy flooring with coved base

   b. Walls: Paint

   c. Ceiling: Scrubbable Acoustical ceiling tile

   d. Transaction window: Stainless Steel roll up windows

6. Cybersecurity and Networking

   a. Floor: Carpet Tile, access flooring

   b. Walls: Paint

   c. Ceiling: Acoustical ceiling tile

7. LAN

   a. Floor: Static- Dissipative Resilient tile flooring, access flooring

   b. Walls: Paint

   c. Ceiling: Acoustical ceiling tile

8. Shop

   a. Floor: Polished Concrete

   b. Walls: Paint

   c. Ceiling: Open ceiling

9. Chem/Waste Receiving

   a. Floor: Polished Concrete

   b. Walls: Paint

   c. Ceiling: Scrubbable Acoustical ceiling tile

10. Greenhouse / Headhouse:

    a. Floor: Concrete with Medium Broom Finish

b. Walls: Greenboard with pebbleboard finish / epoxy coated CMU

c. Ceiling: Greenhouse Structure

11. Planetarium

a. Floor: Carpet tile

b. Walls: TBD

c. Ceiling: Perforated metal dome

12. Offices

a. Floor: Carpet tile

b. Walls: Paint

c. Ceiling: Acoustic Ceiling tile

13. Copy/ Mail/Work Room/ Storage/ Kitchen

a. Floor: VCT

b. Walls: Paint

c. Ceiling: Acoustic ceiling tile

14. Corridors (high impact areas)

a. Floor: Epoxy terrazzo with 4” integral cove base

b. Walls: Paint

c. Ceiling: Acoustical ceiling tile and gypsum board

15. Public Restrooms

a. Floor: Epoxy terrazzo with 4” integral cove base.

i. Alternate: Large format porcelain tile with epoxy grout

b. Walls: Porcelain tile with epoxy grout

c. Ceiling: Acoustical ceiling tile

i. Alternate: Painted gypsum board

d. Partitions: Solid core phenolic

16. Mechanical and Electrical Spaces

a. Floor: Sealed concrete

b. Walls: Paint

c. Ceiling: Open to structure

17. Penthouse

a. Floor: Traffic Coating

b. Walls: Paint

c. Ceiling: Open to structure

3 LABORATORY PLANNING

SCHEMATIC DESIGN NARRATIVE

LABORATORY PLANNING

PLANNING CONCEPTS

Of paramount importance to Montgomery College's *Leggett Math and Science Building* would be that the proposed facilities' instructional and research laboratories be planned in a modular and flexible manner. Flexible planning best supports a facility to implement technological and personnel changes in future years.

During the programming process the project team determined the type and amount of space required for each respective area of instruction, preparation and student research. These spaces have been planned utilizing a modular approach, since this approach strongly enhances assignment and re-assignment of space, while maintaining an orderly approach to the laboratory configurations.

In addition, the facility shall be designed to embrace future changes in technology. Consequently flexible distribution systems shall be of paramount importance, some that could easily accommodate changes as well as additions to the services provided in each laboratory area.

Keeping the desired goals in mind, the following concepts have been proposed as premises in the programming of the new Chemistry Building:

PLANNING REQUIREMENTS

The planning concept for the proposed laboratory building shall meet the following established requirements:

Modularity	Space Allocation on Similar/Incremental Basis
Flexibility	Change Space Function and Size
Adaptability	Add and/or Delete Functions in a Given Space
Serviceability	Durable Ease of Maintenance Ease of Installation
Efficiency	Space Optimization Space/Systems to Support Needs
Interactivity	Promotes Communication among its Users
Expandability	Can Easily Accommodate Future Growth in the Modular Framework
Cost	Use of Appropriate Systems Where Required
Effectiveness	Wise/Balanced Use of Resources
Aesthetics	Looks Good When New and for Years to Come
Safety	Ensures a Safe Operation and Observation Provides location of Safety
Components	

LABORATORY FLEXIBILITY

Flexibility is one of the most important components of a new laboratory building. We believe that in order for a facility to be flexible, planning for this concept shall start at the programming phase.

A fully flexible facility is one where we can place any element in any area of the facility without significant effort or cost. We have found that it is possible to develop a fairly flexible and effective facility that allows for changes in use or technology within each space type without the expenditure of significant resources. In order to do that, the following issues affecting lab flexibility should be considered:

Component Location - Component location shall determine how the facility is organized and how space types shall be grouped. It should reflect the desired space relationships and program adjacencies, ultimately defining the beginnings of the planning concept.

Component Location includes:
Space Relationships
Location of Program Elements
Location of Mechanical / Electrical Spaces
Stacking Concepts

Service Distribution - Service distribution within a facility greatly impacts flexibility. For a multi-storied facility we are concerned with both the vertical as well as the horizontal distribution systems utilized. The vertical systems bring the desired utilities to each floor from the mechanical, electrical and/or telecommunication rooms. The horizontal distribution systems carry the utilities to the individual spaces. Laboratory flexibility should also consider accessibility to these utility distribution systems.

Casework/ Workbench Systems - Selection of a flexible casework system when combined with the prescribed building module and an adequate vertical and horizontal distribution should assure a large degree of flexibility for all aspects of the laboratory. Where possible the instructional labs are planned with fixed perimeter casework and movable center casework. At least one perimeter wall is planned accommodating accessible heights and reach ranges.

MODULARITY

Additionally, this programming effort has also recommended a *building module* for laboratory spaces. This modular approach has been utilized in the space allocation of the laboratory areas. In establishing this module, consideration has been given to the multiple requirements of both the instructional and research laboratory spaces, and the spatial needs associated with these requirements. A common module to support these various requirements was desired, thus allowing for flexibility in space configuration and re-assignment.

The *laboratory module* maximizes the space allocation by understanding the recognized functions in the open lab. For open laboratory areas, we recommend an “x” times “y” clear, with the basic module of 10'-8" x 10’-8”.

Instructional labs are planned on multiples of this module, typically as 32’-0 x 42’- 8”. The open research labs are also planned on a 10’-8” lab module, their length varying by the number of lab modules or bays with typically four modules in length. Their width is usually 32’-0”.

Instructional labs have less rigorous vibration requirements, allowing for larger structural spans. These are planned on a 21’-4” x 42’-4” *structural module*. For the research labs with higher vibration requirements, we recommend a typical *structural module* of 21’- 4” x 32’-8”, thus accommodating two lab module widths in the “x” direction, and the dedicated bench portion, cross corridor, equipment zone and the ghost corridor in the “y” direction of the module.

Laboratory support spaces shall be planned within the lab spaces utilizing the building basic “x” module of 10’-8". With spaces in this area varying in size and planned in multiples of the basic module.

LABORATORY PLANNING ORGANIZATION

The Leggett Math and Science Building will house both instructional and student research laboratories. For the most part, the building’s lower floors shall be organized around the instructional laboratories and with a showcase location of the student research laboratory.

Instructional Laboratories:
The number and type of instructional laboratories was determined by the courses offered by the departments, the semester(s) that the courses are offered, the number of students enrolled in each course, the desired numbers of students per session and the number of rooms required. Attention was given to maximize the room utilization.

For the most part, Chemistry Instructional Laboratories are fume hood intensive rooms, requiring adequate space between benches and equipment. Due to the nature of their work, they also required extensive glassware and equipment storage. Additionally, many of the rooms require space to conduct pre-lab instruction or lectures as a separate space from the area where the fume hoods and chemicals are located.

The following instructional labs are included in the project:

- General Chemistry
- Organic Chemistry
- Analytical Chemistry
- Microbiology
- Cell Biology
- General Biology
- Environmental, Ecology, Landscape Technology
- Biology 150
- Biology 151
- Anatomy and Physiology Laboratory
- Greenhouse
- Physics/Engineering Laboratory
- Engineering/Physics Shop
- Computer Laboratory
- Networking Laboratory
- Cyber Center
- Student Research Laboratory

Also included as part of these instructional labs are the Organic/Analytical shared Instrument Lab, microbiology support rooms and Greenhouse Headhouse. Prep spaces, staff offices, and a central stock room will support these areas.

For the most part, instructional lab spaces shall be equipped with fixed benches with wall-mounted, cabinets or wall-mounted, adjustable shelves. For durability we recommend painted metal cabinets with all sinks and work surfaces to be epoxy resin. Instructional spaces are being planned for in a manner that will enable spaces to be reassigned without the need for major infrastructure modifications.

INTERACTIVITY

In order to create a fully interactive and collaborative facility, program elements shall relate to one another. In order to achieve this goal, we studied the following key planning areas:

- instructional laboratory locations
- preparation lab concept and locations
- dry/computational laboratory locations
- interdisciplinary student research laboratory location
- faculty offices
- student space
- interaction spaces
- connectivity concepts

The location of the desk space has also been studied. The programming effort recommended for the technician's desks are to be located in clusters near the labs with a direct access to the public area and not embedded in the lab prep area.

The other issue is the provision and location of *interaction spaces*. Although we should create interactive labs and office blocks, we should also provide for spaces were the students and faculty can formally or informally interact with each other. Typically, we shall provide:

- *Formal Interaction Spaces* – these include small and large conference rooms located at the lab floor, and seminar and multi-purpose rooms supporting the entire building.

- *Informal Interaction Spaces* - usually include cafe/break area, large and small interaction areas located and supporting each floor, a STEM Concourse adjacent to the instructional labs, a STEM Forum adjacent to the learning center and interdisciplinary classrooms and an Innovation Hub adjacent to the Planetarium pre-function space, Student Research Lab and Physics and Engineering Spaces.

The last key issue is the *connectivity*. Today's research efforts are based not only on on-site interaction, but also on intra-building, campus and global collaboration. Providing systems that foster collaboration shall be imperative to the researchers. Physically and visually connecting floors is very important.

Programmed in this facility are a number of interactive spaces that could foster the desired connectivity and collaboration. Recommended for each floor are interaction areas for spontaneous meetings.

The large, Departmental Conference Room is recommended to be located in a more public floors. Open, vertical connectivity between floors is also highly desired.

Another area of special care, beyond providing spaces in the building, is the connectivity with other sites. Being connected "anywhere, anytime" through the data/communication systems is essential. Today's state-of-the-art research facility shall include both wired and wireless systems.

EFFICIENCY

Requiring extensive laboratory services, and advanced mechanical and electrical systems, laboratories are not efficient facilities. In addition, there are other factors that affect the efficiency of these types of buildings, such as:

• Site Constraints and Building Configuration
• Location of Key Elements – grouping and relationship of offices, labs, lab support, etc.
• Service Distribution Systems -vertical and horizontal distribution components
• Corridor/ Circulation System – such as Single vs. Double loaded, racetrack, open labs, etc.
• Number of floors and size of floor-plate.

EQUIPMENT

The following is a list of the project's equipment:

Contractor Provided / Contractor Installed
- All Fume Hoods
- All casework including movable tables and tall cabinets
- All Vented Flammable Gas Cylinder Cabinets
- All free standing flammable or corrosive cabinets
- Medium Glassware Washer (2)
- Autoclaves (2)
- Undercounter Glassware Washer (2)
- Cylinder Restraints and Corrals
- Local RO/DI System
- Point Exhausts and Arms (PE)

Owner provided / Owner installed equipment (Part of FFE)
- Instructor's station – (By IT)
- Waste Drums
- Utility Carts
- Bio-safety Cabinets
- Aquatic Racks
- All refrigerators and freezers
- All scientific equipment

Montgomery College Leggett Math and Science Building
Laboratory Service Matrix
1/23/2018

Lab Services

		Electrical			Water					Gas Services			Fume Hood			Other Exhaust		
Space Name	HEGIS Code	Electric	Stand-by Power	Data	Hot/Cold (Qty)	Pure Water	Safety Shower	Eyewash	Floor Drain	Nat. Gas	Comp. Air	Vacuum	4' Hood (Qty)	6' Hood (Qty.)	8' Hood (Qty.)	Snorkel	Steam Canopy	Vented Acid Cab
Math																		
Math Lab 1	110	Yes	No	Yes	0	No	No	No	No	No	No	No	0	0	0	0	0	0
Math Lab 2	210	Yes	No	Yes	0	No	No	No	No	No	No	No	0	0	0	0	0	0
Biology																		
Microbiology Laboratory 1	210	Yes	No	Yes	4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	2	0	0
Microbiology Laboratory 2	210	Yes	No	Yes	4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	2	0	0
Microbiology / Cell Biology Laboratory	210	Yes	No	Yes	4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	2	0	0
Microbiology Support Room 1	210	Yes	Yes	Yes	1	Yes	No	Yes	No	Yes	Yes	Yes	0	0	0	0	0	0
Microbiology Support Room 2	210	Yes	Yes	Yes	1	Yes	No	Yes	No	Yes	Yes	Yes	0	0	0	0	0	0
Microbiology Support Room 3	210	Yes	Yes	Yes	1	Yes	No	Yes	No	Yes	Yes	Yes	0	0	0	0	0	0
Microbiology Laboratory Prep Room	215	Yes	No	Yes	3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	1	0
General Biology Laboratory 1	210	Yes	No	Yes	4	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	2	0	0
General Biology Laboratory 2	210	Yes	No	Yes	4	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	2	0	0
Environmental, Ecology, Landscape Technology	210	Yes	No	Yes	4	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	0	0
Environmental, Ecology, Landscape Tech Prep	215	Yes	No	Yes	1	Yes	No	Yes	No	Yes	Yes	Yes	0	0	0	0	0	0
Gen Bio Lab Prep Room	215	Yes	No	Yes	3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	0	0
Biology 150 Laboratory 1	210	Yes	No	Yes	4	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	0	0
Biology 150 Laboratory 2	210	Yes	No	Yes	4	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	0	0
Biology 150 Laboratory 3	210	Yes	No	Yes	4	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	0	0
Biology 150 Laboratory 4	210	Yes	No	Yes	4	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	0	0
Biology 150 Laboratory Prep Room	215	Yes	No	Yes	3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	1	0
Biology 151 Laboratory	210	Yes	No	Yes	4	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	8	0	0
Biology 151 Laboratory Prep Room	215	Yes	No	Yes	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	0	0	0
Anatomy and Physiology Laboratory 1	210	Yes	No	Yes	3	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	8	0	0
Anatomy and Physiology Laboratory 2	210	Yes	No	Yes	3	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	8	0	0
Anatomy and Physiology Laboratory 3	210	Yes	No	Yes	3	No	Yes	Yes	Yes	Yes	Yes	Yes	1	0	0	8	0	0
Greenhouse	580	Yes	No	Yes	2	No	No	Yes	Yes	No	No	No	0	0	0	0	0	0
Greenhouse Head House	585																	
Chemistry																		
General Chemistry Laboratory 1	210	Yes	No	Yes	4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	6	0	0	0	0
General Chemistry Laboratory 2	210	Yes	No	Yes	4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	6	0	0	0	0
General Chemistry Laboratory 3	210	Yes	No	Yes	4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	6	0	0	0	0
General Chemistry Laboratory 4	210	Yes	No	Yes	4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	1	6	0	0	0	0
Organic Chemistry Laboratory	210	Yes	No	Yes	5	Yes	Yes	Yes	Yes	No	Yes	Yes	1	9	0	0	0	0
Organic Analytical Chemistry Laboratory	210	Yes	No	Yes	5	Yes	Yes	Yes	Yes	No	Yes	Yes	1	9	0	0	0	0
Instrumentation Room	210	Yes	No	Yes	4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	0	0	2	2	0	0
Central Chemistry Prep and Storage	210	Yes	No	Yes	3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	0	2	0	0	0	0
Engineering, Physical and Computer Science, Cybersecurity and Networking																		
Physics / Engineering Laboratory 1	210	Yes	No	Yes	3	No	Yes	Yes	Yes	No	Yes	No	0	0	0	0	0	0
Physics / Engineering Laboratory 2	210	Yes	No	Yes	3	No	Yes	Yes	Yes	No	Yes	No	0	0	0	0	0	0
Physics Prep	115	Yes	No	Yes	1	No	Yes	Yes	Yes	No	Yes	No	1	0	0	1	0	0
Engineering/Physics Shop	210	Yes	No	Yes	2	No	Yes	Yes	Yes	No	No	No	0	0	0	2	0	0
Computer Laboratory	210	Yes	Yes	Yes	0	No	No	No	No	No	No	No	0	0	0	0	0	0
Networking Laboratory	210	Yes	No	Yes	0	No	No	No	No	No	No	No	0	0	0	0	0	0
Cyber Center	210	Yes	No	Yes	0	No	No	No	No	No	No	No	0	0	0	0	0	0
Academic Support Space																		
Student Research Laboratory	210	Yes	No	Yes	3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	0	1	0	0	0	0
Building Support Space																		
Chemical Waste Transfer Storage Room	760	Yes	No	Yes	No	No	Yes	Yes	No	No	No	No	1	0	0	0	0	2

4 CIVIL DESIGN

SCHEMATIC DESIGN NARRATIVE

1. Existing Conditions

   i. Summary

   - The existing project site includes two existing College buildings, Falcon Hall and Science South, which are to be demolished as part of this project; and replaced by the new building. The Science South building is connected to another existing building, Science North, with an overhead, enclosed, pedestrian bridge, which will also be demolished. An 80-space (approximate) surface parking lot is located on the site, south of Falcon Hall, adjacent to Fenton St. and Takoma Ave. Two concrete tennis courts are located to the north, in a campus quad area between Falcon Hall, Commons and the Resource Center. Also, a one-way driveway, which is currently a designated fire lane, runs between Falcon Hall and Science South, also adjacent to Commons and the Resource Center, connecting New York Ave. with Takoma Ave.

   ii. Topography

   - In general, the site flows from a high point of 331' along Fenton St. near Science South to a low point of 308' at the intersection of New York Ave. and Takoma Ave. Much of the site drains into the quad area, adjacent to the tennis court, with elevations inside the quad generally being lower than adjacent areas near the existing buildings and nearby streets, leaving the site subject to flooding during large storm events and making drainage improvements a primary focus of the site design.

   iii. Utilities

   - Domestic Water
     - Science South is currently served by a 3" water line, along the western frontage, coming from the north.
     - Falcon Hall is served by a 6" (assumed) line on it's east frontage; this line connects from the WSSC main in Takoma Ave.

   - Sanitary Sewer
     - Several collector lines from 5-10" run through the site. These lines eventually combine to the east of the site, past the intersection of New York Ave. and Takoma Ave.
       - Science South feeds an unconfirmed 5" line (shown only from available campus records).

        - Falcon Hall feeds several lines of varying size into a manhole structure located just east of the building, the outfall pipe from this structure is 8" in diameter.

- Storm Drain
    - Stormwater on the site drains directly into the city system from yard drains, lateral pipes, and roof drains. The majority of the collector pipes combine and flow to a drain to the east of the site, past the intersection of New York Ave. and Takoma Ave. A smaller portion of the site drains to existing storm structures along Fenton St. which feed to a public system running to the south at the intersection of Fenton St. and Takoma Ave.

- Electric Service
    - Many electric lines run through the site. Most buildings are served by pad-mounted transformers which are fed by distribution lines that tap off the overhead feeders.
        - Science South is served via underground service from a pole-mounted transformer bank.
        - Falcon Hall is served by a pad mounted transformer located north of the building, adjacent the tennis courts, fed from overhead lines on Takoma Ave.

- Hot Water/Chilled Water
    - A hot/chilled water system runs through the site from New York Ave. through an existing driveway and ends between Falcon Hall and the Science South Building.

- Telecommunications
    - Several communication lines run across the site, servicing the academic buildings.

- Overhead Electric
    - All three public streets bordering the site - New York Ave., Takoma Ave. and Fenton St. - contain overhead electric lines.

- Natural Gas
    - Science South is fed natural gas from a main in Fenton St.
    - There is no indication that Falcon Hall has a gas service.

2. Site Plan

Both Science South and Falcon Hall, as well as the pedestrian bridge connection between Science South and Science North, will be demolished as part of this project. The existing tennis courts, surface parking lot and asphalt fire lane will also be demolished. All of these demolished features will be replaced by the new 134,600 gross square foot (GSF) Catherine and Isiah Leggett Math and Science Building.

Surrounding the new building, site improvements will include the following:

- A new surface parking lot to be accessed from Takoma Ave., designated for staff parking and to include accessible spaces.
- A new pick-up and drop-off accessed from Fenton St. to serve the main entrance to the Leggett Building. The drop-off proposes a one-way flow of traffic, entering to the south and exiting to the north. The drop-off area will also include several accessible parking spaces.
- A newly configured service area parking lot, accessed from Fenton St. and located adjacent to the northwest corner of the Leggett Building and the southwest corner of Science North. This lot will provide parking for College service vehicles, campus contractors, deliveries and trash pick-up.
- New sidewalks will be provided along Fenton St., set back from the street to provide a green strip between pedestrians and vehicular traffic. The three driveways proposed along Fenton St. will include clearly marked pedestrian crosswalks, as will the one proposed driveway along Takoma Ave.
- To the north or rear of the building the area encompassed currently by the tennis courts will be replaced by a newly designed campus quad. The quad area will include sidewalk connections between all adjacent buildings; the Catherine F. Scott Commons building, the Resource Center, Science North and, of course, the Leggett Building. Refer to Landscape Architecture sections of this narrative for more detailed information regarding the quad area.
- The existing fire lane will be removed and replaced with new paving, extending from New York Ave. into the site approximately 150-ft before terminating at a new campus walk.
- This fire lane, combined with fire access along Fenton St. and Takoma Ave. as well as a new remote standpipe proposed near the north entrance of the building will provide fire coverage to the Leggett Building and adjacent buildings in accordance with Montgomery County Fire & Rescue regulations.

3. Utilities

Existing utility services to Falcon Hall and Science South will be either removed or abandoned in place.

The new Leggett Building will be served with domestic water, sanitary sewer, underground electric, natural gas, campus hot and chilled water and various telecommunications feeds.

In order to meet Fire & Rescue requirements, a new 6” water service from Takoma Ave. will not only serve the new building but a new fire hydrant will also be provided off of this line, to be located at the southwest end of the new staff parking lot.

4. Stormwater Management

Careful attention will be paid to the way this site will accept and handle storm water. Most importantly, the quad area will be designed with ample storm drain inlets and adequately sized piping to convey large storms quickly from this area to prevent any sort of water back-ups in the quad or at the adjacent buildings.

The Stormwater Management Concept evaluates and quantifies the Environmental Site Design (ESD) requirements of a development project, to the Maximum Extent Practical, in accordance with the Maryland Stormwater Management Act of 2007. Per the Maryland Stormwater Management guidelines, a pre-developed site consisting of greater than 40% impervious area shall be considered "redevelopment" and therefore required to treat, through ESD practices, just the 1" rainfall event.

To meet the project's stormwater requirements, the design proposes to utilize a combination of four micro-bioretention facilities, a green roof system and a series of smaller planter-type rain gardens.

The micro-bioretention facilities will be located on the southern side of the site, collecting and treating storm runoff from the new building as well as the new parking lot and drop-off area. These facilities will treat, by rule, a maximum of 20,000 SF of drainage area and ponding a typical 12" of water during heavy storms, with the overflow from larger storms being collected by a stormwater riser structure and conveyed to the adjacent City storm drain system.

The building will also include a partial green roof above the portion of the lower roof on the north side of the structure. The green roof is proposed to have an 8"-thick media layer, this exceeds minimum county green roof standards and allows for a wider variety of plantings, taking on characteristics of a meadow. The runoff from the green roof will be conveyed to the City storm drain system.

On the north side of the building, adjacent to the exterior stairs leading into the new quad space, a series of stepped, planter-type, rain gardens is proposed. These rain gardens will also collect runoff from the building's roof, albeit a much smaller area than the micro-bioretention facilities, and pond no more than 6" of water. Overflow from larger storms will be collected in on-site storm drain inlets and conveyed to the City's public storm drain system.

5. Forest Conservation

The Natural Resources Inventory / Forest Stand Delineation plan (NRI/FSD) includes mapping of significant trees (6"+ DBH), steep slopes (> 25%), soil types/boundaries, as well as other man-made, natural, and cultural items. Trees are inventoried and assessed for species, size and condition. The NRI/FSD confirms that no floodplains, streams, wetlands, forests or tree stands are present within the project site. Further, the site is not located within a Special Protection Area, there are no known records or readily observable rare, threatened or endangered species or critical habitats on site. Finally, although there are several significant and specimen trees on the site, there are no Montgomery County or State Champion trees impacted by this project.

The project is expected to be exempt from Montgomery County Forest Conservation laws, although a Tree Save Plan has been prepared and provided for review by both MNCPPC and the City of Takoma Park.

6. Traffic Considerations

In accordance with the procedures of the MNCPPC's Local Area Transportation Review Guidelines (LATR/PAMR), the project was discussed with MNCPPC staff and resulted in a detailed scoping letter dated August 28, 2018, the scoping letter is included in the enclosed Traffic Impact Study. Based on this scoping letter, a traffic study was conducted on the dates of Tuesday, September 25th and Wednesday, September 26th with a total of eight (8) intersections in and around the project site being studied. Results of the study demonstrate that the new building is projected to generate a total of 134 new vehicle trips per day. Existing and background conditions analysis shows that all study intersections currently operate at acceptable conditions during the AM and PM peak hours, with conditions in the future condition, even when accounting for future pipeline development projects, also maintaining operations at acceptable levels.

5 LANDSCAPE DESIGN

SCHEMATIC DESIGN NARRATIVE

LANDSCAPE

Scope of Work

The overall landscape design approach will serve to integrate the new Montgomery College Leggett Math and Science building with the project site and its contextual environment, using materials that are consistent or compatible with those elsewhere on the campus. Outdoor spaces will be developed to enhance the academic and social goals of the programs at MC and the Leggett building, and to create a collegial and supportive environment for students and staff.

The proposed landscape scope is comprised of the following:

1) Entry Plaza/Drop-off along Fenton Street
2) Entry Plaza/monument stairs at the north entrance to the Leggett Building
3) Re-configured Staff-only Parking Lot
4) Pedestrian corridors associated with the building site and its edges
5) Enhanced pedestrian and accessible connections from the north part of campus to the Leggett and Scott Commons Buildings.
6) Entry plaza/seating area at the Resource Center
7) Terraced Quad and Campus Lawn amenity zone framed by Leggett building, the Resource Center, and the Commons building.
8) Stepped bioretention planter/stormwater feature along east façade of the Leggett Building.
9) Re-configured fire truck access from New York Avenue, enhanced pedestrian connection to the north entrance of the Commons building.
10) Buffer and bioretention planting areas along the south side of the building, to the north and south of the proposed Staff-only parking lot.
11) Landscaping/screening at the loading dock.
12) Creating a continuous tree lawn along Fenton Street.
13) Landmark signage at Nunley Student Center Plaza and related sitework

Design Approach

The landscape design for the project site will serve to support both the programming and the collaborative ethos of the Leggett building, and will showcase integrated sustainability practices in the environment. The site will feature the function of natural systems through stormwater management design and use of native vegetation areas, facilitating the emergence of habitat for pollinator species. The building is uniquely positioned to frame a large open lawn terraced quad at the southern portion of the site. Smaller feature plazas will serve as informal, social gathering spaces, and the terraced walls and central quad will create opportunities for education and site study and interpretation.

Universal access is integral to the site's circulation system. Clearly defined paths and crossings will be provided between the north of the campus and the Leggett and Commons buildings, and accessible routes will also function as major spines. Due to the large amount of grade change, the central ADA spine, which will consist of a series of ramps offering accessible connection to seating areas as well as to the lawn terraces of the quad area, is supplemented by stairs along the face of the building.

Strong indoor/outdoor connections from building to site are a key objective of the site design, and will serve to promote social, cultural, educational and environmental engagement.

The site/landscape design will adhere to ESD standards set forth as part of LEED v4 Silver certification requirements and to promote long-term environmental sustainability and showcase design innovation. Outdoor open space shall comprise a minimum of 30% of the total site area (including building footprint), and at least 25% of that open space will be vegetated with plantings, in addition to 30% of the total site being restored with native or adapted vegetation.

Hardscape

The hardscape design will feature specialty unit pavers at building entrances. Primary pedestrian corridors will be comprised of the campus standard paving, which is typically a concrete walk. It is a project goal to achieve the Heat Island Reduction LEED credit, so pavers with an acceptable SRI value will be proposed. Paver cross-sections will be comprised of a concrete base of appropriate thickness for pedestrian or vehicular use, a bituminous setting bed and pavers. In the parking areas, pavers will be on a fine aggregate bedding course and aggregate-filled joints, open graded aggregate (#2 and #57 stone) typical of pervious paving for vehicular use, and a geotextile fabric on top of compacted subgrade.

In the drop-off along Fenton Street, the vehicular drop-off area will be paved with concrete pavers, with ADA parking spots and aisles denoted in pavers of a contrasting color.

Both pedestrian- and vehicular-grade walkways will be standard concrete paving at appropriate thicknesses. Emergency access areas (if required) shall be 12' wide at vehicular paving depth with an additional 8' of reinforced turf (Fibersoils turfgrids).

The hardscape and landscape features will respect the scale of the campus while incorporating the better traditions of design and architecture; both landscape and hardscape design will incorporate timeless and durable materials and detailing.

The hardscape design will include materials implemented elsewhere on the campus and will reflect the materiality of the buildings while tying thematically into existing site features.

Site walls will be stone or brick veneer with stone caps to tie into the campus context. A tree lawn will separate the pedestrian sidewalks along roads from vehicular traffic to provide a buffer and improve the quality of the experience walking along Fenton Street; sidewalks will be paved with 5” thick decoratively scored concrete over a 4” aggregate base.

Gathering areas (plazas and terraces), and the main entrance nodes will be stone or other specialty paving over a 4” concrete base in pedestrian areas and 8” concrete base in vehicular areas (i.e. the drop-off).

At the Nunley Student Center plaza, hardscape and seat walls will be re-clad or replaced as needed to complement the new monument sign. Plaza paving will be replaced or repaired as needed adjacent to the sign. Any planting that is required will be simple and in keeping with that on the rest of the project, and intended to complement the sign and adjacent campus character.

Specialty Features

Planters between the building and the quad may be “flow through” planters and will act as attractive landscape features as well as provide natural irrigation and innovative storm water management opportunities. These planters will be highlighted with curbs with slots to take in water from nearby paving or roofs. These features may also include interpretive signage or other opportunities for student and staff interaction with the environment. These terraced runnel walls and planting will complement the terraced quad landscape across the path. Plantings under the building overhang will be irrigated, but all other areas will be planted with native or adapted species that do not require irrigation.

The roof garden will feature a “green screen” as well as a meadow roof; a mixture of deciduous and semi-evergreen native vines will be planted in the rooftop media that supports the meadow on an attractive trellis attached to the planetarium, creating both a habitat amenity as well as an aesthetic one. The meadow roof itself will provide four season interest to users of the building as well as those off site, be planted in 8-12” of media. Integral irrigation will be provided, along with hose bibs as required.

Site Furnishings

Site furnishings will be Landscape Forms, or comparable per the campus standard. They will include benches, trash receptacles, bike racks, tables and chairs, and bollards. These will be selected based on the vernacular of the other Leggett site materials and architectural treatments, also taking into consideration the palette of pre-existing or standard MC campus furnishings.

Site lighting (by others) throughout the site will follow the campus standards and will comply with LEEDv4 light pollution reduction. Handrail lights may be used on stairs, both monument and standard, to achieve acceptable levels of lighting across the site in a minimally disruptive manner.

Removable bollards may be used at the New York Avenue fire lane to insure it is used by emergency and service vehicles only.

Planting

Landscape treatments will seamlessly blend into the campus context, while emphasizing comfort and scale within the quad, as well as providing screening for the residences across Takoma Avenue. Special attention will be paid to the scale of plant material and plant masses in order to be consistent with the scale of the buildings. Shade tree plantings at 3 ½" caliper are proposed for the majority of the site; a few specimen trees may be planted at 5" caliper in key areas. Deciduous trees may be accented by ornamental trees (10-12' in height) and evergreen trees (8'-10' in height) to provide interest and screening. Placement of evergreen material will be sensitive to safety and visibility concerns. Plant materials will be natural and native grasses, shrubs and groundcovers encouraging a sustainable, low maintenance landscape.

Throughout the site, plant material will be chosen for its appropriateness to orientation, use, and maintenance requirements. Plants will be grouped in masses and will incorporate both evergreen and deciduous species which bloom and exhibit color at varied intervals for year-round interest.

Shrub material will be #3 or #5 generally with up to 24” spreads and 36” heights and will represent approximately 40% of each planting area.
Grasses and perennials will be #1 or #2 and will represent approximately 60% of each planting area.

All turf areas will be sodded. Turf areas will be minimized to avoid the necessity for excessive watering and to encourage areas of natural habitat within the campus, and non-programmed turf areas are minimized.

At grade planting areas (except under the building overhang) will not be irrigated to provide a sustainable landscape. Plant selection will conform to the college landscape master plan documents, and will avoid plants on the campus forbidden list. Hose bibs will be provided for additional watering during establishment or periods of drought.

Stormwater management feature areas will be planted with containerized woody shrubs and herbaceous material and ornamental grasses at a ratio of 40-60 respectively. Sod/lawn will also be used selectively in areas that serve campus functions but will otherwise be minimized in anticipation of achieving LEEDv4 Water Efficiency credit with reduced irrigation.

6 STRUCTURAL DESIGN

SCHEMATIC DESIGN NARRATIVE

INTRODUCTION

The building consists of a new three level, 134,600 gsf structure to be used as a new Math and Science building for the Montgomery College Takoma Park campus.

STRUCTURAL SYSTEM FOR NEW BUILDING

The new building addition consists of a 3-story structure with classrooms, offices, laboratories and a clear span planetarium. The typical bay spacing across the long direction of the building is anticipated to be 21'-4". The short direction of the building mostly consists of three bays: 42'-8", 17-4" and 42'-8".

At this time two structural system are being considered for the building:

<u>Option #1 - Composite structural steel frame</u>

Framing for the elevated floors in this option will consist of W18x40 girders spanning the 21'-4" bays with W21x44s beams spaced 10'-8" o.c. for the 42'-8" spans and W12x22s beams for the 21'-4" span. The slab spanning between the beams will consist of a 4½" normal weight concrete slab over a 3" (18 ga) metal deck (7½" total depth) reinforced with 6x6-2.1x2.1 welded wire mesh. Steel fibers, polypropylene fibers, or a blended mix of the two may be substituted for welded-wire reinforcement for slabs on composite steel deck.

The thicker normal weight concrete slab was selected to assist in mitigating the vibrations in the longer spans. The slab provides a 2-hour rating between floors without the need of spraying (if needed).

Columns will likely be W10x60 and/or W12x58 steel sections. Lateral forces will be resisted by X and K steel braced frames located at the core elements and at strategic locations within the floor layout. Additional steel moment frames will be incorporated if added stiffness is required. These frames will require coordination with the architectural requirements of the project.

Roof framing, including the planetarium roof, will be similar to the typical floor framing. This will allow for the support of the green roof areas and provided support and vibration/noise protection for MEP equipment. For the planetarium roof, the beams will be supported by a perimeter ring beam supported on columns which will be transferred at the supporting floor below.

<u>Option #2 – Concrete flat PT beams and one-way slabs</u>

Framing for the elevated floors and roofs in this option will consist of flat post tensioned beams, 48" wide by 18" deep spanning the short direction of the building with a 7" thick, mild steel reinforced, concrete slab spanning between the beams. This system also provides very good resistant to vibrations, is shallower than the steel option and provides more than a 2-hour fire rating between floors.

Columns will likely be 24" square with 4#11 vertical reinforcing and #4 ties at 12" o.c.. Lateral forces will be resisted by concrete shearwalls located at the core elements and at strategic locations within the floor layout. For estimating purposes, we anticipate approximately 140 linear feet of 12" thick shearwalls with 5 psf of reinforcing per floor. These shearwalls will require coordination with the architectural requirements of the project.

Slab on Grade and Below Grade Structures

For both options, the Ground Level slab will consist of a traditional 5" thick slab on grade reinforced with WWF or polypropylene fibers, with a minimum 6" deep gravel sub-base. A permanent sub drainage system will be required to maintain groundwater levels below the lowest level floor. In addition to the perimeter subdrains for the walls, the system should include and underfloor drainage blanket and a series of interior under slab subdrains (for additional information see Geotech report).

Also, for both options, a concrete retaining wall will be needed along the west elevation and portions of the north and south elevations. This wall which will be up to 12' high is needed to resist the unbalance soil pressures caused by the building being located against a small hill.

The foundation system for both options is anticipated to consist of individual and strip footings bearing on 3,000 psf soil and structural fill. The following are the typical interior and exterior footing sizes for both options:

- Option #1 (Steel) – Interior Footing 11'x11'x28" w/9#8 each way
  Exterior Footing 10'x10'x26" w/10#7 each way

- Option #2 (Concrete) – Interior Footing 12'x12'x30" w/12#8 each way
  Exterior Footing 11'x11'x28" w/9#8 each way

Typical exterior spread footings will bear at least 2'-6" below finished grade. Large areas of fill have been found and will need to be removed prior to installing new foundations. At some locations, cuts up to 15' of depth are expected which will need to be replaced with structural fill or lean concrete. Settlement plates will need to be installed and the fill monitored to ensure that settlement has dissipated prior to installing the foundations.

Other Structural Components

A screen will be required above the roof level to hide the mechanical equipment located on the roof. The screen will be approximately 14' tall and will be supported with a steel frame, spaced at 11'-0" maximum, consisting of HSS8x8 vertical members and HSS 6x6 kickers.

Several areas of the floors will require "sunken" slabs to accommodate a raised floor system for network cable management. On the concrete scheme, these floor depressions will be handled by folding the slab and maintaining the minimum concrete thickness. A minimum 24" of overlap width between the depressed and actual floor slab will be needed along the entire perimeter of the depression.

On the steel scheme the supporting beams closest to the outside perimeter of the fold will need to be lowered to maintain the minimum slab thickness. Since the location of the slab fold is critical to the stability of the structure, it is likely that the "framed" depression will be larger than needed and the extra area will need to be filled with concrete.

We do not anticipate any expansion joints at this time but we will review this as the design progresses.

Efforts will be made to limit footfall vibrations as much as possible but the structural systems intended to be used for this building are not capable of resisting stringent equipment vibration criteria without significant architectural and structural modification which tend to be extremely costly. Any equipment to be used in this building, which requires a very stringent vibration criteria, will require the use of isolation tables or other supplemental vibration mitigation supplemental supports.

Structural Design Criteria

Codes and Standards:

- 2015 International Building Code
- Minimum Design Loads for Buildings and Other Structures, ASCE 7
- Building Requirements for Structural Concrete, ACI 318
- Standard Specifications for Tolerances for Concrete Construction and Materials, ACI 117
- Specifications for Structural Concrete, ACI 301
- Manual of Standard Practice, Concrete Reinforcing Steel Institute
- Steel Construction Manual, American Institute of Steel Construction
- Structural Welding Code ANSI/AWS D1.1, American Welding Society
- Design Manual for Floor Decks and Roof Decks, Steel Deck Institute

Superimposed Dead Loads:

- Floors .... 15 psf
- Roof .... 20 psf
- Green Roofs.. 60 psf

Live Loads (reduced as allowed by the building code):

- Classrooms ....40 psf + 15 psf partitions
- Offices ....50 psf + 15 psf partitions
- Laboratories..50 psf + 15 psf partitions
- Stairs, Lobbies, Corridors .... 100 psf
- Public areas and Terraces .... 100 psf
- Mechanical / Storage .... 125 psf
- Roof .... 30 psf (Use Snow Load when Snow exceeds 30 psf)

Snow Loads:

- Ground Snow Load (P_g) .... 25 psf
- Snow Exposure Factor (C_e) 1.0
- Snow Thermal Factor (C_t) 1.0
- Snow Importance Factor (I) 1.10
- Flat Roof Snow Load ($Pf = 0.7P_gC_eC_tI$) .... 20 psf
  (Unbalanced, drifting, and sliding snow considered as applicable)

Wind Loads:

- Ultimate Design Wind Speed ....120 mph (3-second gust)
- Site Exposure Category .... B
- Importance Factor 1.0

Seismic Loads:

- Response Modification Factor, R 3
- Site Soil Classification (Assumed).. D
- Mapped Short Period Spectral Response Acceleration (S_s)....... 0.131
- Mapped 1-Sec Period Spectral Response Acceleration (S_1) 0.052
- Short Period Design Spectral Response Coefficient (S_{DS}) 0.140
- 1-Second Period Design Spectral Response Coefficient (S_{D1}) ...0.083
- Occupancy Category III
- Seismic Importance Factor 1.25
- Seismic Design Category .... B

I. Material Properties

Cement:

- ASTM C150; Type I or III

Blended Hydraulic Cement: (Cement Substitutes)

- ASTM C595, Type 1S

Aggregate:

- ASTM C33 (Normal weight)

Admixtures:

- Air Entraining Admixtures: ASTM C260
- Chemical Admixtures: ASTM C494

Concrete: (Air entrain all exposed concrete 6% +/- 1½% by volume)

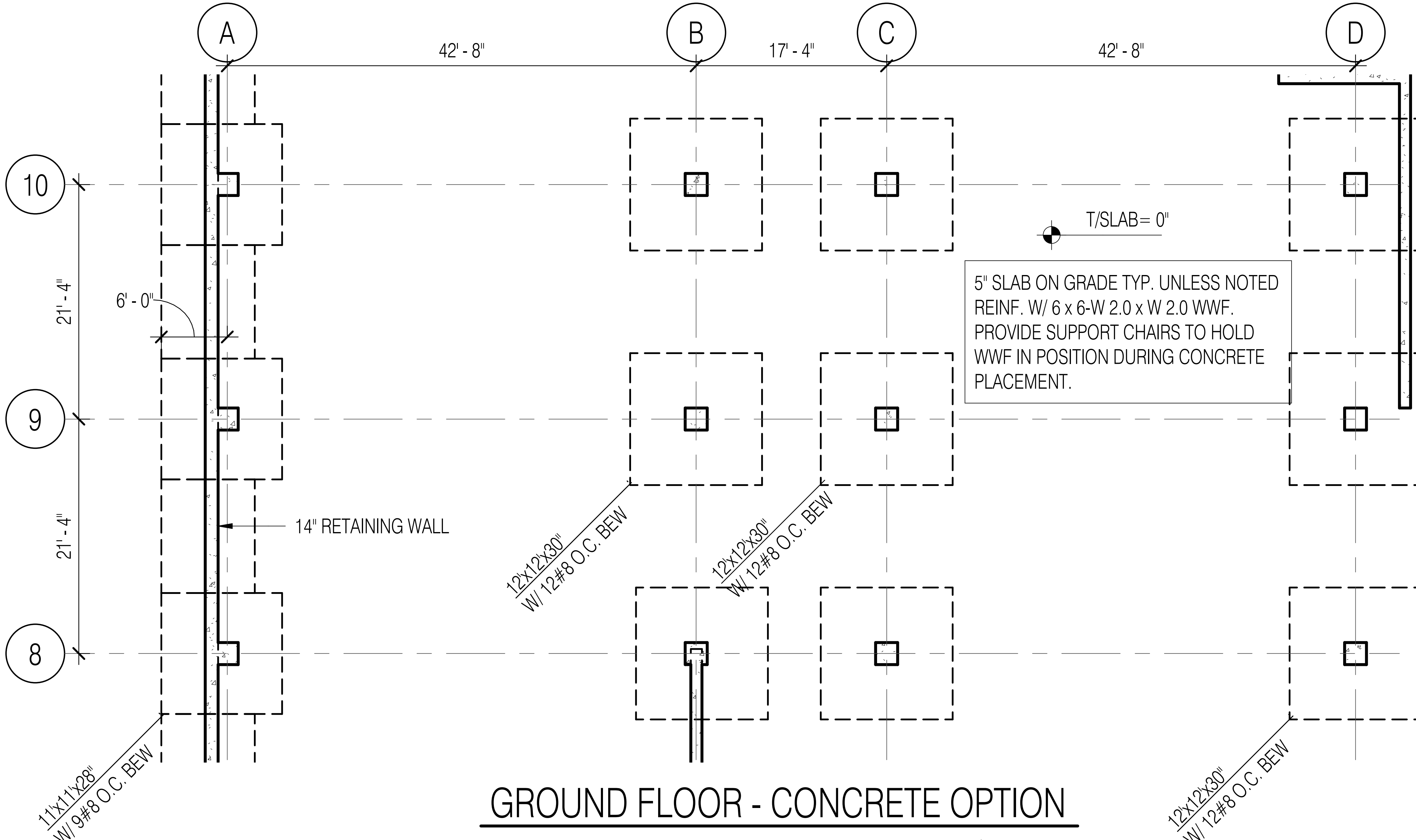
- Spread Footings (Interior).. 3,000 psi
- Spread Footings (Exterior).. 4,500 psi
- Slabs on Grade .... 3,500 psi
- Foundation/Retaining Walls .... 4,500 psi
- Columns..4,000 psi
- PT Structural Slabs and Beams ....5,000 psi
- Concrete Slab on Steel Decking .... 3,500 psi

Reinforcement:

- Deformed Reinforcing Bars .... ASTM A615, Grade 60
- Welded Wire Reinforcement .... ASTM A185
- Post Tensioning Cables..............Seven Wire ASTM A416, Grade 270
- Synthetic Macro Fibers...................................ASTM C1116, TYPE III

Steel:

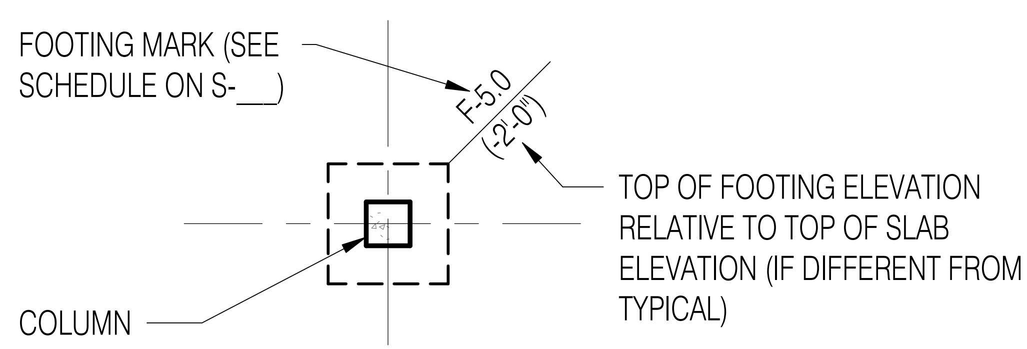
- Wide Flange Shapes and Tees .... ASTM A992
- Round Hollow Structural Shapes .... ASTM A53, Gr B, Fy=35ksi or ASTM A501, Fy= 36 ksi
- Square or Rect. Hollow Struct. Shapes .. ASTM A500, GrB, Fy=46ksi
- Base Plates and Rigid Frame Continuity Plates .... ASTM A572, Gr 50
- Other Structural Shapes and Plates .... ASTM A36
- High Strength Bolts .... ASTM A325-N or ASTM F1852
- Anchor Rods .... ASTM F1554, Gr 36
- Smooth and Threaded Rod .... ASTM A36
- Headed Shear Studs .... AWS D1.1, Chapter 7, Gr B
- Welding Electrodes .... AWS A5.1 or A5.5, E70xx with min. cvn toughness of 20 ft-lbf at 20 deg. F
- Expansion Bolts .... Hilti Kwik Bolt III or Approved Equal
- Adhesive Anchoring System .... Hilti HY-200 or approved equal
- Galvanized Steel Composite Floor Deck ASTM A653 SS, Gr 40, G-60
- Galvanized Steel Roof Deck .... ASTM A653 SS, Gr 33, G-90
- Grout .... ASTM C1107, non-shrink, non-metallic; f'_c=5000 psi

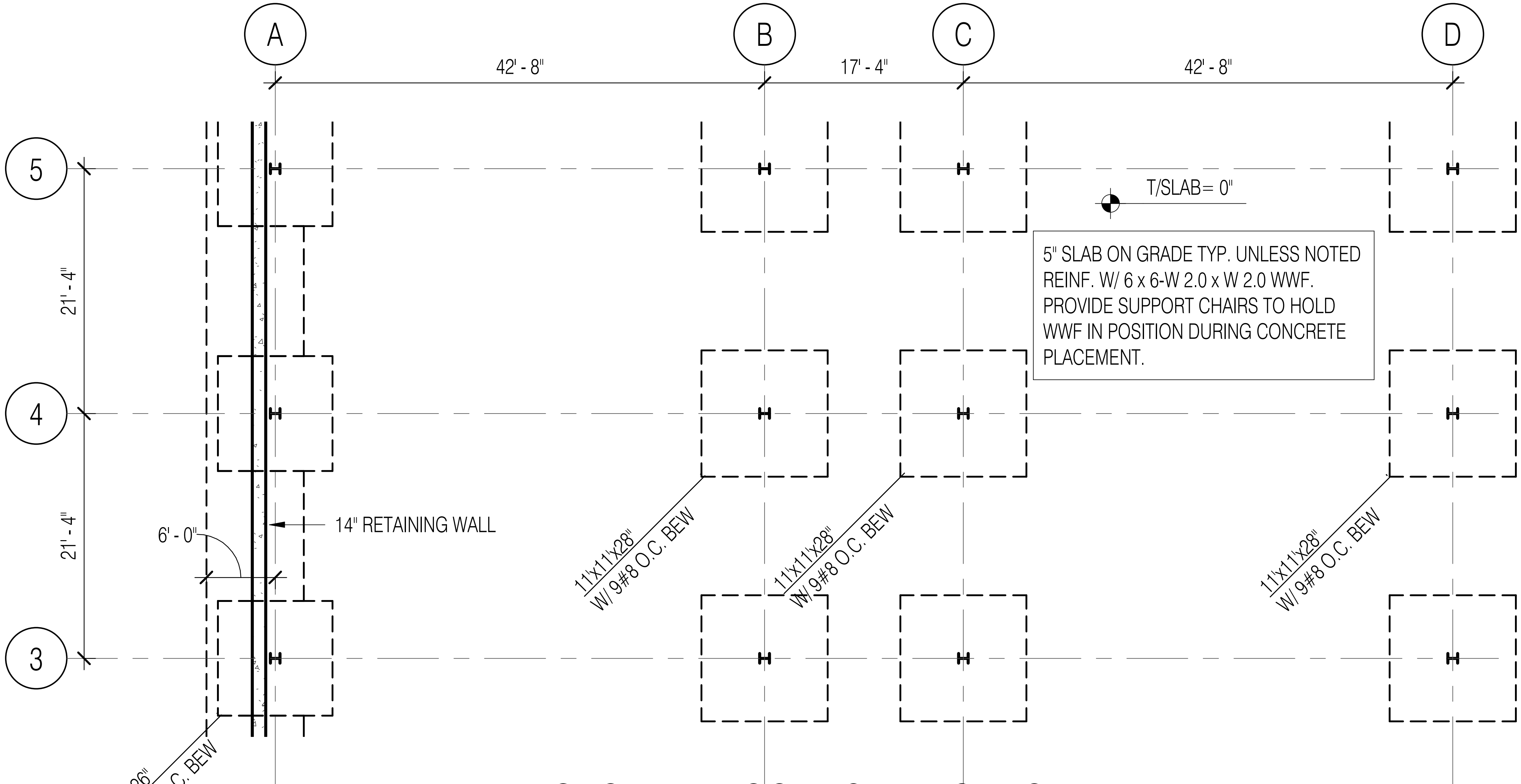


GROUND FLOOR - CONCRETE OPTION

3/32" = 1'-0"

PLAN NOTES:
1. TOP OF SLAB IS AT ELEVATION AS SHOWN ON PLAN.
2. ALL ELEVATIONS INDICATED (±0'-0") ARE TAKEN FROM TOP OF SLAB ELEVATION.
3. TOP OF INTERIOR FOOTING ELEVATION = -1'-0" UNLESS OTHERWISE NOTED.
4. TOP OF EXTERIOR FOOTING ELEVATION = -1'-0" UNLESS OTHERWISE NOTED. TOP OF WALL FOOTING ELEVATION TO MATCH ADJACENT COLUMN FOOTING. STEP FOOTING AS REQUIRED PER DETAIL __/S-___.
5. FOOTING KEY:



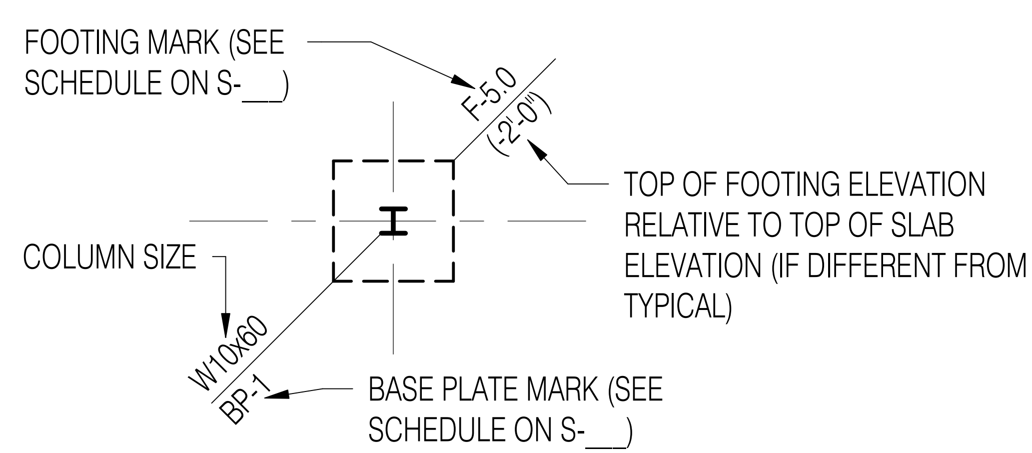


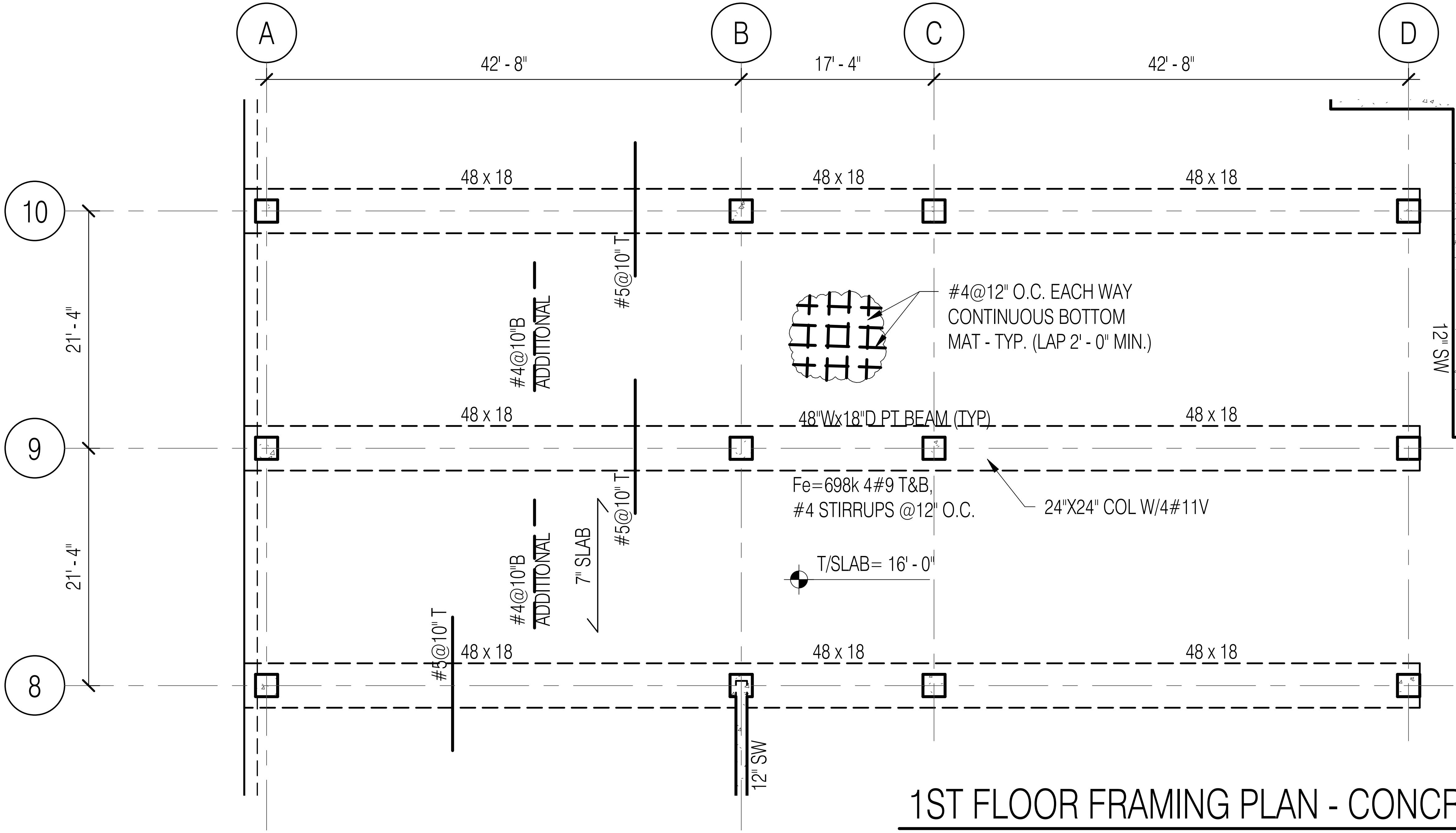
GROUND FLOOR - STEEL OPTION

3/32" = 1'-0"

PLAN NOTES:

1. TOP OF SLAB IS AT ELEVATION AS SHOWN ON PLAN.
2. ALL ELEVATIONS INDICATED (±0'-0") ARE TAKEN FROM TOP OF SLAB ELEVATION.
3. TOP OF INTERIOR FOOTING ELEVATION = -1'-0" UNLESS OTHERWISE NOTED.
4. TOP OF EXTERIOR FOOTING ELEVATION = -1'-0" UNLESS OTHERWISE NOTED. TOP OF WALL FOOTING ELEVATION TO MATCH ADJACENT COLUMN FOOTING. STEP FOOTING AS REQUIRED PER DETAIL __/S-___.
5. COLUMN AND FOOTING KEY:



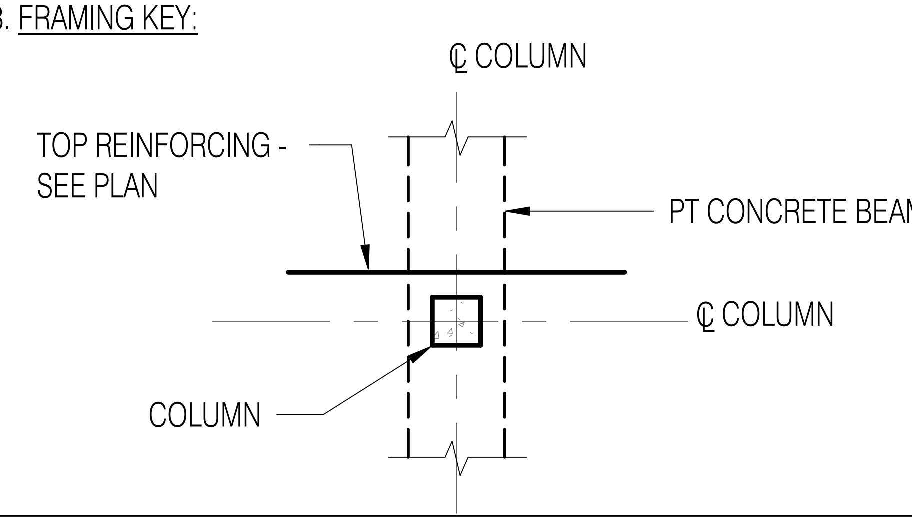


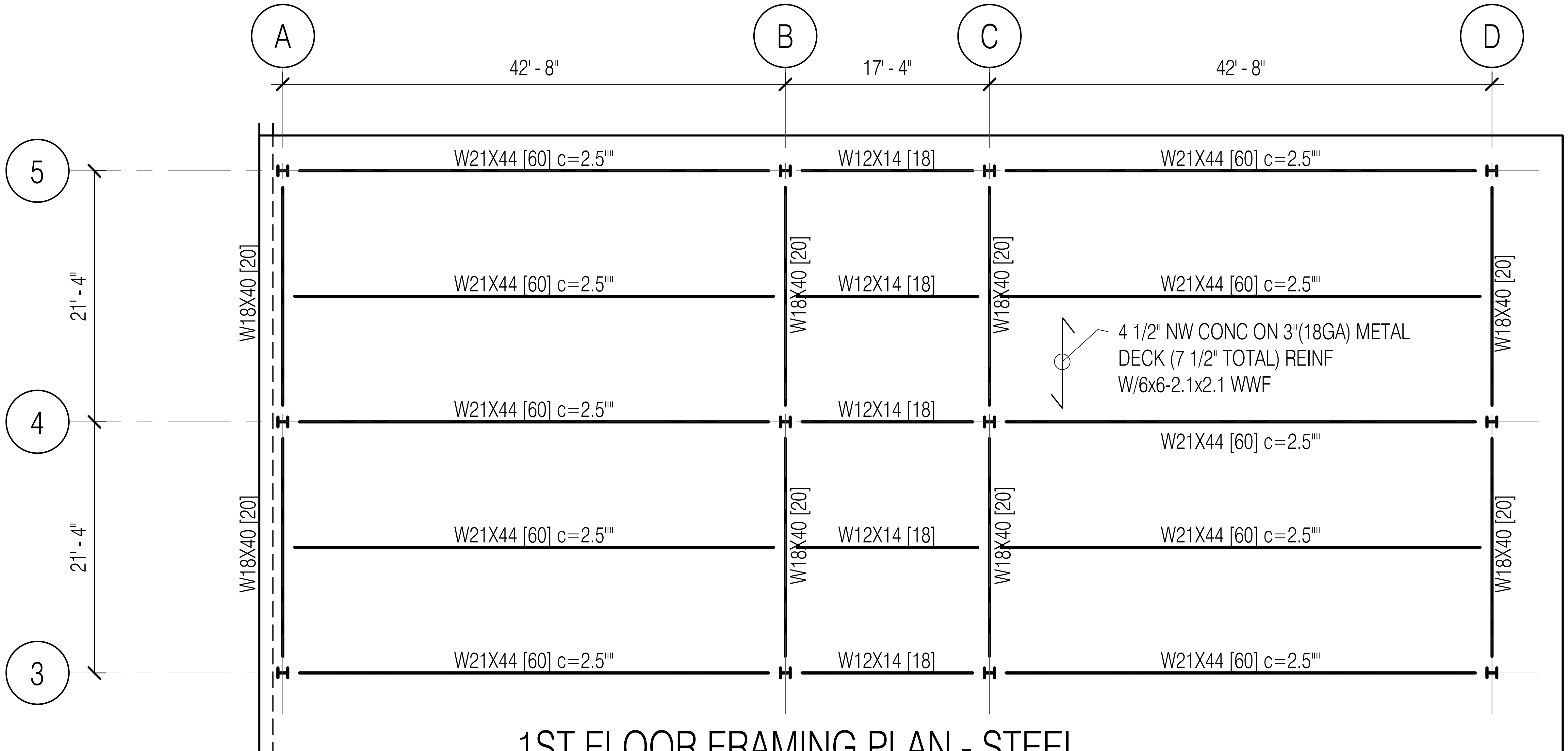
1ST FLOOR FRAMING PLAN - CONCRETE OPTION

3/32" = 1'-0"

PLAN NOTES:

1. TOP OF STRUCTURAL SLAB IS AT ELEVATION AS SHOWN ON PLAN.
2. SLAB THICKNESS IS 7" AND REINFORCED WITH #4@12" BOTTOM MAT O.C EACH WAY. ALL REINFORCING SHOWN ON PLAN IS ADDITIONAL.
3. FRAMING KEY:



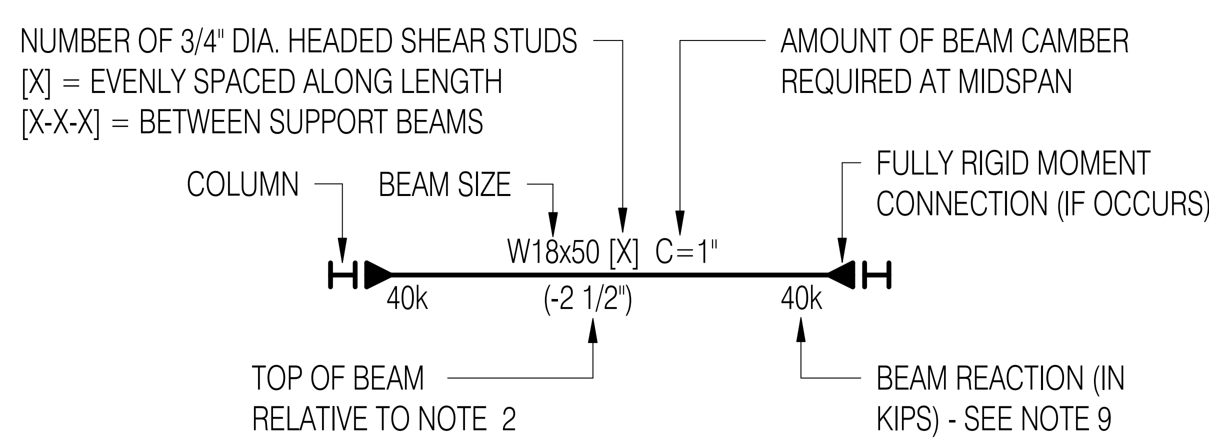


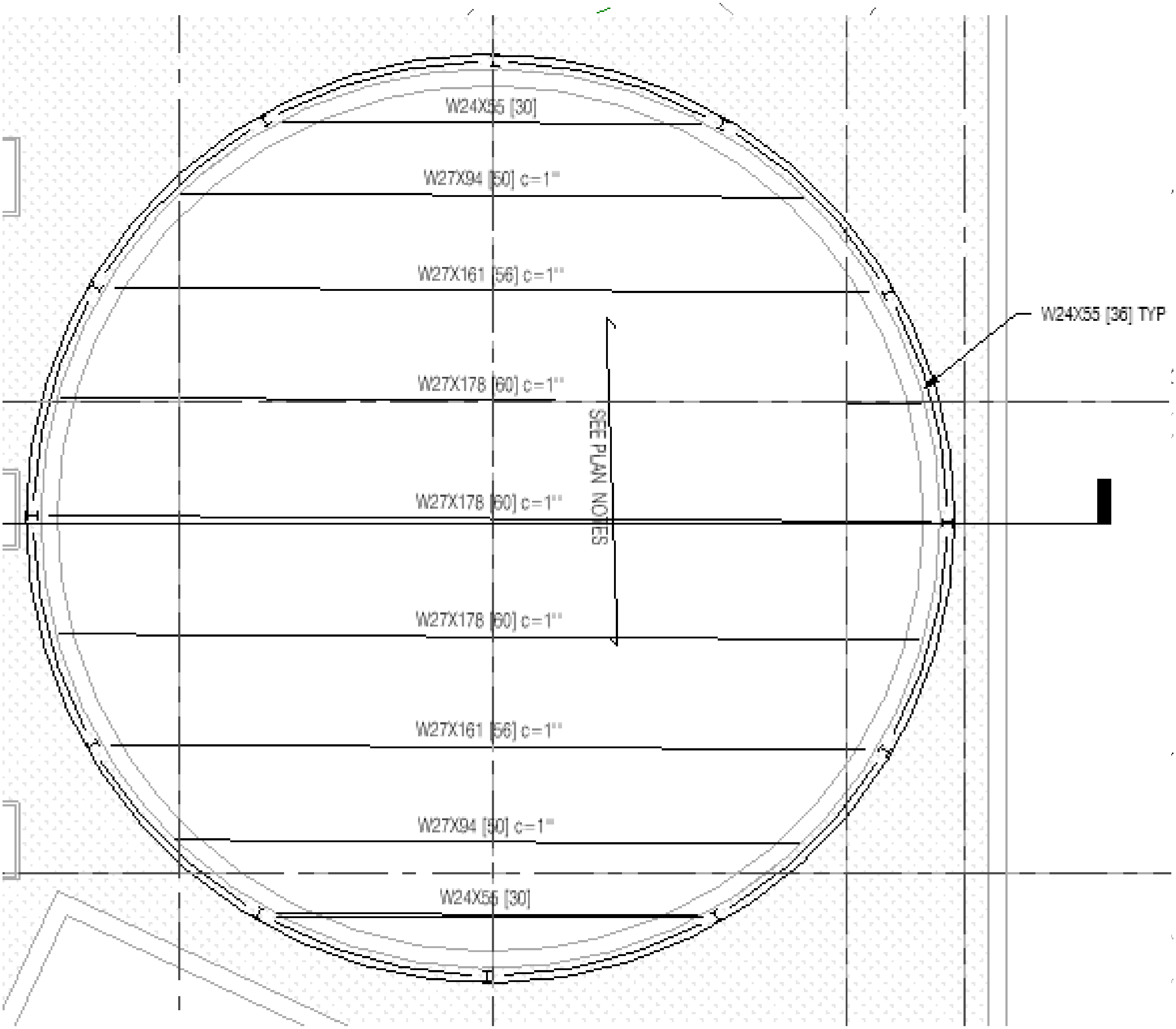
1ST FLOOR FRAMING PLAN - STEEL OPTION

3/32" = 1'-0"

PLAN NOTES:

1. TOP OF SLAB IS AT ELEVATION = ___'-___"UNLESS NOTED OTHERWISE. THIS IS TO BE REFERENCE ELEVATION FOR THIS FLOOR.
2. TOP OF STEEL (BOTTOM OF STEEL DECK) IS 7 1/2" BELOW TOP OF FLOOR SLAB UNLESS NOTED.
3. STRUCTURAL SLAB TO BE 4 1/2" NORMAL WEIGHT CONCRETE OVER 3" DEEP X 18 GAGE GALVANIZED COMPOSITE STEEL DECK (TOTAL THICKNESS = 7 1/2") REINFORCED WITH 6x6-W2.1xW2.1 WWF.
4. STRUCTURAL STEEL FRAMING KEY:

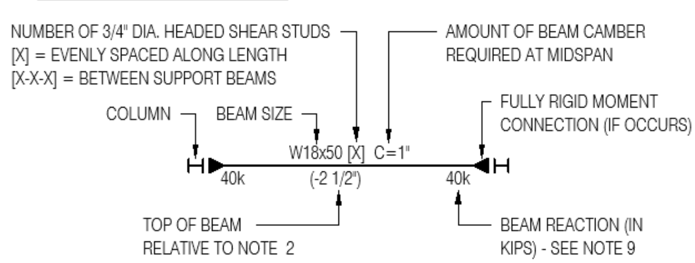


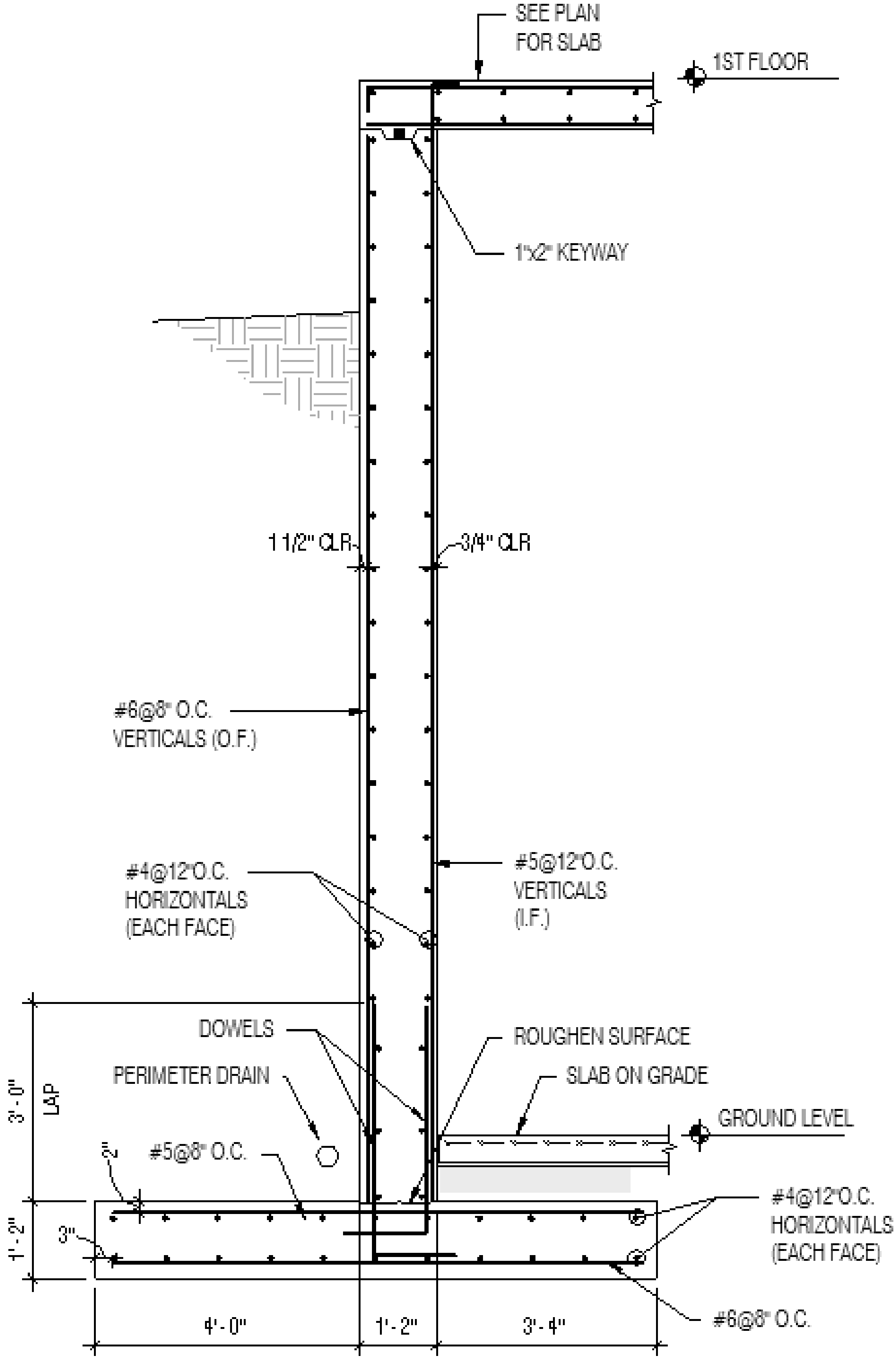


PLANETARIUM ROOF PLAN (STEEL OPTION)

PLAN NOTES:

1. TOP OF SLAB IS AT ELEVATION = ___'-___"UNLESS NOTED OTHERWISE. THIS IS TO BE REFERENCE ELEVATION FOR THIS FLOOR.
2. TOP OF STEEL (BOTTOM OF STEEL DECK) IS 7 1/2" BELOW TOP OF FLOOR SLAB UNLESS NOTED.
3. STRUCTURAL SLAB TO BE 4 1/2" NORMAL WEIGHT CONCRETE OVER 3" DEEP X 18 GAGE GALVANIZED COMPOSITE STEEL DECK (TOTAL THICKNESS = 7 1/2") REINFORCED WITH 6x6-W2.1xW2.1 WWF.
4. STRUCTURAL STEEL FRAMING KEY:





TYPICAL PERIMETER RETAINING WALL

7 MECHANICAL DESIGN

SCHEMATIC DESIGN NARRATIVE

MECHANICAL CODES, REGULATIONS & REFERENCE STANDARDS

I. APPLICABLE GOVERNING CODES, REGULATIONS AND REFERENCE STANDARDS

A. 2015 International Code Council (ICC)

1. 2015 International Building Code (IBC)
2. 2015 International Mechanical Code (IMC)
3. 2015 International Plumbing Code (IPC)
4. 2015 International Energy Conservation Code (IECC)
5. 2015 Fuel Gas Code
6. 2015 Fire Prevention Code

B. 2015 NFPA 101

C. 2014 National Electric Code (NEC)

D. LEED Version 4

E. ASHRAE Std. 90.1-2010, Energy Standard for Buildings Except Low-Rise Residential

F. SMACNA IAQ Guidelines for Occupied Buildings Under Construction, 2nd Editions 2007 (LEED 2009)

G. Montgomery College Design Standards

H. Maryland Community College Facilities Manual

I. Montgomery County Building Code, Ch. 8-14A, 8.00.02 Adoption of International Codes, and 8.00.03 Buildings – Energy Conservation and Sustainable Building Design.

J. Maryland Green Building Council – High Performance Green Building Program

K. ASHRAE Handbooks

HEATING, VENTILATING, AND AIR-CONDITIONING SYSTEMS

II. SUMMARY

A. Provide all labor, materials, equipment, services and perform all required procedures to allow for a complete operating heating, ventilation, and air conditioning (HVAC) system.

B. The mechanical work will generally include but not be limited to the following:

1. Primary Cooling System
   a. Water-Cooled Centrifugal Chillers
   b. Chemical Water Treatment Systems
   c. Solid Separation Systems
   d. Primary Distribution Pumps

e. Appurtenances

2. Primary Heating System
    a. Condensing Boilers
    b. Primary Distribution Pumps
    c. Non-Chemical Water Treatment Systems
    d. Appurtenances
3. Central Station Airside Systems
    a. Outdoor, Custom, Modular Air-Handling Units
    b. Indoor, Modular Air-Handling Units
4. Fans
    a. Centrifugal – Housed
    b. Centrifugal – Plenum
    c. Utility Set
    d. Cabinet
5. Unitary Systems
    a. Multi-Zone, Variable Refrigerant Flow Systems
6. Air Distribution Systems
    a. Air Terminal Devices – Volume Control Boxes
    b. Diffusers, Registers, Grilles
    c. Air Distribution Appurtenances
7. Local Heating Systems
    a. Hydronic Reheat Coils
    b. Finned-Tube Radiation
8. Building Management System – Automatic Temperature Controls
    a. Direct Digital Controls
    b. Building Management System
    c. Central Network System
    d. Energy meters
9. Ductwork Systems
    a. Material
    b. Sizing Criteria
    c. Ductwork Accessories
10. Piping Systems
    a. Chilled Water Piping Systems
    b. Heating Hot Water Piping Systems
11. Insulation Systems
    a. Ductwork
    b. Piping
    c. Equipment
12. Test and Balancing
13. Miscellaneous Mechanical Equipment / Systems
14. Manufacturers of Major Equipment and Appurtenances

15. Duct mounted smoke detectors.

16. Misc. exhaust and intake louvers and hoods.

17. Equipment Support
    a. Vibration isolation
    b. Concrete equipment pads.
    c. Pre-manufactured roof curbs.

18. Commissioning of HVAC Equipment, Listing of Equipment/Systems to be Commissioned:
    a. Boilers
    b. Chillers
    c. Pumps
    d. Air Handling Units
    e. Fans
    f. Fan Coils
    g. Volume Control Boxes
    h. Temperature Controls
    i. Variable Refrigerant Flow Systems

III. DESIGN CRITERIA

A. Heating and Cooling Load Calculations: The heating and cooling load calculations for SD level equipment sizing were calculated using Integrated Environmental Solutions Virtual Environment (IESVE) 2017, Version 2017.4.0.0.

B. Outdoor Design Criteria: The heating, ventilating and air-conditioning systems will be designed and constructed for the following weather criteria based on the annual 99.6% and 0.4% 2017 ASHRAE Handbook of Fundamentals (HOF) for Ronald Reagan Washington National, VA, USA (WMO: 724050). The 0.4% Cooling DB/MCWB was selected to account for the upward trend in temperatures that may not be fully reflected in historical typical meteorological year data.

Occurrence	Summer	Winter
Summer Cooling DB/MCWB	94.7°F / 75.5 °F	-
Summer Evaporation WB/MCDB	78°F / 87°F	-
Summer Dehumidification DB/HR/MCDB	75.7°F / 134.4 / 83.2°F	-
Winter Heating DB	-	17.9°F

C. Indoor Design Criteria:
The indoor conditions for labs and planetarium are conservative to account for setpoint demands in specialized equipment and processes. These values will be adjusted as lab equipment selections are refined and operating conditions provided.

Occupancy Category	Cooling DBT / %RH	Heating DBT
PLANETARIUM	72 / 55%	72
CLASSROOM - MULTIPURPOSE	75 / 55%	72
CONFERENCE	75 / 55%	72
CORRIDOR	77	70
ELECTRICAL/MECHANICAL	80	65
TELECOM	75	65
ELEVATOR MACHINE ROOM	75	65
LAB - DRY	72 / 55%	72
LAB - COMPUTER	75 / 55%	72
LAB - SUPPORT	72 / 55%	72
LAB - WET	72 / 55%	72
LOBBY	75 / 55%	72
LOUNGE	75 / 55%	72
OFFICE - PRIVATE	75 / 55%	72
OFFICE - WORKROOM	75 / 55%	72
RESTROOM	75	72
STAIR	80	65
VESTIBULE	80	65
STORAGE - INACTIVE	77	70

D. Ventilation (Outside Air) Rate Criteria: The HVAC systems will be designed and constructed as follows:

1. All ventilation rates shall be in accordance with the IMC and ASHRAE 62.1.
2. The laboratory areas will be supplied with 100% outdoor air, with no recirculation.

E. Exhaust Airflow Rate Criteria: The HVAC systems will be designed and constructed as follows:

1. All exhaust air rates shall be in accordance with the IMC and ASHRAE 62.1.
2. Laboratory areas will have a dedicated exhaust system.
    a. Fume Hood exhaust: 80 feet per minute at 18” sash height.
    b. General Space Exhaust: Minimum of 8 air changes per hour (ACH, based on combined general and fume hood exhaust) when spaces are occupied and 4 ACH when unoccupied. BAS will tie into occupancy sensors to determine override of scheduled unoccupied space mode.

F. Space Pressurization Criteria: The HVAC systems will be designed and constructed as follows:

1. The building will be positively pressurized in relation to the external environment.
2. Laboratory spaces will be negatively pressurized with respect to adjacent occupied areas.

G. Filtration Criteria:

1. Office / Classroom air handling equipment will be provided with MERV 8 and MERV 13 filters.

2. Laboratory air handling equipment will be provided with MERV 8 and MERV 14 filters.

H. Vibration Criteria: The HVAC systems will be designed and constructed as follows.

1. Pumps: Provide inertia bases for base-mounted pumps.
2. Air Handling Units: Provide spring isolators to support each fan.
3. Exhaust Fans: Provide spring isolators to support each inline fan.
4. Cooling Towers: Provide spring isolators to support each tower.
5. Chillers: Provide neoprene pads to support each chiller.
6. Boilers: Provide neoprene pads to support each boiler.

I. Reliability Criteria: The HVAC systems will be designed and constructed in accordance with the following minimum reliability criteria:

1. The Primary Chilled Water Pumps shall be designed to provide 2N capacity.
2. The Secondary Chilled Water Pumps shall be designed to provide 2N capacity.
3. The Primary Heating Hot Water Pumps shall be designed to provide 2N capacity.
4. The Secondary Heating Hot Water Pumps shall be designed to provide 2N capacity.
5. The lab exhaust fans shall be designed to provide N+1 capacity.
6. Lab AHU’s shall be designed to provide (2) two air tunnels. Each unit will contain multiple supply and exhaust fans with N+1 capacity inside the unit.
7. The boilers shall be designed to provide 75% of full load capacity with the failure of any single unit.

I. Internal Loads:

1. Occupant sensible and latent heat generation corresponds to the space density and activity level matching the program for the space. Occupant density for SD load calculations were based on architectural program and comparison to ASHRAE 62.1-2013 reference density for that space type. The occupant heat gains are based on 2017 ASHRAE HOF, these values are listed in the table below.

Occupancy Category	2017 HOF Degree of Activity	Occupant Sensible (btuh)	Occupant Latent (btuh)
PLANETARIUM	Seated, Very Light Work	245	155
CLASSROOM - MULTIPURPOSE	Moderately Active Office Work	250	200
CONFERENCE	Moderately Active Office Work	250	200
CORRIDOR	N/A	0	0
ELECTRICAL/MECHANICAL	N/A	0	0
TELECOM	N/A	0	0
ELEVATOR MACHINE ROOM	N/A	0	0
LAB - DRY	Moderately Active Office Work	250	200
LAB - COMPUTER	Seated, Very Light Work	245	155
GREENHOUSE	Moderately Active Office Work	250	200
LAB - SUPPORT	Moderately Active Office Work	250	200
LAB - WET	Moderately Active Office Work	250	200
LOBBY	Walking, Standing	250	250
LOUNGE	Moderately Active Office Work	250	200
OFFICE - PRIVATE	Seated, Very Light Work	245	155
OFFICE - WORKROOM	Moderately Active Office Work	250	200
RESTROOM	N/A	0	0
STAIR	N/A	0	0
VESTIBULE	N/A	0	0
STORAGE - INACTIVE	N/A	0	0

2. Lighting power density is currently based on 10% reduction on ASHRAE 90.1-2013 space by space values and will be revised to reflect actual design values as the design progresses.

3. Plug load power density is based on standard practice and evaluation of the expected equipment in the space and the associated heat generation as guided by 2017 ASHRAE HOF and proposed equipment identified in the RFP. Preliminary plug loads used in SD load calculation are listed in the table below.

Occupancy Category	Plug Loads (W/sf)
PLANETARIUM	5
CLASSROOM - MULTIPURPOSE	2.5
CONFERENCE	2.5
CORRIDOR	0.2
ELECTRICAL/MECHANICAL	40
TELECOM	50
ELEVATOR MACHINE ROOM	50
LAB - DRY	8
LAB - COMPUTER	8
GREENHOUSE	2.5
LAB - SUPPORT	5
LAB - WET	8
LOBBY	0.75
LOUNGE	1.5
OFFICE - PRIVATE	1.5
OFFICE - WORKROOM	2
RESTROOM	0
STAIR	0
VESTIBULE	0
STORAGE - INACTIVE	0

J. Noise Criteria (NC):

1. In accordance with acoustical consultant recommendations, the following NC Levels will be targeted:

Room Name	NC Level
Conference and Seminar Rooms	30
Faculty / Admin Office	35
Group Meeting Spaces	35
Open Office / Workstations	35
Planetarium	35
Classrooms	35
Lobby / Corridor / Vestibule	40
Lab Spaces	40

IV. BUILDING ENVELOPE CONSTRUCTION

SD level heating and cooling load calculations assume the building envelope thermal performance follow the prescriptive requirements of ASHRAE 90.1-2013 for Climate Zone 4A. These requirements are listed in Ch. 5 Building Envelope and summarized in the tables below.

Excerpt from ASHRAE 90.1-2013 Table 5.5-4: BUILDING ENVELOPE REQUIREMENTS FOR CLIMATE ZONE 4	
Roofs	
Insulation entirely above roof deck	R-30 c.i.
Walls, Above Grade	
Mass	R-9.5 c.i.
Walls, Below Grade	
Below-grade wall	C-0.119
Floors	
Mass	U-0.057
Joist/framing	U-0.038
Slab-On-Grade Floors	
Unheated slabs	F-0.52
Heated slabs	F-0.84
Opaque doors	
Swinging	U-0.5

Excerpt from ASHRAE 90.1-2013 Table 5.5-4: BUILDING ENVELOPE REQUIREMENTS FOR CLIMATE ZONE 4A, FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS		
Vertical Fenestration	**U-factor**	**SHGC**
Metal Framing, Fixed	0.42	0.4
Metral Framing, Operable	0.50	0.4
Metal Framing, Entrance doors	0.77	0.4
Skylights		
All Types	0.50	0.4

V. MECHANICAL SERVICES ENTRANCE

A. In line with the Montgomery College Facilities Master Plan 2013-2023, the existing high-performance central plant distribution system will connect to the new Math and Science building. In addition, the campus distribution will tie into the building’s proposed stand-alone central heating and cooling systems such that the building’s chiller and boiler systems will be able to supplement the campus heating and chilled water loops. The buildings Central Utility Plant is described in the following section.

B. Chilled Water
1. The building will receive new 8” chilled water supply and return piping from the campus central plant. New connections will be made in the existing underground vault near New York Avenue. Demolish existing piping serving Falcon hall, as required. The supply and return piping will be direct-bury, underground cased piping and will enter the buildings North Mechanical Room on the ground floor.
2. Primary Chilled Water pumps and valving assembly to switch chilled water service from the campus loop to the chilled water plant will be located in the North Mechanical Room on the ground floor near the incoming service entrance.
3. Provide (2) end-suction Primary Chilled Water Pumps arranged in a 2N configuration.
4. Each pump shall have the following capacities:
   a. Water Flow: 900 GPM

b. Head: 75’
c. Motor Size: 25 HP
d. Basis of Design: Bell and Gossett, model 1510

5. Additional Chilled water connections will be provided in an underground vault for future connection and campus expansion. Connections will have shutoff valves and capped.

C. Heating Hot Water

1. The building will receive new 4” hot water supply and return piping from the campus central plant. New connections will be made provided in the existing underground vault near New York Avenue. Demolish existing piping serving Falcon hall, as required. The supply and return piping will be direct-bury, underground cased piping and will enter the buildings North Mechanical Room on the ground floor.
2. Primary hot water pumps and valving assemble to switch hot water service from the campus loop to the boiler plant will be located in the North Mechanical Room on the ground floor near the incoming service entrance.
3. Provide (2) end-suction Primary Hot Water Pumps arranged in a 2N configuration.
4. Each pump shall have the following capacities:
   a. Water Flow: 375 GPM
   b. Head: 65
   c. Motor Size: 10 HP
   d. Basis of Design: Bell and Gossett, model 1510
5. Additional, Hot water connections will be provided in an underground vault for future connection and campus expansion. Connections will have shutoff valves and capped.

D. Natural Gas

1. The new Math and Science Center will be independently connected to the public gas line.
2. The natural gas service entrance will include a dedicated gas meter to determine totalized volume of gas consumption.
   a. Downstream of natural gas meter, natural gas pipe will be split into dedicated piping for individual systems as necessary.
3. Natural gas service will include emergency generator, HVAC boilers, domestic water heaters, and lab services as described in the academic programming.

VI. CENTRAL UTILITY PLANT (PENTHOUSE)

The mechanical work will generally include but not be limited to the following:

A. Chillers:

a. Provide (2) two water-cooled centrifugal chillers based on the following design data (each chiller):

(1) Net capacity: 350 tons
(2) Chilled water temperatures: 40°F EWT / 58°F LWT
(3) Chilled water flow:450 GPM
(4) Condenser water temperatures: 85°F EWT/ 95°F LWT
(5) Condenser water flow: 1050 GPM
(6) NPLV: 0.665 kw/ton

(7) Basis of design: Carrier, 19XRV

b. Refrigerant Monitoring and Removal

(1) Follow minimum standards for refrigeration systems as required by ANSI/ASHRAE Standard 15 paying special attention to requirements for air monitoring, ventilation, self-contained breathing apparatus, and leak detection to assure the safety of personnel.

(2) Install proper outside exhaust of chiller refrigerant relief device and purge unit(s) complete with dirt leg, blow down valve, and flexible connector. Purge system shall include motorized intake complete with exterior indication and control. Route exhaust to the exterior of the building and away from all air intakes in compliance with ANSI/ASHRAE 15.

(3) Install a refrigerant monitor that can be calibrated for appropriate refrigerant. Unit shall be capable of detecting concentrations of minimum parts per million (ppm) for low level leak detection to assure the safety of personnel.

(4) Install suitable audible and visual alarms that activate well below the Acceptable Exposure Level (AEL) of the specific refrigerant to alert persons inside and outside of the equipment room that a refrigerant leak condition exists.

(5) Acceptable Manufacturer: Honeywell, Model 301 or Approved Equal.

c. Provide chemical treatment for chilled water system to match existing campus treatment standards.

B. Cooling Tower:

1. Provide (2) two cooling towers on spring type vibration isolators; each cooling tower cell shall be independently supported by spring type vibration isolators without the need to provide a structural steal beam to support it.

2. Design Data (each tower):

a. Capacity: 350 Tons

b. Flow: 1050 GPM

c. Condenser water entering/leaving temperature: 95°F / 85°F

d. Outside air wet bulb: 78.4°F

e. Basis of Design: BAC, Series 1500

f. Provide a VFD for each fan motor.

g. Provide basin heaters as recommended by manufacturer.

h. Basin Sweeper System

(1) Basis of Design: Lakos

(2) Basin sweeper system to be located inside of central plant on the roof.

i. Heat Trace

(1) Provide heat trace for all exposed outdoor cooling tower pipe between the penthouse and the cooling towers.

(2) Provide a separate heat trace panel with test circuits and contactors, installed inside of the plant enclosure. Provide a master heat trace thermostat for control.

3. Provide chemical treatment system for condenser water to match existing treatment standards.

C. Condensing Boilers:

1. Provide (3) three fire-tube, high efficiency, condensing boilers, each with the following capacities:

a. Boiler Entering/Leaving Water temperatures: 105 °F / 140°F

b. Maximum input: 2500 MBH

c. Basis of design: Fulton, Endura

2. Each condensing boiler intake and exhaust shall be individually piped through the plant roof. Manifold type boiler intake or exhaust in not acceptable.

3. During normal operation boilers are sized to operate at 90% full capacity. In the case of a boiler being taken out of operation due to maintenance, the system will be able to produce 75% of the total heating load.

4. Provide chemical treatment system for heating hot water to match existing treatment standards.

D. Pumps and Motors:

1. Secondary Chilled Water Pumps

a. Provide (2) two end-suction chilled water pumps arranged in a 2N configuration.

b. The secondary chilled water pumps will distribute flow through the new Science and Math building. The chilled water loop will operate to maintain a design temperature differential of 18°F, with a chilled water supply temperature of 40°F.

c. Each pump shall have the following capacities:

(1) Water Flow: 900 GPM

(2) Head: 70’

(3) Motor Size: 15 HP

(4) Basis of Design: Bell and Gossett, 1510 series

2. Condenser Water Pumps:

a. Provide (2) two end-suction condenser water pumps arranged in a 2N configuration. Each pump shall have the following capacities:

(1) Water Flow: 2100 GPM

(2) Head: 50’

(3) Motor Size: 75 HP

(4) Basis of Design: Bell and Gossett, 1510 series

3. Secondary Hot Water Pumps:

a. Provide (2) two end-suction heating hot water pumps arranged in a 2N configuration.

b. The secondary hot water pumps will distribute flow through the new Science and Math building. The heating hot water loop will operate to maintain a design temperature differential of 35°F, with a heating hot water supply temperature of 140°F.

c. Each pump shall have the followings capacities:

(1) Water Flow: 375 GPM

(2) Head: 65’

(3) Motor Size: 10 HP

(4) Basis of Design: Bell and Gossett, 1510 series

4. Provide a variable frequency drive, mounted on the wall or unistrut, for each pump.

5. Provide suction diffuser with removable stainless-steel strainer for each pump.

VII. AIR HANDLING AND VENTILATION EQUIPMENT

A. Custom, Variable Air Volume, Dedicated Outdoor Air-Handling Systems

1. Laboratory Air Handling Unit

a. Provide a 100% outside air unit located on the roof sized to provide supply air for ventilation and cooling requirements for all laboratory areas. The Air Handling Unit will be designed to supply low temperature air at 47 °F. General space return shall be returned to the AHU. The AHU shall be built with the following specifications.

b. Design Data:

(1) 100% outside air, 4” thick wall injected foam

(2) Outside air section: aluminum interior liner, galvanized painted exterior liner.

(3) Supply air: 80,000 CFM

(4) Return air: 10,000 CFM

(5) Provide four supply fans and one return fan.

(6) Provide chilled water coil, hot water preheat coil, energy recovery coil, pre-filter (MERV 8) final filter (MERV 14)

c. Each fan to have a dedicated VFD.

d. Unit will be designed with an internal service vestibule the full length of the unit. Vestibule will be divided into outdoor air intake and coil / fan service (conditioned) sections. Manufacturer will provide louvers and isolation dampers for outdoor air intake from service vestibule to unit.

e. Provide an energy recovery coil (pumped glycol loop) to pre-condition outdoor air using energy from the laboratory exhaust air system. Coil shall be provided with phenolic coating for long term corrosion resistance.

B. Custom, Outdoor, Variable-Air Volume, Recirculating Air-Handling Systems

1. Provide a custom, outdoor, variable air volume, recirculating air handling unit to serve classrooms and academic support spaces. The air handling unit will be designed to supply low temperature air at 47 °F. A plenum return air system will be utilized with motorized dampers at each floor as required. The AHU shall be built with the following specifications.
   a. Design Data:
      (1) 4” thick wall injected foam
      (2) Outside air section: aluminum interior liner, galvanized painted exterior liner.
      (3) Supply air: 60,000 CFM
      (4) Return Air: 55,000 CFM
      (5) Provide four supply fans and four return fans.
      (6) Provide an outdoor air intake (with economizer), return air connection and mixing box, chilled water coil, hot water preheat coil, pre-filter (MERV 8) and final filter (MERV 13)
   b. Each fan to have a dedicated VFD.
   c. Unit will be designed with an internal service vestibule the full length of the unit.

C. Modular, Indoor, Variable Air Volume, Recirculating-Air-Handling Systems

1. The ground floor planetarium, pre-function and lobby area will be served by an indoor, modular, air handling unit located in the south mechanical room 37. The unit will be comprised of an outdoor air intake (with economizer), return air connection and mixing box, pre-(MERV-8) and final (MERV-14) filters, hydronic heating coil, chilled water coil, plenum supply fan and discharge plenum, and plenum relief fan and return plenum. Provide unit sized for variable supply air operation up to 10,000 CFM.
2. Air Handling Unit will be designed to supply low temperature air at 47°F
3. Unit construction will consist of 2-inch, double-wall panels with foam insulation (not less than R-13), with galvanized 16 gage exterior and 18 gage interior steel casings. Frame construction will be 16 gage tube steel with no structural support from unit casing.
4. Unit will be provided with base rail, for floor-mounting to concrete housekeeping pad.
5. Unit will include thermal dispersion-type outdoor air and supply air flow monitoring for verification and control.
6. Air handling Unit and Ventilation is sized for typical occupancy in pre-function space and standard classroom occupancy in planetarium. Additional, above ceiling hung, ducted fan coil units will be provided for high occupant density events when the Planetarium and adjacent pre-function spaces are combined.

7. Basis of Design Manufacturer: Trane, Climate Changer

D. Laboratory Exhaust

1. (3) Three laboratory exhaust fans located on the roof of the building will exhaust all fume hood, snorkel, and general space exhaust. Fan arrangement will be designed so that each fan can support approximately 50% of the total exhaust requirement. Lab exhaust fans shall be non-ferrous type rated for lab exhaust.
2. Design Data (for set of 3 fans)
   a. Exhaust airflow: 70,000 CFM
   b. Exhaust air external static pressure: 4”
   c. Provide fan set with a heat recovery plenum and energy recovery coil.
   d. Provide three fans, each sized for 50% of the total airflow; one fan shall be standby.
   e. Provide each fan with a VFD and a 40HP motor.
   f. Basis of Design: Strobic, Tri-Stack
3. Exhaust fans will be mixed-flow, induced dilution, high plume fans with non-ferrous fan inlet bell. Fan array will be modular in construction for field re-assembly on roof. Unit construction will be welded steel
4. Access to the fan system motors will be provided by Manufacturer’s custom application grated service platform. Access doors will be provided for all fan impellers.
5. Inlet mixing plenum will be designed and provided by fan unit Manufacturer. Plenum will include energy recovery coils (with phenolic coating) with piping ready for field connection to (glycol) energy recovery loop. Energy recovery loop pump will be installed in the service vestibule of the DOAS air-handling unit. Provide two (2) pumps at 3 HP, with one pump acting as standby for maintenance and emergency operation.
6. Each fan will be provided with a VFD that will adjust the fan speed to match the space occupancy/usage requirements. VFD to be located inside of Central Utility Plant on the Roof.
7. Provide a silencer on each exhaust fan nozzle.
8. An 80% diversity usage factor has been applied to the total laboratory exhaust airflow requirement.

E. Toilet Rooms and Custodial Closets

1. Toilet rooms and janitor’s closets will be provided with a dedicated direct drive centrifugal, roof mounted toilet exhaust power ventilator (upblast) fan.. \ The fans will run at constant volume according to the building occupancy schedule. Basis of design Manufacturer: Greenheck, Model Cube.

F. Mechanical Penthouse (Central Plant)

1. The penthouse will be ventilated by mechanical sidewall power ventilators. Ventilation fans will be controlled by a wall mounted, reverse acting thermostat.

VIII. AIR TERMINAL UNITS

A. Laboratory Air Exhaust Valves & Laboratory Air Supply Valves.

1. Laboratory supply, general exhaust, and fume hood exhaust will be controlled using air valves.

2. Performance: Pressure independent up to 3.0” static pressure drop across valve. Volume control accurate to +/- 5% of airflow command signal. Response time to change in command signal less than 1 second. Response time to change in duct static pressure less than 1 second.

3. Basic Assembly: Casings will be 16-gage spun aluminum with continuous welded seam. Composite Teflon shaft bearings. Stainless steel springs with polyester slider assembly.

4. Supply valves will be provided with a separate duct mounted hydronic heating coil downstream of the supply air valves.

5. Acceptable manufacturers: AccuValve

B. Variable Air Volume Recirculating Air Handling Systems:

1. Single-duct, pressure-independent, variable volume control boxes with hot water reheat coils will provide temperature control of the spaces being served by VAV air handling units. In general, a single VCB will be provided for each conference or team room. Groups of 2-3 offices/study rooms will be served by a single VCB and multiple VCB’s will be used in open office/study areas. Large classrooms and non-hazardous (dry) Labs will be served by multiple VCB’s. The inlet damper in each VCB will vary the air flow to the area served from the preset maximum to the preset minimum, approximately 30-50% of the preset maximum as the cooling load reduces. The heating coil will reheat the supply air to meet space heating loads.

2. VCBs serving spaces designed for NC-30 and below, or as shown on the drawings, will have integral sound attenuators.

3. VCBs will be used for all non-Laboratory spaces. This includes spaces served by both the dedicated outdoor air handling unit and recirculation air handling unit systems.

VIII. FAN COIL UNITS

A. Stairwells will be provided with a vertical, floor mounted, 4-piped fan coil unit at every floor, and will provide space cooling to 80°F and space heating to 65°F. Unit will be controlled by a wall-mounted thermostat.

B. Vestibules will be provided with a heating and cooling fan coil unit. Units will be concealed, mounted above the vestibule ceiling, and will provide space cooling to 80°F and space heating to 65°F. Unit will be controlled from a wall-mounted thermostat.

C. Mechanical penthouse central plant will be provided with a horizontal, ceiling hung, 4-piped fan coil unit, and will provide space cooling to 80°F and space heating to 65°F. Unit will be controlled from a wall-mounted thermostat.

IX. VARIABLE REFRIGERANT FLOW (VRF)

A. Telecom Rooms, including MDF and IDF, will be provided with a cooling only wall mounted indoor unit with a manufacturer provided condensate pump and thermostat/controller.

B. Elevator Machine Rooms will be provided with a cooling only wall mounted indoor unit with a manufacturer provided condensate pump and thermostat/controller.

C. Electrical rooms will be provided with a cooling only ceiling hung indoor unit with a manufacturer provided condensate pump and thermostat/controller.

D. Multiple indoor units will be combined with shared outdoor air-cooled condensing units. Outdoor air-cooled condensing units to be provided with low ambient kits to provide cooling down to 0°F.

E. Entire VRF system to be served by emergency power.

F. Manufacturer: Daikin or Mitsubishi

X. AIR DEVICES: DIFFUSERS, REGISTERS, AND GRILLES

A. All air devices shall be corrosion resistant construction of aluminum or stainless steel.

B. The Price architectural linear slot diffuser, Model SDS with manufacturer provided insulated plenum and installed in a Narrow-T ceiling application, will be used to supply air to corridors and other relatively small airflow applications where a square plaque diffuser cannot be accommodated due to capacity limitations.

C. The Price linear slot diffuser, Model AS, with field fabricated insulated plenum and installed in a ceiling application, will be used in lieu of Model SDS in select areas requiring a more refined architectural appearance and/or areas requiring longer lengths of linear slot diffusers with a continuous appearance.

D. The Price square plaque, architectural ceiling diffusers, Model SPD, will be used to supply air of higher airflow quantities to spaces. Panel size will be 24x24.

E. The Price radial flow diffuser, Model FRFD, with adjustable pattern and perforated flush face design will be used in laboratories to supply large air volumes at low room air velocities. Diffusers will be provided with adjustable inlet dampers, foil-backed exterior plenum insulation and quarter turn fasteners for removal of face for plenum access. Panel size will be either 24x24 or 24x48, depending on laboratory requirements.

F. The Price perforated return panel, Model PDDR, will generally be used for non-ducted return applications and is applicable for lay-in ceilings.

G. The Price perforated face air return ceiling diffuser will generally be used for ducted return applications and is applicable for lay-in ceilings.

H. The Price linear slot diffuser, Model SDR, with blades removed to allow diffuser to serve as low-pressure-drop return will be used in applications where Model SDR is also used for supply.

XI. FINNED-TUBE RADIATION HEATER

A. The East and South areas of the floor plan that utilize a curtain wall glazing system will be provided with supplemental perimeter heating using finned-tube radiation heaters.

B. Heating elements shall be copper tubing, mechanically expanded into flanged collars of evenly spaced aluminum fins resting on element supports.

C. Heater shall be pedestal mounted-type, with continuous metal enclosure with flat, louvered, top and open bottom.

D. Basis of Design: Sterling Hydronics.

XII. BUILDING MANAGEMENT CONTROL SYSTEM (BMCS)

A. Controls will be provided and installed by Siemens (local field office). Contractor will coordinate graphics for front end with Montgomery College facilities engineering prior to development of graphics packages for approval. The BMS will be connected to the Montgomery Colleges campus controls system.

B. All Local Control Processors will be compatible with existing campus Siemens system for monitoring and control over the Siemens BACnet MS/TP backbone.

C. The BMS will be connected the Montgomery Colleges campus controls system.

D. Contractor will coordinate graphics for front end with owner prior to development of graphics packages for approval.

E. The Building Management System (BMS) will consist of an information sharing network of standalone Direct Digital Control Panels (DDCP's) to monitor and control equipment for specified control sequences." Information sharing" will be defined as the function of each DDCP to exchange data on the network trunk with other DDCP's without the need for additional devices such as network managers, gateways or central computers."

F. “Standalone" will be defined as the function of each DDCP to independently monitor and control connected equipment through its own microcomputer. Communications with the DDCP's will be accomplished by utilizing any of the control system terminals. Actuation of valves will be through electronic/electric actuators.

1. The facility will be provided with a direct digital control (DDC) system that will control, monitor and energy manage all mechanical equipment in the building.

G. Provide fully integrated DDC controls for the HVAC systems to be installed as indicated in these documents, building management control system (BMS), incorporating Network Central Processors, Energy Management Monitoring and Control, and Local Control Processors, all of standard products as manufactured by a single manufacturer: Johnson Controls.

H. Temperature sensors will be nickel construction.

I. Control thermostat/sensor boxes in walls will be sealed/caulked to prevent airflow through the device.

J. Control relays will be installed in control panels, starters or variable speed drives.

K. Damper and valve operators will be electric type.

L. Controls contractor will be responsible for the initial controls testing prior to commissioning by Montgomery College. All aspects of the system must be correct in functionality before commencement of commissioning. Commissioning will be performed by Montgomery College, Contractors, BAS Contractor, Construction Administration Engineer and Commissioning Agent.

XIII. DUCTWORK CRITERIA

A. All ductwork will be constructed and reinforced to standards in the 2005 edition of “HVAC DUCT CONSTRUCTION STANDARDS – Metal and Flexible,” published by SMANCA. The Mid-Panel Tie-Rod addendum, issued as a supplement to this standard, will not be permitted as an alternative means for reinforce ductwork on negative pressure systems. Proprietary duct jointing systems may be used on this project, however, sheet metal material gauge and reinforcement criteria will meet the above referenced SMANCA standard.

B. Duct risers will be rectangular. All remaining ductwork will be spiral-wound round or flat oval. All ductwork to be insulated, double-wall construction with flanged connections.

C. The contractor will prepare coordination drawings indicating all work including, but not limited to: equipment, ductwork, HVAC piping, plumbing piping, lighting systems, fire protection systems, structural members, cable trays and main electrical conduits, and ceilings. Deviation from the Basis of Design Document ductwork will not be permitted if ceiling elevation needs to be lowered.

D. Ductwork Material:

1. Supply Air Systems - Galvanized steel.
2. Outside Air Systems - Galvanized steel.
3. Return Air Systems (where shown) - Galvanized steel.
4. General Building Exhaust Systems - Galvanized steel.
5. Laboratory Exhaust Main – Galvanized steel.
6. Laboratory Exhaust Runouts– Stainless Steel (Flanged).

E. Ductwork will be sized in accordance with the maximum friction loss and velocity criteria as listed in the following table:

F.

System	Maximum Friction Loss Inches w.g./100 ft.	Maximum Velocity (FPM)
Main Supply Air Riser	0.20	2,000
Main Supply Ductwork Upstream of Volume Control Boxes	0.20	2,000
Main Supply Ductwork – Low Pressure	0.10	1,800
Low Branch Supply Ductwork	0.08	1,200
Main Return and Exhaust Air Ductwork	0.10	1,800
Main Return and Exhaust Air Ductwork Upstream of Riser	0.10	1,800
Outside Air Intake / Relief Air Ductwork	0.08	1,000
Low Pressure Branch Return and Exhaust Ductwork	0.08	1,000

G. Duct Schedule:

1. VAV Systems:

a. All supply ductwork (office, classrooms and study rooms) from air handling unit discharge to the supply riser in shaft will be of 6" w.g. positive static pressure classification, seal class A. All supply ductwork from supply riser to VCB inlets will be of 4" w.g. positive static pressure classification, seal class A. All supply ductwork from VCB outlet to air terminal unit will of 2" w.g. positive static pressure classification, seal class A.

b. All return ductwork from administrative spaces office and conference rooms from ceiling return plenum to air handling unit will be of 4" w.g. negative static pressure classification, seal class A.

c. All return ductwork from classrooms and study rooms shall be fully ducted. Ductwork shall be 4" w.g. negative static pressure classification, seal class A.

2. DOAS Systems:

a. All supply ductwork from air handling unit discharge to the supply riser in shaft will be of 10" w.g. positive static pressure classification, seal class A. All supply ductwork from supply riser to VCB inlets will be of 6" w.g. positive static pressure classification, seal class A. All supply ductwork from VCB outlet to air terminal unit will be of 2" w.g. positive static pressure classification, seal class A.

b. All exhaust ductwork (and return where applicable) from VCB to air handling unit will be of 6” w.g. negative static pressure classification, seal class A. All return/exhaust ductwork from diffuser registers to return risers in shafts will be of 6” w.g. negative static pressure classification, seal class A.

3. Exhaust Systems:

a. All general exhaust (office, classrooms and study rooms) ductwork from registers to fan and fan to discharge location will be of 2” w.g. negative static pressure classification, seal class A.

b. All general and point exhaust (laboratory system) ductwork will be flanged duct and will be 10” w.g. negative static pressure.

c. All fume hood exhaust (laboratory system) branch ductwork shall be flanged stainless steel and will be 10” w.g. negative static pressure. Ductwork downstream of exhaust air valve (duct mains) shall be similar in construction to general and point exhaust.

H. Manual Volume Control (Balancing) Dampers

1. Provide manual volume control dampers at all duct branches except where otherwise noted.

2. Cable operated dampers may be required in areas where architectural ceilings don’t allow for damper access.

XIV. ATTENUATION

A. Air Handling Units: Return and supply air discharge attenuators will be used for all air-handling units. Attenuator will be included overall unit design and will not be shipped loose for field-installation in ductwork. Attenuators shall be fiber-free, packless type.

B. Transfer ducts: The office portion of the project will primarily utilize a plenum return air strategy. To maintain acoustical privacy, Z-shaped, sound-lined transfer ducts from the following enclosed spaces will be used and sized for 500 FPM or less: Conference Room equal to or greater than 500 SF. Transfer ducts from other enclosed spaces will simply comprise a sheet metal sleeve of required size to maintain 500 FPM or less

C. Return air boots: Private Offices, Conference Rooms and other Administrative Spaces less than 500 SF, will be provided with return grilles having sound-lined return air boots.

XV. PIPING CRITERIA

A. Piping Systems: Piping systems will include: Chilled Water Piping, Heating Water Piping, Steam Piping, Steam Condensate Piping, Condensate Piping, Insulation, Hangers, Expansion Compensation and Appurtenances.

1. Chilled Water Piping:

a. Above Grade: Provide black steel, schedule 40 (5” and larger) and Type “L” copper tubing (4” and smaller). All piping will be designed, fabricated and installed in accordance with the American Standard Code for Pressure Piping ANSI B31.1. Wrought fittings will conform to ANSI Specification B16.18. Solder shall be lead-free, 95% tin 5% antimony conforming to ASTM Specification B32 Alloy 95TA. Flux shall be non-corrosive, best grade petrolatum base, impregnated with zinc and ammonium chlorides. Copper tubing may also be joined by copper or bronze pressure-seal fittings.

b. Below-Grade: Provide factory-fabricated cased piping system with carrier pipe, insulation and casing. Carrier pipe shall be standard-weight, steel pipe. Insulation shall be rigid, cellular, high-pressure injected between carrier pipe and jacket with thermal conductivity not to exceed 0.14 Btu-in / hr-sf-deg. Casing shall be HDPE. System shall include joint kits, expansion blanket and end seals. Basis of Design: Perma-Pipe Xtru-Therm.

2. Heating Water Piping:

a. Above Grade: Provide black steel, schedule 40 (5” and larger) and Type “K” copper tubing (4” and smaller). All piping will be designed, fabricated and installed in accordance with the American Standard Code for Pressure Piping ANSI B31.1. Wrought fittings will conform to ANSI Specification B16.18. Solder shall be lead-free, 95% tin - 5% antimony conforming to ASTM Specification B32 Alloy 95TA. Flux shall be non-corrosive, best grade petrolatum base, impregnated with zinc and ammonium chlorides. Copper tubing may also be joined by copper or bronze pressure-seal fittings.

b. Below Grade: Provide factory-fabricated cased piping system with carrier pipe, insulation and casing. Carrier pipe shall be standard-weight, steel pipe. Insulation shall be rigid, cellular, high-pressure injected between carrier pipe and jacket with thermal conductivity not to exceed 0.14 Btu-in / hr-sf-deg. Casing shall be HDPE. System shall include joint kits, expansion blanket and end seals. Basis of Design: Perma-Pipe Xtru-Therm.

3. Cold Water Make-up Piping: Provide Type "L" copper. Copper tubing shall be Type "L" hard, conforming to ASTM Specification B88. Wrought fittings will conform to ANSI Specification B16.18. Flared fittings shall conform to ANSI Specification A40. Solder shall be lead-free, 95% tin - 5% antimony conforming to ASTM Specification B32 Alloy 95TA. Flux shall be non-corrosive, best grade petrolatum base, impregnated with zinc and ammonium chlorides.

B. Pipe Insulation: Provide pipe insulation on all ambient, chilled and heated piping systems.

1. Above Grade, Chilled Water Piping Systems: 2-inch thick cellular glass, preformed pipe, Type I with factory-applied ASJ-SSL. Provide field-applied PVC jacket on all exposed piping below 8-feet above finished floor.

2. Above Grade, Heating Hot Water Piping Systems: 2-inch thick mineral fiber, preformed pipe, Type I with factory-applied ASJ-SSL. Provide field-applied PVC jacket on all exposed piping below 8-feet above finished floor.

XVI. MISCELLANEOUS MECHANICAL SYSTEMS

A. Duct Mounted Smoke Detectors: Provide duct mounted smoke detectors on the inlet side of all central recirculated fan systems with capacities of 2,000 CFM and larger. Provide duct mounted smoke detectors on the discharge side of all central fan systems with capacities of 15,000 CFM and larger.

B. Misc. Exhaust and Intake Louvers: All louvers will be provided by the General Contractor and specified by the Architect. Access doors shall be provided for cleaning of bird screens.

C. Concrete Equipment Pads: Provide all floor-mounted equipment with 4-inch high concrete housekeeping pads.

D. Pre-Manufactured Roof Curbs: Provide all roof mounted equipment with factory fabricated roof curbs matched to the size of equipment.

E. Access: Access panels shall be provided for all devices such as dampers, actuators, valves and other items needing access. Access doors in the ceiling shall be a minimum 2’x2’ panel.

F. The Greenhouse manufacturer will provide standalone mechanical space conditioning equipment. A 2” hot water piping connection shall be provided for connection to manufacturer’s equipment.

XVII. TESTING AND BALANCING

A. The contractor will engage an independent Testing-Balancing certified by NEBB or AABC and licensed to practice in the project jurisdiction. Contractor shall be a different company than the mechanical contractor and approved by the Colleges Project Lead.

B. The contractor will execute the balancing of the HVAC systems as indicated in these documents to achieve appropriate air and water quantities and temperature drops to all parts of the system. This work will include periodic testing and adjustment of the system throughout construction; and final system balance to insure adequate air and water flow to all portions of the building.

C. All the work will be performed in accordance with the National Standards for Field Measurements and Instrumentation -Total System Balance Volume 1 of the Associated Air Balance Council. In addition, the balancing firm will recheck any specific terminals at the request of the Owner within the first year of operation.

D. Final TAB report shall include design and actual readings and explanation and recommendation for remediation for readings that could not be balanced.

XVIII. EXECUTION

A. The Contractor will install all equipment in accordance with manufacturer's written instructions, applicable codes, and recognized industry practices.

B. After all equipment is installed, it will be tested to demonstrate proper operation of performance and compliance with the specifications. Equipment not operating correctly will be modified in the field in an approved manner or replaced.

C. All equipment shall be field inspected and tested by the manufacturer or a factory trained authorized representative for installation in compliance with the manufacturer’s installation instructions and recommendations prior to start-up. The manufacturer or a factory trained authorized representative shall do, or be present at, the start-up. Start-up documentation certifying proper installation and start-up shall be submitted to the Colleges Project Lead at that time and shall also be included in the O&M manuals.

D. HVAC systems shall not be started until cleaning, flushing and pre-treatment has been performed to the satisfaction of the Colleges Project Lead.

E. Heating hot water systems shall be cycled through heat up and cool down and checked for leaks prior to substantial completion.

F. Following start-up procedures, adjust equipment for proper operation within manufacturer’s published guidelines and tolerances. Demonstrate proper operation of equipment and systems to designated Colleges Project Lead and Commissioning Agent.

8 PLUMBING DESIGN

SCHEMATIC DESIGN NARRATIVE

PLUMBING DESIGN

PLUMBING SYSTEMS

I. SUMMARY

A. Provide all labor, materials, equipment and services, and perform all operations necessary and incidental to the completion of all plumbing work.

B. The plumbing work will generally include but not be limited to the following:

1. Plumbing fixtures.
2. Plumbing specialties.
3. Domestic water systems.
4. Industrial water systems.
5. Sanitary drainage systems.
6. Storm drainage systems including perimeter drainage systems.
7. Compressed air systems.
8. Vacuum pump systems.
9. Central R.O. Water system Skid
10. Green House
11. Natural Gas
12. Irrigation systems.
13. Perimeter/footer and subsoil drainage systems.

II. PLUMBING FIXTURES

A. Water Closets

All water closets will have minimum 1" water supply connections and a minimum 2.25" diameter trap-ways, solid plastic seats with stainless steel self-sustaining check hinges.

1. Water Closets (Women's-Public): Dual flush 1.6 / 1.1 GPF, wall-hung, siphon-jet, elongated bowl, vitreous china, sensor-operated automatic flush valve with manual override button, with chair carrier and open-front seat, ADA. Autoflush, touchless valve shall be battery powered.
2. Water Closets (Men's-Public): 1.28 GPF, wall-hung, siphon-jet, elongated bowl, vitreous china, sensor-operated automatic flush valve with manual override button, with chair carrier and open-front seat, ADA. Autoflush valve shall be battery powered.

B. Urinals

1. Urinals: 0.125 GPF ultra high-efficiency, wall-hung siphon-jet, vitreous china with chair carrier. Urinals will be provided with hard wired, automatic sensor flush valve with manual override button. Urinal passageway is a minimum 2” diameter. Water supply connection is ¾”, ADA.

C. Lavatories/Sinks

1. Lavatories: vitreous china, wall hung with concealed arm carrier. Faucet: 0.5 GPM, ¼ turn ceramic disk cartridge with 4” minimum length wrist blade handles. P-trap: 17 gauge brass with integral cleanout. Traps have mechanical connection (not soldered) at wall connection to allow for removal and use as a cleanout. ADA trap guards will be provided for ADA lavatories.
2. Laboratory Sink and Faucet: All laboratory equipment will be selected per application requirements (i.e. chemical resistance, bowl depth, faucet size and neck type, etc.) during design development.
   a) In locations where the laboratory sink is included as a component of the casework, this will be specified as part of the casework system (not in scope of Plumbing work).
   b) In locations where there are wall-mounted laboratory sinks, equipment will be stainless steel.

D. Mop Service Basins

1. Mop Service Basin: floor mount, pre-cast concrete or stone construction, with minimum 24” x 24” size and 8” maximum height. Equipped with aluminum bumper guards, mop hanger bracket, hose and hose bracket, stainless steel wall guards. Basin and wall guards are sealed water tight to the wall and floor. Faucet: with vacuum breaker, integral check valves, integral stops, an adjustable wall brace, and a pail hook and ¾” hose thread on spout.

E. Emergency Showers

1. One (1) emergency shower will be located in each laboratory.
2. Basis of design Manufacturer: WaterSaver Faucet Company.

F. Emergency Eyewash

1. One (1) emergency eyewash will be located in each laboratory.
2. Eyewash will be recessed, wall-mounted, swing down style, with drain pan.
3. Basis of design Manufacturer: WaterSaver Faucet Company.

G. Electric Water Coolers and Drinking Fountains with Bottle Filling Stations:

1. Water Coolers: Self-contained, refrigerated wall hung double bowl, Hi/Low, recessed water coolers, all stainless steel, ADA. Provide water coolers with Bottle Filling Stations.

III. PLUMBING SPECIALITIES

A. Floor Drains

1. Finished Areas: Cast iron drain body, 6” nickel-bronze round or square strainer with trap primer.
2. Mechanical Equipment Rooms: Provide minimum two (2) 4” drains, galvanized cast iron with medium duty nickel bronze grate, with secondary strainer in bottom and trap primer. 7” minimum square grate.
3. Floor drains for emergency shower and eyewash will be provided with electric trap primer.

B. Roof Drains

Primary and Secondary Roof drains: Cast iron drain body with cast iron domed strainer and deck clamp.

C. Hydrants

Freeze proof, cast bronze, recessed wall box with tamper proof cover and loose key. Located maximum of every 100’-0” around building perimeter.

IV. DOMESTIC WATER SYSTEMS

A. Domestic water service will be provided from a campus water main to the WATER/ FIRE PUMP 38 room on Ground floor Area B via combined water/ fire water line. Domestic and Fire water will be separated into two rooms. The underground piping will be ductile iron or copper “K”. Above ground will be copper “L”, hard drawn with soldered joints.

B. Water meter will be provided by the WSSC. Submeters will be provided for landscaping hose-bibs, Green House water, green roof water irrigation system and other non-sewered uses.

C. All domestic water pipes are insulated with Fiberglass.

D. Calculations of WSFU (Water Supply Fixture Units) and flow are as below. Based on the total flow of 208 GPM, a 6” domestic water service is required. Location of the water meter to be determined.

E. Two (2) reduced pressure backflow preventers will be provided in parallel (with a bypass around the assembly) in the WATER/ FIRE PUMP 38 Room with an air gap fitting and spills to a floor drain. One will act as the primary and the other will be a backup for emergency and annual maintenance. Basis of design Manufacturer: Watts, Model 909-OSY-Lead Free.

F. Domestic water booster pump system:

1. Based on 12/13/2018 Hydrant Flow Report, the incoming domestic water pressure is at approx. 64 PSI. It is not sufficient to operate the fixtures on all levels. A duplex domestic water booster pump system is required.
2. Based on the total WSFU, a duplex booster pump system (BP-1) at 65%-65% will be designed and located in the WATER/ FIRE PUMP 38 Room on Ground floor Area B.
3. Basis of design Manufacturer: Tigerflow model DESV-5EB-C-S4-CC-P-VFD-NSF.
   a) Approx. dimension of the booster pump systems: 70"L x 34"D x 72"H plus 3'-0" clearance on all sides.
   b) BP-1 skid to be installed on a conc pad.

G. Water Heaters

1. Domestic hot water will be provided by central, gas-fired water heaters in the MECH 10 room located on Ground floor area A. The domestic hot water system will be a recirculating design.
2. Water heater system will include two (2) water heaters, each with 50% of the system total capacity. Heaters will be condensing design, with stainless steel construction.
   a) Basis of design Manufacturer: PVI Tricon Condensing Water Heater Model 50 L 300A-PVIF.

V. INDUSTRIAL (LAB) WATER SYSTEMS

1. The main hot and cold water system will be sized for all the lab sinks, mop sink basins and lavatories.

A. Distribution piping will be copper "L", hard drawn with soldered joints.

B. Industrial water service (hot) to the laboratory spaces will utilize a dedicated HW line with RPZ-BFP, with service direct from the industrial water (cold) distribution. Heaters will be provided in the MECH 10 room on ground floor level. Distribution piping will be copper "L", hard drawn with soldered joints.

C. Water Heater:

1. Hot water will be provided by central, gas-fired water heaters in the 1-1/2" domestic cold water with RPZ-BFP (Reduced Pressure zone Backflow Preventer) and sub meter will be provided in the WATER/FIRE 38 room on the ground floor. Hot water system will be a recirculating design.
2. Water heater system will include two (2) water heaters, each with 50% of the system total capacity. Heaters will be condensing design, with stainless steel construction.
   a) Basis of design Manufacturer: PVI Tricon model 50 L 300A-PVIF.

VI. SANITARY DRAINAGE SYSTEMS

A. Based on the total drain fixture unit count 539 DFU, a 8” sanitary building drain is required. The single sanitary connection to Civil will be located 5’-0” outside the building on the South side of the building, see civil utility drawing for more information.

B. All sanitary drainage piping 4” inches and larger will be sloped at a minimum of 1/8-inch per foot; all other piping will be at 1/4-inch per foot. Vent piping will slope toward the drain. Cleanouts will be provided per International Plumbing Code.

C. Separate acid resistant sanitary system shall be provided for all laboratory operations (sinks and eyewash drains), provided per WSSC. System does require acid neutralization or sediment separation systems. Drain and waste lines for laboratories will be selected for chemical resistance and will combine after the treatment from the Acid Neutralization Tank with building sanitary at final point of penetration to exterior, such that a single sanitary connection is made to Civil.

D. Below grade piping materials: Certified cast iron hub and spigot. Above grade piping materials: Certified cast iron no-hub with four band mechanical clamps, Husky Heavy duty.

E. Indirect drains: copper type “M” for 1” and smaller, type “DWV” for 1-1/4” and larger with sweat joints.

F. A 50 GPM, oil-minder, elevator pump will be provided at base of elevator 6 in the 2’ X 2’ X 2’ sump pit. 100 GPM, oil minder elevator pump will be provided for the elevators 79 & 80 in combine 3’ X 3’ X 3’ sump pit. Pump discharge goes to sanitary system through indirect funnel.

VII. STORM DRAINAGE SYSTEMS

A. Per International Plumbing Code, Montgomery College Takoma Park has 3.1”/hour design rainfall rate. Total roof area is approximately 59,300 SF. The building will be divided into East and South areas, with a dedicated 8” and 10” storm sewer connection for each area (8” & 10” to East and 8” & 10” to South = total of 4).

B. Storm drainage systems:

1. On flat roof, primary and secondary roof drains will be located on roof. Internal storm leaders connect to below grade storm building drains. Secondary storm drainage systems daylight at 2’-0” above finished grade on exterior walls.
2. On mechanical penthouse roof, gutters and downspouts will be designed by the Architects. Storm water goes via downspout to the main roof.

C. HVAC condensate will be discharged to the storm system.

D. All storm drainage piping will be sloped a minimum 1/8” per foot. Cleanouts will be provided per International Plumbing Code.

E. Below grade piping materials: Certified cast iron hub and spigot. Above grade piping materials: Certified cast iron no-hub with four band mechanical clamps, Husky Heavy duty.

F. Horizontal piping and drain bodies within ceiling spaces will be provided with 1" fiberglass pipe insulation and all-purpose service jacketing.

VIII. LABORATORY SYSTEMS

A. Compressed air system:

1. Central laboratory (non-medical) compressed air system will be designed. Air compressor system will be provided in the MECH 10 room located on the Ground Floor area A of the building to feed all outlets in laboratories throughout the building.

a) Provide multi-compressor arrangement (for increased reliability), with belt-driven, scroll compressors. System will be entirely air-cooled, including compressed air aftercooler. Water separator will convey condensate drain.

b) System will produce compressed air at 100 psi pressure. Each laboratory will include a local, point-of-use reducing valve to for the final delivery pressure requirements. Basis of design Manufacturer: Powerex model LSED4006.

c) Piping materials: All compressed air will be ASTM B88, Type K copper tubing. Fittings will be ASME B16.8 cast copper alloy or ASME B16.22 wrought copper and bronze, soldered joints, lead free ASTM B32, 95-5 tin-antimony or tin and silver.

d) Unit will be skid-mounted and tested at factory as a complete system. Piping, power and controls will be single point field connections after installation.

(1) Skid will include compressor(s), dryer and tank, enclosed in a steel, sound-insulated canopy with removable panels for maintenance access.

B. Vacuum system:

1. Central laboratory vacuum system will be designed. Vacuum pump will be provided in the MECH 10 room located on the Ground Floor area A of the building to feed all outlets in laboratories throughout the building.

a) Provide Quadplex central vacuum system, consisting of four (4) oil lubricated, claw vacuum package with HMI/PBMI, air-cooled, vacuum pumps in a vertical stacked arrangement.

b) Basis of design Manufacturer: Powerex model LCPQ1005.

c) Piping materials: All vacuum system piping will be ASTM B88, Type K seamless copper tubing. All fittings will be ASME B16.18 cast copper alloy or ASME B16.22 wrought copper and bronze.

Joints will be brazed, AWS A5.8 BCuP silver/phosphorus/copper with melting temperature range 1190 to 1480 degrees F.

d) Unit will be skid-mounted and tested at factory as a complete system. Piping, power and controls will be single point field connections after installation.

C. Specialty gas distribution:

1. Where indicated on laboratory guide plates and architectural floor plans, local gas storage closets, flammable storage cabinets and cylinder restraints will be provided. Each location will be provided with a central gas manifold and piping distribution from the closet (or cabinet) manifold to each associated fume hood or point-of-use required.

D. RO systems:

1. Central laboratory water treatment system (reverse osmosis) will be designed. RO skid will be provided in the MECH 10 room located on the Ground Floor Area A of the building to feed all outlets in laboratories throughout the building. System will be entirely separate from RO system intended for clean steam generator feed water use.

   (1) System will produce 3 GPM of RO water at a water quality of Level 2. System will include pre-filter, multi-stage high-pressure RO booster pump, RO pressure vessels, RO membranes, monitoring instrumentation and all valves (manual and automated), piping and accessories necessary full complete and operational system. RO production will be 1500 gallon per day.

   (2) System will include 500 gal of RO water storage capacity.

   (3) System will be Marlow model# MRO-AMES-1500-SKD-500

2. Unit will be skid-mounted and tested at factory as a complete system. Piping, power and controls will be single point field connections after installation.

E. All laboratories will be provided with industrial hot and cold water, RO water, compressed air and vacuum. Cold and hot water will be distributed to each laboratory sink. RO water, compressed air and vacuum will be distributed to a dedicated (single) discharge point in each space

F. Laboratory fume hoods will have connections for industrial cold water, compressed air, and vacuum in each hood. Refer to architectural plans for hood quantities and locations.

IX. GREEN HOUSE

A. 2” domestic cold water with RPZ-BFP will be provided for the Green House mechanical and plumbing equipment.

X. NATURAL GAS

A. Total load for the natural gas approximately 17,000 CFH. Which include 500 KVA generator, two water heaters, three boilers, turrets and fume hoods in the laboratories. 4” gas line at 2 PSI, meter and regulator will be located at north corner of the building by Washington Gas. 2-1/2” gas at 2 PSI will serve generator outside north corner of the building while 3” at 2 PSI will serve equipment inside the building.

XI. IRRIGATION SYSTEMS

B. Irrigation systems will be design and provided by irrigation consultant.

C. 1-1/2” domestic cold water with RPZ-BFP (Reduced Pressure zone Backflow Preventer) and sub meter will be provided in the WATER/FIRE 38 room on the ground floor. An irrigation booster pump system may not be required since we have main Domestic water Booster System (BP-1) which will meet irrigation equipment pressure requirements.

D. 1-1/2” domestic cold water with RPZ-BFP (Reduced Pressure zone Backflow Preventer) will be provided in the WATER/FIRE 38 room on the ground floor for the limited outside the building irrigation needs.

XII. PERIMETER/FOOTER AND SUBSOIL DRAINAGE SYSTEMS

A. Per Final Geotechnical report dated 12/11/2018 under-slab sub-drainage system and perimeter footer drainage is required for this project. 30 gpm duplex sump pumps with 6’ diameter X 10’ deep fiberglass sump basin will be provided for the under-slab sub-drainage system. 30 gpm duplex sump pumps with guiderail with sump basin will be provided for the perimeter footer drainage.

XIII. EXECUTION

A. The Contractor will install all equipment in accordance with manufacturer's written instructions, applicable codes, and recognized industry practices.

B. Potable water systems will be sanitized in accordance with the requirements of the local authorities.

C. After all equipment is installed, it will be tested to demonstrate proper operation of performance and compliance with the specifications. Equipment not operating correctly will be modified in the field in an approved manner or replaced.

9 ELECTRICAL DESIGN

SCHEMATIC DESIGN NARRATIVE

GENERAL

CODES AND STANDARDS

Emphasis in the electrical systems design will be made toward life safety, quality of power service, reliability, ease of maintenance of systems, flexibility and functionality.

Electrical systems for the Leggett Math and Science Building will be designed in compliance with the following applicable codes and regulations.

American National Standards Institute (ANSI) 1.C2 – Electrical Safety Code
American Society for Testing and Materials (ASTM)
ASHRAE 90.1 2013
Illuminating Engineering Society of North America – Lighting Handbook, 9th Edition
International Energy Conservation Code (IECC), 2015
National Electrical Contractors Association (NECA) 1 – Standard of Installation
National Electrical Manufacturers Association (NEMA)
National Fire Protection Association (NFPA) 70 – National Electrical Code
National Fire Protection Association (NFPA) 72 – National Fire Alarm Code
Underwriters Laboratories Inc. (UL)

ELECTRICAL LOAD ANALYSIS

A preliminary load analysis was completed for the building based on a volt-amperes (VA) per square foot calculation utilizing the gross square footage (GSF) of building areas. A load summary follows.

Area Summary (Approx.)
Building 134,600 GSF

Load Type	Power Density (VA/GSF)	Demand Factor
Lighting	1.0	100%
General Power (e.g., Offices)	3.0	55% (approximation of NEC, 220.44)
Equipment Power (e.g., Labs)	8.0	50%
Mechanical Equipment	15.0	100%

Load Summary

Load	Connected	Demand
Lighting	135 kVA	135 kVA
General Power	404 kVA	222 kVA
Equipment	1,077 kVA	538 kVA
Mechanical	2,019 kVA	2,019 kVA

- Total connected load for the building = 3,634 kVA
- Average demand load for the building = 2,914 kVA

- Total connected load with 20% growth = 4,361 kVA
- Average demand load with 20% growth = 3,497 kVA

ELECTRICAL SERVICE

Electrical service will be provided by Potomac Electric Power Company (Pepco). Two redundant 15 KV feeders will be extended to a new outdoor pad mounted 1,500 KVA oil filled transformer via an outdoor 15 KV primary selective automatic source transfer switch. A KWH meter will be provided on the transformer 480-volt secondary. The 15kV feeders, medium voltage switch, transformer, meter and transformer secondary feeders to the main switchboard will be furnished and installed by Pepco.

480-volt versus 208-volt service was compared. 480-volt service is to be utilized to reduce cable size in the underground ductback. Utilizing 480-volt feeders from the main electrical room to the stacked electrical rooms in the center of the building will be cost effective for the building distribution. Transformers will be provided in each stacked central electrical room for receptacle loads on each floor.

MAIN POWER DISTRIBUTION

From the transformer secondary, 480Y/277-volt, 3 phase, 4 wire service will run underground in rigid steel conduit to the main electrical room on the first floor of the building and terminate in a 4,000 amp service-entrance-rated main switchboard. The main switchboard will be circuit breaker type with ground-fault protection, surge protection, and a digital customer meter. The switchboard will be front accessible, with an air power main circuit breaker and molded-case feeder breakers, all with adjustable RMS sensing trip units. The 480Y/277-volt section will feed a 500 kVA total harmonic distortion (THD) transformer to feed a section of 208Y/120-volt switchboard serving lab panelboards.

A concrete encased feeder will tap the service ahead of the main circuit breaker and route below the basement slab to the fire pump controller that will have an integral automatic transfer switch (ATS).

The photovoltaic system will tie into the service entrance for the opportunity to backfeed the grid or power building loads.

INTERIOR POWER DISTRIBUTION SYSTEM

Power will be distributed throughout the building at 480/277-volt, 3 phase, 4 wire system. Dry type, 480 delta to 208Y/120-volt, 3 phase, 4 wire transformers will be provided in the electrical rooms. The systems between telecom, mechanical equipment, offices and laboratories/learning will be kept separate. Metering will be provided to monitor and record whole building, mechanical, interior lighting, exterior, and receptacle power consumption separately. Monitoring and recording will be tied into the BAS system.

Cable and conductors will be copper, with a minimum of ¾” diameter conduit. Motors will be specified as premium efficiency and meet IEEE standards for variable frequency drive compatibility.

Distribution panelboards will be provided in the main mechanical room and penthouse to connect to mechanical equipment within. Lab and learning power will be fed from THD 208Y/120-volt sources. Lab and learning spaces within area A of the building will be fed from the 208Y/120-volt section of the service switchboard in the main electrical room on level 1. Lab and learning spaces within area A of the building will be fed from the 208Y/120-volt section of the service switchboard in the main electrical room on level 1. Lab and learning spaces within area B of the building will be fed from a208Y/120-volt in the level 1 electrical room.

It is anticipated that the most common type of power needed in labs and learning spaces is 208Y/120-volt. Each lab is provided a 208Y/120-volt panelboard within the space for lab branch circuiting. The panelboards have main circuit breakers for local disconnect within each lab. In some areas, lab panelboards will serve adjacent learning space. Laboratory panels will have 200% rated neutrals and all branch circuits serving laboratory equipment, electronic office equipment, and computers will have dedicated neutrals and grounds. Some labs may require 480-volt power and/or 240-volt power. Where 480-volt power is needed, branch circuits will be provided from a common power panel in the electrical closets; where 240-volt power is needed a buck-boost transformer will be provided off the 208-volt system to the loads.

Common power is provided for office, corridors, restrooms, stairwells, equipment, storage and exterior power. The panelboards are in the electrical closet within area B and some panelboards will be in the main electrical room to serve level one devices. Branch circuiting between floors to devices will be avoided.

EMERGENCY POWER SYSTEM

An outdoor 500 kW 480/277-volt, 3 phase, 4 wire natural gas genset with gas line and sound attenuated weather-proof enclosure will be in the generator yard located along the access road to the north of the site. The capacity of the generator is based on estimated connected loads and known ratings for existing equipment to connect to the new generator. The existing to remain loads include two sump pumps to the East of the new building and three automatic transfer switches serving life safety lighting loads in the Commons Building, Science North, and Resource Center. Each existing ATS is a 30A ASCO ATS with normal feeds from separate services. New feeders and branch circuits with control wiring will run underground to the existing to remain loads described.

The generator will feed life safety, mechanical equipment and information technology (IT) loads. Life safety and standby systems will have separate automatic transfer switches and distribution systems. Emergency power feeders will run underground from the generator main breaker to an emergency distribution switchboard in the main electrical room on Level 1. This switchboard will feed two automatic transfer switches: one for life safety loads and another for standby loads. Both existing to remain sump pumps will connect to the standby ATS and the life safety ATS will connect to the life safety loads in Commons Building, Science North, and Resource Center. Separate vertical switchboard sections will divide life safety and optional standby systems. Another separate vertical switchboard section will be provided for a tap ahead of the main circuit breaker in the switchboard to feed the fire pump. The fire pump will be fed via underground concrete encased feeders to the automatic transfer switch integral to the fire pump controller. The elevators will not require back-up power.

All life safety switchboards and panelboards will be provided surge protection device (SPD) on adjustable RMS sensing trip unit main circuit breakers.

LIGHTING SYSTEM

The lighting system will be designed to meet ASHRAE 90.1 – 2013 and IECC – 2015, while following IESNA standards.

Specialty lighting will be provided in the planetarium, greenhouse, building entries, math and science learning center, STEM concourses, STEM forum, digital theater and pre-function, and innovation hub. The lighting design in non-specialty areas will use a mixture of recessed, suspended, and surface mounted LED lighting fixtures. Lighting systems in lab, learning and office spaces will be designed to function consistently across similar space types for ease of operation. Installed lighting power density will target 0.75 W/sf building wide.

Laboratories and office areas will use 1x4, 2x2, and 2x4 recessed troffer LED type fixtures for ambient illumination. Lab, learning, and office fixtures will be located to achieve uniformity at the work plane while supporting a flexible furniture layout. Downlights and linear lighting will be designed as needed to highlight space features and supplement the ambient lighting. Certain laboratory spaces may require task lighting at work benches and along presentation walls. In the stairwells, surface mounted LED fixtures will Illuminate stairwells to 10 foot-candles minimum. Exterior LED fixtures will provide for the building site. College standard LED pole type fixtures will be utilized for the parking and path areas. Building mounted fixtures will be integrated into the building façade at entries. Handrail illumination will be provided to meet code along exterior stairs. LED marker lights will be recessed into the vertical face of the outdoor learning seating. Utility rooms and similar areas will use standard industrial strip LED fixtures.

The following foot-candle levels will be targeted:

- Research laboratories: 50 fc
- Classroom laboratories: 50 fc
- Classrooms: 30 fc
- Corridors: 10 to 15 fc
- Lobbies and Public Areas: 10 to 20 fc
- Toilet Rooms: 15 to 20 fc
- Mechanical/Electrical 15 to 20 fc
- Storage 10 fc
- Stairwell 20 fc

LED signage lighting will be provided for signage at Nunley building. Electrical circuiting will be provided from an electrical room on ground level of Nunley building and route underground from a new exterior penetration on the Nunley Building façade.

LIGHTING CONTROL SYSTEM

The lighting control system will be designed to meet ASHRAE 90.1 – 2013 and IECC – 2015. Additionally, LEED v4 will influence control strategies. The lighting control system supports exterior lighting, spaces requiring dimming, and back of house. The planetarium is expected to be controlled by an audio visual (AV) system and is not considered within the lighting control system scope at this time.

Exterior lighting is controlled by relays connected to the Building Automation System (BAS). The BAS provides scheduling capabilities to reduce exterior lighting consumption between 12:00 AM and 6:00 AM and will connect to a roof mounted photocell for fixture control in response to daylight. Fixtures in areas requiring dimming control will be controlled by stand-alone room control modules manufactured by Wattstopper. Controllers connect photocells, occupancy sensors, and user keypads via LMRJ cables. The controller contains contacts for line voltage branch circuiting to each control zone. The room controllers connect to the BAS for demand response capabilities and status monitoring. Back of house areas such as storage and equipment rooms will control lights via line voltage switches and occupancy sensors where required. Areas utilizing room controllers will utilize relay devices to tie the occupancy sensors for VAV control. The following table indicates control intent by space. "D" indicates dimming and "S" indicates switching methods to achieve bilevel requirements. The information populated combines ASHRAE 90.1 – 2013 requirements and the preferred control strategy by Montgomery College.

Space Type	RCPT Control	Local Control	Manual On	Partial Auto On	Bilevel	Daylight	Partial Off	Full Off	Schedule
Office Private	X	X	X		D	X		X	
Office Shared	X	X		X	D	X		X	
Class/Learning	X	X		X	D	X		X	
Lab		X		X	D	X		X	
Support Lab		X		X	S	X		X	
Support Storage		X	X		S	X		X	
Support Equip		X	X			X			
Restroom		X				X		X	
Stair					D	X	X		TBD
Circulation		X				X	X	X	
Planetarium		X	TBD	TBD	D	X		TBD	TBD
Greenhouse		X	TBD	TBD	D	TBD			

Night lighting will be provided in restrooms, labs, and circulation areas to energize select light fixtures 24/7. Dual-technology vacancy sensors will be utilized in all spaces requiring full shutoff. Dual-technology occupancy sensors will be utilized in areas requiring full shutoff and partial automatic on. The sensors will utilize an external relay to signal VAV's. Stairwells will utilize occupancy sensors to energize fixtures to 100% output upon detecting occupancy, and dim lighting fixtures to 50% output upon detecting vacancy for 20 minutes. Photocells will be provided to dim lighting fixtures with installed wattages exceeding 150W within the primary and secondary zone. The photocell will dim the primary and secondary daylight zones in response to daylight within the space. Dimming will be provided in conference rooms and other a/v-intensive spaces.

Plug load control is required in offices and classrooms. Plug load will tie to the lighting control system occupancy/vacancy sensor within the space. Upon detecting vacancy for 20 minutes, half of the receptacles within the space will de-energize. Upon detecting occupancy, the de-energized receptacles will be energized until vacancy is detected. Controlled receptacles will be indicated on the device faceplate with the switched receptacle symbol.

Control for signage lighting at Nunley Building will connect to the lighting control system within Nunley building to reduce electric lighting consumption by at least 30% between 12:00 AM and 6:00 AM.

PHOTOVOLTAIC SYSTEM

Based on the skylight locations and rooftop equipment, it is estimated that a 50 kW photovoltaic (PV) array can be provided over the learning center roof. The system is capable of tying into the building service with a potential to back feed into the grid or power building loads. The system payback is estimated at 30 years.

FIRE ALARM SYSTEM

The fire alarm system will tie into the generator controls and life safety lighting controls. Fire alarm signal cabling to the generator control panel will provide emergency signals to start the engine. Jumper cables will be provided to UL924 life safety lighting load transfer devices for 100% light output override upon receiving emergency signal from the fire alarm system.

TELECOMMUNICATIONS SYSTEM

The main telecommunications room be provided a central UPS system that supports a specification to be provided by the College. The main telecommunications room UPS will be connected to the generator for prolonged interruption to normal power. Each telecommunication room will be provided a subpanel with a minimum of 30 circuit breakers to support the equipment within.

AUDIO/VISUAL (AV) SYSTEM

Empty raceway system will be provided for the AV system in conference rooms. Power & raceway for data for wall mounted AV screens and monitors, projectors, AV equipment racks, and outlets at tables will be provided.

Conduits and devices supporting the planetarium AV system will be provided and coordinated with the planetarium design.

LIGHTNING PROTECTION SYSTEM

Lightning protection system complete with arrestors, down-leads and ground rods on the exterior of the building will be provided. The system will be in accordance with NFPA 780 and will have a UL Master label. The system will be comprised of nickel-plated air terminals located around the perimeter of the roof with flat copper conductor cables, copper down leads in PVC. A ground ring will loop the perimeter of the building and connect each copper coated steel ground rod. All connections to ground rods and any building steel will utilize exothermic welds.

10 TELECOMMUNICATIONS

SCHEMATIC DESIGN NARRATIVE

The telecommunications systems to be provided as part of the as part of the Montgomery College Math and Science building project include pathways and spaces, low voltage cabling systems, and a public safety distributed antenna system (DAS). The preliminary (schematic) design of the telecommunications systems are described below.

1. Telecommunications Systems Design Standards

   The telecommunications systems for the project will be designed in accordance with the Montgomery College Office of Information Technology Voice/Data/Video Cabling MDF / IDF Communications Room Standard dated 11/2017, as well as generally accepted industry design principles and standards, including but not limited to the following:

   - American National Standards Institute (ANSI)
   - Americans with Disabilities Act (ADA)
   - Building Industry Consulting Services International (BICSI)
   - Electronic Industries Alliance (EIA)
   - Federal Communications Commission (FCC)
   - InfoComm International
   - Institute of Electrical and Electronics Engineers (IEEE)
   - National Electrical Safety Code (NESC)
   - National Fire Protection Association (NFPA)
   - National Electrical Code (NEC)
   - National Electrical Manufacturers Association (NEMA)
   - Telecommunications Industry Association (TIA)
   - Underwriters Laboratory (UL) or equivalent

2. Pathways and Spaces

   For the various technology systems to operate properly, efficiently, and effectively, attention must be paid to the pathways and spaces that will support these systems. Having the properly sized conduit, cable tray, chases, and sleeves, as well as the properly sized and located telecommunications rooms is a critical step to ensure that the technology systems to be designed and installed in the building will function properly and will appropriately support the groups occupying the building.

   a. Existing Ductbank

      The new Math and Science building project requires that an existing telecommunications ductbank be re-routed, including the existing outside plant (OSP) cables installed in them, as we understand that these cables currently route into buildings that are being demolished to make room for the new building. Prior to any demolition, the exact type and quantity of the existing cables will need to be identified and re-routed (in a new ductbank).

   b. New Outside Pathways

      New ductbanks consisting of several 5-inch conduits and supporting 4’ x4’ manholes (MHs) will be designed to connect the new building to the existing ductbank system (from the new main telecommunications room on the Lower Level). As Montgomery

College wants to have (2) diverse pathways into the new building, (2) different ductbanks, each taking a different route, will need to be designed. One of the conduits in each pathway will then have a Sumitomo 19-tube tube cable installed in the main artery of the run transitioning to a 7-tube tube cable into the Lower Level main telecommunications room in the new building. This will provide the pathways for outside plant fiber and copper cables to connect to the existing campus networks supporting voice, data, cable television (CATV), security, etc.

c. Inside Pathways and Spaces

To serve each of the (3) levels of the new building, (1) centrally located telecommunications rooms will be designed on each level. These telecommunications rooms will be located such that the horizontal distance of the Category 6 and Category 6A cables are not longer than 295 feet. Each telecommunications room has been sized to include the space for floor-mounted cable and equipment racks, as well as wall-mounted panels for various services (i.e. security panels). The walls of these telecommunications rooms will be covered with ¾" x 4' x 8' fire retardant plywood. Furthermore, the telecommunications rooms will be stacked and be connected with riser sleeves providing pathways for backbone riser cables.

Within each telecommunications room, the design will include a minimum of two (2) 7-foot cable and equipment racks that will house patch panels that terminate voice and data cables, as well as any voice and data electronics. Each rack with have both horizontal and vertical cable management. Ladder rack will be used around the room to facilitate the routing of cables from the hallways to the racks where they are terminated.

A separate Cybersecurity Telecommunications Room has been designed to support the Cybersecurity program. This room will be located adjacent to the Cybersecurity Lab and Network Lab that are part of the Cybersecurity program. Within this telecommunications room, (1) rack will be provided to support the Cybersecurity Lab and (7) racks will be provided to support the Network Lab.

To facilitate the installation of cabling on each level, cable tray will be designed in corridors, etc. to provide the pathways to the serving telecommunications room on that level. Where tray is not available, the design includes J-hooks and slings to appropriately support cables. To facilitate the installation of cabling to each of the workstation locations throughout the facility, there shall be a minimum of a 1-inch conduit from a double-gang box (with a single-gang ring) at each device location to the accessible ceiling. Where the ceiling is not accessible, the conduit will be designed to the cable tray. Also, either Hilti Speed Sleeves or STI EZ-Path pathways will be designed to provide pathways through fire-rated walls and into the telecommunications rooms.

These telecommunications rooms will have appropriate ceiling lighting and HVAC. The technology systems designers will coordinate with the design team's Electrical engineers to ensure that lighting is designed in front of and behind racks. Similarly, the technology systems designers will coordinate with the Mechanical engineers to ensure that appropriate cooling is provided in each telecommunications room with the ability to maintain the rooms at approximately 72˚ F and that conditioning of the air in the telecommunications rooms is on a 24x7x365 basis. Power in these rooms is also critical. Again, the technology systems designers will coordinate with the design team's Electrical engineers to design the appropriate power outlets in the telecommunications rooms. These will likely include convenience power outlets (20A 120 VAC) located around the room, as well as dedicated 20A and/or 30A circuits for each telecommunications equipment rack installed in each telecommunications room to support electronics. All power shall be on dedicated circuits. Furthermore, both power and HVAC supporting any equipment in the telecommunications rooms will likely be on circuits that are connected to the backup generator for the building.

3. Cabling System

The cabling supporting voice, data, wireless, security, AV, and CATV systems requirements for the building will consist of a combination of backbone and horizontal cables of various cable types installed inside the facility. Outside plant (OSP) cables consisting of air blown optical fiber, copper, and coaxial cables will be designed to connect the new building to the existing campus networks. Inside backbone (riser) cables will be designed to connect the main telecommunications room on the Lower Level to the First Level and Second Level telecommunications rooms. Horizontal cabling will be designed from each device location to its serving telecommunications room. It should be noted that the cabling subcontractor shall be a Sumitomo and Molex certified installer with the ability to provide an extended manufacturer's warranty for the cabling installed.

a. Outside Plant (OSP) Backbone Cable

In order to connect the new building to the campus-wide voice, data, and CATV systems, several cables will need to be designed. For analog voice services, a 50-pair OSP copper cable (PE-89 type) will be designed to connect the new building (Lower Level main telecommunications room) to campus incoming service to provide the capability to have analog voice circuits delivered to the building emergency phones, elevator phones, etc. This cable will be terminated in the new main telecommunications room on building entrance terminals with surge protection modules. For data and data-related services, including backbone for security, a 24-strand singlemode (SM) air blown fiber (ABF) cable (may be larger) will be designed from the new building main telecommunications room through each of the (2) diverse pathways to the Data Center in the Student Services building. These fiber cables will be terminated on each end with LC connectors installed in rack-mounted fiber housings. All cables will need to be appropriately tested and labeled per industry and Montgomery College standards.

b. Inside Backbone (Riser) Cable

Inside the building, a combination of copper, fiber, and coaxial cable will be designed from the Lower Level main telecommunications room to the First Level and Second Level telecommunications rooms. For analog voice services, a 25-pair copper cable will be designed. This cable will be terminated on each end on rack-mounted or wall-mounted 110-type termination blocks. For data services, a minimum of a 24-strand multimode (MM) OM4 ABF cable installed in a 7-tube tube cable will be designed. Also, to support the Cybersecurity program, an additional ABF cable will be designed from the main telecommunications room to the Cybersecurity network room. Each strand of cable will be terminated with an LC connector installed in a rack-mounted fiber housing. All cables will need to be appropriately tested and labeled per industry and Montgomery College standards.

c. Horizontal Cable

To support typical voice and data requirements (including VoIP requirements), strategically located outlets consisting of 4-pair, 24 AWG, UTP plenum-rated Category 6 copper cables will be designed to provide connectivity to each device. In typical hard walled offices and open office workstation locations, (2) Category 6 cables will be designed. Similar configurations will be designed for other types of connectivity, including classrooms, meeting spaces, conference rooms, labs, sim spaces, collaboration spaces, lounges, etc. Category 6 cables will also be designed to support security camera locations, projectors, flat screen displays, and other devices requiring data connectivity. Category 6A cables will be designed throughout the building to support wireless access points. At the device locations, all Category 6 cables that are not in ceiling spaces will terminate on Category 6 8P8C (RJ-45-type) jacks installed in a single-gang faceplate, wall-box, or floor box. For ceiling devices (i.e. wireless access points, security cameras, projectors), cables will terminate on Category 6 or Category 6A RJ-45 jacks installed in a biscuit box or terminated with a field terminable plug. In the telecommunications rooms, the Category 6 cables will be terminated on rack-mounted, 48-port Category 6 patch panels supported by horizontal cable managers installed above and below each patch panel. Category 6A cables will terminate on Category 6A patch panels. An appropriate number of patch cords will be provided for all patch panel ports in the telecommunications rooms.

The Cybersecurity program will have a separate horizontal cabling system with Category 6 (or Category 6A) cables designed from the device locations to the Cybersecurity network room. Within the Cybersecurity Networking Lab specifically, each workstation location will require (2) wired connections; (1) to the Cybersecurity rack and (1) to the Networking teaching racks. These rooms also require robust wireless coverage.

4. Labeling and Documentation

The design will include specifications that clearly state that all backbone and horizontal cables, as well as racks, patch panels, fiber housings, etc. will be appropriately labeled per industry standards and Montgomery College standards and guidelines.

At the end of the project, it will be incumbent upon the contractor to provide Montgomery College with as-built documentation that clearly identifies telecommunications rooms, major cabling pathways, outlet devices and labeling, backbone cables and associated labeling, and rack elevations with labeling. As part of the final documentation, all cable test results and warranty information will also be provided by the contractor.

5. Grounding and Bonding

The technology systems designers will again coordinate with the design team's Electrical engineers to design a telecommunications grounding system that will provide a telecommunications grounding bus bar (TGB) in each of the telecommunications rooms. All backbone copper cables, racks, ladder rack, cable tray, etc. will be specified to be appropriately grounded to the TGB in each telecommunications room and to conform to TIA/EIA 607 standards.

6. Public Safety Distributed Antenna System

Part of the telecommunications systems design will include a Distributed Antenna System (DAS) for Public Safety Radio Networks (PSN). The DAS components that will be included in the design are:

- Donor antennas
- Coverage antennas
- Coaxial cable and connectors
- Splitters, combiners, and couplers
- Fiber optic cable, connectors, and jumpers
- Bi-directional amplifiers (BDA)
- Fiber optic Master Unit
- Fiber Optic Remote Units

Any other devices required to provide a full, complete, and functioning system will also be included in the design.

Radio Coverage will be designed as follows:

- General building areas shall be provided with 95% floor area coverage.
- Critical areas such as the emergency command center, fire pump room(s), exit stairs, exit passageways, elevators, elevator lobbies, standpipe cabinets, and sprinkler valve locations shall be included in the required coverage area.

Signal Strength shall be as follows:

- Inbound – A minimum inbound signal strength of -95dBm shall be provided at the coverage areas.
- Outbound – A minimum outbound signal strength of -95dBm at the donor site shall be provided.

Regarding system frequencies, the system will be capable of transmitting all public safety radio frequencies assigned to the Montgomery College Public Safety Department, as well as the area Police and Fire Departments.

11 ACOUSTIC DESIGN

SCHEMATIC DESIGN NARRATIVE

INTRODUCTION

Acoustical Design Collaborative, Ltd performed noise and vibration measurements due to CSX, MARC, Amtrak, and Metrorail trains at the site of the future Leggett Math and Science Building. Measurements were also performed to determine noise immissions at nearby residential communities from exterior-located HVAC equipment at the Science South and Falcon Hall buildings. The measurement and calculation results are summarized below.

SITE OBSERVATIONS

The Science South and Falcon Hall buildings currently occupy the site of the future Leggett Building. Noise from CSX, MARC, Amtrak, and Metrorail trains is clearly audible at the building façades. Locomotive noise from CSX trains have the highest level; Metrorail trains have the lowest level.

When built, the west façade of the Leggett Building will be approximately 120 feet from the center of the nearest CSX, MARC, and Amtrak tracks and approximately 140 feet from the center of the nearest Metrorail tracks. Variations in building set-back from the tracks will not significantly affect building façade noise exposure levels. Variations of ±20 feet will have no more than 1.5 dB change in noise level exposure.

The site is essentially flat, though the railway tracks are approximately 10 feet lower than the Leggett Building site.

DESIGN CRITERIA AND ASSUMPTIONS

Building Interior Noise Criteria

No specific noise and vibration design criteria for the new building were received from Montgomery College based on requests by Acoustical Design Collaborative, Ltd, nor are such criteria in the project RFP.

Subjective impressions were provided by faculty stating that transmitted noise from the CSX, MARC, and Amtrak train pass-bys into the Science South and Falcon Hall buildings are disruptive during instruction. Vibration tolerance criteria have been received for a limited number of laboratory equipment; much equipment has been described by faculty in terms of general vibration tolerance, e.g., ‘not sensitive’, ‘moderately sensitive’, or ‘very sensitive.’ No response was received to an inquiry by Acoustical Design Collaborative, Ltd asking if current laboratory equipment has been adversely affected by vibration from CSX, MARC, Amtrak, and Metrorail train pass-bys.

Design criteria for interior noise levels due to train pass-bys are normally expressed in the United States in terms of 8-hour and 24-hour measurement durations. These metrics do not fully account for the disturbance of individual train pass-bys which are much shorter in duration than the 8- and 24-hour time limits. Individual train pass-bys will have numerically higher noise levels than the longer measurement durations. Studies in Great Britain have developed noise criteria for disturbance associated with individual train pass-bys. These criteria indicate interior noise levels should not to exceed 35 dBA in spaces such as Classrooms, Laboratories, and Offices, with an upper limit of 40 dBA in less critical spaces. These noise levels may be audible, but likely not disturbing, depending on the building HVAC system noise levels. For comparison, we estimate current interior noise levels in the Science South and Falcon Hall buildings from CSX locomotives to be approximately 55 dBA. Designing to the 35 dBA interior noise level criterion will result in subjective noise levels being one-fourth as loud as existing conditions.

Building Exterior Noise Criteria

Noise limits within the City of Takoma Park are regulated by City Ordinance 2016-4. Noise immission limits at the receiving property line and its skyward extension cannot exceed 65 dBA during daytime (7:00 am to 8:00 pm) and 60 dBA during nighttime (8:00 pm to 7:00 am) as stated in lines 118 to 120 in the Ordinance. The Ordinance has a ‘noise disturbance’ clause, stated in lines 81 to 89 in the Ordinance, whereby a noise violation can be cited without measuring the sound level.

Noise limits for the Montgomery County Noise Ordinance are slightly more restrictive than the City of Takoma Park Noise Ordinance, requiring 55 dBA at nighttime for residential adjacencies.

For design purposes, a 55 dBA maximum noise level will be used for noise emissions from the new building HVAC equipment at the campus property line.

Building Vibration Criteria

Vibration criteria on floor surfaces within the building are based on the intended space use, and for laboratories, on individual equipment vibration tolerance thresholds. Table 1 summarizes laboratory equipment that is in current use or possible future purchase along with overall vibration sensitivity criteria.

Table 1. Catherine and Isiah Leggett Building
Laboratory Equipment Vibration Sensitivity

Very Sensitive	Moderately Sensitive	Not Sensitive
Nuclear Magnetic Resonance Spectrometer Electron Microscope (possible purchase) Microbalance (possible purchase) Fourier-Transform Infrared Spectrometer	Gas Chromatograph Spectrometer Thermogravimetric Analyzer	Ultra-Violet/Visible Spectrometer High Performance Liquid Chromatography

Laboratory equipment sensitivity to vibration can be classified in terms of vibration velocity criteria. These criteria are summarized in terms of the vibration criteria (VC) appended with a letter A through E to designate severity of vibration tolerance. Table 2 summarizes the VC criteria and the maximum vibration for the above equipment vibration sensitivity classifications. Units of vibration are velocity in μin/s (micro-inches per second) and are normally expressed in terms of vibration velocity level (VdB) with a reference of 1 μin/s. Higher letter values appended to the VC criterion and lower numerical VdB values indicate higher vibration sensitivity.

Table 2. Catherine and Isiah Leggett Building
Maximum Vibration Velocity Level (VdB) as Function of Equipment Sensitivity

Very Sensitive	Moderately Sensitive	Not Sensitive
VC-C 54 VdB	VC-A 66 VdB	72 VdB

The laboratory equipment vibration criteria should be confirmed with specific equipment manufacturers. It may be possible to achieve the vibration goals for very sensitive equipment by using vibration isolation tables or other manufacturer’s products. Otherwise, for very sensitive equipment, specific building structural design may be necessary.

NOISE AND VIBRATION ASSESSMENT LOCATIONS

Building Noise and Vibration Assessment

The noise and vibration assessment location for the future Leggett Building was approximately 75 feet from the center of the nearest CSX, MARC, Amtrak tracks and approximately 95 feet from the center of the nearest Metrorail tracks. Figure 1 shows the measurement assessment location.

Figure 1 Noise and vibration measurement location

Community Noise Assessment

Seven (7) community noise assessment locations were selected with input from SmithGroupJJR based on the proximity to the Montgomery College campus. Figure A1 in the Appendix shows the measurement locations.

NOISE MEASUREMENT RESULTS

Measurement Methodology

Noise measurements were performed in accordance with procedures outlined in ASTM E1503, 'Standard Test Method for Conducting Outdoor Sound Measurements Using a Digital Statistical Analysis System.' The sound level measurements were corrected for the insertion loss of the windscreen and the self-noise of the microphone before tabulating the measurement results.

A Norsonic NOR-140 sound analyzer with Norsonic Type 1209 preamplifier and Type 1225 free field microphone were used to measure the noise levels. The sound analyzer and microphone were calibrated with a Norsonic Type 1251 acoustic calibrator prior to and after performing the acoustic measurements.

Two different noise measurements were performed. One evaluated noise in the local community from exterior HVAC equipment serving the Science South and Falcon Hall buildings. The second evaluated noise at the Science South and Falcon Hall buildings from train pass-bys.

Community noise measurements were performed on 19 August 2018, a Sunday, when Montgomery College turns off all campus building equipment. During the measurement period, weather conditions were cloudy with temperatures in the low-80s and no winds present. This measurement provides a baseline community ambient noise level representative of a quiet period when vehicular traffic volume is low and Montgomery College campus equipment is not operating. Figure A1 in the Appendix shows the ambient noise levels at the seven (7) measurement locations in red color.

The community noise measurements were repeated on 23 August 2018, a Thursday, between the hours of 12:00 and 1:00 pm with all equipment in the Science South and Falcon Hall buildings turned on. During the measurement period the weather conditions were sunny with temperatures in the mid-80s and no winds present. Figure A1 in the Appendix shows the ambient noise levels at the seven (7) measurement locations in blue color. Mechanical equipment from the Science South and Falcon Hall buildings were generally inaudible beyond the walkway between Fenton Street and the railroad tracks. The noise levels in the community are controlled by traffic on nearby and distant streets. No perceptible noise from the Montgomery College campus was audible at any of the measurement sites.

For the train pass-by noise measurements, the sound analyzer was set-up to continuously record ⅓-octave band Leq (average) noise levels for 30-second durations. Each 30-second duration was logged by the sound analyzer. The measurements were conducted from 11:45 am to 12:30 pm and again from 1:45 pm to 4:30 pm. The measurement microphone was elevated 12 ft above the ground. A time log was kept of individual train pass-bys and correlated with the measurement clock time on the sound analyzer.

Community Exterior Noise Levels

Community noise levels during Sunday range from 45.4 to 55.2 dBA. During Thursday when the traffic volume was greater, community noise levels increase with levels between 56.3 and 62.8 dBA. Community noise levels are controlled by vehicular traffic and not equipment from the Science South and Falcon Hall buildings.

Based on the measured noise levels, exterior equipment noise emissions from the future building are likely not to be an issue and will comply with the City of Takoma Park and Montgomery County Noise Ordinances.

Building Exterior Noise Levels

The ⅓-octave band Leq noise level measurements, shown in Figure A2 in the Appendix, were averaged to obtain a single value for each train type and an ambient noise level in the absence of train pass-bys. The averaged train pass-by noise levels were adjusted to account for the 75 ft distance between the measurement site and the building west façade. The resulting maximum A-weighted and C-weighted noise levels at the west façade are listed in Table 3. Note that façade noise levels are expected to vary by less than 1 dB over the height of the building. Noise levels at the north and south façades will be 5 dBA less than the west façade and 10 dBA less at the east façade since at this elevation there is no direct line-of-sight to the railroad tracks.

The following conclusions can be made from the train pass-by noise measurements:

- The average site ambient noise level for intervals with no trains is 54 dB(A) and is plotted in black on Figure A2. Ambient noise is due primarily to Fenton Street traffic as well as insect and bird noise.

Table 3. Catherine and Isiah Leggett Building Calculated A-Weighted and C-Weighted Sound Levels at West Façade		
Train Type	**dB(A)**	**dB(C)**
CSX Engine	78	88
MARC	71	86
Amtrak	70	78
CSX Cars	66	74
Metro	65	69

- MARC, Amtrak, and Metrorail train pass-by noise last for approximately 10 to 15 seconds. Average measured MARC and Amtrak noise levels are 74 dB(A) and are plotted in blue and purple respectively on Figure A2. Average measured Metrorail noise levels are 69 dB(A) and is plotted in orange on Figure A2.
- CSX train pass-by noise can be split into two categories: engine noise, which lasts for approximately 15 seconds, and car noise, which can last for up to 5 minutes depending on train length. Average measured CSX engine noise levels are 82 dB(A), the loudest train noise source measured, and is plotted in red on Figure A2. Average measured CSX car noise levels are 70 dB(A) and is plotted in green on Figure A2.
- No train whistles, bells, or signal horns were sounded during the measurement period and likely not to occur because there are no nearby at-grade road crossings or stations where signaling is required. Based on Federal Railroad Administration horn data, if horns are used for signaling passing by the building site, noise levels are expected to be over 100 dB(A) at the façade. Noise control for this noise level is not cost-effective.

VIBRATION MEASUREMENT RESULTS

Measurement Methodology

Vibration measurements due to train pass-bys were performed simultaneously during the building site noise measurements. Vibration levels were measured and logged in the same manner as the train pass-by noise levels

A Norsonic NOR-140 sound analyzer with an MMF KS42C accelerometer mounted on a ground stake were used to measure the vibration levels. The accelerometer was calibrated with an MMF VC20 calibrator prior to and after performing the vibration measurements.

Building Exterior Vibration Levels

The groundborne vibration levels from the trains were averaged to obtain a single value representative of each train type. The average measured ⅓-octave band groundborne vibration velocity levels are plotted on Figure A3 in the Appendix. These are the levels at the measurement location approximately 75 ft from the new building. Depending on soil type(s), vibration levels may decrease at the new building location.

The highest vibration levels are due to the CSX engines, followed by the CSX cars, Amtrak, and MARC trains. As a reference, the VC-A and VC-C vibration criteria curves are shown along with the vibration measurement data on Figure A3. Comparing the measured vibration levels and the VC criteria would suggest the VC-C criterion is exceeded. However, this is not representative of conditions within the future building.

Groundborne vibration transmission into the building will depend on structural footing and column design and the impedance characteristics between the structural members and the soil. Further losses may result through the building structural system.

BUILDING NOISE CONTROL RECOMMENDATIONS

Exterior Walls

The exterior wall should have a minimum STC-54 rating with a minimum 35 dB transmission loss between 100 and 125 Hz.

Two different exterior wall assemblies, with variants, have been proposed based on 4 inch face brick and 1-½ inch terracotta cladding.

Wall assembly 1 comprises 4 inch brick veneer, 1-½ inch airspace, 3 inch mineral wool insulation, fluid-applied air barrier, 5/8 inch GWB sheathing, 6 inch 16 gauge steel studs and 5/8 inch interior GWB. Wall Assembly 1A is the same as wall assembly 1 except 12 inch CMU or 8 inch reinforced CMU replaces the 5/8 inch GWB sheathing and 6 inch steel studs and adds 2-½ inch metal studs and 5/8 inch interior GWB.

Wall assembly 2 comprises 1-5/8 inch terracotta cladding, 1-½ inch airspace, 3 inch mineral wool insulation, fluid-applied air barrier, 5/8 inch GWB sheathing, 6 inch 16 gauge steel studs and 5/8 inch interior GWB. Wall Assembly 1A is the same as wall assembly 1 except 12 inch CMU or 8 inch reinforced CMU replaces the 5/8 inch GWB sheathing and 6 inch steel studs and adds 2-½ inch metal studs and 5/8 inch interior GWB. Wall Assembly 2A is the same as wall assembly 1 except 12 inch CMU or 8 inch reinforced CMU replaces the 5/8 inch GWB sheathing and 6 inch steel studs and adds 2 ½ inch metal studs and 5/8 inch interior GWB.

All wall assemblies should be modified to have fiberglass batts between the studs at the interior side. Doing so will result in the STC rating and 100 to 125 Hz transmission loss criteria being met.

A value engineering item that may be proposed is to replace the 3 inch mineral wool insulation with polyisocyanurate insulation. This is not recommended as the exterior wall sound isolation will decrease with this substitution.

Exterior Windows

Window acoustic performance to abate the CSX engines to achieve the interior noise level design goal will depend on the window unit sizes, the ratio of glazing to exterior wall, and interior room finishes. The STC ratings listed below can be used as an initial guideline:

- West Façade – STC-45 to STC-50;
- East Façade – STC-35 to STC-40;
- North Façade – STC-40 to STC-45;
- South Façade – STC-40 to STC-45.

In addition to the STC ratings, the windows should have a minimum 24 dB transmission loss between 100 and 125 Hz for windows STC-40 and lower, 27 dB for windows between STC-41 and STC-45, and 30 dB for windows between STC-46 and STC-50.

Windows with STC ratings higher than 40 will be double glazed units with a 2 to 4 inch airspace. There are many configurations for glass lite thickness and airspace dimensions that can achieve a given STC rating. The STC-35 windows can be standard 1 inch insulated glass. Windows are recommended no to be operable. If operable windows are to be used, the STC ratings should be increased by 3 to 4 points from the above listed values. Suggested suppliers of high STC rated windows include DeVAC/Monray DeVAV Monray and St Cloud Window St Cloud Window.

Other Exterior Construction

Other exterior construction should be as listed below:

- No through-the-wall HVAC units except at the east façade;
- Roof to be minimum 3 inch thick concrete;
- Interior finished ceilings to be acoustic ceiling tile with minimum NRC 0.70 rating.

BUILDING VIBRATION CONTROL RECOMMENDATIONS

Building vibration control can be designed into the building. There are several approaches, the most common being to use vibration isolators between the building footings and the soil. Alternate methods involve floor design to provide a stiff assembly that is independently framed from other building areas. These options are costly. While groundborne vibration from train pass-bys has been the focus of the measurements, vibration due to walking and mechanical equipment can be as high or higher than transmitted groundborne vibration.

Before building vibration control recommendations can be developed, several factors need to be resolved to determine if this is necessary:

1. Will laboratory equipment that needs to conform to the VC-C criterion be used, currently or in the future? Vibration tolerance levels need to be confirmed from manufacturers for this equipment.
2. Can manufacturer's vibration isolation tables be used for the sensitive equipment to meet the VC-C criterion? Manufacturers should be contacted.
3. Have there been problems with existing laboratory equipment due to groundborne vibration transmission from train pass-bys into the building? If so, are occasional experimental errors due to vibration acceptable? Faculty should be consulted.
4. If there is to be laboratory equipment that is sensitive to vibration, where will the equipment be located? Locating this equipment on grade supported by the soil is generally the best approach but may still require additional vibration mitigation measures.

CONCLUSIONS

Noise and vibration measurements due to train pass-bys have been performed at the site of the future Catherine and Isiah Leggett Building on the Montgomery College Takoma Park Campus. Noise levels were measured from exterior-located HVAC equipment in the nearby community.

Noise levels at the building façade are highest from the CSC engines and correspond to faculty complaints that this noise disrupts teaching. Groundborne vibration from train pass-bys into the building may be problematic depending on the type of laboratory equipment to be used and individual equipment vibration tolerance limits.

Design modifications for the exterior walls and windows have been developed to meet the interior noise level criteria. Windows will need to be selected based on both STC and 100 and 125 Hz transmission loss values due to the low-frequency noise from CSX engines. Groundborne vibration control can be part of the building design. Specific requirements for equipment and the necessity of building vibration isolation needs to be determined before these costly measures are designed. Laboratory equipment manufacturers and faculty should be consulted on the vibration tolerance for laboratory equipment and whether groundborne vibration is problematic in the current buildings.

Noise immissions at the nearby residential neighborhoods will not be problematic due to exterior-located HVAC equipment associated with the new building.

Please contact me at 410.821.5930 or nts@akustx.com if you have any questions on our analysis and recommendations.

APPENDIX A

Figure A1 Community noise measurement locations

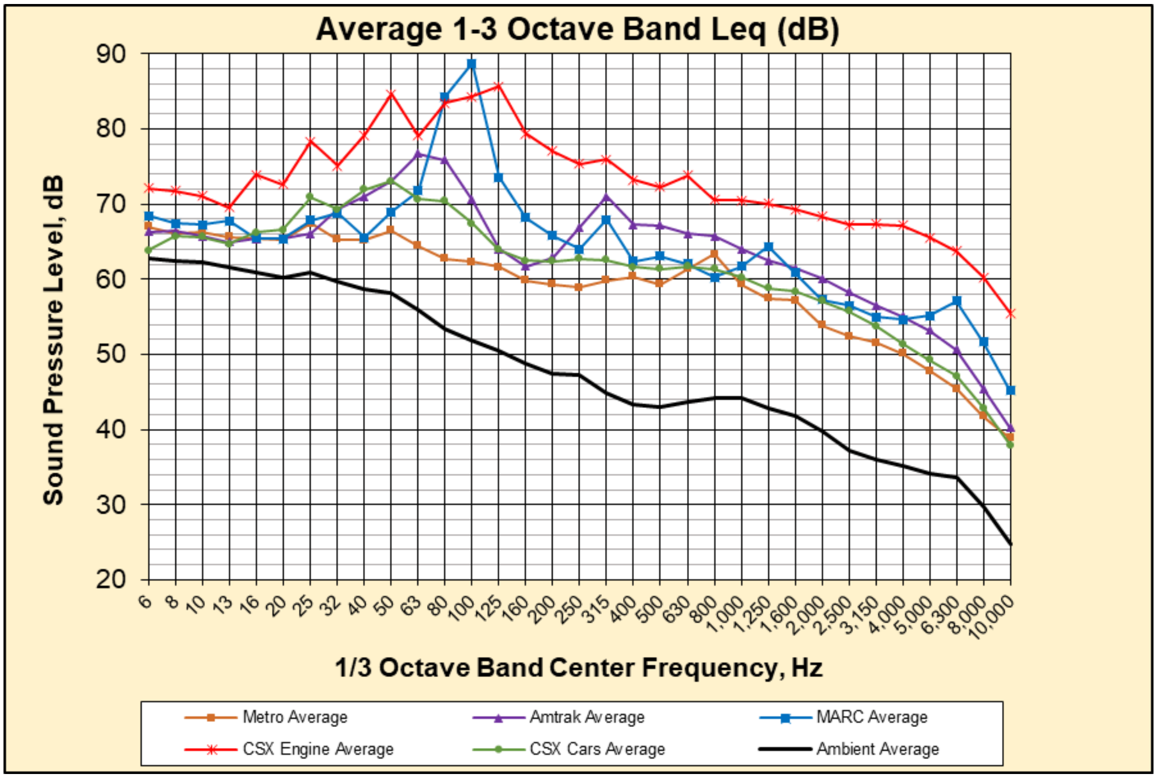


Figure A2 Average measured ⅓-octave band noise levels from train pass-bys

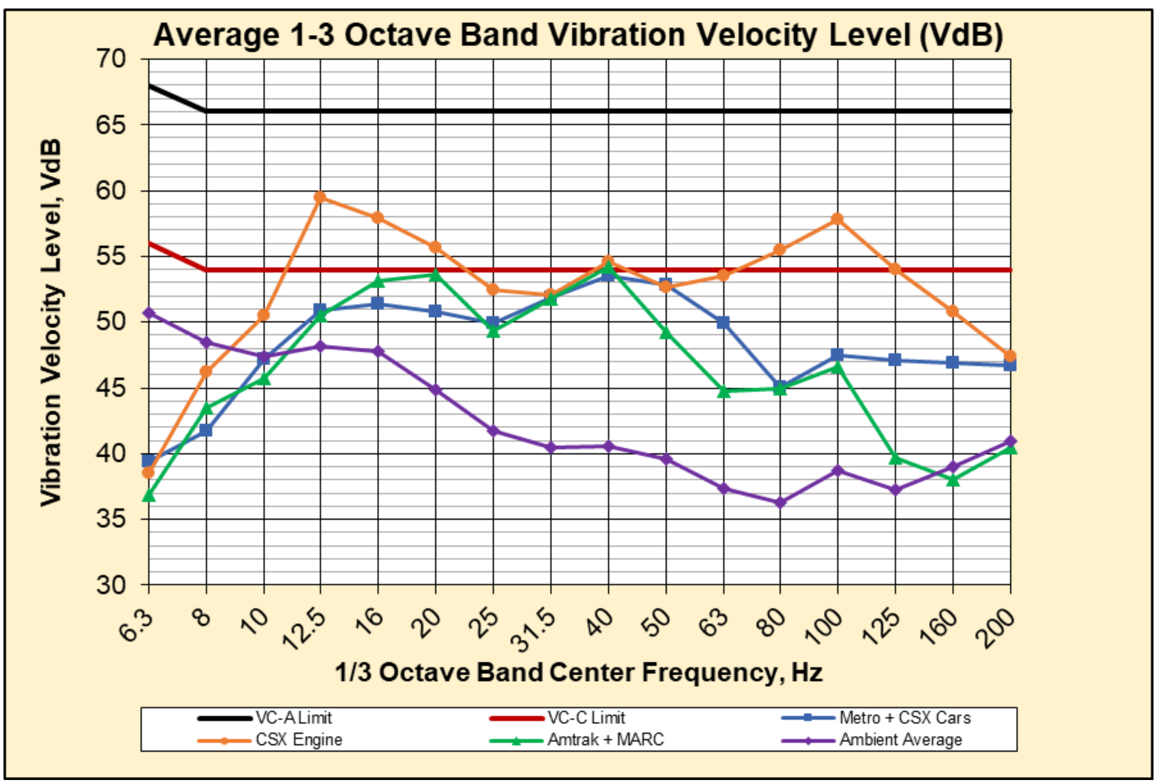


Figure A3 Average measured ⅓-octave band vibration velocity levels from train pass-bys

12 FIRE AND LIFE SAFETY

SCHEMATIC DESIGN NARRATIVE

LIFE SAFETY

1. Introduction

   This report contains a fire protection and life safety code analysis for the proposed Montgomery College Math and Science building to be located on campus at Takoma Ave, in Takoma Park, Maryland. The Math and Science building will be constructed in accordance with the applicable building codes and standards as enforced by the Maryland Building Performance Standards Regulations (COMAR 05.02.07), the Maryland Department of General Services (DGS), and those referenced by Montgomery college design standards.

2. Applicable codes and standards

   a. The following codes and standards will be utilized in the development of this assessment:

      i. The 2015 Edition of the International Construction Codes, adopted by Montgomery County, Maryland with amendments:

         - International Building Code (IBC), 2015 ed.
         - International Mechanical Code (IMC), 2015 ed.
         - International Plumbing Code (IPC), 2015 ed.
         - International Energy Conservation Code (IECC), 2015 ed.

      ii. The primary National Fire Codes (NFC) published by National Fire Protection Association (NFPA) with amendments applicable to this project include, but not limited to:

         - NFPA 1, NFPA 1, Fire Code, 2015
         - NFPA 10, Portable Fire Extinguishers, 2013
         - NFPA 13, Installation of Sprinkler Systems, 2013
         - NFPA 14, Installation of Standpipe and Hose Systems, 2013
         - NFPA 20, Installation of Stationary Pumps for Fire Protection, 2013
         - NFPA 24, Installation of Private Fire Service Mains and Their Appurtenances, 2013
         - NFPA 45, Fire Protection for Laboratories Using Chemicals, 2011
         - NFPA 70, National Electrical Code, 2014
         - NFPA 72, National Fire Alarm Code, 2013
         - NFPA 80, Fire Doors and Fire Windows, 2013
         - NFPA 101, Life Safety Code, 2015

      iii. ASME A17.1, 2007 ed. - Safety Code for Elevators and Escalators

      iv. Maryland Building Performance Standards (COMAR 05.02.07)

v. Montgomery College Standards

vi. Montgomery County Fire Safety Code and other applicable standards

3. General Building Descriptions

The proposed facility will provide Montgomery College with a classroom and laboratory facility that has sufficient space to accommodate current and projected enrollments for the math and science programs. Proposed functions within the facility include: academic space for a classrooms, teaching and research labs (and preparation areas for such); support space for laboratories and classes; administrative space for the department personnel and small meeting rooms to facilitate faculty-student meetings, and student collaboration areas including vending/lounge areas and study areas of various sizes. The penthouse consists of a mechanical penthouse. The building will be of Type IIA construction constructed of fire resistive, non-combustible materials. The building height will be approximately 38 feet. Ground floor will be approximately 50,000 square feet whereas the 1st and 2nd floor will be approximately 38,000 square feet each. The building will be treated as mixed use, non-separated occupancy.

The proposed design includes 3-story spaces and a penthouse. Each story space is separated from the adjacent floor levels by 1-hour fire-resistance rated floors.

4. Occupancy Classification

The following use groups and occupancy classification is anticipated to be part of the design:

a. Primary Occupancies:

i. Business "B" Occupancy - Administration areas, labs, research areas, faculty offices
ii. Assembly "Group A-3" Occupancy – Planetarium and greenhouse
iii. Low Hazard Storage "Group S-2" Occupancy - Storage rooms, janitor's closet, etc.

b. Accessory Spaces and Incidental Uses:

i. Mechanical and electrical equipment rooms

5. New building Construction and Limitations

The building will be provided in accordance with Construction Type IIA criteria per IBC. All materials used with be noncombustible except for as noted within IBC section 603. The allowable building area and height will be calculated as mixed, non-separated use.
The following table shows the maximum allowable area for the non-separated mixed-use portions of the building.

Occupancy Type	Tabular Allowable Area (SF)	Multiplier for Sprinkler Allowance*	Frontage Increase area (SF)	Maximum Allowable area (SF)
Assembly	15,500	3	10,850	57,350
Business	37,500	3	26,250	138,750
Storage (S-2)	39,000	3	27,300	144,300

Values are indicated from IBC table 503.

*Multiplier includes the 200% sprinkler allowance increase and the original tabular value.

6. Exterior exposure protection

   There are a total of three buildings adjacent to Math & Science Building. The buildings are classified as construction type IIB. Between on-campus buildings, there are no defined lot lines. The imaginary lot lines will be assumed to be 10 ft away from the exterior walls of the surrounding buildings. The 30-foot separation distance between an imaginary lot line and the exterior wall of Math & Science building is taken into account in determining the 1-hour exterior exposure protection (This will be indicated in life safety drawings). For a separation distance greater than 40 feet between an exterior wall of the proposed Math & Science Building and other buildings, no exterior wall fire-resistance rating will be provided.

7. Fire resistance rating requirements

   a. In accordance with Construction Type IIA construction, the fire resistance ratings in hours for the various building elements are as follows:

ELEMENT	FIRE RESISTANCE (HOURS)
Primary Structural Frame Including Columns (i)	1
Interior and Exterior Load Bearing Walls	1
Floor Construction and Secondary Members (i)	1
Roof Construction and Secondary Members (ii)	1
Shafts and Elevator Hoistways	1

i. But not less than the fire resistive rating of the elements being supported.
ii. Unless glass surround with no horizontal mullions. Glass will require sprinklers be provided on each side with a walkable surface.

8. Occupancy separation requirements

   The entire building is classified as mixed-use, non-separated occupancy. The building construction required is based upon the most stringent occupancy present, therefore Assembly A-3 will be the most limiting/restricting occupancy present.

9. Protection of openings

   Openings within fire resistance rated walls and floors will be protected in accordance with IBC and NFPA 101 criteria.

   a. Shaft Enclosure

      Every stairway, elevator shaft, and other vertical openings will be protected by 1-hour fire resistance rated assemblies. Openings protection shall be provided as follows:

Wall Fire Resistance Rating (hours)	Door Fire Resistance Rating (minutes)	Glass Fire Resistance Rating (minutes)
1	60	60

      Openings other than those necessary for the function of the shaft will not be provided. All permitted openings into a new stair shall be protected with an approved opening protective. No storage shall be permitted within the shaft.

10. Maximum Allowable Quantity of Hazardous Materials

    The laboratories will have fire resistance rated separations designed in accordance with Chapter 3 and 4 from the IBC and Chapters 5 and 10 of NFPA 45. Maximum allowable quantities (MAQ) of flammable/combustible liquids and oxidizers will be indicated as part of the life safety design.

    IBC restricts the quantities of flammable liquids and oxidizers as the control areas move up from the Ground floor. MAQ will be limited on the Ground floor and 1st floor relative to the 1st floor. NFPA 45 has both a maximum density and a total allowable quantity per laboratory unit. MAQ will not exceed the tables from NFPA 45 and IBC. The tables are shown below and in the end of the life safety narrative.

    a. NFPA 45 Design Criteria per Laboratory
       Laboratories in Math & Science building that are used for education past the 12th grade and before post-college graduate-level instruction, and therefore are considered as instructional laboratory units. The instruction laboratory units will be classified as Class C. For laboratory unit Class C, there are no limitation on area of lab unit and fire separation requirements up to 3rd story of building above the grade line per NFPA 45, Table 5.1.1.

The maximum quantities of flammable and combustible liquids in any laboratory shall not exceed the quantity indicated in the table below Per NFPA 45 Table 10.1.1 (b).

Laboratory Unit Fire Hazard Class	Flammable and Combustible Liquid Class	Quantities in Use[I]		Quantities in Use and Storage[I]	
		Maximum Quantity per 100 ft^2 of Laboratory Unit (gal)[II]	Maximum Quantity per Laboratory Unit (gal)	Maximum Quantity per 100 ft^2 of Laboratory Unit (gal)[II]	Maximum Quantity per Laboratory Unit (gal)
C	I	2	150	4	300
	I,II, and IIIA	4	200	8	400

I. The maximum amount in use in open systems is limited to 10 percent of the quantities listed.
II. The quantities per 100 ft^2 do not imply the quantities must be within that 100 ft^2 area; the quantities per 100 ft^2 are for calculation purposes to determine the total quantity allowed per laboratory work area and the total amount overall in the laboratory unit.

b. IBC Design Criteria per Control Area

IBC restricts the number of control areas, MAQ, and fire-resistance rating for fire barriers depending on the floor level the control area(s) are located on. The MAQ for Ground and Second floor will be reduced to 75% of the MAQ per control area whereas hazardous materials are allowed to store up to 100% of the MAQ. Floor assembly is -hour fire resistance rated for each floor and each floor will be considered as a control area. In addition to each control area per a floor, the Ground floor will have an additional control area in “Central Chemical Preparation & Storage” room where most chemicals will be stored. The Central Chemical Preparation & Storage Room will be separated with 1-hour fire resistance rating from the rest of floor area. MAQ for each story is tabulated in the tables. See the table shown in the end of life safety narrative for maximum allowable quantity allowed.

11. Means of Egress

The means of egress criteria will be based on both IBC and NFPA 101 criteria. The following means of egress requirements are applicable. As the floor plans and spaces have not been finalized, these requirements will be considered as the basis for designing the means of egress and will be updated as the project progresses. Per the current design, one egress stair connects the Ground and Penthouse floors while the other egress stair connects the Ground through Second.

a. Occupant Loads:

The number of occupants for whom exit facilities shall be provided is based on the following occupant load factors: The most restrictive factor from either IBC or NFPA is used in the table.

Occupancy Use Group	Occupant Load Factor (persons/sf) IBC	Occupant Load Factor (persons/sf) NFPA 101
Business Occupancy	100 gross	100 gross
Assembly Concentrated	7 net	7 net
Assembly, Unconcentrated	15 net	15 net
Electrical and Mechanical	300 gross	500 gross
Storage	300 gross	500 gross

The life safety drawings utilize the NFPA 101 occupant load factors to determine the total occupant load and egress capacity for each floor.

b. Exit Capacity:

The capacity of means of egress components for the area served shall be sufficient for the occupant load served by the exits. The following exit component's capacities and notes are applicable, regardless if the building is to be provided with automatic sprinkler protection.

i. Stairways: 0.30 inches of clear width per person.

ii. Doorways corridors and ramps: 0.20 inches of clear width per person.

See life safety drawings for actual exit capacities calculated for each floor level.

c. Number and Remoteness of Exits:

The occupant load on Ground floor is expected to be more than 1000 people whereas the occupant loads for the f 1st and 2nd floors are expected to be more than 500 people. Based on these calculated occupant loads, not less than four exits will be required on the Ground floor and not less than three exits will be required on the 1st and 2nd floors respectively. The building will be provided with three enclosed exit stairs serving each level except the Penthouse. The Penthouse will have access to one enclosed stair. Exits will be located with a separation distance of at least 1/3 the length of the maximum overall diagonal of the area served.

d. Arrangement of Means of Egress:

Maximum travel distance, common path of travel and dead ends for a fully-sprinklered building will be provided in accordance with the most stringent requirements of NFPA 101 and IBC.

Occupancy	Maximum Travel Distance (ft)	Maximum Common Path of Travel (ft)	Maximum Dead End (ft)
Business	300	100	50
Assembly	250	75	20
Storage S-2	400	100	50

See life safety drawings for maximum travel distance, common path of travel, and dead ends for each floor provided on each life safety sheet.

e. Measurement of Travel Distance to Exits:

The life safety drawings will indicate actual travel distances. All travel distances will be shown straight along the probable path of travel and adjacent to walls with turns at 90 degrees.

f. Doors:

NFPA 101 and IBC require a minimum clear width of 32 inches. Doors shall swing in the direction of exit travel when serving an occupant load greater than 50 people or serving as an exit enclosure. Doors in main electrical rooms will swing in direction of travel. Positive latching door hardware will be provided on all fire resistance rated doors**.** Security controls will be provided in fire command center. All the exit doors shall remain accessible for use whenever the building is occupied. Drawings will be reviewed to verify requirements related to door arrangement are followed and are compliant.

g. Marking of Means of Egress:

Exist and exit access paths will be provided with approved exit signs in accordance with all applicable codes. The front door will not be provided with exit signage as it will be readily identifiable as an exit. Exit sign placement in exit access will be laid out such that any point will not more than 100 feet from the nearest visible sign. Directional indicators will be provided on exit signs where the direction of travel to nearest exit is not apparent. Exit signs will be located and of such size and design to be readily visible and provide contrast with decorations, interior finish or other signs. Signs may be either internally illuminated. Exit signs will be illuminated by a source providing not less than 5 foot-candles (54 lux) and shall employ a contrast ratio of not less than 0.5 and be on emergency power.

h. Illumination of Means of Egress:

All means of egress will have artificial lighting with the required level of illumination. Emergency lighting will be continuous for the duration of time required for everyone to exit the building. Lighting will also illuminate the exit discharge. A minimum of one foot-candle (11 lux) will be provided at the walking surface. Exit illumination is to be arranged such that the failure of any one single lighting unit, such as the burning out of a bulb, will not leave the area or space in total darkness. Lighting will be connected to an approved emergency power source capable of providing minimum illumination for a period of 1-1/2 hours.

12. Interior finish

Minimum interior finish requirements per IBC Table 803.9 and NFPA 101 are as follows:

a. Assembly Occupancy

   i. Exit enclosures: Class A
   ii. Corridors: Class B
   iii. Rooms and enclosed spaces: Class B
   iv. Interior floor finish: Class II

b. Building Remainder

   i. Exit enclosures: Class B
   ii. Corridors: Class C
   iii. Rooms and enclosed spaces: Class C
   iv. Interior floor finish: Class II

Fire Protection

1. Fire Protection Systems Summary

   The Montgomery College Math & Science Building will be provided with an automatic fire suppression system throughout. The system will be a combination wet sprinkler and automatic wet standpipe system. A 6-inch incoming water service is expected to be required to supply the new automatic sprinkler/standpipe system. A 6-inch backflow preventer will be provided on the new incoming fire water service. A new, electrically driven,fire pump located in a dedicated, fire rated, fire pump room will provide required pressure for all sprinkler and standpipe systems.

2. Water Supply and Fire Pump

   The fire water supply for the new Montgomery College Math & Science building will be provided by one water main. All fire pump and underground systems will be designed in accordance with NFPA-20 and NFPA-24. A 6-inch feed main will supply the fire protection water for fire sprinkler and automatic-standpipe systems in the building.

   A horizontal split case, electric motor driven fire pump will be provided. The preliminary hydraulic calculation indicates that the expected capacity of the fire pump would be rated for 1000 gpm at 95 psi. The exact capacity of fire pump will be determined as the project progresses. The fire pump room will be located on Ground level and enclosed by 1-houre fire rated barriers and the fire pump room will have 1 hour rated passageway to a rated exit enclosure.

3. Backflow Preventer Assembly

   A 6-inch backflow preventer assembly will be provided on the 6-inch combined domestic and fire incoming water service. The 6-inch backflow preventer assembly will be *Ames* Model 3000SS or equivalent. An equivalent backflow preventer assembly must be stainless steel type. For a full forward test for the backflow preventer required per NFPA 25 annually, a backflow preventer test header will be provided with a normally closed control valve. The test header will be four-way, flushed type and will be clearly marked with a permanent sign and a plate to distinguish between a test header and a fire department connection.

4. Hydrant Flow Test Data and Hydraulic calculations

   Automatic sprinkler system will have 20% safety margin on both demand pressure and demand flow at the pump discharge. Water supply information will be corrected to accommodate the low hydraulic gradient in the hydraulic calculations. Class I automatic standpipe system will be hydraulically calculated and designed to obtain the required flows and pressures when supplied by a fire pump and by the fire department connection.

Available Hydrant flow test data records indicate the following conditions.

Date: 12-13-2018.
Time: 11:21 a.m.
Performed by: WSSC
Static Pressure at Residual Fire Hydrant R: 68 psi
Measured Flow at Flow Fire Hydrant F: 1289 gpm
Residual Pressure at Residual Fire Hydrant R: 64 psi

5. Sprinkler Systems

The building will be fully sprinklered and provided with standpipes for firefighting functions. All systems will be wet-pipe sprinkler system. The sprinkler and standpipe system will be a combined system fed from 6-inch feed main from fire pump located on Ground level. Each sprinkler zone boundary will not exceed 52,000 sq.ft. in area. Sprinkler zone control assemblies will be located in each stair landing adjacent to the corresponding floor sprinkler zone. Sprinkler zone control assembly will consist of a control valve, check valve, riser assembly including pressure gauge, pressure relief valve, water flow switch and combination test and drain valve.

a. Sprinkler Water Demand:

Sprinkler systems will be designed in accordance with NFPA 13.

Occupancy	Hazard Category	Sprinkler Design Demand
Offices, meeting rooms, class rooms, and similar areas	Light Hazard	0.1 gpm over 1500 sq.ft
Laboratories, Utility, and equipment rooms	Ordinary Hazard Group 1	0.15 gpm over 1500 sq ft

b. Sprinkler Type

All sprinklers will be quick response concealed pendent with white concealer plate. Rooms with ceiling will be quick response upright sprinkler with brass finish. Sprinkler rating will be ordinary temperature except areas specified in NFPA 13.

c. Pipe and Fittings

Wet sprinkler piping with a diameter of less than 2.5 inches will be Schedule 40 black steel. Wet sprinkler piping with a diameter of 2.5 inches and larger may be reduced to Schedule 10 pipe. Threaded, roll grooved, and mechanical tee fittings are permitted for all pipe sizes, however, cut grooved is permitted for pipe size 5 inches and larger only. Usage of CPVC or flexhead is not permitted. Hangers will be provided per NFPA 13 requirements. No seismic bracing is required.

d. Supervision of Valves and Water Flow Switch.

Control valves will be provided with supervised tamper switches and water switches will be provided on floor control assemblies and fire pump. Contractor is responsible for coordinating with fire alarm contractor to tie in tamper switches and water flow switches to the fire alarm system.

6. Standpipe Systems

A combination standpipe/sprinkler riser will be provided in each stair tower and supplied by a looped feed main. The standpipe system will be Class I automatic wet type and will be sized based on fire pump capacity and fire truck pump capacity (150 psi at 1000 gpm). Supervised standpipe isolation valves will be provided at the bottom of each standpipe systems. The standpipe system will be sized to provide the 500 gpm at the most remote standpipe and 250 gpm for each additional standpipe for a maximum of 1000 gpm as required by NFPA 14. The standpipe system will be designed to support these flow requirements with the pressure supplied by the fire pump and the fire department through fire department connections. Each fire hose valves will have 2.5 inch hose connection, 2.5 inch to 1.5 inch reducer, cap, and chain.

7. Fire Department Connections:

A wall mounted fire department connection will be provided within 100 feet of a fire hydrant. The exact location of fire department connections will be determined later. The fire department connection will supply all of the standpipe risers and sprinkler systems and will be four-way flush mounted type with chrome plate finish. The size of fire department connection line will be sized at least as large as the fire pump discharge line. A check valve and automatic ball drip will be provided.

8. Exterior Class I Standpipe Connection

To provide additional fire protection features as an alternative to meeting fire lane access requirements., an exterior, supervised (with outdoor listed, valve supervisory switch) Post Indicating Valve (PIV) assembly will be provided to hold back water from filling at the weather exposed outlets. The underground fire service piping serving the exterior standpipe assembly will be installed at a depth to ensure the underground piping is installed below the local frost line, and the 2 ½-inch multiple outlet standpipe connection assembly will be provided at exterior within the confined area created by the construction of the Math & Science building.

Fire Alarm

1. Fire Alarm Systems Summary

   A Tyco Simplex Fire alarm control panel (4100ES) will support the new proposed Math & Science Building. The system shall be a voice evacuation type system and shall also serve as a mass notification system. These integrated systems shall be capable of notifying building occupants by means of tones, strobes, textural messaging, pre-recorded and live voice announcements. The fire detection and alarm system will be designed in accordance with NFPA 72 and per Montgomery College Standards.

2. Mass Notification System

   Fire alarm control panel shall deliver the mass notification system pre-recorded and live mass notification message broadcasts. Message boards will be provided at each exit to notify occupants with textual and graphical visible notification

3. Manual Pull station and Detectors

   Manual pull stations will be provided within five feet of each exit along the path of egress. The maximum travel distance to a manual station shall not exceed 200 feet. Automatic smoke detection will be provided for elevator recall, and HVAC shutdown. Addressable duct smoke detection and fan shut down will be provided per International Mechanical Code on the return and supply side of all systems with a capacity of 2,000 cfm or greater. They will be arranged to indicate a supervisory alarm only and will not sound a building evacuation alarm upon detection.

4. Visible Notification Appliances

   Visible notification appliances will be provided throughout the facility. The visible alarm strobe indicating appliances will generally be field selectable 15, 30, 75 and 110 candela, synchronized devices. The audio notification appliances will be designed to output a minimum 15 dB above the ambient noise level. Weatherproof visual/audible notification appliances will be provided at exterior gathering areas. Acoustically distinguishable spaces will be indicated on the drawings along with all zone names. The fire alarm zone extents will match that of the sprinkler zones on each floor. All equipment will be labeled with common English language and coded identifiers will not be provided. Notification devices will be red devices marked with white “ALERT” and have clear lenses.

5. Fire Alarm Control Panel and Annunciator

   A Tyco SimplexGrinnell (now Johnson Controls) fire alarm control panel (4100ES) will be located in the Main Electrical Room on the First floor. The remaining floors will have distributed notification appliance circuit power panels and amplifiers located inside the respective floor’s stacked electrical rooms. Terminal boxes will be provided for connections between floors. An LCD annunciator panel will be provided at the main entrance, unless otherwise specified by the fire department.

6. Fire Alarm Wiring

   The fire alarm wiring will be supervised and in accordance with Class B criteria and wiring between control panels will be installed in accordance with Class X criteria.

   Intermediate Metal Conduit (IMC) conduit shall be used in mechanical rooms and anywhere that may be exposed to damage. Electrical Metallic Tubing (EMT) conduit is acceptable for use above ceilings and when concealed from harm. Compression type fittings are required for EMT.

   Fire pump or routing electrical power wiring to a fire pump shall be in a 2-hour fire separation rated assembly enclosure around all power conduit to fire pumps, or in a min. 2" concrete cover around the conduit.

7. Fire Alarm Power

   The fire detection and alarm system is to be provided with standby battery secondary power which will designed to provide a minimum of 24-hour standby service under normal conditions followed by not less than 15 minutes in alarm. The entire fire alarm system will be connected to the emergency power distribution system. The emergency generator's state will also be supervised by the fire alarm system.

8. Fire Alarm Smoke Detector

   A smoke detector will be provided within five feet of the fire alarm control panel and all associated fire alarm panels. Duct smoke detectors will be provided on the supply and return of all mechanical equipment exceeding 2000 cfm and per NFPA 90A and IBC requirements.

9. Sprinkler Water Flow and Tamper Switches

   Sprinkler water flow and tamper switches shall be monitored by the fire alarm system; addressable interfaces shall be provided for these devices. All devices shall be wired into the SLC loops. All waterflow switches shall have separate addresses.

Ground Floor	is the	First Story Below Grade	
Max. No. of Control Areas is	3	Fully-Sprinklered?	Yes
Fraction of MAQ Permitted is	75.0%	Storage in Cabinets?	Yes

			Storage			Use in Closed Systems			Use in Open Systems	
Material	**Class**	**Group When the MAQ is Exceeded**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***	**Gas Cu. Ft. at NTP**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***	**Gas Cu. Ft. at NTP**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***
Combustible Liquid	II	H-2 or H-3		360			180			45
	IIIA	H-2 or H-3		990			495			120
	IIIB	N/A		Unlimited			Unlimited			Unlimited
Combustible Fiber	Loose	H-3	*75*			*75*			*15*	
	Baled		*750*			*750*			*150*	
Consumer Fireworks	N/A	1.4G	*187.5*							
Cryogenics, Flammable	N/A	H-2		67.5			67.5			15
Cryogenics, Oxidizing	N/A	H-3		67.5			67.5			15
Explosives	Div 1.1	H-1	1.5	*1.5*		0.1875	*0.1875*		0.1875	*0.1875*
	Div 1.2	H-1	1.5	*1.5*		0.1875	*0.1875*		0.1875	*0.1875*
	Div 1.3	H-1 of H-2	7.5	*7.5*		0.75	*0.75*		0.75	*0.75*
	Div 1.4	H-3	75	*75*		37.5	*37.5*			
	Div 1.4G	H-3	375							
	Div 1.5	H-1	1.5	*1.5*		0.1875	*0.1875*		0.1875	*0.1875*
	Div 1.6	H-1	1.5							
Flammable Gas	Gaseous	H-2			3000			3000		
	Liquefied			*450*			*450*			
Flammable Liquid	1A	H-2		90			45			15
	1B and 1C	H-3		360			180			45
Flammable Liquid, Combination (1A, 1B, 1C)	N/A	H-2 or H-3		360			180			45
Flammable Solid	N/A	H-3	375			187.5			37.5	
Organic Peroxide	UD	H-1	1.5	*1.5*		0.1875	*0.1875*		0.1875	*0.1875*
	I	H-2	15	*15*		1.5	*1.5*		1.5	*1.5*
	II	H-3	150	*150*		75	*75*		15	*15*
	III	H-3	375	*375*		187.5	*187.5*		37.5	*37.5*
	IV	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited
	V	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited
Oxidizer	4	H-1	1.5	*1.5*		0.1875	*0.1875*		0.1875	*0.1875*
	3	H-2 or H-3	30	*30*		3	*3*		3	*3*
	2	H-3	750	*750*		375	*375*		75	*75*
	1	N/A	Unlimited	*Unlimited*		Unlimited	*Unlimited*		Unlimited	*Unlimited*
Oxidizing Gas	N/A	H-3		*450*	4500		*450*	4500		
Pyrophoric Materials	N/A	H-2	6	*6*	37.5	0.75	*0.75*	15	NP	NP
Unstable (Reactive)	4	H-1	1.5	*1.5*	15	0.1875	*0.1875*	3	0.1875	*0.1875*
	3	H-1 or H-2	15	*15*	150	1.5	*1.5*	30	1.5	*1.5*
	2	H-3	150	*150*	2250	75	*75*	2250	15	*15*
	1	N/A	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Water Reactive	3	H-2	15	*15*		7.5	*7.5*		1.5	*1.5*
	2	H-3	150	*150*		75	*75*		15	*15*
	1	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited

Notes:

1. All quantities shown here are based on the 2015 IBC, and include applicable increases for sprinkler protection and storage in appropriate containers or cabinets, if presence of sprinklers and use of such containers is indicated at the top of this table.
2. Combustible dusts have been omitted from this table as their maximum permitted quantity is dependent on the individual material and the hazardous materials report required by IBC Section 414.1.3.
3. Inert gases and inert cryogenics have been omitted as they have unlimited quantities in all forms. All quantities shown here are based on the 2015 IBC.

Level 1 is the First Story Above Grade
Max. No. of Control Areas is 4 Fully-Sprinklered? Yes
Fraction of MAQ Permitted is 100.0% Storage in Cabinets? Yes

			Storage			Use in Closed Systems			Use in Open Systems	
Material	**Class**	**Group When the MAQ is Exceeded**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***	**Gas Cu. Ft. at NTP**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***	**Gas Cu. Ft. at NTP**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***
Combustible Liquid	II	H-2 or H-3		480			240			60
	IIIA	H-2 or H-3		1320			660			160
	IIIB	N/A		Unlimited			Unlimited			Unlimited
Combustible Fiber	Loose	H-3	*100*			*100*			*20*	
	Baled		*1000*			*1000*			*200*	
Consumer Fireworks	N/A	1.4G	*250*							
Cryogenics, Flammable	N/A	H-2		90			90			20
Cryogenics, Oxidizing	N/A	H-3		90			90			20
Explosives	Div 1.1	H-1	2	*2*		0.25	*0.25*		0.25	*0.25*
	Div 1.2	H-1	2	*2*		0.25	*0.25*		0.25	*0.25*
	Div 1.3	H-1 of H-2	10	*10*		1	*1*		1	*1*
	Div 1.4	H-3	100	*100*		50	*50*			
	Div 1.4G	H-3	500							
	Div 1.5	H-1	2	*2*		0.25	*0.25*		0.25	*0.25*
	Div 1.6	H-1	2							
Flammable Gas	Gaseous	H-2			4000			4000		
	Liquefied			*600*			*600*			
Flammable Liquid	1A	H-2		120			60			20
	1B and 1C	H-3		480			240			60
Flammable Liquid, Combination (1A, 1B, 1C)	N/A	H-2 or H-3		480			240			60
Flammable Solid	N/A	H-3	500			250			50	
Organic Peroxide	UD	H-1	2	*2*		0.25	*0.25*		0.25	*0.25*
	I	H-2	20	*20*		2	*2*		2	*2*
	II	H-3	200	*200*		100	*100*		20	*20*
	III	H-3	500	*500*		250	*250*		50	*50*
	IV	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited
	V	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited
Oxidizer	4	H-1	2	*2*		0.25	*0.25*		0.25	*0.25*
	3	H-2 or H-3	40	*40*		4	*4*		4	*4*
	2	H-3	1000	*1000*		500	*500*		100	*100*
	1	N/A	Unlimited	*Unlimited*		Unlimited	*Unlimited*		Unlimited	*Unlimited*
Oxidizing Gas	N/A	H-3		*600*	6000		*600*	6000		
Pyrophoric Materials	N/A	H-2	8	*8*	50	1	*1*	20	NP	NP
Unstable (Reactive)	4	H-1	2	*2*	20	0.25	*0.25*	4	0.25	*0.25*
	3	H-1 or H-2	20	*20*	200	2	*2*	40	2	*2*
	2	H-3	200	*200*	3000	100	*100*	3000	20	*20*
	1	N/A	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Water Reactive	3	H-2	20	*20*		10	*10*		2	*2*
	2	H-3	200	*200*		100	*100*		20	*20*
	1	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited

Notes:
1. All quantities shown here are based on the 2015 IBC, and include applicable increases for sprinkler protection and storage in appropriate containers or cabinets, if presence of sprinklers and use of such containers is indicated at the top of this table.
2. Combustible dusts have been omitted from this table as their maximum permitted quantity is dependent on the individual material and the hazardous materials report required by IBC Section 414.1.3.
3. Inert gases and inert cryogenics have been omitted as they have unlimited quantities in all forms. All quantities shown here are based on the 2015 IBC.

Level 2	is the	Third Story Above Grade	
Max. No. of Control Areas is	2	Fully-Sprinklered?	Yes
Fraction of MAQ Permitted is	50.0%	Storage in Cabinets?	Yes

			Storage			Use in Closed Systems			Use in Open Systems	
Material	**Class**	**Group When the MAQ is Exceeded**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***	**Gas Cu. Ft. at NTP**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***	**Gas Cu. Ft. at NTP**	**Solid Pounds / *Cubic Feet***	**Liquid Gallons / *Pounds***
Combustible Liquid	II	H-2 or H-3		240			120			30
	IIIA	H-2 or H-3		660			330			80
	IIIB	N/A		Unlimited			Unlimited			Unlimited
Combustible Fiber	Loose	H-3	*50*			*50*			*10*	
	Baled		*500*			*500*			*100*	
Consumer Fireworks	N/A	1.4G	*125*							
Cryogenics, Flammable	N/A	H-2		45			45			10
Cryogenics, Oxidizing	N/A	H-3		45			45			10
Explosives	Div 1.1	H-1	1	*1*		0.125	*0.125*		0.125	*0.125*
	Div 1.2	H-1	1	*1*		0.125	*0.125*		0.125	*0.125*
	Div 1.3	H-1 of H-2	5	*5*		0.5	*0.5*		0.5	*0.5*
	Div 1.4	H-3	50	*50*		25	*25*			
	Div 1.4G	H-3	250							
	Div 1.5	H-1	1	*1*		0.125	*0.125*		0.125	*0.125*
	Div 1.6	H-1	1							
Flammable Gas	Gaseous	H-2			2000			2000		
	Liquefied			*300*			*300*			
Flammable Liquid	1A	H-2		60			30			10
	1B and 1C	H-3		240			120			30
Flammable Liquid, Combination (1A, 1B, 1C)	N/A	H-2 or H-3		240			120			30
Flammable Solid	N/A	H-3	250			125			25	
Organic Peroxide	UD	H-1	1	*1*		0.125	*0.125*		0.125	*0.125*
	I	H-2	10	*10*		1	*1*		1	*1*
	II	H-3	100	*100*		50	*50*		10	*10*
	III	H-3	250	*250*		125	*125*		25	*25*
	IV	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited
	V	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited
Oxidizer	4	H-1	1	*1*		0.125	*0.125*		0.125	*0.125*
	3	H-2 or H-3	20	*20*		2	*2*		2	*2*
	2	H-3	500	*500*		250	*250*		50	*50*
	1	N/A	Unlimited	*Unlimited*		Unlimited	*Unlimited*		Unlimited	*Unlimited*
Oxidizing Gas	N/A	H-3		*300*	3000		*300*	3000		
Pyrophoric Materials	N/A	H-2	4	*4*	25	0.5	*0.5*	10	NP	NP
Unstable (Reactive)	4	H-1	1	*1*	10	0.125	*0.125*	2	0.125	*0.125*
	3	H-1 or H-2	10	*10*	100	1	*1*	20	1	*1*
	2	H-3	100	*100*	1500	50	*50*	1500	10	*10*
	1	N/A	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Water Reactive	3	H-2	10	*10*		5	*5*		1	*1*
	2	H-3	100	*100*		50	*50*		10	*10*
	1	N/A	Unlimited	Unlimited		Unlimited	Unlimited		Unlimited	Unlimited

Notes:
1. All quantities shown here are based on the 2015 IBC, and include applicable increases for sprinkler protection and storage in appropriate containers or cabinets, if presence of sprinklers and use of such containers is indicated at the top of this table.
2. Combustible dusts have been omitted from this table as their maximum permitted quantity is dependent on the individual material and the hazardous materials report required by IBC Section 414.1.3.
3. Inert gases and inert cryogenics have been omitted as they have unlimited quantities in all forms. All quantities shown here are based on the 2015 IBC.

13 SECURITY SYSTEMS

SCHEMATIC DESIGN NARRATIVE

The security systems to be provided as part of the Math and Science building at Montgomery College include access control, emergency alerting, and video surveillance, and emergency alerting. The preliminary (schematic) design for the security systems is described below.

1. <u>Security Systems Design Standards</u>

   The security systems for the project will be designed in accordance with Montgomery College's specific security systems design standards, as well as generally accepted industry design principles and standards, including but not limited to the following:

   - American National Standards Institute (ANSI)
   - Americans with Disabilities Act (ADA)
   - Electronic Industries Alliance (EIA)
   - Federal Communications Commission (FCC)
   - Institute of Electrical and Electronics Engineers (IEEE)
   - National Electrical Safety Code (NESC)
   - National Fire Protection Association (NFPA)
   - National Electrical Code (NEC)
   - National Electrical Manufacturers Association (NEMA)
   - Underwriters Laboratory (UL) or equivalent

2. <u>Access Control System</u>

   An access control system enables the College to control access to resources or areas using some type of credential or information to verify that a person is authorized to have access. It not only provides the ability to limit access to those authorized, but also provides an audit function by recording who access what areas and when they access those areas.

   Currently, the College is transitioning to the Lenel On-Guard system for access control. Mercury hardware (controllers, reader interfaces, etc.) will be used to support this system. Every door except thos of private offices will be provided with electronic access control.

   All electric locks will be of an electric latching type. Power supplies for electric locks as well as other access control equipment will typically be installed in each floor-serving telecom room on backboards designated for access control equipment.

   Cabling for access control shall include cable for the card reader, REX, door position switch, and electric lock. This cabling may be discrete cables or an all-in-one cable. Connection of the access control system to the Campus network shall be via a campus network connection.

3. <u>Video Surveillance System</u>

   The video surveillance system consists of video cameras and a video management system (VMS), as well as cabling and network devices required to connect the cameras and VMS.

   Currently, the College uses the Mobotix VMS and cameras.

Video cameras will be provided on the interior of the building to cover entry and egress doors, elevator lobbies, hallways, areas where students congregate, and entrances to any particularly sensitive areas.

As the design develops, the College will review the site plan and request exterior cameras to cover outdoor areas that may not be currently covered by existing cameras. We anticipate there may be 6-8 exterior cameras. Cameras shall be Mobotix Series 6 cameras in the following varieties:

- Fish-eye
- Single lens dome camera
- Dual lens dome camera
- Day/Night camera

The IP devices that are part of the VMS shall be connected to the main campus IP data network.

4. Emergency Alerting

Message boards for the emergency alerting system will be located throughout the building (2-3 per level). All of these will be connected via network connections to the existing Inova system.

14 DOOR HARDWARE

SCHEMATIC DESIGN NARRATIVE

DOOR HARDWARE

1. Hinges, Butts and Pivots:
    a. Materials: Steel for interior doors; stainless steel for exterior doors.
    b. Quantity of hinges per door leaf: Furnish three hinges for doors up to 7'-6" in height and one additional hinge for each additional 30" or fraction thereof.
    c. Hinge size: 4-1/2" x 4-1/2". Hinges for labeled doors shall comply with requirements of NFPA 80.
    d. Provide non-removable pins at exterior doors.
    e. Butts: Five knuckle ball-bearing type.
    f. Electric power transfer pivots as required for electrified locking hardware.
    g. Acceptable products and manufacturers:
        1) BB1279 Series by Hager Companies.
        2) TB2714 Series by McKinney Products Company.
        3) BB5000 Series by Bommer Industries.

2. Continuous Hinges:
    a. Geared-type: Extruded aluminum leaves with interlocking cover and nylon bearings.
    b. Continuous geared hinges shall consist of two full height bearing levers, geared together for the full length of the hinge and joined with a cover channel.
    c. Continuous geared hinges are to be heavy duty type with a minimum of 32 bearings up to 84-inches in height. Bearings are to be completely concealed in a full cover channel.
    d. Acceptable products and manufacturers:
        1) CG31L Series by PBB, Inc.
        2) SL24 Series by Select Products Limited.
        3) 914AA Series by Zero International.

3. Locksets and Latches:
    a. Heavy-duty commercial mortise type.
    b. Trim design: Lever handles complying with ADA.
    c. Electrified locks with integral request-to-exit switches for card reader operation, as required by security requirements.
    d. Acceptable products and manufacturers:
        1) L9000 Series by Schlage Lock Company.

4. Cylinders:
    a. Interchangeable core with cores removable by special control key.
    b. All cylinders equipped with brass color-coded, temporary cores for use during construction and for testing the hardware.
    c. Acceptable products and manufacturers:
        1) Primus® by Schlage Lock Company.

5. Exit Devices:
    a. Furnish with provision for concealed mounting, throughbolts will not be acceptable.
    b. Provide UL-labeled fire-exit hardware at fire-rated openings.
    c. Trim design: Lever handle trim shall match design of levers specified for locksets and latchsets.

   d. Electrified exit devices with integral request-to-exit switches for card reader operation, as required by security requirements.
   e. Pairs of doors to be provided with removable center mullions, equipped with cylinders and removable cores
   f. Acceptable manufacturers:
      1) 98 Series by Von Duprin, Inc.

6. Flush Bolts:
   a. Furnish in pairs (top and bottom of door).
   b. Provide dust strikes for each bottom flush bolt.
   c. Acceptable manufacturers:
      1) Hager Companies.
      2) Rockwood Manufacturing Company.
      3) Ives.
      4) Triangle Brass Manufacturing Company, Inc.

7. Surface Closers:
   a. Heavy-duty cast-iron construction; surface-mounted.
   b. Closer arms shall be forged and fluid shall accommodate all applicable weather conditions.
   c. At parallel arm installations, provide manufacturer’s heaviest-duty arm assembly.
   d. Acceptable products and manufacturers:
      1) 4010 Series by LCN Closers.

8. Power Operators:
   a. Low-energy type, overhead surface-mounted; provide for indicated doors.
   b. Units shall operate as manual door closers unless operator is activated and when power is lost.
   c. Operation: Pressing actuator switch automatically opens door leaf to 90-degrees, operator then manually closes door after variable time delay expires.
   d. Actuators: 4-1/2” round wall- and bollard-mounted, and 1-3/4” wide jamb-mounted stainless-steel actuator plates.
   e. Acceptable manufacturers:
      1) 9500 Series by LCN Closers.

9. Architectural Door Trim:
   a. Stainless steel, beveled on all sides.
   b. 10” tall kick plates and 34” tall armor plates.
   c. Push and pull plates fabricated from 1/8-inch thick stainless steel.
   d. Acceptable manufacturers:
      1) Hager Companies.
      2) Rockwood Manufacturing Company.
      3) Ives.
      4) Triangle Brass Manufacturing Company, Inc.

10. Wall and Floor Stops:
   a. Provide risers for floor stops as required to coordinate with undercuts, thresholds, carpet or other finish materials.
   b. Acceptable manufacturers:
      1) Hager Companies.

2) Ives.
3) Rockwood Manufacturing Company.
4) Triangle Brass Manufacturing Company, Inc.

11. Silencers:
   a. Do not provide silencers at aluminum frames or at doors specified to receive continuous weather-stripping or seals.
   b. Acceptable manufacturer:
      1) Hager Companies.
      2) Ives.
      3) Rockwood Manufacturing Company.
      4) Triangle Brass Manufacturing Company, Inc.

12. Overhead Stops and Holders:
   a. Heavy-duty; fabricate with bronze arms.
   b. Acceptable manufacturers:
      1) Architectural Builders Hardware.
      2) Glynn-Johnson.
      3) Rixson.
      4) Rockwood Manufacturing Company.

13. Key Control System:
   a. Wall-mounted metal cabinet with baked-enamel finish; containing key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150% of the number of cylinders required.
   b. Acceptable manufacturer:
      1) Lund Key Cabinets.
      2) MMF Industries.
      3) TELKEE, Inc.

14. Electromagnetic Door Holders:
   a. Connect devices to fire or smoke/heat alarm system via dry contacts, so that when alarm devices are activated, electromagnetic holders will automatically release allowing doors to close.
   b. Acceptable manufacturers:
      1) Architectural Builders Hardware.
      2) LCN Closers.
      3) Rixson.

15. Thresholds, Weather-stripping and Seals:
   a. Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated
   b. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated.
   c. Acceptable manufacturers:
      1) National Guard Products, Inc.
      2) Pemko Manufacturing Company.
      3) Reese Enterprises, Inc.

4) Zero International.

16. Keying:
    a. All cylinders to be keyed to the existing Schlage Lock Company master key system.
    b. Equip all cylinders with brass, color-coded temporary cores for use during construction and for testing the hardware; plastic cores are prohibited.
    c. Provide Grand Master and Master keys for all locks, keyed in different sets as directed by Owner.

17. Finish: Satin stainless steel, ANSI/BHMA 630/US32D.

18. Security system requirements to be determined during design.

15 ELEVATORS

SCHEMATIC DESIGN NARRATIVE

1. Introduction

This report is a theoretical study of the vertical transportation proposed for the referenced building. It provides an analysis for the transportation of people in accordance with project requirements, The Americans with Disabilities Act and industry standards.

In preparing this report we will make some assumptions and judgments based on elevator industry standards and the type of equipment that is to be installed.

"Elevatoring" is a theoretical method of determining how to move passengers through a building or facility efficiently. It is part science and part informed judgment.

The standard benchmark used within the industry for traffic analysis is the number of people/passengers transported in a five minute period based on building population, arrival rate and the average amount of time or interval someone will wait for an elevator.

The elevators will be designed in accordance with applicable provisions of the National Safety Code for Elevators and Escalators (ANSI/ASME A17.1), the American National Standard for Physically Handicapped People (ANSI A117.1), Americans with Disability Act (ADA), applicable local codes and project requirements.

2. Definitions

Elevator performance is evaluated based on standards related to the following:

A. Handling Capacity:

The number of persons the elevator system must move in any given 5 minute period of constant traffic used to measure the average interval and average waiting time. This is usually expressed as a percentage of the building population or arrival rate.

B. Average Interval:

Average Interval is the calculated time between departures of elevators from the main lobby.

Design Criteria

	Classroom
Handling Capacity (% of population per 5-minutes)	20% - 40%
Interval	< 40 to 50 sec
Average Passenger Waiting Time	< 28 to 35 sec

Building Population Data

Classroom Building

BUILDING DATA

Floor Name	Floor Height (ft)	No of people	Entrance Floor
2	16	618	No
1	16	448	Yes
G		437	Yes

3. **Traffic Analysis**

We performed a series of studies based on the following information to determine the number of elevators, speed and capacity required to efficiently move passengers throughout the building. The anticipated building population was provided by the Owner.

A. Floor height of the Lobby and individual floors of the building.
B. Total travel of the Elevators.
C. Various numbers of elevators required.
D. Capacity of 3,500 pounds for the elevators.
E. Door Open Time of 1.6 seconds and Door Close Time of 2.4 seconds for 42" center opening doors. (Note: service elevator will provide IBC stretcher compliance)
F. Elevator Car Speed of 150, 200, and 350 feet per minute.
G. Industry standards were used for Acceleration (ft/s2) and Jerk Rate (ft/s3).
H. Motor Start Delay or Pre-Torque of .50 seconds.
I. The First Floor Lobby Landing is considered the home floor.
J. Building population was based on the above column titled "Population".
K. Loading and Un-Loading time per passenger of 1.20/1.20 seconds respectively.
L. Average Passenger Weight of 165 pounds.
M. Stair Usage Factor of 10 percent.
N. Arrival Rates as shown in the table above with 20% handling capacity with traffic pattern as follows (30% incoming/30% outgoing/40% interfloor) for the classroom building.
O. Utilization factory for each space was 50%.
P. Target Capacity Factor of 80 percent per elevator or less.

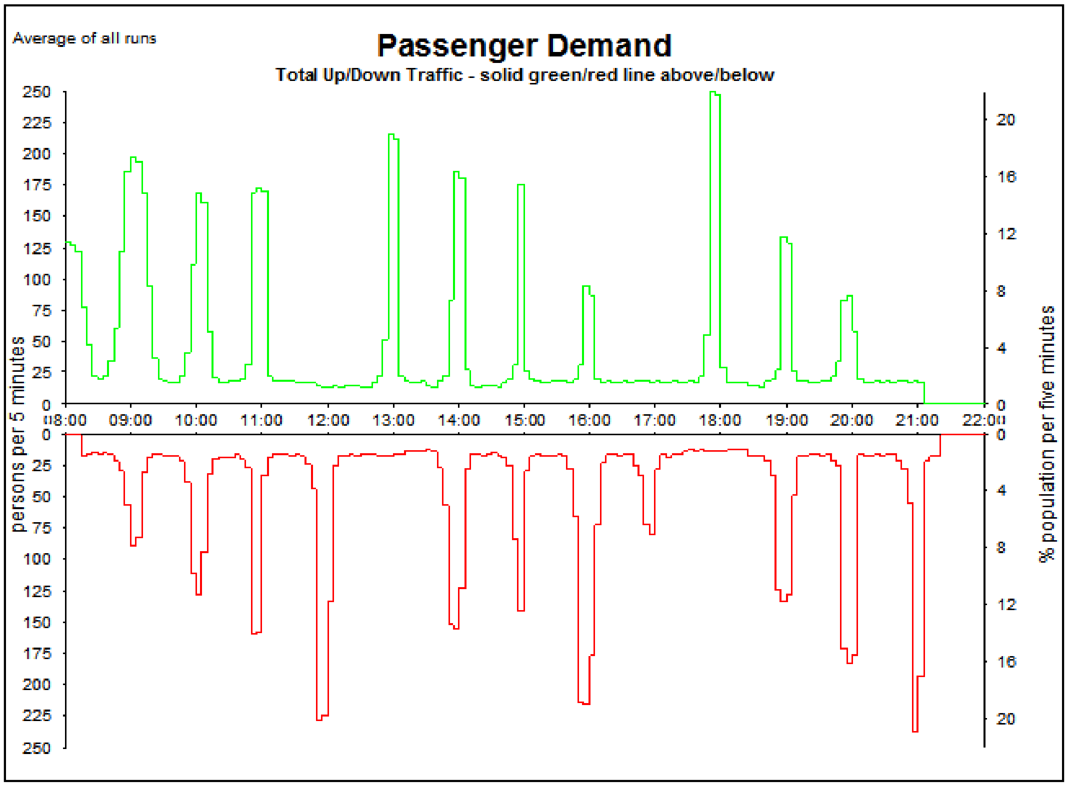
4. **General Results**

Listed below are the results from building models created to determine the number of elevators required.

A. Classroom Building

In a classroom setting we will see traffic patterns range from 20-40% of the population in a 5 minute period. As you can see from the chart below the typical crush is when classes change and the demand on the elevators can be very intense. Typically we do not building academic building vertically for this reason because the average round trip time for an elevator can become an issue where we cannot adequately meet the demand. In some cases we will use escalators at each floor because they can better handle the in rush of people when classes change but can still find this problematic due to the additional cost, additional space required and other considerations.

The graph below the Strakosch model for handling capacity requirements throughout the day in a typical classroom building.



I ran the traffic simulations utilizing a scenario that was based upon 20% of the population in a five minute period in a 30% incoming, 30% outgoing, and 40% interfloor traffic pattern using different number of elevators and speeds.

The chart bellows shows the anticipated elevator performance of the elevator group based on these assumptions. We look to achieve an average Waiting Time between 28 -35 seconds and an average interval of less than 40 - 50 seconds.

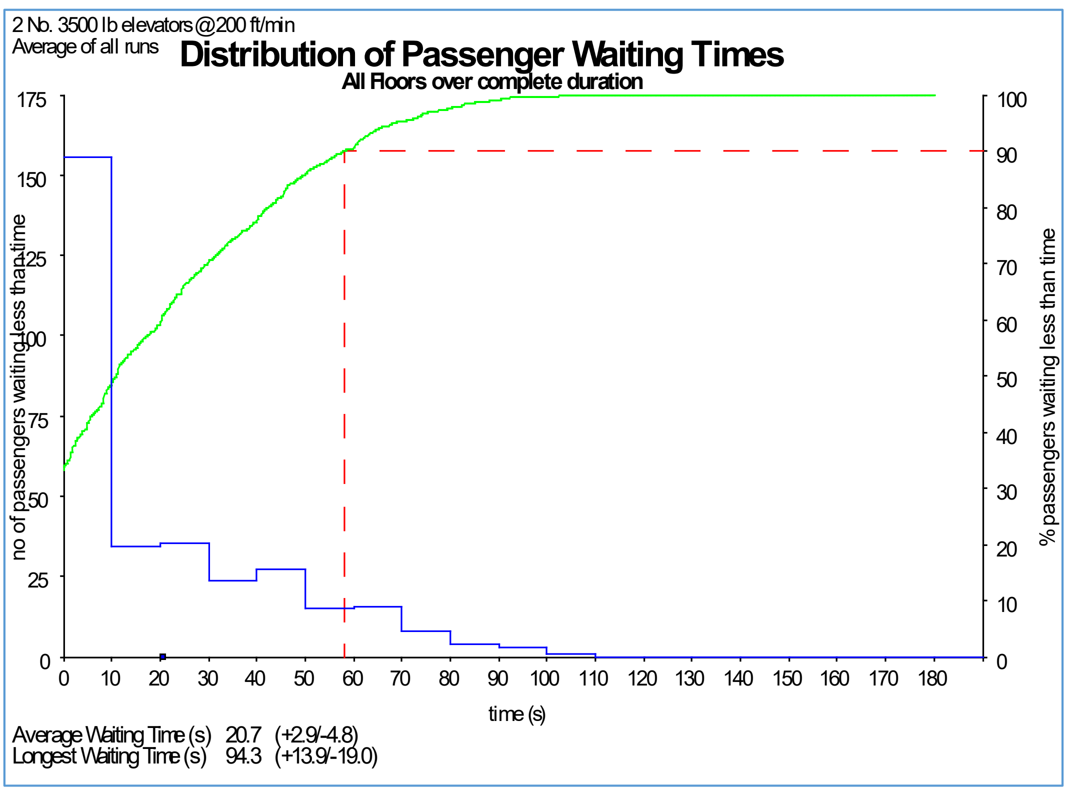
SIMULATION RESULTS

Based on average of all runs over complete duration of the simulation

No of Elevators	Speed (ft/min)	Elevator Capacity (lb)	Average Waiting Time (s)	Interval Time (s)
1	150	3500	225.8	150.0

1	200	3500	212.9	150.0
1	350	3500	181	150.0
2	150	3500	28.1	72.2
2	200	3500	20.7	69.3
2	350	3500	20.3	50.0
3	150	3500	11.1	35.2
3	200	3500	8.7	36.4
3	350	3500	5.8	31.9

We do not achieve an interval of less 50 seconds until we add a third elevator. However, interval is measured only at the main lobby. So, with multiple entry points in this building we must also look at the average wait time. As you can see, we are able to achieve an AWT between 28-35 seconds with just two elevators. Therefore, we would only suggest two elevators be utilized to meet the passenger needs for the building.



5. **Recommended Equipment**

In order to provide continuity of service and maintenance for MCC, the following product manufacturers have been specified and no substitutions will be allowed.

1. Hollister Whitney Elevator Corporation
2. G.A.L. Manufacturing Corporation
3. Innovation Industries, Inc.
4. Motion Control Engineering (MCE)
5. Minnesota Elevator Company (MEI)
6. Canton Elevator Company
7. Schumacher Elevator Company

A. Classroom Elevators Nos. 1 - 2

Traction passenger elevators as detailed will serve the general public and be responsible for passenger traffic throughout the building.

Elevator Type:	Passenger
Capacity:	3,500 lbs.
Speed:	350 fpm
Number of Stops:	Three (3)
Number of Openings:	3, front
Car and Hoistway Door Size:	3'- 6" wide by 7'- 0" high
Car and Hoistway Door Type:	Single Speed Side Slide
Hoist Motor Horsepower:	30
BTU Output:	15,000 btu per elevator
Hoistway Dimensions:	8' - 6" wide x 8' - 1" deep
Pit Depth:	5' - 6"
Overhead Required:	16' – 7"

Note - 1: 4" inch divider beams are required between the elevators for mounting of the guide rails.

Note - 2: Overhead dimension is based on 8' – 0" inside car height. For each additional inch of inside car height, add one inch to the overhead dimension.

Note - 3: Dimensions, BTU, and electrical data provided are for MCE Freedom (independent).

Note – 4: Control room should be sized at a minimum of 8’ 0” by 8’ 0”.

B. **Service Elevators No. 3**

Traction elevator as detailed will provide service for the building.

Elevator Type:	Service
Capacity:	4,500 lbs.
Speed:	200 fpm
Number of Stops:	Four (4)
Number of Openings:	4 front
Car and Hoistway Door Size:	4’ – 0” wide x 7’ – 0” high
Car and Hoistway Door Type:	Single Speed Center Opening
Hoist Motor Horsepower:	40
BTU Output:	18,000 per elevator
Hoistway Dimensions:	8’ - 10” wide x 9’ - 11” deep
Pit Depth:	5’ - 6”
Overhead Required:	18’ – 3”
Counterweight Safeties:	No.

Note - 1: 4” inch divider beams are required between the elevators for mounting of the guide rails.
Note - 2: Overhead dimension is based on 9’ – 0” inside car height. For each additional inch of inside car height, add one inch to the overhead dimension.
Note - 3: Dimensions, BTU, and electrical data provided are for MCE Freedom (independent).
Note – 4: Control room should be sized at a minimum of 5’ 0” by 10’ 0” with an outside swinging door. If all three elevators were to share the same control room approximate size would be 10’ by 10’.

6. **Associated Work Required For Elevators**

Structural

A. Projections, recesses and setbacks, within hoistway of 4 inches or more must be beveled at an angle of 75 degrees to the horizontal.

B. Adequate supports for mounting of the machine assembly at the top of the hoistway, guide rail brackets, pit buffers and hoistway entrance installation.

C Provide a hoist beam at the top of the elevator shaft for use during installation and construction of the elevator.

D. Verify pit, hoistway, overhead and control room dimensions.

E. Elevator hoistway and control room are required to be of fire rated construction.

F. Elevator control room door shall be fire rated and self closing and self locking.

G. Provide a pit ladder, hoist beam and sill attachment points. Ladder is required to extend 48 inches above lowest floor.

H. Supports for rail brackets at the pit, each floor and the roof. When the distance between landings exceeds 14' – 0", intermediate rail brackets will be required.

I. Provide access to underside of the elevator car. When the distance from the pit floor to the underside of the plank channels exceeds 83 inches, with the car at the lowest landing, a means shall be permanently installed or permanently stored in the pit to provide access to the equipment on the underside of the car.

K. Provide two (2) lifeline attachments at the top front of each elevator hoistway. Each must be capable of withstanding a 5000 lb. (2250 kg) load per OSHA CFR 1926.502 and or local applicable code.

Mechanical

A. Any pipes or equipment not associated with the operation of the elevator are not allowed in the hoistway or machine room.

B. Provide a sump pit or floor drain in the elevator pit. Drains connected to sewers shall not be installed in elevator pits. Drains or sumps shall not be used as the normal means of drainage for liquids directed into the pit from other areas of the building. . Drains and sump pumps shall be designed to accommodate 3,000 GPH per elevator.

C. All elevators equipped with firefighter's service operation are required to have a sump pump or a means to prevent the accumulation of water in the elevator pit.

D. Air conditioning equipment, condensate drains or pipes containing fluid shall not be located above elevator or electrical equipment.

Ventilation

A. Elevator hoistways extending more than three floor levels shall be vented to the outside. The area of the vent shall not be less than 3 ½ percent of the area of the elevator hoistway, provided a minimum of 3 square feet is provided. However; ICC rule 3004.1 does not require ventilation in buildings equipped throughout with a fire suppression system that do not have overnight sleeping accommodations.
B. Elevator hoistway shall not be vented through the elevator control room.
C. Vents shall be located in the side of the hoistway enclosure directly below the underside of the overhead enclosure.
D. Where elevator hoistway walls are not part of an exterior wall of the building, a duct may be used that extends either horizontally or vertically from the hoistway wall opening to the exterior of the building. Ducts shall be incombustible material equivalent of that of no. 18 U.S. standard -gage steel; recommend that ducts shall be enclosed within a fire-rated material equal to that of the hoistway enclosure. If duct work is used, fire dampers may also be required.
E. The elevator control room shall be vented by natural or mechanical means to maintain a temperature minimum 50 degrees F to 90 degrees F maximum. Some AHJ's also deem that the hoistway shall also be temperature controlled given that the hoist machine is located in that space. Control room air conditioning is recommended. Where control room walls are not part of an exterior wall of the building, a duct may be used that extends either horizontally or vertically from the hoistway wall opening to the exterior of the building. Ducts shall be incombustible material equivalent of that of no. 18 U.S. standard -gage steel; recommend that ducts shall be enclosed within a fire-rated material equal to that of the machine room enclosure. If duct work is used, fire dampers may also be required.

Electrical

A. Any ducts or conduits not associated with the operation of the elevator are not allowed in the control room, hoistway or pit.
B. Electrical service to the elevator equipment. Provide fused disconnect or thermal delay circuit breakers sized in accordance with the power requirements provided by the elevator contractor. Locate on the lock jamb side of the machine room door or in line of sight of the equipment. Disconnect switch shall be lockable in the open position only. Provide contacts that signal the elevator when operating on standby power and prior to transfer from standby power to normal power.

C. If the control room or hoistway is equipped with fire suppression sprinklers, a means to disconnect main power from the elevator before the sprinkler activates is required.

D. Provide a separate 120 volt, 15 amp car light and alarm circuit disconnect switch located on the lock lamb side of the control room door. Disconnect switch shall be lockable in the open position only.

E. Provide 220 VAC single-phase temporary power and 115 VAC single-phase temporary power, of permanent characteristics at each elevator landing for lighting and installation method tools. Locate connection points at elevator hoistway.

F. Lighting and ventilation circuits should always be connected to normal and standby power source (if provided).

G. Lighting of pit, hoistway and control room per code. Control room lighting should be fluorescent type with a guarded or protected fixture. Pit and overhead lighting should be heavy duty type incandescent guarded or protected fixture. Locate the control room light switch near the control room (lock jamb side) door. Locate the pit and overhead light switch at the top of the pit entry ladder. Illumination of the control room shall be 20 foot candles minimum measured at the control room floor. Illumination of the elevator pit shall be 10 foot candles minimum measured at the elevator pit floor.

H. Provide electrical utility outlets in the control room and elevator pit. All electrical outlets shall be ground fault circuit interrupted (GFCI) type. Provide non-GFCI-protected single receptacle for sump pumps (NFPA 70 article 620.85, NFPA 70 article 620.85 or CEC article 38.85 whichever is applicable).

I. Provide smoke detectors or signal from the fire alarm system for recall of the elevator in the event of fire or fire emergency. Provide in accordance with ANSI A17.1 code. This requires smoke detectors or a fire alarm signal from all elevator lobbies and the machine room. If sprinklers are located in the control room, hoistway or elevator pit, smoke and heat detectors are also required. If sprinkler systems installed in the pit are located at 24 inches or less heat and smoke detectors are not required.

J. Provide telephone connections to terminals of the control equipment within the control room.

K. Elevators installed in buildings with fire suppression sprinklers are required to have all elevator pit electrical equipment, mounted below 48 inches installed in accordance with NEC NEMA 4 waterproof requirements.

L. Illumination of all elevator landings shall be 10 foot candles minimum measured at the entry sill.

<u>Miscellaneous</u>

A. Provide a fire extinguisher mounted in the elevator machine room.

B. Provide a trash receptacle and non-combustible rag container in the elevator machine room.

16 SPECIALTY LIGHTING

SCHEMATIC DESIGN NARRATIVE

SPECIALTY LIGHTING

Specialty lighting will be designed for normal tasks performed in each space. Specialty lighting may deviate from the College's prescribed light fixture standards and will be presented to the College for review and approval. In conditions where tall ceilings exist, care will be taken to provide suspended or wall mounted light fixtures that will be easily accessible from a 12' ladder.

For all lighting fixtures, care will be taken to select the longest life LED source possible. The color temperature will be 3500K with an 80+CRI minimum. Fixtures with replaceable LED boards and power supplies will be utilized in all spaces.

Unless the College has additional design criteria, IESNA recommended illumination levels will be followed for all areas. Lighting power density will be less than IECC 2015 allowed values. Initial goal is 10% to 15% below code and will be verified during design development.

The following areas will have specialty lighting:

- Building Entries & Double Height Lobby
- Math & Science Learning Center
- STEM Concourses
- STEM Forum
- Digital Theater & Prefunction
- Innovation Hub

BUDGET

\$14/ft², based on 38,000 ft² = \$532,000

Fixture cost only, does not include installation, taxes, delivery or contractor profit

ILLUMINATION LEVELS

The following footcandle levels will be targeted:

• Building Entries	10fc to 20fc
• Double Height Lobby	15fc to 25fc
• Learning Center	30fc to 50fc
• Stem Concourses	25fc to 35fc
• Stem Forum	15fc to 25fc
• Digital Theater & Prefunction	25fc to 35fc
• Innovation Hub	25fc to 35fc

17 SIGNAGE

SCHEMATIC DESIGN NARRATIVE

SIGNAGE FOR THE CATHERINE AND ISAIH LEGGETT MATH AND SCIENCE BUILDING

Note: Original Campus Gateway signage was designed for large grassy expansive campus entrances. Takoma Park/Silver Spring is a smaller scale and a residential campus. Our sign recommendations have been appropriately sized to complement the campus and not overwhelm the neighborhood.

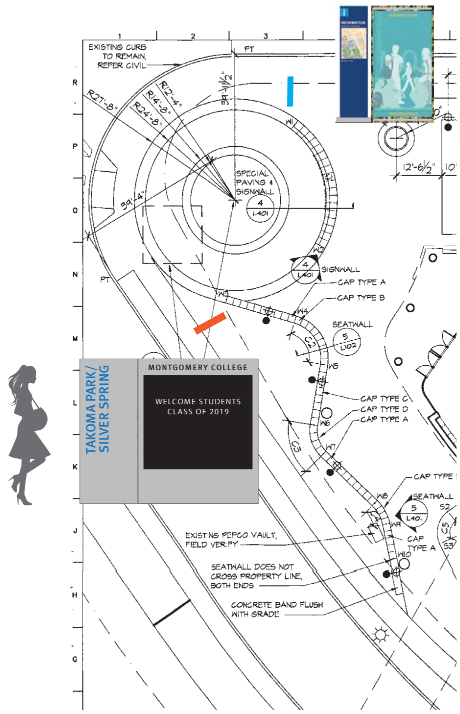
1. Campus Gateway Signage — Primary Campus Entrance Signage Kit of Parts Option 1

a. Re-clad BOTH SEAT WALL and LONG LOW WALL with appropriate stone.

b. Install CAMPUS NAME PANEL SIGN and LED DISPLAY BOARD as combination sign. Size to be coordinated with Display Board size recommendation. In effort to size the Campus Gateway Signage to be appropriate to the residential campus of Takoma Park/Silver Spring, we are proposing combining these two types into one sign. Sign is to be located at corner of green space at end of long low wall near the paved circle. The LED Display Board (mounted to stainless steel frame) to be coordinated with MC IT Group (SCALA & ACE). Sign to have hard wire network cable. The College/Campus Name Panel Sign to be in Stainless Steel with Takoma Park/Silver Spring in Blue letters running vertically up left side, to identify the College and Campus

c. Install CAMPUS MAP SIGN (Sign Type C1) 1’8” x 7’0” x 4” Deep, and CHANGEABLE BANNER SIGN to be 3’0” x 7’6” Stainless Steel Frame with exterior grade banner, tension mounted to stainless steel frame, as combination sign near seatwall to provide wayfinding for entire campus.

d. Please confirm if SOLAR PANELS are required at this location. Solar panels may not be appropriate on this residential type campus.



Campus Gateway Signage

Primary Campus Entrance Collection Option 1

CAMPUS MAP/CHANGEABLE BANNER COMBINATION SIGN
3'0" x 7'6" Stainless Steel Frame with Exterior grade Banner
Tension mounted to stainless steel frame. Two sided.

Use Sign Type C1 InfoKiosk/Map from Exterior Building Sign System.
Install near seat wall perpendiculr to New York Ave with good visibility from Fenton.

CAMPUS NAME PANEL/LED DISPLAY BOARD COMBINATION SIGN
College/Campus Name Panel to Identifiy the College and Campus. two-sided
LED Display Panel mounted to stainless steel frame.
Install in grass area below paver circle at end of long low wall. Good visibility from Fenton.

2. Campus Gateway Signage — Primary Campus Entrance Signage Kit of Parts Option 2

a. Re-clad BOTH SEAT WALL and LONG LOW WALL with appropriate stone.

b. Install slightly smaller than original specification for this residential campus LETTERING SIGN, 24” High x 4“ Deep, Stainless Steel letters anchored to continuous 1/2” thick Stainless Steel base plate mounted to top of seat wall. Letters span 30’0”± (Sign TBD).

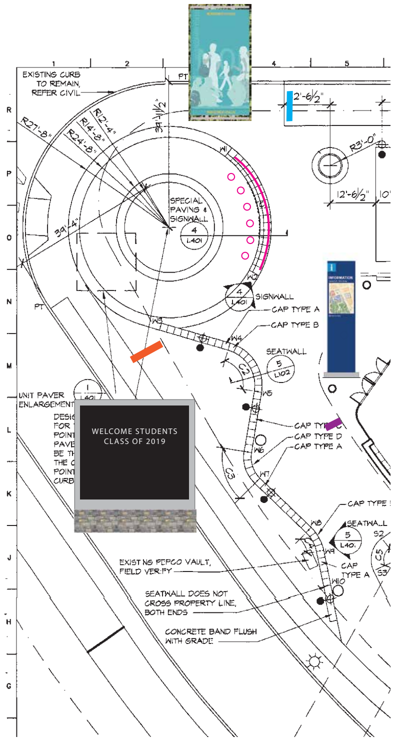
c. Install IN-GROUND LIGHTING at base of wall to illuminate lettering. Fixture to feature the stone base and accent the stainless steel lettering with cool-white, high color-rendering light. Fixture spec coordinated with MC Lighting Consultant based on “Campus Gateway Signage” Kit of Parts specifications.

d. Install LED DISPLAY BOARD sign. Size to be coordinated with Display Board size recommendation. Sign is to be located at corner of green space at end of long low wall near the paved circle. Sign to have a stone base. Sign to have hard wire network cable. The Digital Display Board to be coordinated with MC IT Group (SCALA & ACE) .

e. Install CAMPUS MAP SIGN (Sign Type C1) near entrance to Nunley Student Center Building to provide wayfinding for entire campus

f. Install CHANGEABLE BANNER SIGN to be 3’0” x 7’6” Stainless Steel Frame with exterior grade banner tension mounted to stainless steel frame. Two sided. Sign to be located in grassy area behind seat wall off New York Avenue

g. Please confirm if SOLAR PANELS are required at this campus location. Solar panels may not be appropriate on this residential type campus.



Campus Gateway Signage

Primary Campus Entrance Collection Option 2

LETTERING
24"± High Letters x 4"± Deep, Stainless Steel letters anchored to continous 1/2" thick Stainless Steel base plate mounted to top of seatwall.
Install letters on top of existing seatwall.

GROUND LIGHTING
In ground lighting fixtures to illuminate letters.
Install in grass in front of existing stone wall.

CHANGEABLE BANNER
3'0" x 7'6" Stainless Steel Frame with Exterior grade Banner
Tension mounted to stainless steel frame. Two sided.
Install near seat wall perpendiculr to New York Ave with good visibility from New York & Fenton.

CAMPUS MAP
Use Sign Type C1 InfoKiosk/Map from Exterior Building Sign System.
Install near entrance to Nunley Student Services Building.

LED DISPLAY BOARD COMBINATION SIGN
LED Display Panel mounted to stainless steel frame with stone base.
Install in grass area below paver circle at end of long low wall. Good visibility from Fenton.

3. Campus Gateway Signage — Primary Campus Entrance Signage Kit of Parts Option 3

a. Re-clad BOTH SEAT WALL and LONG LOW WALL with appropriate stone.

b. Install LETTERING SIGN, 36” High x 6“ Deep, Stainless Steel letters anchored to continuous 1/2” thick Stainless Steel base plate mounted to top of long low stone wall. Letters span 45’0”± (TBD).

c. Install IN-GROUND LIGHTING at base of wall to illuminate lettering. Fixture to feature the stone base and accent the stainless steel lettering with cool-white, high color-rendering light. Fixture spec coordinated with MC Lighting Consultant based on “Campus Gateway Signage” Kit of Parts specifications.

d. Install combination LED DISPLAY BOARD/CAMPUS NAME PANEL SIGN. Size to be coordinated with Display Board size recommendation. Sign is to be located in center of paved circle. The LED Display Board to be mounted to stainless steel frame. Sign to have hard wire network cable. To be coordinated with MC IT Group (SCALA & ACE) .

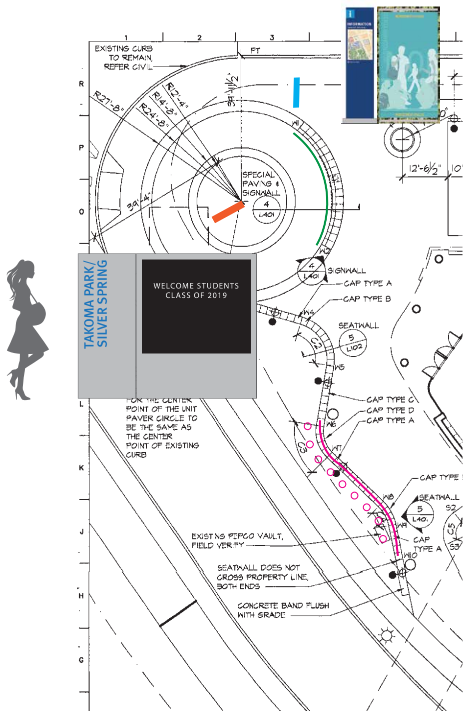
e. Install GREEN SCREEN in front of seat wall to provide backdrop to LED Display Board.

f. Irrigation of Green Screen to be coordinated with MC Landscape Team.

g. Plantings to be coordinated with MC Landscape Team.

h. Install CAMPUS MAP SIGN (Sign Type C1) and CHANGEABLE BANNER SIGN combination near seatwall to provide wayfinding for entire campus.

i. Please confirm if SOLAR PANELS are required at this campus location. Solar panels may not be appropriate on this residential type campus.



Campus Gateway Signage

Primary Campus Entrance Collection Option 3

CAMPUS MAP/CHANGEABLE BANNER COMBINATION SIGN
3'0" x 7'6" Stainless Steel Frame with Exterior grade Banner
Tension mounted to stainless steel frame. Two sided.

Use Sign Type C1 InfoKiosk/Map from Exterior Building Sign System.
Install near seat wall perpendiculr to New York Ave with good visibility from Fenton as well.

CAMPUS NAME PANEL/LED DISPLAY BOARD COMBINATION SIGN
College/Campus Name Panel to Identifiy the College and Campus. Two-sided
LED Display Panel mounted to stainless steel frame.
Install in center of planter of paver circle. Good visibility from traffic coming from New York as well as Fenton.

GREEN SCREEN
Green Screen (Stainless Steel Mesh screen with year round vines).
Install in front of wall to form a backdrop for the digital display sign.

LETTERING
36" High Letters x 6" Deep, Stainless Steel letters anchored to continous 1/2" thick Stainless Steel base plate mounted to top of stone wall. Letters span 45'0"±
Install letters on top of existing stone wall.

GROUND LIGHTING
In ground lighting fixtures to illuminate letters.
Install in grass in front of existing stone wall.

4. Campus Gateway Signage — Secondary Entrance Signage Kit of Parts

a. Install CAMPUS NAME PANEL SIGN and CHANGEABLE BANNER SIGN Combination Sign. The College/Campus Name Panel Sign to be in Stainless Steel with Takoma Park/Silver Spring in Blue letters running vertically up left side, to identify the College and Campus and Changeable Banner Sign to be 3’0” x 7’6” Stainless Steel Frame with exterior grade banner, tension mounted to stainless steel frame, as combination sign. Two sided..

b. Install Sign Type E4— SMALL BUILDING DIRECTIONAL SIGN at entrance to employee parking lot.,

Campus Gateway Signage

Secondary Campus Entrance Signage

VEHICULAR WAYFINDING TO EMPLOYEE LOT, LEGGETT BLDG AND DROP OFF
Sign Type E1, Sign Type E3 and/or Sign Type E4

CAMPUS NAME PANEL/CHANGEABLE BANNER COMBINATION SIGN
College/Campus Name Panel to Identify the College and Campus at Secondary Entrances.
Changeable Banner Sign, 3'0" x 7'6" Stainless Steel Frame with Exterior Grade Banner Tension mounted to stainless steel frame. Two sided.

Install new sign in grass area off Fenton near entrance to Leggett Building.

5. Campus-wide Signage — Wayfinding Signage

a. Install Sign Type E4— SMALL BUILDING DIRECTIONAL SIGN at entrance to drop off in front of Leggett. Sign consists of (2) posts with Painted Aluminum Face Panels, double sided.

b. Install Sign Type E4— SMALL BUILDING DIRECTIONAL SIGN at entrance to employee parking lot.

6. Bus stop Signage

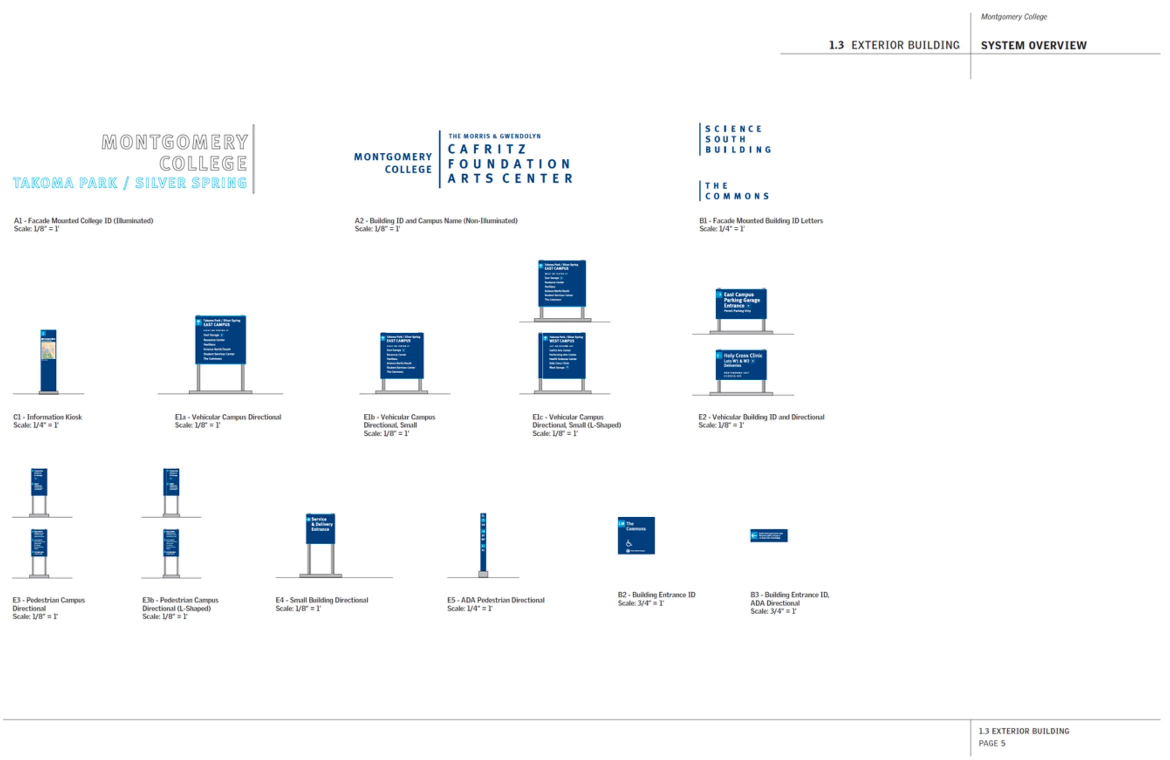
a. Install new bus stop signage for new shuttle bus stop.

7. Educational/Interpretive Signage

a. Install new educational signage to highlight LEED Points as well as Science related and Green related achievements. Location, size and content TBD.

8. Dedication Plaque Signage

a. Install dedication plaque near entrance to building about history of building erected prior to new Leggett Building. Location, size and content TBD.



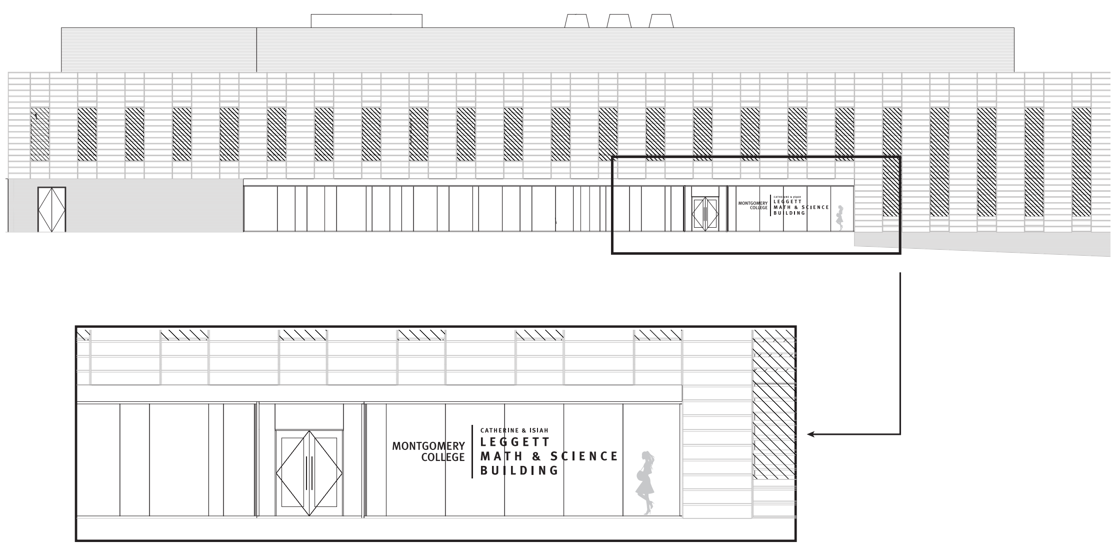
9. Building Identification

All signs will be fabricated and installed using Montgomery College Exterior and Interior Signage System Manual specifications.

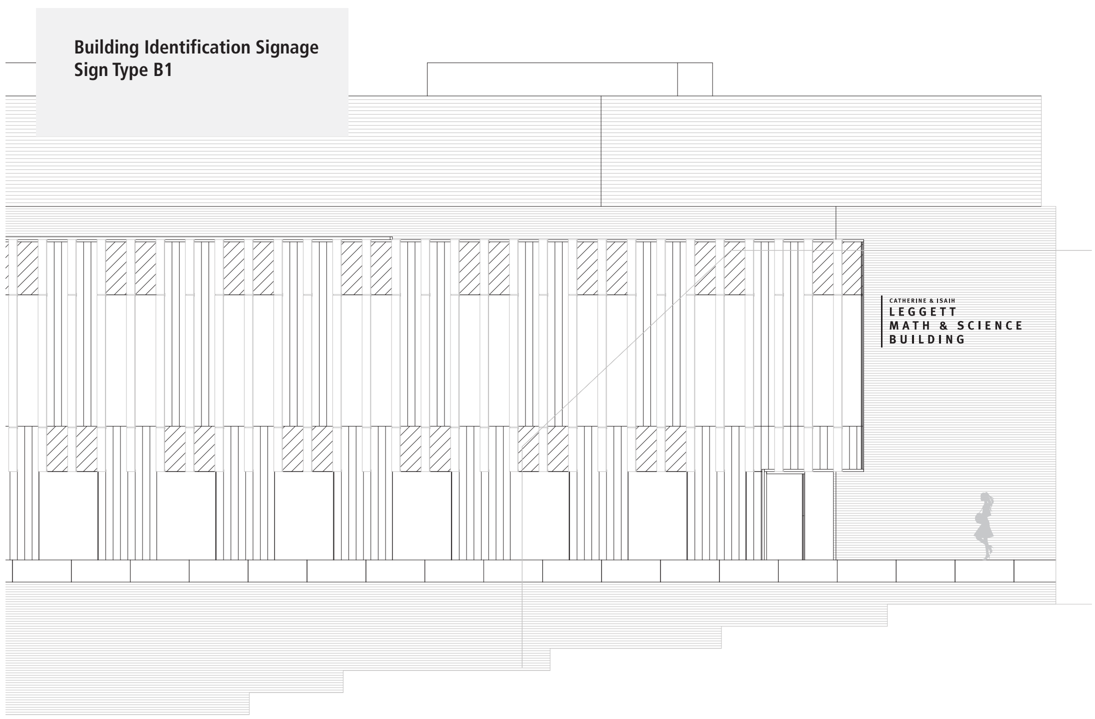
Note, full comprehensive signage documentation including design layouts, sign location plans, and signage message schedule will be provided for review by Montgomery College Team of all sign types, sign location plans and message schedule for the Leggett Building Sign Program.

a. Install Sign Type A2 — Building Identification and Campus Name Sign to west elevation facing Fenton Street. Sign is non-illuminated.
One Set: 10” High x 2” Deep MONTGOMERY COLLEGE
One Set: 6’4” Tall x 1” Thick x 2” Deep, RULE LINE
One Set: 6” High x 2” Deep, CATHERINE & ISIAH
One Set: 12” High x 2” Deep, LEGGETT MATH & SCIENCE BUILDING
Dimensional Letters to be Fabricated Stainless Steel Letters pin-mounted to exterior wall with 3/4” Spacers. Typeface to be MetaPlus Bold.

Building Identification Signage
Sign Type A2



b. Install Sign Type B1 — Facade Mounted Building ID Letters on East Elevation. Sign is non-illuminated.
One Set: X'X" Tall x 1" Thick x 1 1/2" Deep, RULE LINE
One Set: X" High x 1 1/2" Deep, CATHERINE & ISIAH
One Set: 8" High x 1 1/2" Deep, LEGGETT MATH & SCIENCE BUILDING
Dimensional Letters to be Fabricated Stainless Steel Letters pin-mounted flat to exterior wall. Typeface to be MetaPlus Bold.



c. Install Sign Type B2 & B3 — Building Entrance ID Signs & ADA Directional Signs. Install sign(s) at each entrance.
1'4" x 1'4" x 1/8" Plaque with 1'4" x 5 1/2" x 1/8" Plaque(s) to be mounted flat to exterior walls at all building entrances. Typeface to be MetaPlus Medium. Sign includes Non Smoking Information and if entrance is ADA; or provides direction to ADA Entrance if necessary. Highlight color to be Process Cyan Blue for Takoma Park/Silver Spring Campus.

10. Interior Signage — per Montgomery College Sign System Manual

All signs will be fabricated and installed using Montgomery College Exterior and Interior Sign System Manual specifications and guidelines.

Note, full comprehensive signage documentation including design layouts, sign location plans, and signage message schedule will be provided for review by Montgomery College Team of all sign types, sign location plans and message schedule for the Leggett Building Sign Program.

Interior Signage Room Number System will be provided by MC Team.

All aluminum chassis room signs to be manufactured by Systech Signage.

All interior room signs to comply with the ADA.

a. SIGN TYPE H1 — INTERIOR BUILDING ID (WALL MOUNTED)
Install Building Identification Letters on wall adjacent to main entrance with maximum legibility and complementary with interior architecture.
One set: X” High x 1/2” Deep, CATHERINE & ISIAH
One set: 3 1/2” High x 1/2” Deep, LEGGETT MATH & SCIENCE BUILDING
Dimensional Letters to be water-jet cut aluminum letters mounted flat to interior wall with tape & silicone. Exact location to be shown in Comprehensive Signage Design Documentation. Typeface to be MetaPlus Bold.

b. SIGN TYPE H2A & H2B — OVERHEAD ROOM IDENTIFICATION
Install Room Identification signs to all appropriate rooms above entrances.
3’1” x 8 1/4” Panel sign flat mounted (H2a) Ceiling Hung (H2b).

c. SIGN TYPE H3 — SERVICES FLAG IDENTIFICATION
Install projection mounted services sign at entrances for additional wayfinding to, and Identification of Restrooms.

d. SIGN TYPE H4A — ROOM NUMBER ID SIGN WITH INSERT
Install room number sign at entrances of all rooms. Sign consists of ADA compliant header and window insert sign below.

E. SIGN TYPE H4B — ROOM NUMBER ID SIGN W/ INSERT AND TACK BOARD.
Install room number sign at entrances of all rooms. Sign consists of ADA compliant header and window insert and tack panel sign below.
*Option for consideration: Substitute tack panel with dry erase panel.

f. SIGN TYPE H4C — ROOM NUMBER AND NAME ID SIGN
Install room number sign at entrance of all rooms. Sign consists of ADA compliant top and bottom zone panels.

g. SIGN TYPE H4D — EXIT ID SIGN
Install ADA compliant exit sign.

h. SIGN TYPE H6 — OCCUPANCY SIGN
Post occupancy load in all rooms as required by Montgomery County.
Sign Type H6 is not an ADA Compliant Sign.

i. SIGN TYPE H7 — RESTRICTED AREA SIGN
Install Authorized Personnel Only signs as required.
Sign Type H7 is not an ADA Compliant Sign.

j. SIGN TYPE H8A — STAIR IDENTIFICATION, OCCUPANCY SIDE
Sign identifies Stair Number, Floor ID & Exit Information. Install at all Stairwell entrances

k. SIGN TYPE H8B — STAIR IDENTIFICATION, STAIR SIDE
Sign identifies Stair Number, Floor ID & Exit Information. Sign to comply with Montgomery County Fire Marshal Requirements. Install inside all stairwells.

l. SIGN TYPE H9 — RESTOOM IDENTIFICATION, ADA COMPLIANT
ADA Compliant Men, Women & Restroom Signs, ADA Compliant.
Install at entrances to all restrooms.

m. SIGN TYPE H10 — EMERGENCY EGRESS SIGN AT ELEVATORS
Install Emergency Egress Sign at Elevators. Sign to be coordinated with Elevator Shop drawings in case already included in call button panel.

n. SIGN TYPE H11 — EMERGENCY EGRESS MAP INSERT SIGN
Install Emergency Egress Map Sign at all Elevators. Modify existing map art to include new Leggett Building. Existing map art files to be provided by College for updating.

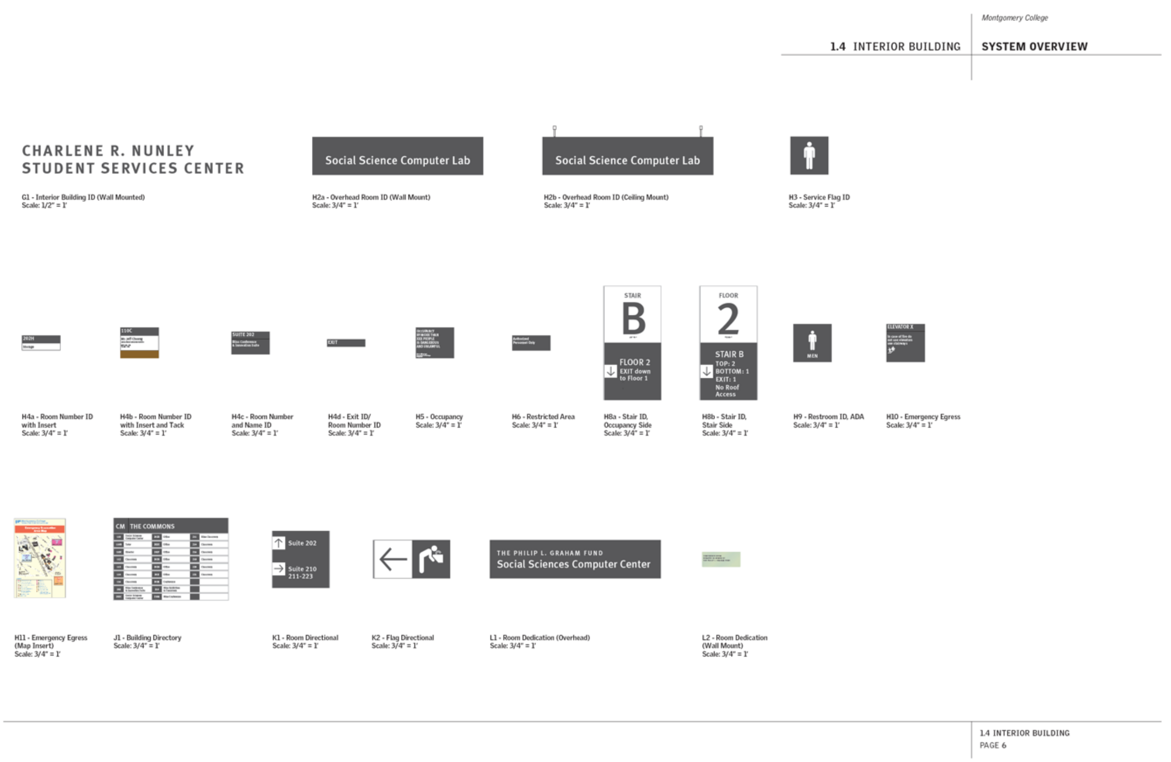
o. SIGN TYPE J1 — BUILDING DIRECTORY
Building Directory with Leggett Building Header and insert for floor directory.

p. SIGN TYPE K1 — ROOM DIRECTIONAL
Install directional signage to provide wayfinding throughout building.

q. SIGN TYPE K2 — FLAG DIRECTIONAL
Install projection mounted directional signage where necessary.

r. SIGN TYPE L1 — ROOM DEDICATION (OVERHEAD)
Install Dedication Sign above entrance to any room that has been dedicated as required by College.

s. SIGN TYPE L2 — ROOM DEDICATION (WALL MOUNT)
Install Dedication Sign to side of entrance to any room that has been dedicated As required by College.



18 PLANETARIUM

SCHEMATIC DESIGN NARRATIVE

Table of Contents

Section 1.0
Design of Physical Characteristics of the Digital Theater

An important note:

When creating a plan view drawing with a tilt dome, the dome will appear on the drawing as an oval, not as a circle. When the contractor lays out dome suspension points, knee walls, etc for a tilt dome, the plan views of these will appear as oval in shape.

As a starting point on the design, the dome will be 50 feet in diameter and at tilted 15 degrees with the front of the dome cove 4 feet AFF. The dome tilt may be adjusted depending architectural factors. The floor of the Digital Theater will be flat. Removable seating will be provided as opposed to fixed seating. 150 seats is a target number for the amount of seating, but it could be less. A storage space for the seats will need to be provided.

Discussions and renderings have included an opening from the Pre-function space. Due to the proximity of food traffic and outdoor noise thru glazed exterior walls, we believe you will need to have double airwalls between the pre-function space and the dome presentation area.

An independent emergency lighting system would need to be provided under the base building as well as other life safety systems. Full-color LED cove lighting is not emergency cove lighting.

The rear of the planetarium will be a moveable acoustic wall separating the planetarium and the pre-function area.

Typically there will be two basic modes of planetarium operation. Mode 1 is with the moveable wall closed so that the planetarium is dark and acoustically isolated for planetarium shows and class use. Mode 2 is with the moveable wall open to allow free motion of guests from the pre-function area into the planetarium. In this arrangement the lower front of the dome will be visible from the pre-function area. This allows for a less formal use of the facility , but there will not be a light or sound barrier, so it will be more of an open plan.

A review of some terms is in order at this time:

Springline-The Springline is the actual physical base ring of the bottom of the Projection Dome.

Horizon Line-The Horizon Line is the latitude line on the Projection Dome where the projection field terminates.

Projection Dome degree points:

> -We define the 0 degree point as the front center of the Projection Dome.
>
> -Projection Dome degrees on horizontal axis are numbered clockwise in plan view. So the 180 degree point is directly center at the rear of the Projection Dome.
>
> -Projection Dome degrees on the vertical axis are numbered from the bottom base ring. So, the 90 degree point would be at the zenith of the Projection Dome.

Base Ring- The bottom ring of metal; that supports the Projection Dome, whether hung or supported from a knee wall.

Immersive Projection System- Basis of design is for a digital, dual-projector, cove-mounted projection system. We will call this the Immersive Projection System.

Instructional Projection System- Basis of design is for a single 1920 x 1200 native resolution projector with sources and signal path that support true 1920 x 1200 and 1920 x 1080 HD video/graphics with synchronized stereo and 5.1 surround sound audio. This system is used for computer-based presentations, BluRay and HDTV as well as for live music/theatrical and rental events. This projector is cove mounted adjacent to the rear Immersive Projection System projector at 180 degrees. It will be preferred that this projector feature LED or laser light source for lampless operation. We will call this the Instructional Projection System.

Digital Theater Technology Package- The designed turnkey package including the electronics and usually the Projection Dome.

Digital Theater Contractor- The firm that is selected to provide the package for the electronics and usually the Projection Dome.

Section 1.1 Projection Dome for the Digital Theater

The objective is to implement a perforated Projection Dome Screen, hereafter known as the Projection Dome.

This section describes infrastructure needed to support installation of a 50-foot diameter tilt-domed screen useful for projection reproduction of digital astronomy projection content, video/graphics projection content, lighting effects content, and optical star projection content.

1.1.1. Basis of design is a 50-foot diameter Domed Projection Screen.

1.1.2. Projection Dome is to be installed at a tilt. The exact amount of tilt is in development. 15 degrees is a starting point for the design.

1.1.3. Target seating capacity is for 150 removable seats.

1.1.4. Projection Dome reflectivity will be determined upon final selection of Immersive Projection System.

1.1.5. Final exact specifications regarding suspension points and load bearing are to be determined between the Architect, Bowen Technovation, SmithGroup, and the Projection Dome Vendor. Guidelines are provided here for the Architect.

1.1.6. This Dome will support uses for various scholastic, instructional, and entertainment purposes.

1.1.7. This Dome will support uses for public astronomy/science presentations.

1.1.8. This Dome will support projection of video/graphics content, Immersive Projection System science content, lighting effects.

1.1.9. This Dome will allow audio pass thru for speaker placement behind the Projection Dome and for acoustic control.

Section 1.2 Projection Dome Cove/Knee Wall

The Projection Dome Cove/Knee Wall needs to incorporate a number of significant features.

1.2.1. Support Structure.
The dome will be hung from overhead support structure.

1.2.1.A. The number and method of dome suspension points is engineered by the Architect's structural engineer with information provided by BT in Section 4.10.

1.2.2. Interior Cove Wall Construction
With the dome being installed via suspension, this wall takes on a cosmetic function, not load bearing. Typical is:

1.2.2.B. Metal stud wall.
1.2.2.C. Finished on the outside with one layer of finished, flat black painted gyp board.
1.2.2.D. We suggest utilizing any wall cavities as a part of the acoustic treatment with a perforated metal, wood or fabric covering and filled inside with a 4" layer of acousta-batt black sound absorber blanket.

1.2.3. Subwoofer Installation.
One high-efficiency subwoofer will be recommended.

1.2.3.A. It is preferable that the subwoofer is installed inside a concrete "niche" at the floor grade/slab, centered approximately at the 0-degree location, or as close as possible to this point.
1.2.3.B. The location of the subwoofer is somewhat dependent on which Immersive Projection System is selected.
1.2.3.C. Dimensions of the niche(s) will be determined after selection of equipment.

1.2.4. Immersive Projection System Projector Portals/Windows.
Construction should include enough space for up to six projection portals at locations to be determined for the Immersive Video Projectors. The number and location of these is determined by which projection system is selected.

1.2.5. Instructional Projector Portal/Window.
Construction should include enough space for one projection portal at 180° for the Instructional Video Projector.

1.2.6. Architect should note whether footlights and utility power outlets should be installed in to this wall. If so these locations need to be added to the conduit and box count in Sections 5.0 and 6.0.

Section 1.3 Areas Behind/Above the Projection Dome and the Theater Walls

The areas behind and above the Projection Dome need to address a number of significant issues that require immaculate attention to detail. These include light generation and reflectivity, acoustics and noise, temperature and humidity control.

1.3.1. Catwalk and Access

We suggest whenever possible that a catwalk should be included in the design. Care will need to be taken that the catwalk does not conflict with speaker locations.

1.3.2. Exterior Theater Walls.
More discussion is needed on this subject.
The exterior walls need to effectively isolate the theater from exterior sounds and vice versa.

1.3.3. Finished Surfaces, Parts, and Materials
All surfaces (no exceptions) behind the Projection Dome MUST be finished with a durable, totally flat black non reflective finish. This means every duct, pipe, hanger, nut, bolt, washer, etc. Any surface not finished in this way will be seen thru the dome when the projection is on.

Section 1.4 Projector "Pit" Area (Theater Center)
A pit area would only be used for a center of theater based projection system.

We suggest a central floorbox should be installed with a wireway to the control room and with one 20A circuit. This will appear on our PL-1 drawing.

Section 1.5 Digital Theater Control Console
Sample console photos can be provided. BT and Architect's will work with Montgomery College to design a compact, closeable and lockable Theater Console. This will be a custom designed/built unit. When the digital theater is not in operation, the Owner may need to lay three monitors flat. This console that will house:

1.5.1. Control system components and display monitors for the Immersive Projection System.

1.5.2. Presentation Media such as computer inputs, Blu-ray players, PowerPoint computers, etc.

1.5.3. Lighting Control System.

1.5.4. Audio System Volume Level Controls.

1.5.5. Presentation computer inputs.

1.5.6. Computer network connections.

1.5.7. Any manual remote control (buttons, faders, etc) of media delivery system as requested by client.

1.5.8. We typically recommend that all other equipment is to be housed in 19" equipment racks in the Digital Theater Equipment Room located adjacent to Digital Theater. This will remove equipment noise and heat from the audience environment.

1.5.9. A phone should also appear behind the Theater Console so as to be used for troubleshooting. Operators must be able to disable the ringer on this unit.

1.5.10. Network RJ-45 connection in recessed table box for streaming video, audio, web media, etc.

1.5.11. Power as shown in Section 5.0.

1.5.12. Wireways as shown in Section 6.0.

Section 1.6 General Observations
None additional at this time.

<u>Section 2.0</u>
Design of Physical Characteristics of Equipment Room for Digital Theater

Note that HVAC loads, power, and wireway description are estimated in Sections 5 and 6 of this report. Once the equipment package is actually designed exact specifications can be created.

Section 2.1. Digital Theater Equipment Room: General Concept
We recommend that the design include a space we will call the Equipment Room. This room should include the following general characteristics:

2.1.1. The access door must be within very close distance of the Theater Console allowing quick access by presenters. This is to facilitate system reboots and troubleshooting.

2.1.2. Thermal and humidity control that is independent of the audience area. This must be capable of cooling even in winter months.

2.1.2.A. Network and phone lines necessary for operation and maintenance of the Digital Theater Equipment.

2.1.2.B. If possible, this is a good application for a raised/removable computer room type floor with conduits, power and wireways located beneath the floor. If not possible, overhead cable trays might be required.

Section 2.2. Digital Theater Equipment Room Rack Layout
Floor space for at least two 24 to 40-space racks with dimensions of 77.98” tall x 24” wide x 32” deep. We prefer installing these as an island in the room, with 36” access space in front and behind the racks. At last one rack side should preferably be no closer than 36” to any walls, allowing the technicians access in all directions.

Section 2.3. Digital Theater Equipment Room Power and Wireways
See accompanying updated drawing PL-1. Power and wireways for the racks can be supplied above or below the racks. This will be finalized in with the Architect’s staff during DD and CD phase.

Section 2.4. Digital Theater Equipment Room Communications
The following are to be installed to provide communications necessary for operation and maintenance of the Theater:

2.4.1. One network connection to provide access to the rest of the “campus” LAN network.

2.4.2. One dedicated network connection between the Immersive Projection System server rack and the media Production Suite (if any).

2.4.3. One direct outside network connection to the Internet for remote system software updating and manufacturer troubleshooting.

2.4.4. One phone line to access an outside line for troubleshooting.

2.4.5. One coax connection in this room to subscription HDTV cable system for access to NASA Select and other science programming channels.

Section 2.5. Digital Theater Equipment Room Lighting
Work lights may be standard fluorescents as specified by the lighting designer.

Section 2.6. Digital Theater Equipment Room Ceilings/Room Doors/Sound/Acoustics

2.6.1. Light lock and sound barrier between the Digital Theater Equipment Room and other spaces will be necessary. The fan noise in this room will be significant. Installation of an automatic door bottom is recommended, as well as acoustic sealing head and jam seals. Select the thickest one that budget supports. For example, Reese makes a series that is 7/8" thick. Definitely select a model with a neoprene edge strip. Some manufacturers of these are by Pemco (www.pemco.com), and Reese Enterprises (www.reeseusa.com). Acoustic Solutions (www.acousticsolutions.com) is a very high-end provider of these systems.

2.6.2. Doors should provide an STC rating of 45 minimum, 50 and up would be better. But this STC will be greatly negated if a good door sealing system is not installed.

2.6.3. The higher you can keep the ceilings the better. This also lets the heat from the computers and monitors get away from the equipment and staff.

2.6.4. Walls should be of masonry or 6" offset metal stud construction with 2-layers of 5/8" gyp board. If these are stud walls, wall cavities should be filled with 4" Certainteed Acoustablanket. Walls must be continuous all the way to any overhead floor/roof decking and thoroughly sealed to prevent bi-directional sound transmission

Section 3.0
Design of Physical Characteristics of the Media Production Suite

This is optional and the plan is to use other campus facilities for these functions.

We recommend some sort of version of this space for show programming.

Section 4.0
Design for Installation and Integration of Digital Theater Systems.

Note: None of this section constitutes an actual purchasable spec or equipment list.

Section 4.1. Immersive Projection Systems

4.1.1. General Technical Description

The Immersive Projection System will display the entire sky on the Projection Dome through between two and six of projectors. The Immersive Projection System will compose the scene virtually within the computer software. There should be two primary components to the system that will be described below.

This system would need to provide enough real time rendering power for exploration and modeling of various datasets as well as displaying models generated from various engineering/architectural software.

The system would need to include an SDK (Software Development Kit) so Montgomery College students and faculty could author their own programs and interfaces for this modeling.

4.1.2. Theater Operator's Console Interface Description

The User interface will include two flat panel LCD monitors, a mouse and a keyboard. These will be connected to the IG (Image Generator) servers in the Digital Theater Equipment Room rack.

4.1.3. Equipment Room Computing Rack Description

The Immersive Projection software will run on a platform of several high-end PC computer graphics servers. The first computer will run the Immersive Projection user interface application and the system automation software. This computer will serve as the Controlling PC (Host PC) through which the operator programs shows and manually operates the system. The other IG (IG=Image Generator) Processor PCs will run the Immersive Projection rendering application exclusively, which, taking commands from the controlling computer, will generate the high-resolution real time imagery that will be displayed on the Projection Dome.

4.1.4. Controlling PC (Host) General Technical Description

- 4.1.4.A One PC computer runs the entire Immersive Projection System and is located the Equipment Room rack.
- 4.1.4.B This is connected to the Operator's Console via KVM extender system.
- 4.1.4.C This machine needs to be connected to the Internet for remote diagnostic and updating performed by the Projection system manufacturer.
- 4.1.4.D Montgomery College IT department will need to participate in creating this connection.
- 4.1.4.E No antivirus software can be run on these machines.

4.1.5. IG Render Servers General Technical Specifications

- 4.1.5.A These PC based computers are very high powered and generate the images projected onto the Projection Dome.
- 4.1.5.B The generate great deal of heat and noise and thus in Sections 1.0 and 9.0 we describe how they should be isolated for noise and heat.
- 4.1.5.C No antivirus software can be run on these machines.

4.1.6. Audio Output Technical Description

The Immersive Projection System computer rack will provide at least 5.1 channel optical format or analog +4Db balanced line level output to the sound system.

4.1.7. Cove Mounted Projection System General Technical Description

4.1.7.A. This option places the 4K projectors (number and type to be determined) with specialized lenses at the edge of the dome base ring, thus eliminating any obstruction in the center of the theater.

4.1.7.B. The projectors will require power and signal wireway at these locations. See Section 5.

Section 4.2. Digital Audio System With Subwoofer(s)

A modern Digital Theater includes a 5.1 sound system that amplifies and supports spoken instructional messages and that also allows for presentation of fully-produced show soundtracks with surround mixes. A typical system includes:

4.2.1. Hardwired microphone(s) with switch(s).

4.2.2. UHF or 2.4GHz wireless microphone system with headset, handheld and lavaliere elements and mic stands.

4.2.3. Bluray/DVD/CD/MP3 player with external serial control and balanced inputs/outputs.

4.2.4. Rack-mount audio mixer.

4.2.5. ¼" patch bay system to allow manual routing of any audio component in the system.

4.2.6. DSP based digital which provides channel routing, equalization, limiting, crossovers and all other processing for audio.

4.2.7. Digital cinema amplifiers.

4.2.8. Five speaker clusters for L-C-R-Ls-Rs plus one single-driver subwoofer speaker.

4.2.9. An ADA compliant assistive listening system with headset and neck loops receiver units, a transmitter, and charger base.

4.2.10. A 5.1 decoder/switcher to properly decode 5.1 audio from sources such as computers, HDTV, BluRay, etc.

4.2.11. The L-R-C-Ls-Rs speaker systems are mounted to the dome frames with specially designed vibration isolated bracket kits. So no attachment to building structure is needed.

4.2.12. All audio equipment (except the audio mixer, CD deck and BluRay/DVD player in the Theater Console) would be located in equipment racks in the Equipment Room, and would be controlled by the Theater Control system.

4.2.13. Wall or floor boxes will be installed at stage left-center-right at the front of the theater with power receptacles on one side. The other side will house inputs for interfacing computers and electronic musical instruments, additional mics for acoustic instruments and choral performances at times of music performances, as well as adding mics for panel discussions and potential distance learning applications.

4.2.14. One mic input will be installed in the recessed table box located in the Operators Console.

4.2.15. A Direct Input interface (DI box) will be included for connecting electronic instruments to the mic inputs in the floorboxes.

4.2.16. Power conditioning units.

Section 4.3. Theater Control System

An automated computer-based control system greatly enhances the ease of presenting shows/lessons. More complex and more accurate visual sequences can be computer programmed, and presentation simplicity and reliability could be achieved which would allow instructors to interact more with the audience. Automated show presentation shall allow student and volunteer participation in the presentation of weekend and evening public shows.

Please note: house lighting is under control of this system as well. This centralizes automated control of the entire audience experience. Shows and presentations can be programmed via drag and drop timeline editing as well as by step time cue list programming.

Section 4.4. Cove Lighting System

4.5.1 An LED based cove light system will provide continuous full-color all-dome lighting allowing for any mix of full spectral color hues complete with the ability to program fades between all mixes.

4.5.2 Control over each one-foot fixture will allow complex color washes, wipes, chases, sunrises, sunsets, and other effects. This means control over approximately 150 zones/fixtures.

4.5.3 Cove lighting will use new, energy efficient, easily replaceable, and cost effective 30cm 16-bit LED lighting strips.

4.5.4 8-bit product is not acceptable for this application as the dimming will be to “steppy” or jerky in the dark environment.

4.5.5 The LED strips will use new technology quad-color R-G-B-W LEDs for smoothest possible coverage. This replaces technologies that use individual R-G-B LEDs.

4.5.6 An additional compliment of high-power dimmable white LED strips is added for instructional and utility applications.

Section 4.5. Ellipsoidal Public Address Spot Lights and House Light Dimming

4.7.1 Two small ellipsoidal spotlights should be included for speaker support and special events.
4.7.2 These are under control of the Theater Control System (4.4).

Section 4.6. Distance Learning/Conferencing Package

This system would enable audio and video from remote sources to be presented in the dome using the Instructional Presentation package (Section 4.9). Cameras installed in the dome would allow capture and export of video from live presentations and classes to remote locations. Typical equipment might include:

4.8.1 Input from telescopes at a remote location or locations.

4.8.2 One or two motorized pan-tilt-zoom cameras with remote control from the Theater Control System.

4.8.3 Network bridge to merge all audio and video sources from the dome to a network feed and to merge audio and video from a network feed into the theater audio and projection systems.

Section 4.7. Digital Theater Instructional Presentation Package

A fully expandable instructional/classroom video/graphic system capable of projecting computer data graphics and text, as well as useful for distance learning and video conferencing. It is typical of this system to include:

4.7.1. A BluRay/DVD player.

4.7.2. A desktop tilt up computer input interface is installed in the Theater Operator’s Console. For guest speaker laptop presentations.

4.7.3. One to three computer and audio input panels with 120V power installed in recessed floorboxes or wallboxes-at theater front. The recessed floor boxes allow a podium to be set over the cable connection so no tripwires are present during use. These are:

4.7.3.A. Stage Left.

4.7.3.B. Stage Center.

4.7.3.C. Stage Right.

4.7.4. A specimen/document camera with HDMI outputs.

4.7.5. An HDMI switcher to switch between HDMI outputs from the various computer and video sources.

4.7.6. One widescreen inorganic LED HD 1920 x 1200 video projector. 6000 or greater lumens.

4.7.7. Master control system interfacing.

Section 4.8. 50-foot Tilted Immersive Projection Dome

4.10.1 See Section 1.1.We will fill in specs for this as we move forward with dome selection.

4.10.2 Preliminary *Typical* Technical Projection Dome Information.

4.10.2.A. Raw Projection Dome Weight
Approximate weight – 9,000lbs. (No devices mounted on Projection Dome).

4.10.2.B. Potential additional weights:
Audio Speakers: 500lb with hanging brackets.

4.10.2.C. Lighting:
100lb.

4.10.2.D. Dome Rib Depth
9”

4.10.2.E. Projection Dome Suspension/Support
21 vertical support points if hung
6-8 lateral support points

4.10.2.F. Rib Count
42 ribs total, 20 main and 20 intermediate

4.10.2.G. Panel Count
147 panels total

4.10.2.H. Surface Area
3,925 square feet

4.10.2.I. Clearance
Height of space between top of the Projection Dome and building superstructure and any MEP is to be not less than 24”.

4.10.2.J. Ladders
Typical is a set of five fixed ladders for future maintenance of speakers and cleaning of the Projection Dome.

4.10.2.K. Cove Light Pan
Provided and installed by the dome manufacturer. The design will include a cove light pan to accommodate the RGBW and white cove lighting. This will be provided by the Projection Dome manufacturer
Typical is 4” high (min) x 8” wide. Aluminum (or other) fascia should face the front of the Cove Lighting pan around the entire Projection Dome. This is to conceal the LED cove lighting fixtures.

4.10.2.L. Rear Cable Tray
12" wide cable tray around the entire 360-degree circumference of the dome. Electrical power receptacles and conduits may be located inside this.

Section 4.9. Directors Office Monitoring System

To be able to conduct surveillance of the Theater in both lighted and darkened conditions using a network connection from anywhere in the building.

4.9.1. An IR camera is to be mounted in the immersive theater for monitoring purposes.

4.9.2. Camera shall be of a compact design capable or day/night monitoring with a variable focal length lens and smoked bubble housing.

4.9.3. Camera shall be installed in an inconspicuous location under the LED lighting cove at or near 180˚ inside the Digital Theater with a view of the console and the seating area.

4.9.4. Requires a network connection.

Section 4.10. Optional Lobby/Prefunction Interactive and Linear Exhibits

To be discussed. Wireway and power not yet included for these.

<u>Section 5.0</u>
Power Locations for the Digital Theater

Note: This section is quite dependent on the exact equipment selected in the final package.

These are general estimates. Actual specs can be determined in coordination with completion of Section 4.

All circuits (unless otherwise notated) will be US National Standard Single Phase 120VAC, 20 Amp service. Electrical phasing is important, both for optimum operation of the automation and to reduce electrical noise in the audio and video equipment. Each circuit will have its own neutral wire and ground wire. All A/V grounds will be isolated and circuits on same phase with no daisy chaining unless noted.

All electrical work must be performed in accordance with the applicable local electric code and the rules and regulations of the local code authorities. Digital Theater installation engineers do not install any line-voltage wiring, fixtures, or devices; these are the responsibility of the owner. Electrical service must be installed and tested prior to Equipment installation. All circuit breakers must be labeled by typewritten inserts and receptacles must be labeled as described in this document.

The Owner is responsible for providing electrical power of the type and variety described in this and future reports. Power for all of the electronic equipment should be free of line transients such as voltage spikes or noise. Voltage fluctuations and outages can cause significant damage to computer equipment. The Equipment warranty does not cover damage caused by electrical power problems.

Although not required, the owner is strongly advised to provide an uninterruptible power supply (UPS) for the Digital Theater equipment. This is especially necessary if the electrical service to the theater is prone to brown outs or black outs. (Repeated above) If local wall dimmers are used, they must provide filtration to prevent the introduction of electrical noise into the sound system.

Digital Theater installation engineers, unless union labor is required, will install all low voltage cables used by the Digital Theater system. If union labor is required, the cost and coordination are the responsibility of the owner. Other low voltage cables such as telephone, fire alarm, and security are supplied and installed by the owner.

All power receptacles must be wired, labeled, and tested for proper polarity.

Section 5.1. Preliminary Electrical Requirements
See drawing PL-1 for preliminary keyed locations and tables for power and wireways.

Section 5.2. Power Consumption Chart for Heat Load Calculations, Theater Interior

Device	Power Draw	Number of Devices
Immersive Projection System Cove Mount Projectors. *To be determined and based on system to be selected.*	2,600W	To be determined
Instructional Projector	460W approx	1
Control System Interfaces	100W max	1
Audio Components in Console	60W max	1
Immersive Projection System Console Computers	500W	1
LED Cove Light PSU's	150W max @100%	8
Theatrical Lights	575W max	2

Section 5.3. Power Consumption Chart for Heat Load Calculations, Equipment Room

Device	Power Draw	Number of Devices
Immersive Projection System Server Equipment Rack. *To be determined and based on system to be selected.*	2,400W	1
Digital Theater Equipment Room Audio/Video Rack	4,800W	1

Section 5.4. Power Consumption Chart for Heat Load Calculations, Production Suite

Device	Power Draw	Number of Devices
Production Workstation	800 watts max	3
Editing Room Audio/ Video Rack	800 watts	1

Section 6.0
Recommendations for Conduit Runs/Wireways/Boxes

These are general estimates. Actual specs can be determined in coordination with completion of Section 4.

Section 6.1. Preliminary Conduit, Wireway and Box Requirements
See drawing PL-1 for preliminary keyed locations and tables for power and wireways.

Section 7.0

Programming: Presentations, Staffing, Show Production
This is determined by MONTGOMERY COLLEGE.

Section 8.0
Additional Observations and Suggestions
There have been discussions about possible exhibit and messaging in the Entry/Lobby areas. The content for these could be produced by students and faculty in the Production Suite. Some possibilities are:

8.1. NASA/Hubble Viewspace. Self-updating science/astronomy display fed by Internet.
http://hubblesource.stsci.edu/exhibits/self-update/viewspace/

8.2. Digital messaging system announcing show times, lectures, and Digital Theater events.

8.3. Interactives with touchscreen interfaces allowing students and visitor to informally explore astronomy, math, geology, meteorology and other disciplines.

Section 9.0
Environment

The areas inside the Projection Dome as well as areas behind and above the Cove Wall and Projection Dome need to address a number of significant issues that require immaculate attention to detail. These include light generation and reflectivity, acoustics and noise, temperature and humidity control.

We will create detailed specifications for these in the next Design Phase.
The following are general concepts.

9.1.1. We recommend an Ambient Background Noise Rating of NC25-30, Theater Unoccupied.

9.1.2. To prevent noise bleed between rooms, and to minimize noise from air handling systems, the best building and HVAC decoupling and vibration techniques should be employed here for ductwork as well as air handling mechanicals. Bowen can author a more detailed report at the request of Architect's after Bowen review of proposed HVAC systems.

9.1.3. We suggest all ductwork and other MEP components should be located as close as possible to the outer wall so access to the rear of the dome is not restricted. Also, any structure behind the dome could become visible when the Projection Dome is hit with projector light, even if all surfaces behind the dome are painted flat black.

9.1.4. We will create specifications for acoustic treatment for theater structure in the next design phase.

9.1.5. All doors must be perfectly sealed around their perimeters for light and sound lock.

9.1.6. The operating environment for the equipment which is in the Equipment Room must remain within these guidelines:
Temperature 62 °F to 72 °F (17 °C to 22 °C)
Relative humidity 30% to 50% (non-condensing)

9.1.7. The operating environment for the equipment which is in the Production Suite must remain within these guidelines:
Temperature 62 °F to 72 °F (17 °C to 22 °C)
Relative humidity 30% to 50% (non-condensing)

9.1.8. The operating environment for the equipment which is in the Theater, must remain within these guidelines:
Temperature 62 °F to 80 °F (17 °C to 27 °C)
Relative humidity 30% to 50% (non-condensing)

9.1.9. The design should not provide air supply or return close to the Projection Dome perforations. In the course of time the perforations will act as a filter, resulting in premature, visible soiling of the projection surface.

9.1.10. <u>The design should provide air flow supply from the back side of the Projection Dome with return air ONLY from the Projection Dome interior.</u>

9.1.11. It is imperative that the space between the Projection Dome and the theater exterior is included in the air conditioning system. The depositing of humidity and the build-up of heat must be prevented there, so that the equipment installed in this space (speakers, illumination etc.) can function properly.

9.1.12. Return air could be drawn off through openings arranged on or near the floor.

9.1.13. Equipment and Production rooms with electronic equipment (control racks, Audio Racks) should be on an independent air conditioning system, able to keep the room cool all year round.

9.1.14. Color and Reflectivity. The audience will be able to see through the perforated Projection Dome into the areas behind. As the audience will be in total dark, any structural items that are even minimally reflective or which generate even small amounts of light must be minimized. All materials constructed in these areas must be non-reflective and painted black. Any devices with status indicator lights should have accessible opaque covers.

<u>Section 10.0</u>
Seating Plan Options
BT, Montgomery College and Architect’s will continue to work on seating plans and seat

selection.
The current plan is to install removable seating with a capacity approximating 150 seats.

Our experience is this will be difficult to achieve in a 50-foot dome.

<u>Section 11.0</u>

Summary of System Costs

This section in development.

Prices are based on standard labor rates. Prevailing wage can be estimated on request.

Component	Description	Estimated	Estimated High
Immersive Projection System	Estimate Based on 4K projection system. Minimum 20,000 lumens. Two Projector – Cove Mounted	$216,000	$751,000
Projection Dome (no prevailing wage)	Scaffolding and decking by other provider. Anchor points by GC.	$310,105	$350,000-$396,000
Dome Cove LED Light Trough	Scaffolding and decking by other provider. Anchor points by GC	$13,000	$22,200
Dome Ladder System	Five fixed ladders.	$15,000	$20,150
Planetarium Control System	Controls all sub-systems in the theater	$12,000	$19,000
Advanced Digital 5.1 Surround Audio System	Controlled by Planetarium Control System	$50,000	TBD
Instructional Package Video Projection System	Must have for classroom, internet, PowerPoint, HDTV and other applications. Controlled by BT control system.	$18,000	$35,000
Full-Color Advanced LED Cove Lighting System	Control over each 30cm fixture. Trillions of color combinations.	$42,000	$42,000
Ellipsoid Public Address Spot Lights	For speaker/presentation support and rentals. Planetarium Control System	$2,000	$3,500
Custom Operator Console		$3,000	$6,000
Seating to be determined		TBD	TBD
Proposed Totals		**TBD**	**TBD**

Typical But Not Essential	Description		
Distance Learning/Conferencing Interface with Dome systems.		$8,000	
Directors Office Monitoring System		$1,500	

Three Station Intercom (Queuing, Director Office, Ticketing).		$2,000	
Optional Digital Media Production Suite	The digital production workstation with hardware and software for complete show production.	$25,000-$65,000	
Media Optional Production Suite /Auxiliary Equipment	Equipment used for audio, video production not included in the production workstation.	$14,000	
Initial Startup Content/Show Library	This gives staff time to develop new shows while running these initial programs.	$25,000	

Component	**Description**	**Level of Importance**
Immersive Projection System	Based on 4K projection system.	A
AutoAlign + AutoBlend (for dual JVC and Christies)	Provides automated blending and alignment for video projectors.	A
Projection Dome	.	A
Dome Cove LED Light Trough	Scaffolding by other provider.	A
Dome Ladder System	Five fixed ladders.	A
Digital Theater Control System	Controls all sub-systems in the theater	A
Advanced Digital 5.1 Surround Audio System	Controlled by Digital Theater Control System	A
Instructional Package Video Projection System	Must have for classroom, internet, PowerPoint, HDTV and other applications. Controlled by BT control system.	A
RGBW Advanced LED Cove Lighting System	Control over each 30cm fixture. Trillions of color combinations.	A
LED all-white lighting system	Control over each 30cm fixture.	A
Ellipsoid Public Address Spot Lights	For speaker/presentation support and rentals. Digital Theater Control System	A
Digital Media Production Suite	The digital production workstation with hardware and software for complete show production. Also provided “hot swap” spared for theater projection IG servers.	TBD
Media Optional Production Suite /Auxiliary Equipment	Equipment used for audio, video production not included in the production workstation.	TBD

Custom Operator Console		A

Typical But Not Essential	Description	Level of Importance
Distance Learning/Conferencing Interface with Dome systems.		B
Directors Office Monitoring System		C
Three Station Intercom (Queuing, Director Office, Ticketing).		C
Initial Startup Content/Show Library	This gives staff time to develop new shows while running these initial programs.	A

Section 12.0
Operation Costs and Maintenance

This to be developed more accurately after exact equipment package is selected.

Section 12.1. Operating Costs

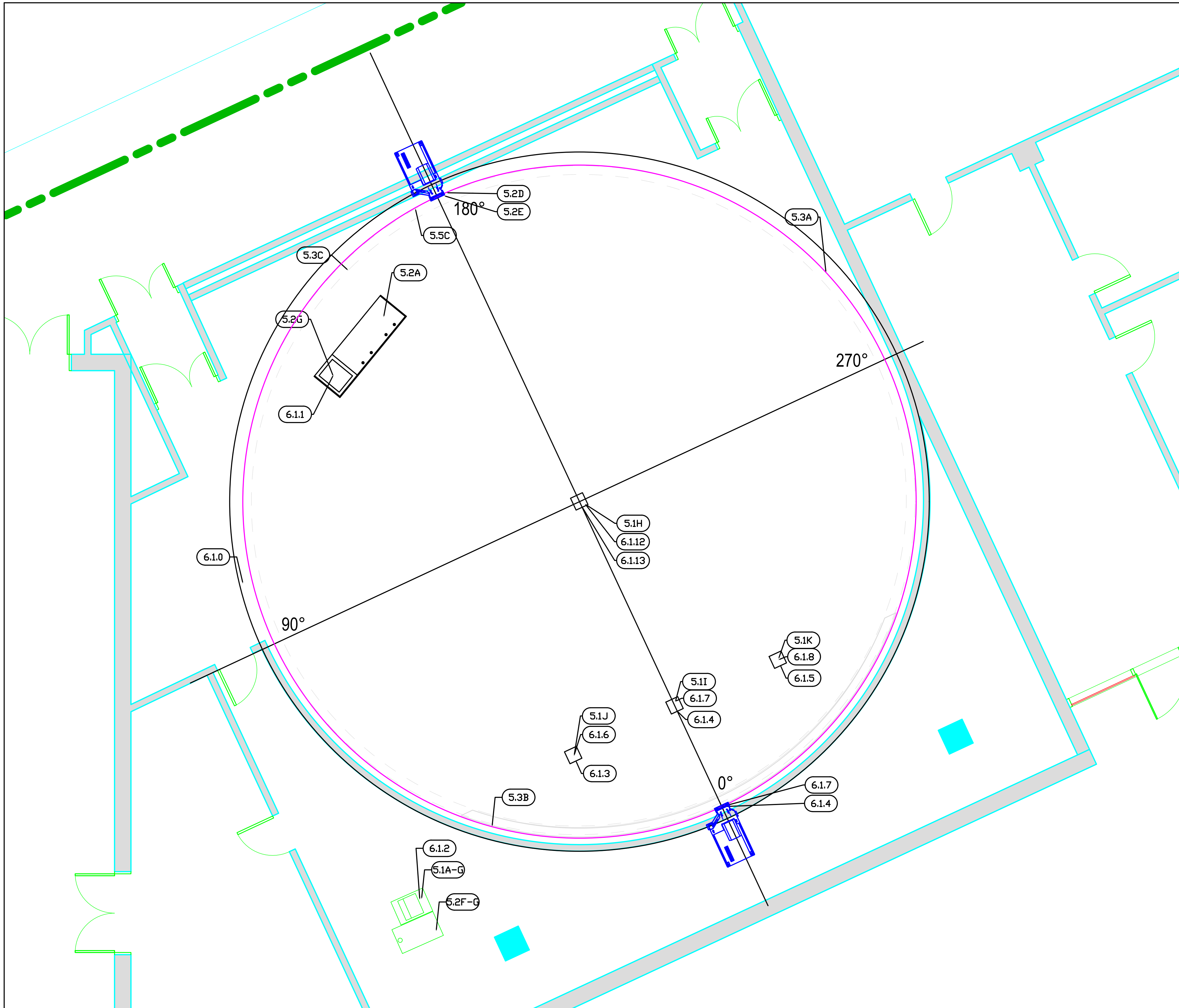
The Annual cost column indicates costs that will occur on an annual basis. Not all sub systems will have annual operation costs, but will require some repair or replacement costs within five years.

Description	Annual Routine Costs	Five Year Major Repairs/Parts
Projection Dome	$0	$0
Theater Control Console	$0	$0
Theater Control System	$0	$2,500
Digital 5.1 Surround Audio System	$200	$1,000
Immersive Projection System and Controls (based on 2500 hours use)	$2,500-$5,500	$5,000
RGBW Cove Lighting System	$250	$1200
Theatrical Lighting	$100	$500
Classroom Video Projection System	$500	$2,500

Section 12.2. Estimated Lifespan of Equipment

Note that lifespan of the components that make up each sub system varies greatly. Costs for regularly replaced items are included in the last column. The following are rough ideas for replacement costs for hardware attrition. In most cases wiring, mounting, and other parts of the sub system can be reused at time of replacement.

Description	**Warranty**	**Extended Warranty Available**	**Lifespan**	**Replacement Cost**
Projection Dome	1 Year	No	25 Years	Repaint $20,000
Show Control System	1 Year	Yes	10 Years	$10,000
Digital 5.1 Surround Audio System	1 Year	Yes	12 Years	$15,000
Immersive Projection System and Controls	1 Year	Yes	10 Years	Depends on selected system.
RGBW Cove Lighting System	3 Years	Yes	10 Years	$30,000
Ellipsoid Theatrical Lighting	1 Year	Yes	15 Years	$1,000
Instructional Presentation Video Projection System	1 Year	No	5 Years	$6,000



1 PL - 1 Power and Wireways

Scale $\frac{3}{8}$" = 1'

Table 5.1 Summary of Power Specifications:

5.1 A	Planetarium Equipment Room above Audio Equipment Rack	20A	A	Single Twist-Lock Receptical
5.1 B	Planetarium Equipment Room above Audio Equipment Rack	20A	A	Single Twist-Lock Receptical
5.1 C	Planetarium Equipment Room above Audio Equipment Rack	20A	A	Single Twist-Lock Receptical
5.1 D	Planetarium Equipment Room above Audio Equipment Rack	20A	A	Single Twist-Lock Receptical
5.1 E	Planetarium Equipment Room above Audio Equipment Rack	20A	A	Single Twist-Lock Receptical
5.1 F	Planetarium Equipment Room above Audio Equipment Rack	20A	A	Single Twist-Lock Receptical
5.1 G	In Theater Rear located in floor under Theater Console (Audio).	20A	A	Double-gang box with NEMA 5-20R
5.1 H	Theater Center Floor Box	20A	A	FSR Floor Box with NEMA 5-20R
5.1 I	Stage Center Floor Box	20A	A	FSR Floor Box with NEMA 5-20R
5.1 J	Stage Left Floor Box	20A	A	FSR Floor Box with NEMA 5-20R
5.1 K	Stage Right Floor Box	20A	A	FSR Floor Box with NEMA 5-20R
5.2 A	In Theater Rear located under desk of Theater Console (Immersive)	20A	A	Two double-gang boxes with NEMA 5-20R
5.2 B	Immersive Video Projector Acc.located at 0° behind Dome	20A	A	One double-gang box with NEMA 5-20R
5.2 C	Immersive Video Projector located at 0° (Front of Theater) behind Dome.	30A*	A	One double-gang box with L6-30 30A Receptacle*
5.2 D	Immersive Video Projector Acc.located at 180° .Behind Dome	20A	A	One double-gang box with NEMA 5-20R
5.2 E	Immersive Video Projector located at 180° (Rear of Theater) Behind Dome	30A*	A	One double-gang box with L6-30 30A Receptacle*
5.2 F	Planetarium Equipment Room above Immersive Equipment Rack	20A	A	Single Twist-Lock Receptical
5.2 G	Planetarium Equipment Room above Immersive Equipment Rack	20A	A	Single Twist-Lock Receptical
5.3 A	LED Cove Light PSU #1 located at 252° behind Projection Dome.	20A	B	Double-gang with NEMA 5-20R
5.3 B	LED Cove Light PSU #2 located at 37° behind Projection Dome.	20A	B	Double-gang with NEMA 5-20R
5.3 C	LED Cove Light PSU #3 located at 160° behind Projection Dome.	20A	B	Double-gang with NEMA 5-20R
5.5 A	Presentation Spotlight at 105°	20A	B	Single-gang with NEMA 5-20R
5.5 **B**	Presentation Spotlight at 255°	20A	B	Single-gang with NEMA 5-20R
5.5 C	Presentation Projector at 175°	20A	A	Single-gang with NEMA 5-20R

* Actual Projector Power Requirements TBD upon selection of system

Table 6.1 Summary of Conduit Specifications: Planetarium Equipment Room to Projection Gallery and to other Areas within the Planetarium Building.

6.1.0	12" Cable Tray around the outer perimeter of the Projection Dome. For Control, Audio, and Video System cables.		
6.1.1	12" x 12" Floor Box located beneath right wing of Theater Console. For Control, Audio, and Video System cables.		
6.1.2	Cable Tray (By Electrical Contractor) from 6.1.0 to Equipment Room above Equipment Room Racks.		
6.1.3	FSR Floor Box located at Front of Theater Stage Left. For Audio, Control, Power, and Video System cables.		
6.1.4	FSR Floor Box located at Front of Theater Stage Center. For Audio, Control, Power, and Video System cables.		
6.1.5	FSR Floor Box located at Front of Theater Stage Right. For Audio, Control, Power, and Video System cables.		
6.1.6	From 6.1.4 FSR Floor Box located at Front of Theater Stage Left. For Additional Audio and Video System Signal Input.	Into side of Floor Box 6.1.1 beneath Theater Console.	1.25”
6.1.7	From 6.1.5 FSR Floor Box located at Front of Theater Stage Center. For Additional Audio and Video System Signal Input.	Into side of Floor Box 6.1.1 beneath Theater Console.	1.25”
6.1.8	From 6.1.6 FSR Floor Box located at Front of Theater Stage Right. For Additional Audio and Video System Signal Input.	Into side of Floor Box 6.1.1 beneath Theater Console.	1.25”
6.1.9	From Floor Box 6.1.1 beneath Theater Console. For AstroFX Commander Control and Audio System cables.	Into Wire Mesh Cable Tray 6.1.0 behind Planetarium Dome.	2”
6.1.10	From Floor Box 6.1.1 beneath Theater Console. For Immersive System cables.	Into Wire Mesh Cable Tray 6.1.0 behind Planetarium Dome.	2”
6.1.11	From Subwoofer Inset Niche .	Into Wire Mesh Cable Tray 6.1.0 behind Planetarium Dome.	1”
6.1.12	Floor Box at Theater Center for Future Control, Audio, Video System Cables		
6.1.13	From Floor Box at Theater Center for Future Control, Audio, Video System Cables	Into Wire Mesh Cable Tray 6.1.0 behind Planetarium Dome.	2”

Table 6.4 Summary of Wireway Specifications: Specialty Lighting

Reference	Origin	Termination	Size
6.4.1	From 6.1.0 Cable Tray. For DMX Dimmer Control of Houselighting	Electrician Provided DMX Dimmer Panel.	1”

Items listed below are currently not depicted on current architectural drawings pending approval by owner or are in development.

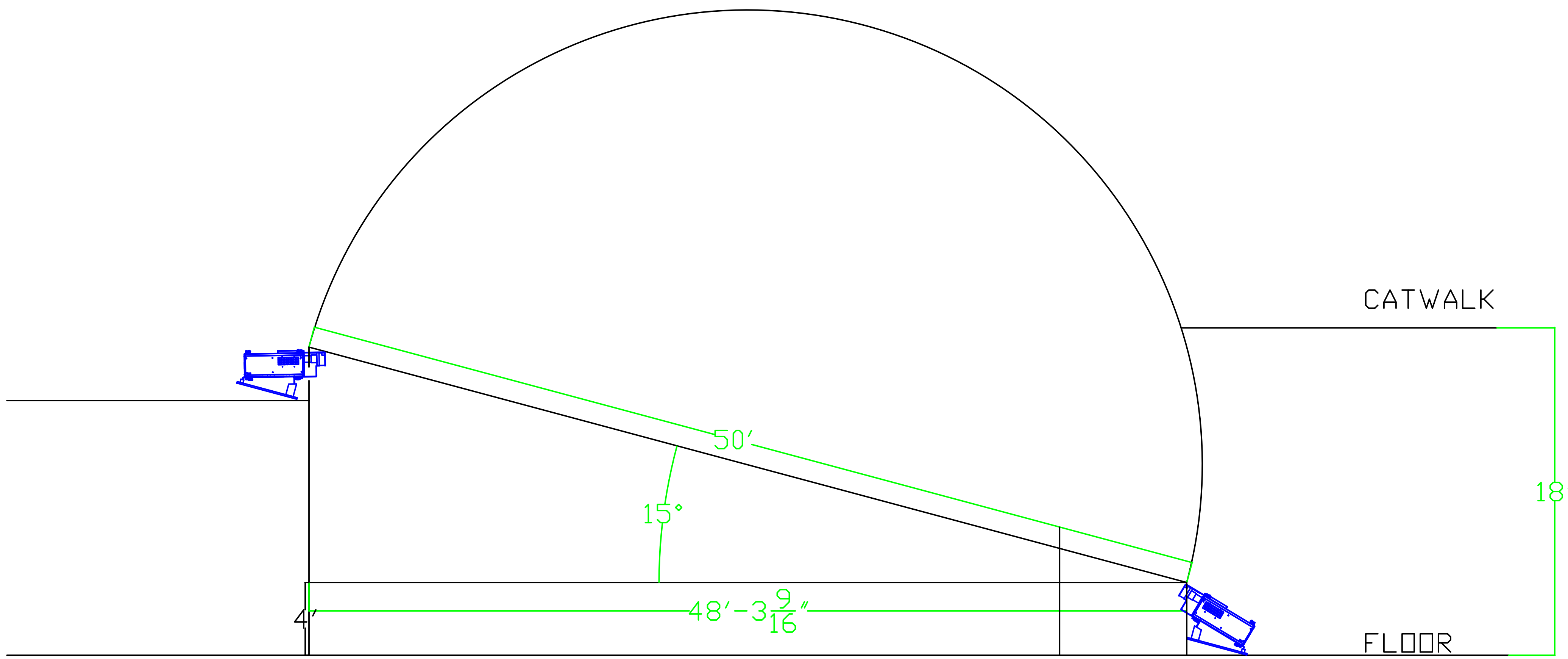
Circuit Reference	Location	Circuit Power	Phase	Box/Connection
	White Fluorescent /LED Work Lights for Projection Theater interior	20A	B	By Electrical Engineer
	Footlights for Stairs and Ramps	20A	B	By Electrical Engineer
	Convenience Outlets	20A	B	By Electrical Engineer

2 PL - 1 Power and Wireways Tables

Scale: NONE

Title: Montgomery College Planetarium SD
Revision Number: 190122JJC
Sheet: PL-1
Scale: As Noted -Designed for 11x17
Date: January 22, 2019
Drawn By: JJC
Creative Director: Jeff Bowen

Bowen Technovation
7999 East 88th Street
Indianapolis, IN 46256
Tel. (317) 863-0525
Fax (317) 863-0531
www.bowentechnovation.com



1

Cross Section Sketch

Scale 1/8 " = 1'

Title: Montgomery College Planetarium SD
Revision Number: 190122JJC
Sheet: Section
Scale: As Noted -Designed for 11x17
Date: January 22, 2019
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Fax (317) 863-0531
www.bowentechnovation.com

19 AIR ENTRAINMENT

SCHEMATIC DESIGN NARRATIVE

BUILDING AIR QUALITY SITE VISIT SUMMARY AND DESIGN GUIDANCE

The following is a summary of RWDI's observations from our visit to the Montgomery College Takoma Park/Silver Springs campus, and general design guidance from the perspective of exhaust dispersion and building air quality for the proposed Math and Science Center. The Math and Science Center will replace the existing Science South and Falcon Hall buildings, and will include classrooms, laboratories, a greenhouse, a planetarium, and offices and support facilities.

Site Observations

The site visit was conducted on May 22, 2018, by Ruth McMath (RWDI), Bill Jones (SmithGroup), and Carlos Castillo (Montgomery College). The objectives of the visit were:

1. To determine the locations of air-sensitive areas such as intakes, operable windows, and pedestrian areas that could be impacted by exhaust sources associated with the Math and Science Center; and
2. To determine the location and nature of existing exhaust sources that will remain on the site and may result in adverse air quality impacts at the Math and Science Center.

The buildings immediately surrounding the development site are Science North, the North Pavilion and Math Pavilion, the Resource Center (Library), and the Catherine F. Scott Commons. The Student Services Center, which houses offices and the cafeteria, is located further to the north on the site. The identified air intakes locations on these buildings are all at roof level, and are highlighted as blue arrows in Image 1. The Science North building also includes operable windows on the east façade at all levels.

Image 1 Locations of Existing Air Intakes

The North Pavilion and Math Pavilion, the Resource Center (Library), and the Catherine F. Scott Commons were not found to include any exhaust sources of concern. The Student Services Building includes a kitchen exhaust, an emergency generator, and atrium smoke exhausts at roof level, as well as a loading dock capable of servicing large diesel vehicles. During the site visit, it was reported by Montgomery College representatives that there have been no existing exhaust re-entrainment concerns associated with these sources at the buildings immediately adjacent (Science North, North Pavilion, Math Pavilion). Based on this existing anecdotal experience, and the large separation distance to the future development area (approximately 350 ft.), these exhaust sources are not expected to represent a significant concern at the future Math and Science Center. This will be verified during the dispersion modeling phase of our work later in the design process, once the air intakes for the Math and Science Center are identified.

The Science North building includes several exhausts of concern, namely three HRU exhaust stacks that provide fume hood ventilation (see red dots on Image 2). Based on mechanical information provided by Montgomery College, flow rates for these exhausts range from 6,560 to 10,490 cfm. The building also includes a 45kW emergency diesel generator, which discharges from a horizontal flue on the south end of the building. However, we understand that this generator may be replaced as part of the Math and Science Center development. The air intake location(s) for the new building will need to carefully consider these exhausts.

Image 2 Locations of Science North Fume Hood Exhaust Stacks

Exhaust Dispersion Overview and Local Wind Climate

Wind interacting with building structures can create complex wind patterns that can hinder dispersion of building exhausts (refer to Image 3). This can result in exhaust re-entrainment at building air intakes, windows, or entrances. Key factors that can influence exhaust dispersion include:

1. Local wind conditions and building geometry;
2. Location of the exhaust sources with respect to intakes or other air-sensitive areas; and
3. Exhaust discharge design (flow rate, stack height, exit velocity, etc.).

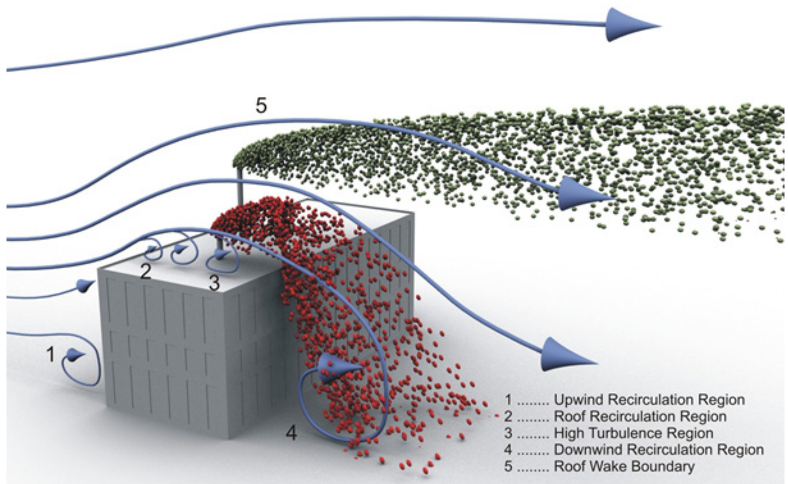

Image 3 Conceptual Example of Wind Interaction with Building Exhausts

Based on RWDI's reviewed of available wind data, the Washington Dulles International Airport was determined to be the closest meteorological station with a substantial and recent data set, and will be used to estimate wind conditions at the site. A summary of the directional distribution of winds over a period from 1973 to 2017 is shown in Image 4, below. The wind directions in the figure refer to the direction from which the wind blows, while the annual frequency of a given wind direction is shown as a distance radially from the center.

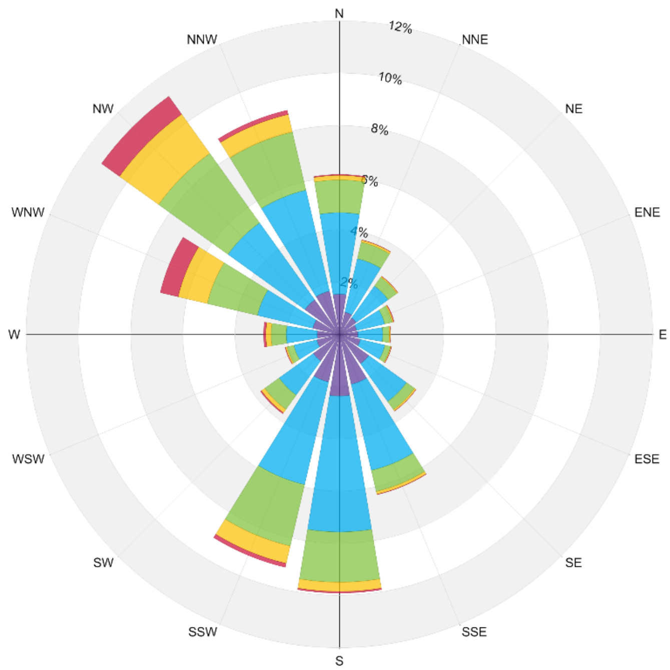

Image 4 Directional Distribution of Winds (Blowing From)
Station: Washington Dulles International Airport (1973-2017)

Prevailing winds in the area are primarily from the northwesterly and southerly directions. This information can be used to guide placement of exhausts and air intakes on the proposed building, where possible.

Proposed Math and Science Center Building

The Math and Science Center will be comprised of a 3 level building with a penthouse to the North end of the building. Due to the grade change, a 2-story massing above grade with one level below grade will occur along Fenton St.No laboratories will be located in the portion of the building interior to the campus, nor will any laboratory exhausts be positioned on the 1-story portion of the building along Takoma Avenue.

Anticipated exhausts of concern could include utility sources such as an emergency generator, cooling towers, and boilers, and laboratory fume hood exhausts. No kitchen exhausts are expected. It is not known whether the proposed building will include a loading dock.

Prescriptive Design Recommendations

Optimal dispersion levels are typically achieved from exhaust sources that are located at the highest building roof level, and discharged from vertically-oriented stacks. Stacks should not include fixed rain caps, as this impedes the upward momentum of the exhaust.

With respect to equipment selections, utility equipment such as boilers and generators should be selected with the lowest emissions of combustion pollutants, particularly oxides of nitrogen (NOx), as possible. If the site includes access to an uninterrupted gas supply, consideration could be given to natural gas generators, rather than diesel, as this would eliminate concerns associated with diesel odor during generator operation. Similarly, low-NOx boilers that operate on natural gas as the primary fuel are preferable over oil-fired units.

For the fume hood exhausts, these should be manifolded together into a common exhaust system as much as possible, rather than equipped with individual exhaust stacks. This type of system allows for pre-dilution of chemical emissions in the event of a chemical spill scenario, and allows for greater operational flexibility, e.g., if there is a desire to utilize fan turndown for energy savings during periods of low building occupancy.

It is preferable to locate outside air intakes with as much vertical and horizontal separation distance from proposed and existing exhaust sources of concern, for example, locating air intakes on building façades rather than at roof level. However, this can be challenging to achieve depending on building geometry and proximity to existing source, such as the fume hood exhausts on Science North.

Image 5 provides recommended locations for exhausts and air intakes on the Math and Science Center. Air intakes are not recommended on the west or north facades of the building, based on potential exposure to existing exhausts of concern. The best locations for air intakes will be on the east or “interior” façades of the building, or on the south façade of the taller building section. These intakes will be best positioned to reduce exposure to existing and proposed exhaust sources during prevailing northwesterly and southerly winds.

The ideal location for exhaust sources will be on the highest roof level of the building, positioned centrally to maximize the distance between existing air intakes on the Science North rooftop, the Resource Center and Commons rooftops, and the private residences along Takoma Avenue.

If screen walls will be utilized around exhaust stacks, for example to reduce noise or visual disruptions, these will need to be considered in the context of exhaust dispersion, as they can exert significant aerodynamic influence on dispersion of nearby exhausts. Porous (mesh or louvered) screens are more ideal from the perspective of exhaust dispersion.

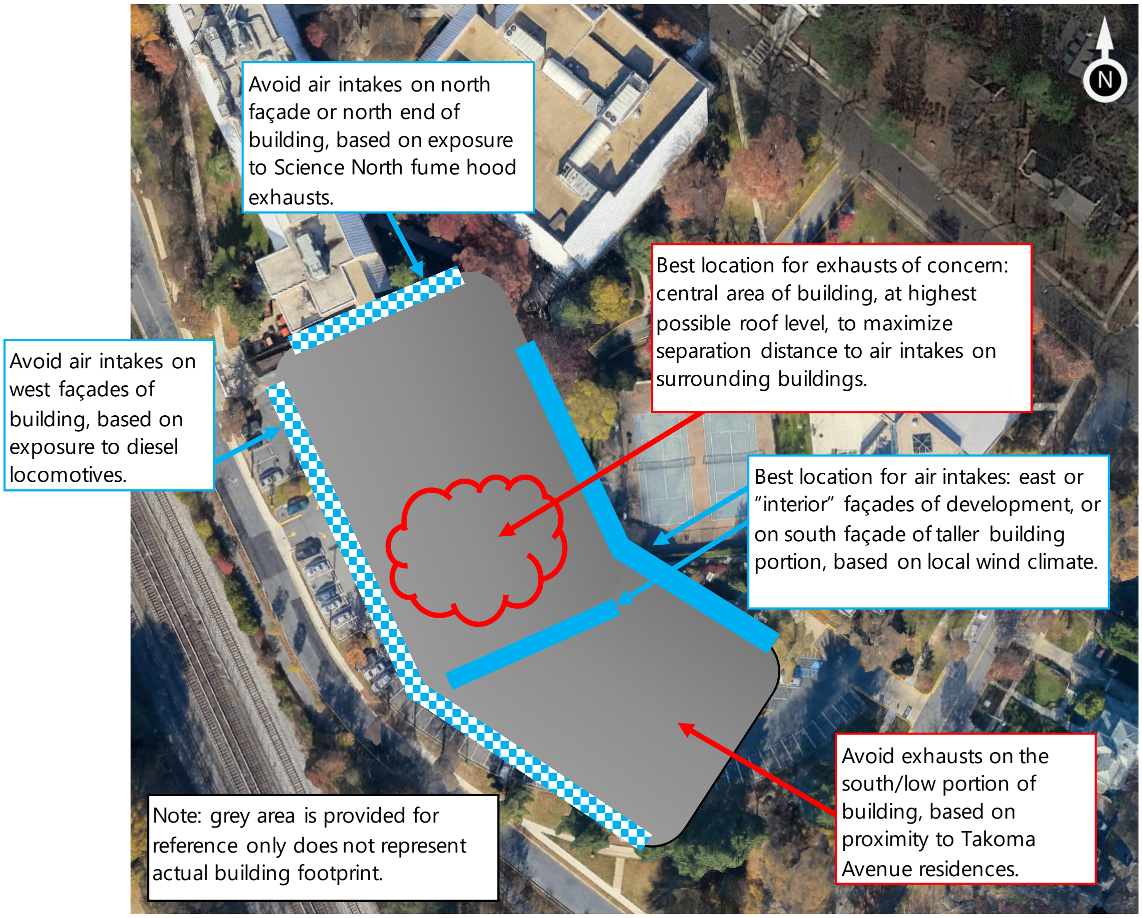

Image 5 Preliminary Design Guidance on Location of Exhausts and Air Intakes

Next Steps

Detailed wind tunnel exhaust dispersion modeling will be conducted as the design progresses to quantify impacts and, where needed, investigate mitigation options. The intent of the modeling will be to optimize the design of the exhaust stacks on the Math and Science Center, based on the locations of the proposed air intakes.

20 AUDIO-VISUAL SYSTEM

SCHEMATIC DESIGN NARRATIVE

The audio-visual (AV) systems to be provided as part of the Montgomery College Math and Science building include presentation systems, including projectors and screens, flat panel displays, video switching equipment, source devices, sound systems, control systems, digital signage, etc. The preliminary (schematic) design for the AV systems is described below.

1. Audio-Visual Systems Design Standards

   The AV systems for the project will be designed in accordance with the College's specific AV systems design standards, as well as generally accepted industry design principles and standards, including but not limited to the following:

   - American National Standards Institute (ANSI)
   - Americans with Disabilities Act (ADA)
   - Audiovisual and Integrated Experience Association (AVIXA)
   - Electronic Industries Alliance (EIA)
   - Federal Communications Commission (FCC)
   - Institute of Electrical and Electronics Engineers (IEEE)
   - National Electrical Safety Code (NESC)
   - National Fire Protection Association (NFPA)
   - National Electrical Code (NEC)
   - National Electrical Manufacturers Association (NEMA)
   - Underwriters Laboratory (UL) or equivalent

2. AV Systems

   Complete audio and visual presentation systems will be provided for each classroom, instructional labs, problem-based learning classroom, and conference rooms for 10 or more. Typically, this will include interactive short-throw projectors or flat panel display, video switching equipment, source devices, audio signal processor, amplifier, loudspeakers, assisted listening system, and control system along with a lectern or other equipment rack that houses the AV equipment. It is also assumed that many presentations will be recorded using the Echo 360 lecture capture system.

   The AV systems and the architecture will be coordinated to provide optimum viewing for all of the students in each room type. Typical distances allowed for viewing of different types of material are shown below.

Type of Viewing	Distance of Farthest Viewer
Film (movies)	8 X Image Height
Presentation	6 X Image Height
Detailed Inspection	4 X Image Height

   To ensure optimum viewing, displays will be sized so that the farthest viewer of any video image will be no more than 6 times the image height away from the screen displaying that image. In cases where detailed inspection of the image is required the display will be sized so that the farthest viewer will be no more than 4 times the image height away from the image. Where the room size will support it (i.e. where the farthest viewer is within proper range) there is the option of using flat panel displays for video viewing if desired. Typically, this will be an LCD type display. The benefit of these when compared to front screen projection is:

- Better Contrast Ratio
- Greater Off-Axis Viewing
- Less Susceptible to Ambient Light

Where direct view displays are not available in a size appropriate for the size of the space, front screen projection will be used for video viewing. These locations will be provided with either high resolution video projectors, and motorized, tab-tensioned projection screens, or interactive short-throw projectors. Which is selected will be dependent upon the College's desire for the specific use of the space.

The type of video display system will help to inform the space size. For example, a typical small classroom accommodates 24-30 students. The dimensions of such a space typically require an image of about 60 inches in height. To provide adequate viewing by the students in this space (which usually has a flat floor), the video image needs to be 42-48 inches above the finished floor. This dimension plus the image height computes to a minimum floor to ceiling height of 8.5-9 feet. Rooms that accommodate larger numbers of students will need to have correspondingly higher ceilings.

Likewise, the type of viewing can inform the width of the room. Use of front screen projection requires that no viewers be located more than 45 degrees off-axis. This often limits the useable width of a space, or necessitates the use of multiple screens and projectors. Direct view displays provide greater off-axis viewing and therefore do not provide as great a limitation to room width.

In all spaces where some type of recorded program material will be presented, a program audio system will be provided to reinforce the sound. This includes the source device, an audio power amplifier and loudspeakers. It may also include a digital signal processor (DSP) if required. In spaces where the normal spoken voice does not have sufficient volume to be heard intelligibly by all occupants of the room, a speech reinforcement system will be provided. This includes the same items as a program audio system with the addition of microphones and a microphone mixer (if this function is not provided by a DSP.

In addition to the basic audio and video equipment, each space that is AV equipped will have some type of AV control system. This system is designed to consolidate the control of all of the AV devices as well as some room devices (e.g. lights, shades, etc.) into a single user interface. Depending on the type of space and the type of AV equipment, this user interface may be a simple push-button interface, or it may be a touch panel LCD device.

All classrooms and other teaching and/or large assembly spaces will be provided with a lectern for the presenter. At each lectern location, a floor box will be provided for connection of AV signal and control cables between the lectern and the AV equipment location.

Depending on the room layout and the amount of equipment in the room, the AV equipment location may be a free-standing cabinet, installed in casework, or in some cabinet mounted in the wall or ceiling. Conduits or other cable pathways will be provided between the lectern, main equipment location, and any other points required to ensure proper functioning of the AV system.

It should be noted that the above represents a general description of functions and not necessarily individual pieces of equipment. In many cases functions are combined into a single piece of equipment. An interactive display, for example, may include the video processing and display capabilities along with an amplifier and loudspeakers.

Brief descriptions of the AV systems for specific room types are provided below.

a. Standard Classroom

Classrooms are designed for traditional lecture and group discussion. They will be provided with a projector and projection screen (or short-throw interactive projector) which can be used for display of program material, annotation, etc. In some locations, it may be necessary to provide two screens and projectors to ensure that all of the seats are within the proper viewing angle. Inputs will include a room-based computer, a wired laptop connection, and a wireless connection to facilitate Bring Your Own Device (BYOD) inputs to the system (Montgomery College currently uses the AirMedia system by Crestron as its wireless BYOD gateway). In addition to the projection system, there will be a confidence display for the presenter which will have annotation capabilities (where interactive projectors are not utilized). Program audio will be provided with a small audio amplifier and several (typically 4) ceiling-mounted loudspeakers. ADA required assisted listening will also be provided. Both the audio and video signals will be processed so they can be switched and transmitted to the appropriate output devices. The implementation of all of this requires sophisticated control and will therefore have an AV control system processor along with a touch panel to allow the instructor to exercise precise control over all of the AV system components. The control system will be configured to control other room devices (e.g. lighting controls, motorized shades, etc.) if provided. Finally, some type of equipment storage device will be provided to house the AV equipment.

b. Instructional Labs

Instructional Labs will be very similar to classrooms in terms of AV functions. Depending on their specific use, they may be provided with additional inputs to the AV system for devices such as document cameras, microscopes, etc.

c. Conference/Meeting Rooms/Breakout Rooms

Conference rooms supporting 10 or more will be provided with a large flat panel display with wired inputs as well as a wireless gateway. A basic wall-mounted control panel will also be provided. Finally, a wall-mounted scheduling display will be provided outside each room.

d. Digital Signage

It is anticipated that there will be 2-3 digital signage displays on each level at entries and major corridor intersections. Each display will be driven by a digital signage “player” attached to the existing Scala digital signage system.

21 Greenhouse

SCHEMATIC DESIGN NARRATIVE

OVERVIEW:

The greenhouse in support of biology / botany / environmental studies is envisioned to be approximately 1000 sq. ft. in plan view (approximately 40' X 25') located on the ground floor corner of the building. Greenhouse will utilize a mono-slope roof of greenhouse style construction incorporating it into the green roof concept on the ground floor roof area. Vertical walls will utilize identical framing members to the remainder of the building envelope for aesthetic compatibility. Appropriate changes to the glazing will occur to maximize utilization as a greenhouse and the greenhouse is designed with full greenhouse functionality for the instructional goals set forth and will be carefully blended into the overall architectural design of the building and character.

The greenhouse will be developed with two independent zones separated by a freestanding, full height partition wall allowing two different independent and fully integrated climate zones for program use. The greenhouse will also be served by a separate headhouse / prep area providing the needed support functions for the greenhouse and programs.

Both the greenhouse growing zones and the headhouse / prep area will be designed to meet ADA compliance requirements. Work flow considerations for staff and student access as well as supply input and debris disposal will also be designed into the zones and headhouse.

1. GREENHOUSE ZONE ENVIRONMENTAL CONTROL:

i. Each of the greenhouse zones will be designed to maintain good growing environment and each zone independently controlled with digital control.
ii. Each zone will be independently heated, ventilated, evaporative cooled, and humidified.
iii. Use of high efficiency heating units, top quality cooling and high pressure fog units as well as natural fenestration will work to achieve zonal desired conditions.
iv. Digital control system will be dedicated horticultural based control system controlling the environment in both zones including a weather station with remote access software.

2. GROWTH LIGHTING, SUN CONTROL, AND "GOOD NEIGHBOR" LIGHT POLLUTION CONTROL:

i. Due to greenhouse location, nearby buildings, tall trees, and general greenhouse use, both growing zones will be equipped with plant growth lighting (under the control of the horticultural controller) providing approximately 900 foot candles supplemental lighting when energized to allow for photo period experimentation, supplemental growth, and low light conditions supplemental lighting as needed.

ii. With consideration of nearby neighbors and other campus activities the roof areas and vertical walls of both zones will be equipped with motorized blackout curtain to be deployed at night any time the lights are turned on after dark.
iii. The blackout curtains can also be used for photo period reduction for any day length reduction experiments as needed.
iv. An independent motorized shade curtain system will be provided for the roof area for each of the two zones featuring shade cloth with approximate 50% shade to reduce the amount of sun light and solar gain as well as protect the plants inside for canopy burn during extremely high sun light times as decided by zone end users.
v. Growth lighting called out above will be mounted on interior Unistrut style track at the appropriate height allowing for additional lighting to be added in the future for any specific experiment areas or redeployment of lights as required by any program needs.

3. **GLAZING:**
   i. The mono-slope roof area and its associated roof top short vertical walls will be single layer glazed to maximized light input during low light times of the year while utilizing the motorized shade curtain system to mitigate interior sun during high light times of the year.
   ii. Lower vertical walls will be glazed with clear tempered insulated units.
   iii. Interior partition to be single layer 1/8" tempered glazed .

4. **INTERIOR FURNISHINGS:**

   i. Greenhouse zones will be arranged with castered plant benches featuring ¾ X #13 hot dipped galvanized open mesh tops in convenient sizes to allow for relocation and rearrangement as program needs mature and change.
   ii. Headhouse area will be equipped with working sink, stainless steel work tables, non-corrosive shelving, hot and cold running water, pesticide storage cabinet (locking) and other standard headhouse features.

5. **GREENHOUSE SERVICES:**

   i. Each greenhouse zone will be equipped with zonal watering featuring cold water piping with multiple outlet taps for watering automation and a minimum of two to four hose bibs per zone. Greenhouse water supply will be considered non-potable with fertilizer injector located in headhouse area fertilizer injection of fertilizer into the greenhouse area. Benching will be equipped with overhead watering rails for on bench "spaghetti" water weights for automated watering through the controller (exact watering outputs per zone to be determined).

   ii. Greenhouse zones and headhouse will be equipped with adequate 110 volt GFCI outlets conveniently located approximately 4' above floor level for access by instructors and students. In addition, convenience lighting will be addressed during the electrical design phase as needed for maintenance / instructional use.

iii. "Wi-Fi" hotspot will be created within the greenhouse space as a part of building data design for this particular area of the building. In addition the greenhouse controller system will report back to Windows PC using proprietary software for remote access, monitoring, logging and control as needed.

CLOSE:

The design of the greenhouse will incorporate controlled environment, aesthetics and functionality and usability to support the educational goals of program using it.

APPENDIX A

DESIGN PROGRAM AREAS

ATTACHMENT 4

SUMMARY - AREA, VOLUME & EFFICIENCY

Project: Leggett Math and Science Building
Facility: Montgomery College
Architect/ Engineer: SmithGroup

Project No.: FP16-077
Date: January 23, 2019

ITEM	AREA (SF)				
	PROGRAM	SCHEMATIC		DD	CD
GROSS AREA		134,720	SF		
NET ASSIGNABLE AREA		83,255	SF		
GROSS VOLUME		2,170,389	CF		
EFFICIENCY FACTOR		1.62			
% EFFICIENCY		61.8%			
SUBMISSION DATE		1/23/2019			

ATTACHMENT 4

TABULATION OF GROSS AREA

Project: Leggett Math and Science Building
Facility: Montgomery College
Architect/ Engineer: SmithGroup

Project No.: FP16-077
Date: January 23, 2019

DESCRIPTION	GROSS AREA (SF)				
	PROGRAM	SCHEMATIC		DD	CD
Ground Floor		52,163	SF		
Ground Floor - Covered Outdoor (1/2)		440	SF		
First Floor		39,444	SF		
First Floor - Covered Entry (1/2)		706	SF		
Second Floor		38624	SF		
Penthouse		3344	SF		
TOTAL		**134,721**	**SF**		

ATTACHMENT 4

TABULATION OF AREAS AND VOLUMES

Project: Leggett Math and Science Building
Facility: Montgomery College
Architect/ Engineer: SmithGroup

Project No.: FP16-077
Date: January 23, 2019

See following pages				

Dept		MAY 2016 PROGRAM						MAY 2018 PROGRAM VERIFICATION					01/23/19 PROGRAM ACHIEVED				
1.0	**Math**						**7,810**					**7,740**					**Notes**
	Space	**HEGIS Code**	**Capacity**	**SF/ Unit**	**NASF**	**Quantity**	**Total**	**Capacity**	**SF/ Occ**	**NASF**	**Quantity**	**Total**	**NACF (Net Volume CF)**	**NASF (Net Area SF)**	**Quantity**	**Total**	
	Office Area											**3,110**					
	Chairperson Office	310	1+3	150	150	1	150	1+3	150	150	1	150					Office Areas accounted below in section 8.0 Offices
	Admin. Assistant Office	310	1	80	80	1	80	1	80	80	1	80					
	Reception/Waiting	315	5	20	100	1	100	5	20	100	1	100					
	Copy/Mail/Work Room/Storage	315	3	250	250	1	250	3	250	250	1	250					
	Conference Room	350	10	25	250	1	250	10	25	250	1	250					
	FT Faculty Office	310	1+2	120	120	12	1,440	1+2	120	120	12	1,440					
	PT Faculty Office (shared)	310	4	30	120	5	600	4	30	120	5	600					
	FT Staff Office	310	1+2	120	120	2	240	1+2	120	120	2	240					
	Lab Area											**4,630**				**5,163**	
	Classroom	110	35	30	1,050	2	2,100	36	27	960	2	1,920			2	2,125	
													11,156	1,116	1		
													10,092	1,009	1		
	~~Classroom~~ Math Lab 1	110	30	35	1,050	1	1,050	36	36	1,280	1	1,280	13,290	1,329	1	1,329	Changed name
	~~Class Laboratory~~ Math Lab 2	210	40	35	1,400	1	1,400	36	36	1,280	1	1,280	13,154	1,315	1	1,315	Changed name
	Storage												603	60	1	60	Convenience storage added
	Storage/ Flex	115	N/A	150	150	1	150	N/A	150	150	1	150	3,340	334	1	334	Potential addition of a 3D printer room to be determined

		MAY 2016 PROGRAM						MAY 2018 PROGRAM VERIFICATION					01/23/19 PROGRAM ACHIEVED				
2.0	**Biology**						**28,810**					**28,690**					**Notes**
	Space	**HEGIS Code**	**Capacity**	**SF/ Unit**	**NASF**	**Quantity**	**Total**	**Capacity**	**SF/ Occ**	**NASF**	**Quantity**	**Total**	**NACF (Net Volume CF)**	**NASF (Net Area SF)**	**Quantity**	**Total**	
	Office Area											**3,950**					
	Chairperson Office for Biology and Chemistry	310	1+3	150	150	1	150	1+3	150	150	1	150					Office Areas accounted below in section 8.0 Offices
	Admin. Assistant Office	310	1	80	80	1	80	1	80	80	1	80					
	Reception/Waiting	310	5	20	100	1	100	5	20	100	1	100					
	Copy/Mail/Work Room/Storage	315	3	250	250	1	250	3	250	250	1	250					
	Conference Room	350	10	25	250	1	250	10	25	250	1	250					
	FT Faculty Office	310	1+2	120	120	15	1,800	1+2	120	120	16	1,920					
	PT Faculty Office	310	4	120	120	4	480	4	120	120	4	480					
	FT Staff Office	310	1+2	120	120	6	720	1+2	120	120	6	720					
	~~PT Staff Office~~	~~310~~	~~4~~	~~120~~	~~120~~	~~1~~	~~120~~	~~4~~	~~120~~	~~120~~	~~0~~	~~0~~					
	Lab Area											**24,740**				**26,482**	
	Classroom/Recitation Room	110	24	25	600	3	1,800	24	27	640	3	1,920			3	2,217	
													7,706	771	1		
													7,788	779	1		

												6,671	667	1		
Microbiology Laboratory	210	18	70	1,260	3	3,780	18	71	1,280	2	2,560			2	2,646	
												13,168	1,317	1		
												13,293	1,329	1		
Microbiology / Cell Biology Laboratory							18	71	1,280	1	1,280	13,174	1,317	1	1,317	
Microbiology Support Rooms	210	18	50	900	1	900	N/A		320	3	960			3	1,027	
												4,133	413	1		
												3,161	316	1		
												2,980	298	1		
Microbiology Laboratory Prep Room	215	N/A	800	800	1	800	N/A		640	1	640	5,991	599	1	599	
General Biology Laboratory (for non-majors)	210	24	50	1,200	2	2,400	24	53	1,280	2	2,560			2	2,624	
												13,165	1,316	1		
												13,083	1,308	1		
Environmental, Ecology, Landscape Technology						0	24	53	1,280	1	1,280	13,297	1,330	1	1,330	
Gen Biology/ Environmental, Ecology, Landscape Tech Prep						0			320	1	320	5,791	579	1	579	Added per users meetings. Includes (1) Storage room of 160 sf
Gen Bio Lab Prep Room												5,911	591	1	591	Added per users meetings
Autoclave														2	215	Added per users meetings
												1,028	103	1		
												1,118	112	1		
Biology 150 Laboratory (for majors)	210	24	50	1,200	4	4,800	24	53	1,280	4	5,120			4	5,321	
												13,592	1,359	1		
												13,174	1,317	1		
												13,184	1,318	1		
												13,271	1,327	1		
Biology 150 Laboratory Prep Room	215	N/A	600	600	1	600	N/A		640	1	640	7,941	794	1	794	Includes (1) Storage room of 160 sf
Biology 151 Laboratory	210	24	50	1,200	1	1,200	24	53	1,280	1	1,280	14,590	1,459	1	1,459	
Biology 151 Laboratory Prep Room	215	N/A	600	600	1	600	N/A		320	1	320	2,331	233	1	233	
Anatomy and Physiology Laboratory	210	24	60	1,440	4	5,760	24	53	1,280	3	3,840			3	3,944	To include the Skeleton area
												13,097	1,310	1		
												13,166	1,317	1		
												13,169	1,317	1		
~~Anatomy and Physiology Laboratory Prep Room~~	~~215~~	~~N/A~~	~~250~~	~~250~~	~~2~~	~~500~~	~~N/A~~		~~320~~	~~1~~	~~320~~	~~0~~	~~0~~	~~0~~	~~0~~	Eliminated per users meetings
Skeleton Room	215	8	120	120	1	120	N/A		100	1	100	0	0	0	0	Space part of an Anatomy and Physiology Lab

Greenhouse	580		1,000	1,000	1	1,000	N/A		960	1	960	12,208	1,221	1	1,221	
Greenhouse Head House Room and Storage	585		300	300	1	300	N/A		320	1	320	3,645	365	1	365	
Storage	115	N/A	150	150	2	300	N/A		160	2	320	0	0	0	0	These (2) storages are part of room Bio 150 Prep and Gen Bio/Env, Ecol, Landsc Tech Prep

		MAY 2016 PROGRAM					MAY 2018 PROGRAM VERIFICATION					01/23/19 PROGRAM ACHIEVED				
3.0	**Chemistry**					14,430					13,970					**Notes**
	Space	**HEGIS Code**	**Capacity**	**SF/ Unit**	**NASF**	**Quantity**	**Total**	**Capacity**	**SF/ Occ**	**NASF**	**Quantity**	**Total**	**NACF (Net Volume CF)**	**NASF (Net Area SF)**	**Quantity**	**Total**

Space	HEGIS Code	Capacity	SF/ Unit	NASF	Quantity	Total	Capacity	SF/ Occ	NASF	Quantity	Total	NACF (Net Volume CF)	NASF (Net Area SF)	Quantity	Total	Notes
Office Area											**2,130**					
Admin. Assistant Office						0	1	80	80	1	80					
Conference Room	350	10	25	250	1	250	10	25	250	1	250					
FT Faculty Office	310	1+2	120	120	8	960	1+2	120	120	8	960					Office Areas accounted below in section 8.0 Offices
PT Faculty Office	310	4	120	120	3	360	4	120	120	3	360					
FT Staff Office	310	1+2	120	120	3	360	1+2	120	120	3	360					
PT Staff Office	310	4	120	120	1	120	4	120	120	1	120					
Lab Area											**11,840**				**11,656**	
Classroom/Recitation Room	110	24	25	600	2	1,200	24	27	640	2	1,280			2	1,302	
												5,185	518	1		
												7,837	784	1		
General Chemistry Laboratory	210	24	50	1,200	4	4,800	24	53	1,280	4	5,120			4	5,300	
												13,631	1,363	1		
												13,123	1,312	1		
												13,128	1,313	1		
												13,117	1,312	1		
~~General Chemistry Laboratory Prep Room~~	~~215~~	~~N/A~~	~~600~~	~~600~~	~~2~~	~~1,200~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	Pooled into Central prep
~~Chemistry Stock Room and Storage~~	~~215~~	~~N/A~~	~~200~~	~~200~~	~~1~~	~~200~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	Pooled into Central prep
Organic Chemistry Laboratory	210	18	80	1,440	2	2,880	16	100	1,600	1	1,600	13,130	1,313	1	1,313	Reduction of area approved by MC
Organic Analytical Chemistry Laboratory							16	100	1,600	1	1,600	13,149	1,315	1	1,315	Reduction of area approved by MC
Instrumentation Room	210	24	50	1,200	1	1,200	N/A		1,280	1	1,280	13,107	1,311	1	1,311	
~~Organic Chemistry Laboratory Prep Room~~	~~215~~	~~N/A~~	~~600~~	~~600~~	~~1~~	~~600~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	Pooled into Central prep
Central Chemistry Prep and Storage						0	N/A		960	1	960	11,150	1,115	1	1,115	
~~Storage (glassware and paper products)~~	~~115/ 215~~	~~N/A~~	~~150~~	~~150~~	~~2~~	~~300~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	Pooled into Central prep

	MAY 2016 PROGRAM						MAY 2018 PROGRAM VERIFICATION					01/23/19 PROGRAM ACHIEVED				
4.0 Engineering, Physical and Computer Science, Cybersecurity and Networking						**12,250**					**13,440**					**Notes**
Space	**HEGIS Code**	**Capacity**	**SF/ Unit**	**NASF**	**Quantity**	**Total**	**Capacity**	**SF/ Occ**	**NASF**	**Quantity**	**Total**	**NACF (Net Volume CF)**	**NASF (Net Area SF)**	**Quantity**	**Total**	
Office Area											**2,420**					
Admin. Assistant Office						0	1	80	80	1	80					
Reception/Waiting						0	5	20	100	1	100					
Copy/Mail/Work Room/Storage						0	3	250	250	1	250					
Conference Room	350	10	25	250	1	250	10	25	250	1	250					Office Areas accounted below in section 8.0 Offices
FT Faculty Office	310	1+2	120	120	5	600	1+2	120	120	7	840					
PT Faculty Office	310	4	120	120	3	360	4	120	120	3	360					
FT Staff Office	310	1+2	120	120	3	360	1+2	120	120	4	480					
PT Staff Office	310	4	120	120	0.5	60	4	120	120	0.5	60					
Lab Area											**11,020**				**12,775**	
~~Classroom/Recitation Room~~	~~110~~	~~24~~	~~35~~	~~840~~	~~2~~	~~1,680~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	Eliminated per users meeting
~~Class Laboratory~~ Physics / Engineering Laboratory #1	210	24	50	1,200	3	3,600	24	53	1,280	1	1,280	13,341	1,334	1	1,334	Changed name
Physics / Engineering Laboratory #2						0	24	53	1,280	1	1,280	13,222	1,322	1	1,322	
General Computer Laboratory (Computer Science)						0	24	53	1,280	1	1,280	13,947	1,395	1	1,395	
Networking Laboratory					0	0	24	53	1,280	1	1,280	12,245	1,224	1	1,224	
Cybersecurity	210	24	45	1,080	1	1,080	24	40	960	1	960	8,661	866	1	866	
Class Laboratory LAN Room	215	N/A	200	200	1	200	N/A		320	1	320	2,169	217	1	217	Added per users meetings
Engineering/Physics Shop	210	24	40	960	1	960	24	40	960	1	960	9,914	991	1	991	
Project Storage Room	215	N/A	100	100	1	100	N/A		320	1	320	4,574	457	1	457	Possibility to include 3D printer room per users meetings
Physics Storage / Prep	115	N/A	300	300	1	300	N/A		640	1	640	5,909	591	1	591	
Planetarium	610	150	15	2,250	1	2,250	150	15	2,250	1	2,250	44,971	2,726	1	2,726	
Planetarium Storage	615	N/A	150	150	1	150	N/A		150	1	150	8,161	816	1	816	
Planetarium Pre-Function										0	0	7,021	510	1	510	Added per users meetings
Media Production Room	530	2	240	240	1	240	2	240	240	1	240	3,256	326	1	326	To include Media Production Audio Booth
Media Production Audio Booth	535	2	60	60	1	60	2	60	60	1	60	0	0	0	0	Included in Media Production Room

	MAY 2016 PROGRAM						MAY 2018 PROGRAM VERIFICATION					01/23/19 PROGRAM ACHIEVED				
5.0 Academic Support Space						9,900					10,130				13,974	Notes
Space	HEGIS Code	Capacity	SF/ Unit	NASF	Quantity	Total	Capacity	SF/ Occ	NASF	Quantity	Total	NACF (Net Volume CF)	NASF (Net Area SF)	Quantity	Total	
Student Research Laboratory	210	18	50	900	1	900	18	53	960	1	960	9,985	998	1	998	
Interdisciplinary Classrooms	110	30	30	900	2	1,800	30	32	960	2	1,920			2	2,071	
												10,386	*1,039*	*1*		
												10,322	*1,032*	*1*		
Informal Student Study Area	410	4	25	100	3	300	4	25	100	3	300			7	2,988	Distributed throughout building
Academic Hosting Space	310	2	120	120	1	120	2		120	1	120	0	0	0	0	Hosting station to use an additional desk station in office area
Math and Science Learning Center Computer Laboratory	220	30	30	900	2	1,800	30	32	960	2	1,920			2	2,260	
												9,524	*952*	*1*		
												13,078	*1,308*	*1*		
Math and Science Learning Center Individual Study Room	410	24	30	720	1	720	24	27	640	1	640	5,873	587	1	587	
Math and Science Learning Center Group Study Room	410	6	30	180	6	1,080	6	30	180	6	1,080			6	1,072	
												1,336	*134*	*1*		
												1,336	*134*	*1*		
												4,829	*483*	*1*		
												1,078	*108*	*1*		
												1,023	*102*	*1*		
												1,107	*111*	*1*		
Math and Science Learning Center Tutoring Center	320	48	30	1,440	1	1,440	48	33	1,600	1	1,600	16,801	1,680	1	1,680	
Math and Science Learning Center Materials Review Room	410	6	20	120	2	240	6	25	150	1	150	2,338	234	1	234	Materials rooms combined into one room
Math and Science Learning Center Materials Storage	415	N/A	150	150	2	300	N/A		120	1	120	0	0	0	0	Materials rooms combined into one room
Math and Science Learning Center Service Desk and Support	415	3	120	360	1	360	3	120	360	1	360	3,612	360	1	360	
~~STEM Center~~	~~680~~	~~6~~	~~30~~	~~180~~	~~1~~	~~180~~	~~6~~	~~30~~	~~180~~	~~1~~	~~180~~	~~0~~	~~0~~	~~0~~	~~0~~	Eliminated per users meeting
Innovation Hub													1,084	1	1,084	Proposed space

Math and Science Learning Center - Director's Office	310	3	150	150	1	150	3	150	150	1	150	1,289	129	1	129	
Math and Science Learning Center - Shared Staff Office	310	4	60	240	1	240	6	60	360	1	360	3,300	330	1	330	
Math and Science Learning Center - Shared Staff Workroom	315	5	150	150	1	150	5	150	150	1	150	1,807	181	1	181	
~~Math and Science Learning Center - Small Meeting Room~~	~~350~~	~~3~~	~~120~~	~~120~~	~~1~~	~~120~~	~~3~~	~~120~~	~~120~~	~~1~~	~~120~~	~~0~~	~~0~~	~~0~~	~~0~~	Revised to be a group study

	MAY 2016 PROGRAM						MAY 2018 PROGRAM VERIFICATION					01/23/19 PROGRAM ACHIEVED				
6.0 Dean's Suite						**1,130**					**1,130**				**459**	**Notes**
Space	**HEGIS Code**	**Capacity**	**SF/ Unit**	**NASF**	**Quantity**	**Total**	**Capacity**	**SF/ Occ**	**NASF**	**Quantity**	**Total**	**NACF (Net Volume CF)**	**NASF (Net Area SF)**	**Quantity**	**Total**	
Dean's Office	310	1+4	200	200	1	200	1+4	200	200	1	200	2,323	232	1	232	
Admin. Assistant Office	310	1	80	80	1	80	1	80	80	1	80	0	0	0	0	Combined with office spaces
Reception/Waiting	315	5	20	100	1	100	5	20	100	1	100	0	0	0	0	Combined with office spaces
Copy/Mail/Work Room/Storage	315	3	250	250	1	250	3	250	250	1	250	0	0	0	0	Combined with office spaces
Conference Room	350	20	25	500	1	500	20	25	500	1	500	3,519	227	1	227	

	MAY 2016 PROGRAM						MAY 2018 PROGRAM VERIFICATION					01/23/19 PROGRAM ACHIEVED				
7.0 Building Support						**2,410**					**2,410**				**3,134**	
Space	**HEGIS Code**	**Capacity**	**SF/ Unit**	**NASF**	**Quantity**	**Total**	**Capacity**	**SF/ Unit**	**NASF**	**Quantity**	**Total**	**NACF (Net Volume CF)**	**NASF (Net Area SF)**	**Quantity**	**Total**	
New Mother's Room	650	1	80	80	1	80	1	80	80	1	80	746	75	1	75	
Meditation/Reflection/Serenity Room	650	4	20	80	1	80	4	20	80	1	80	723	72	1	72	
Student Vending Lounge	650	20	33	650	1	650	20	33	650	1	650	6,172	617	1	617	
Restroom/Locker/Shower/Changing Room	655	1	100	100	2	200	1	100	100	2	200			2	140	
												710	71	1		SHOWER
												685	69	1		SHOWER
Housekeeping Supplies and Work Room	750	N/A	150	150	1	150	N/A	150	150	1	150	1,667	167	1	167	
Housekeeping Satellite Sink Rooms	750	N/A	50	50	2	100	N/A	50	50	2	100			3	84	
												275	28	1		
												275	28	1		
												275	28	1		
AV Storage and Hot Swap	750	N/A	150	150	1	150	N/A	150	150	1	150	1,458	146	1	146	
Building Storage	725	N/A	500	500	1	500	N/A	500	500	1	500	5,021	502	1	502	
Chemical Waste Transfer Storage Room	760	N/A	150	150	1	150	N/A	150	150	1	150	1,414	141	1	141	
Loading Dock	755	N/A	200	200	1	200	N/A	200	200	1	200	9,539	954	1	954	
Waste/Recycling Transfer Storage Room	755	N/A	150	150	1	150	N/A	150	150	1	150	2,360	236	1	236	

	MAY 2016 PROGRAM						MAY 2018 PROGRAM VERIFICATION					01/23/19 PROGRAM ACHIEVED				
8.0 Offices											11,610				10,263	
Space							Capacity	SF/ Unit	NASF	Quantity	Total	NACF (Net Volume CF)	NASF (Net Area SF)	Quantity	Total	Notes
Chairperson Office							1+3	150	150	2.0	300			2	230	(1) Math and (1) Biology department
												1,152	115	1		
												1,152	115	1		
Admin. Assistant Office							1	80	80	4.0	320			3	278	(1) per floor
												941	94	1		
												921	92	1		
												921	92	1		
Reception/Waiting							5	20	100	3.0	300			3	1,010	(1) per floor
												3,349	335	1		
												3,345	335	1		
												3,400	340	1		
Copy/Mail/Work Room/Storage							3	250	250	3.0	750			3	306	(1) per floor
												1,016	102	1		
												1,016	102	1		
												1,016	102	1		
Conference Room							10	25	250	4.0	1000			3	944	(1) per floor
												3,139	314	1		
												3,146	315	1		
												3,146	315	1		
FT Faculty Office							1+2	120	120	43.0	5160			43	4,913	
												1,048	105	1		
												1,178	118	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,059	106	1		
												1,059	106	1		
												1,059	106	1		
												1,178	118	1		
												1,179	118	1		
												1,090	109	1		
												1,029	103	1		
												1,059	106	1		
												1,169	117	1		
												1,029	103	1		
												1,048	105	1		
												1,169	117	1		
												1,065	106	1		

												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,137	114	1		
												1,048	105	1		
												1,131	113	1		
												1,029	103	1		
												1,059	106	1		
												1,029	103	1		
												1,048	105	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,065	106	1		
												1,046	105	1		
												1,169	117	1		
												1,065	106	1		
												3,906	391	1		
PT Faculty Office (shared)							4	30	120	15.0	1800			2	636	
												2,545	255	1		
												3,805	381	1		
FT Staff Office							1+2	120	120	15.0	1800			3	483	
												2,160	216	1		
												1,483	148	1		
												1,192	119	1		
PT Staff Office							4	120	120	1.5	180			5	667	
												2,117	212	1		
												879	88	1		
												1,308	131	1		
												1,430	143	1		
												927	93	1		
Huddle							0	0	0	0.0	0			3	383	(1) per floor
												1,274	127	1		
												1,278	128	1		
												1,283	128	1		
Kitchen/ coffee							0	0	0	0.0	0			3	413	(1) per floor
												1,393	139	1		
												1,383	138	1		
												1,357	136	1		

APPENDIX B

LABORATORY PLANNING ROOM GUIDE PLATES

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

000
DRAWING NUMBER

GENERAL INFORMATION
DRAWING TITLE

PROGRAM SPACE TYPES

Research Labs
Shared Lab Support
Support Areas
Core Labs
Instructional Labs
Collaboration
Building Support
Not in the Program

ABBREVIATIONS

ACT = Acoustical Ceiling Tile
AG = Argon Gas
BSC = Biosafety Cabinet
CA = Compressed Air
CFM = Cubic Feet per Minute
CS = Cup Sink
CG = Cylinder Gas
CL = Center Line
CW = Cold Water
DI = Deionize Water
E = Electrical
EP = Emergency Power
EW = Eye Wash
EW/DH = Eye wash Drench hose
EQ = Equal
FD = Floor Drain
FH = Fume Hood
GFCI = Ground-fault Circuit Interrupter Outlet
GYP BD = Gypsum Wallboard
HPLC = High Performance Liquid Chromatography
HW = Hot Water
INC = Incubator
KS = Knee Space
MF = Mixing Faucet
NG = Natural Gas
LV = Laboratory Vacuum
OC = On Center
PB = Pegboard
PE = Point Exhaust
PTD = Paper Towel Dispense
PR = Pre-Rinse Fixture
REF = Refrigerator
RO = Reverse Osmosis Water
SD = Soap Dispenser
SP = Standby Power
ST = Sediment Trap
TBD = To Be Determined

ARCHITECTURAL REQUIREMENTS

ROOM FINISH CLASS GROUP KEY

Group 1: Rubber Sheet/Tile Floor, Rubber Base,Gyp Bd/Egg Shell Paint Walls, ACT/Exposed Ceiling
Group 2: Rubber Sheet w/ Welded Seams Floor, Rubber Base, Gyp Bd/Epoxy Paint Walls, Gyp Bd/Epoxy Ceiling
Group 3: Epoxy Resin Floor, Integral Epoxy Resin Base, Gyp Bd/Epoxy Paint Walls, Gyp Bd/Epoxy Ceiling,
Group 4: Rubber Sheet/Tile Floor, Rubber Base, Gyp Bd/Egg Shell Paint Walls, Gyp Bd/Egg Shell Paint Ceiling
Group 5: Carpet Floor, Base (see Arch narrative) Gyp Bd/Egg Shell Paint Walls, ACT/Exposed Ceiling
Group 6: Ceramic Tile Floor, Ceramic Tile Base, Ceramic Tile Walls, Gyp Bd/Epoxy Paint Ceiling

VIBRATION SENSITIVITY (micro inches per second)

Typical criteria

SECURITY OPTIONS

None
Key
Card
Lock

SOUND TRANSMISSION CLASS (STC)

Typical criteria

NOISE COEFFICIENT (NC)

Typical Criteria

REAGENT GRADE WATER KEY

1 = 1 Mega Ohm
2 = 10 Mega Ohm
3 = 18 Mega Ohm

SINKS

Large Sink = 28"L X 15"W X 12"D
Medium Sink = 18"L X 14"W X 10 1/2"D

LIGHT CONTROL

None
Blinds
Darkening Shades
Black Out Shades
Light-Tight Door

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

000
DRAWING NUMBER

GENERAL INFORMATION
DRAWING TITLE

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Research Labs
Shared Lab Support
Support Areas
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DI = Deionize Water
E = Electrical
EP = Emergency Power
EW = Eye Wash
EW/DH = Eye wash Drench hose
EQ = Equal
FD = Floor Drain
FH = Fume Hood
GFCI = Ground-fault Circuit Interrupter Outlet
GYP BD = Gypsum Wallboard
HPLC = High Performance Liquid Chromatography
HW = Hot Water
INC = Incubator
KS = Knee Space
MF = Mixing Faucet
NG = Natural Gas
LV = Laboratory Vacuum
OC = On Center
PB = Pegboard
PE = Point Exhaust
PTD = Paper Towel Dispense
PR = Pre-Rinse Fixture
REF = Refrigerator
RO = Reverse Osmosis Water
SD = Soap Dispenser
SP = Standby Power
ST = Sediment Trap
TBD = To Be Determined

ARCHITECTURAL REQUIREMENTS

ROOM FINISH CLASS GROUP KEY
Group 1: Rubber Sheet/Tile Floor, Rubber Base,Gyp Bd/Egg Shell Paint Walls, ACT/Exposed Ceiling
Group 2: Rubber Sheet w/ Welded Seams Floor, Rubber Base, Gyp Bd/Epoxy Paint Walls, Gyp Bd/Epoxy Ceiling
Group 3: Epoxy Resin Floor, Integral Epoxy Resin Base, Gyp Bd/Epoxy Paint Walls, Gyp Bd/Epoxy Ceiling,
Group 4: Rubber Sheet/Tile Floor, Rubber Base, Gyp Bd/Egg Shell Paint Walls, Gyp Bd/Egg Shell Paint Ceiling
Group 5: Carpet Floor, Base (see Arch narrative) Gyp Bd/Egg Shell Paint Walls, ACT/Exposed Ceiling
Group 6: Ceramic Tile Floor, Ceramic Tile Base, Ceramic Tile Walls, Gyp Bd/Epoxy Paint Ceiling

VIBRATION SENSITIVITY (micro inches per second)
Typical criteria

SECURITY OPTIONS
None
Key
Card
Lock

SOUND TRANSMISSION CLASS (STC)
Typical criteria

NOISE COEFFICIENT (NC)
Typical Criteria

REAGENT GRADE WATER KEY
1 = 1 Mega Ohm
2 = 10 Mega Ohm
3 = 18 Mega Ohm

SINKS
Large Sink = 28"L X 15"W X 12"D
Medium Sink = 18"L X 14"W X 10 1/2"D

LIGHT CONTROL
None
Blinds
Darkening Shades
Black Out Shades
Light-Tight Door

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-00
DRAWING NUMBER

GUIDE PLATES INDEX
DRAWING TITLE

SHEET LIST - GUIDE PLATES

SHEET NUMBER	SHEET NAME
GP-00	GUIDE PLATES INDEX
GP-03	MICROBIOLOGY LABORATORY
GP-04	MICROBIOLOGY / CELL BIOLOGY LABORATORY
GP-05	MICROBIOLOGY SUPPORT ROOMS
GP-06	MICROBIOLOGY LABORATORY PREP ROOM
GP-07	GENERAL BIOLOGY LABORATORY (FOR NON-MAJORS)
GP-08	ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECHNOLOGY
GP-09	GEN BIOLOGY/ ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECH PREP
GP-10	BIOLOGY 150 LABORATORY (FOR MAJORS)
GP-11	BIOLOGY 150 LABORATORY PREP ROOM
GP-12	BIOLOGY 151 LABORATORY
GP-13	BIOLOGY 151 LABORATORY PREP ROOM
GP-14	ANATOMY AND PHYSIOLOGY LABORATORY
GP-16	GREENHOUSE
GP-17	GREENHOUSE HEAD HOUSE ROOM AND STORAGE
GP-18	GENERAL CHEMISTRY LABORATORY
GP-19	ORGANIC CHEMISTRY LABORATORY
GP-20	ORGANIC ANALYTICAL CHEMISTRY LABORATORY
GP-21	INSTRUMENTATION ROOM
GP-22	CENTRAL CHEMISTRY PREP AND STORAGE
GP-23	PHYSICS / ENGINEERING LABORATORY #1
GP-24	PHYSICS / ENGINEERING LABORATORY #2
GP-25	GENERAL COMPUTER LABORATORY (COMPUTER SCIENCE)
GP-26	NETWORKING LABORATORY
GP-27	CYBERSECURITY
GP-28	ENGINEERING/ PHYSICS SHOP AND PROJECT STORAGE ROOM
GP-29	PHYSICS STORAGE / PREP
GP-31	MEDIA PRODUCTION ROOM
GP-32	STUDENT RESEARCH LABORATORY
GP-33	INTERDISCIPLINARY CLASSROOMS

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

DS-00
DRAWING NUMBER

DATA SHEET INDEX
DRAWING TITLE

SHEET LIST - DATA SHEET

SHEET NUMBER	SHEET NAME
DS-00	DATA SHEET INDEX
DS-3	MICROBIOLOGY LABORATORY
DS-4	MICROBIOLOGY / CELL BIOLOGY LABORATORY
DS-5	MICROBIOLOGY SUPPORT ROOMS
DS-6	MICROBIOLOGY LABORATORY PREP ROOM
DS-7	GENERAL BIOLOGY LABORATORY (FOR NON-MAJORS)
DS-8	ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECHNOLOGY
DS-9	GEN BIOLOGY/ ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECH PREP
DS-10	BIOLOGY 150 LABORATORY (FOR MAJORS)
DS-11	BIOLOGY 150 LABORATORY PREP ROOM
DS-12	BIOLOGY 151 LABORATORY
DS-13	BIOLOGY 151 LABORATORY PREP ROOM
DS-14	ANATOMY AND PHYSIOLOGY LABORATORY
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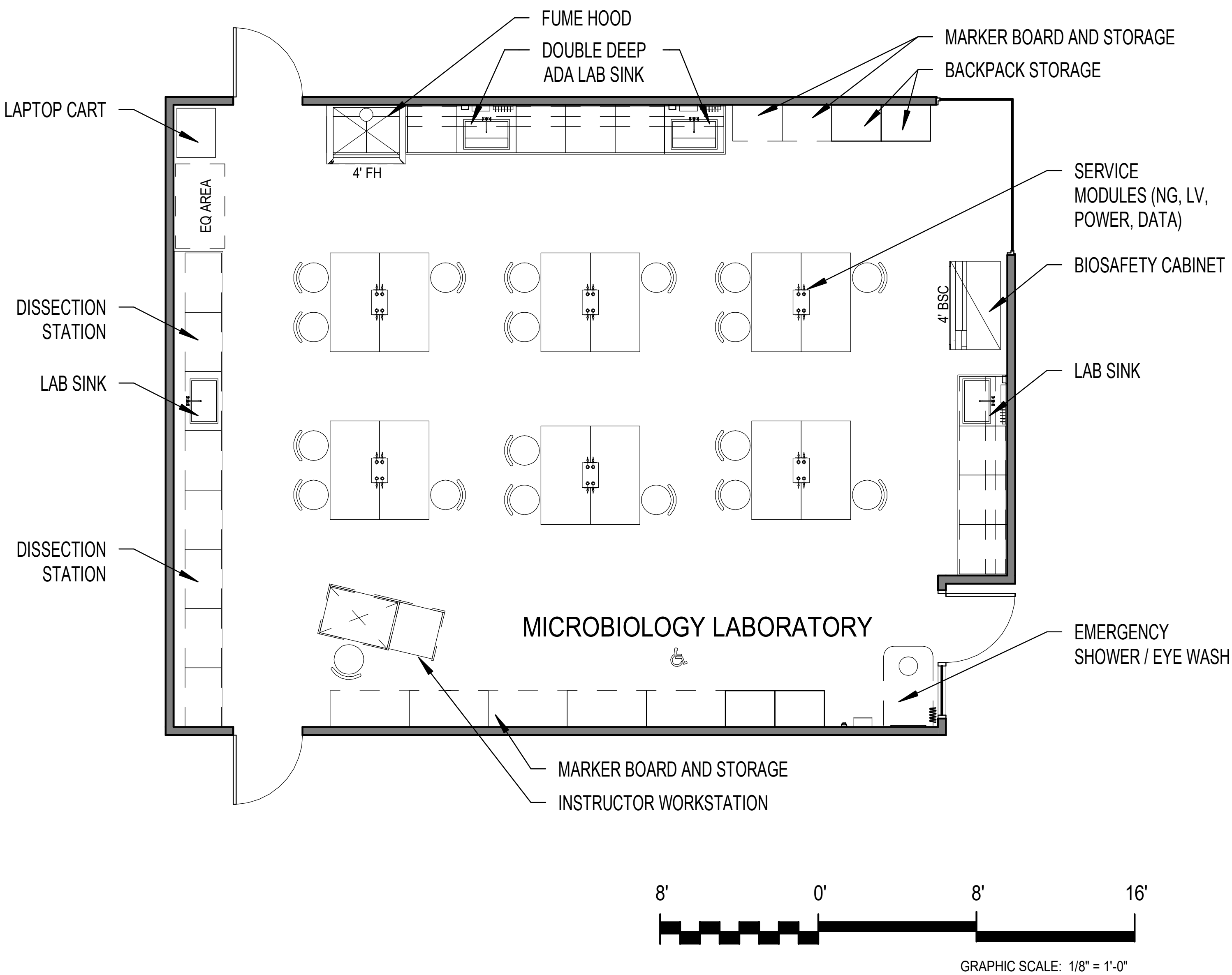
DS-18	GENERAL CHEMISTRY LABORATORY
DS-19	ORGANIC CHEMISTRY LABORATORY
DS-20	ORGANIC ANALYTICAL CHEMISTRY LABORATORY
DS-21	INSTRUMENTATION ROOM
DS-22	CENTRAL CHEMISTRY PREP AND STORAGE
DS-23	PHYSICS / ENGINEERING LABORATORY #1
DS-24	PHYSICS / ENGINEERING LABORATORY #2
DS-25	GENERAL COMPUTER LABORATORY (COMPUTER SCIENCE)
DS-26	NETWORKING LABORATORY
DS-27	CYBERSECURITY
DS-28	PROJECT STORAGE ROOM
DS-29	PHYSICS STORAGE / PREP
DS-31	MEDIA PRODUCTION ROOM
DS-32	STUDENT RESEARCH LABORATORY
DS-33	INTERDISCIPLINARY CLASSROOMS

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-03
DRAWING NUMBER

MICROBIOLOGY LABORATORY
DRAWING TITLE



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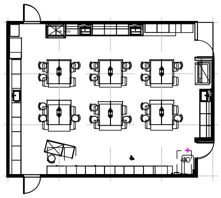


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: BIOLOGY LABS

RDS: 3

Planning Information

Program Space Name: MICROBIOLOGY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	2
Room Occupancy:	18

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	MICRO BIO SUPPORT & PREP
Indirect Adjacency:	CLASS ROOM / RECITATION ROOM
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	ZONED & RM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	2 - DISSECTING STATION

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK- STANDING & ACCESSIBLE HEIGHT
MICROSCOPE CABINETS
BACKPACK STORAGE

Equipment:

SMART INSTRUCTOR WORKSTATION
LAPTOP CART
(SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

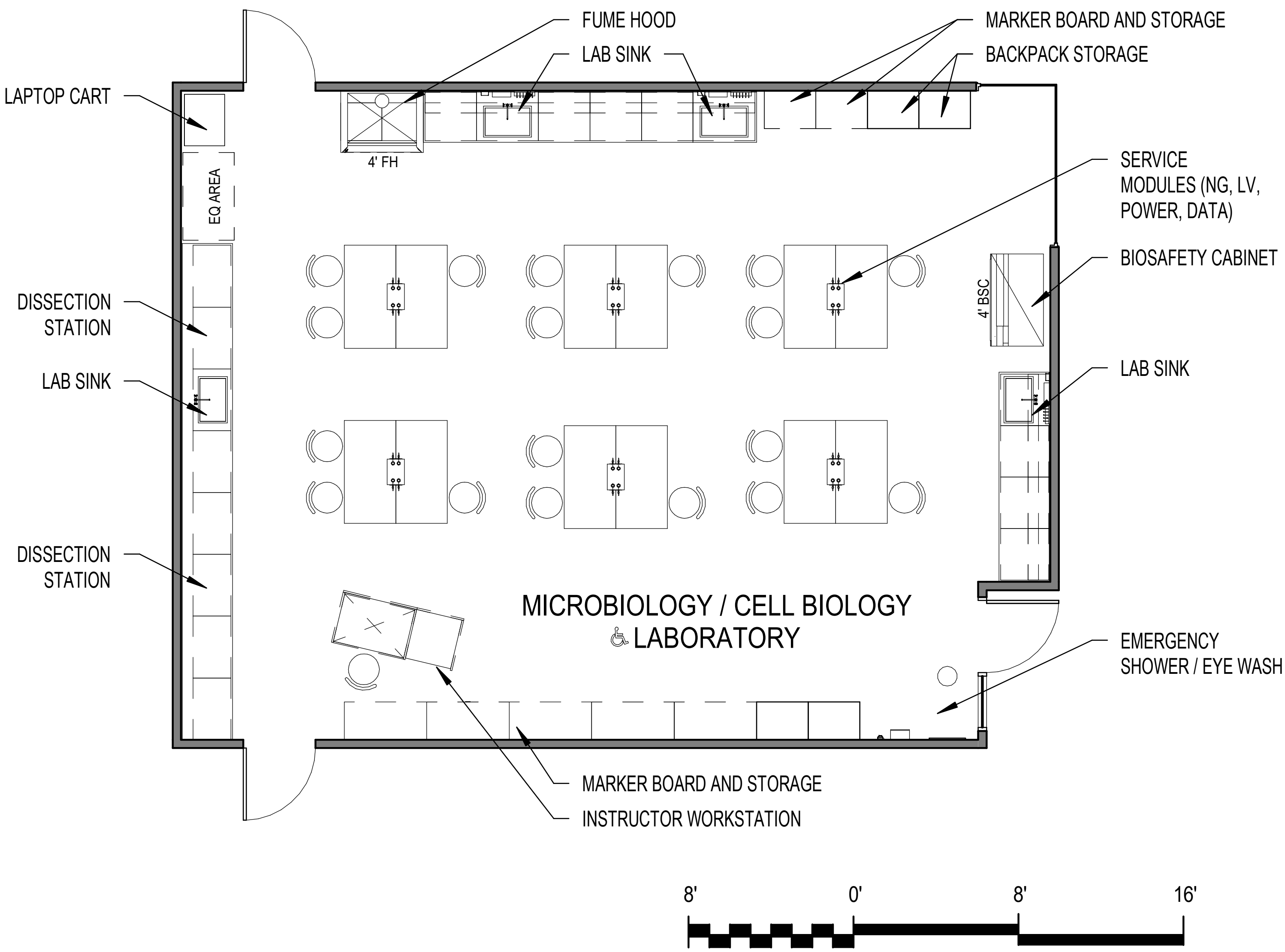
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-04
DRAWING NUMBER

MICROBIOLOGY / CELL BIOLOGY LABORATORY
DRAWING TITLE



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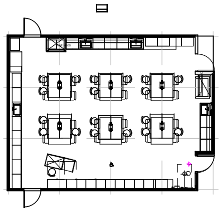


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: BIOLOGY LABS

RDS: 4

Planning Information

Program Space Name: MICROBIOLOGY / CELL BIOLOGY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	18

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	MICRO BIO SUPPORT / PREP
Indirect Adjacency:	CLASSROOM / RECITATION RM
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	ZONED & RM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	2 - DISSECTING STATION

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK - STANDING & ACCESSIBLE HEIGHT
MICROSCOPE CABINETS
BACKPACK STORAGE

Equipment:

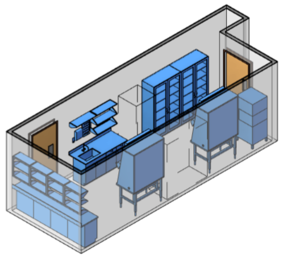
SMART INSTRUCTOR WORKSTATION
LAPTOP CART
(SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

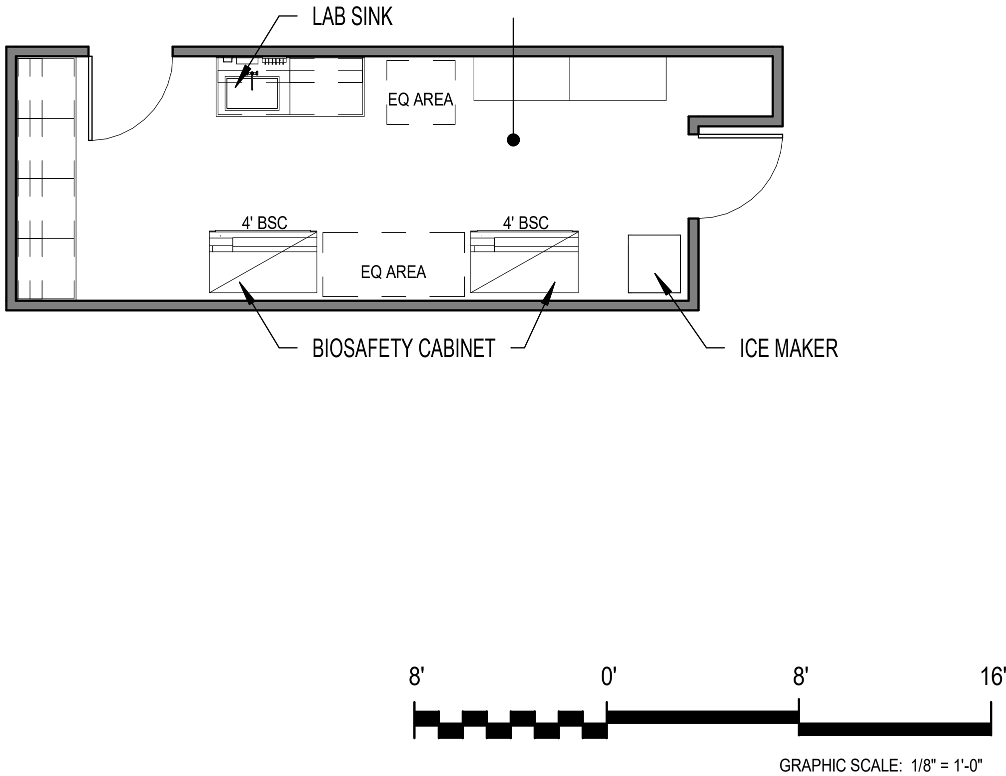


GUIDEPLATE SKETCH

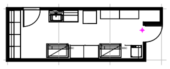
GP-05
DRAWING NUMBER

MICROBIOLOGY SUPPORT ROOMS
DRAWING TITLE

MICROBIOLOGY SUPPORT ROOMS



ROOM DATA SHEET



Program Space Types:
BIOLOGY LABS

RDS: 5

Planning Information

Program Space Name: MICROBIOLOGY SUPPORT ROOM

Notes: EQ SUPPORT RM FOR M.B. LABORATORY

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	320 SF
Program Space Qty:	3
Room Occupancy:	N/A

Architectural Requirements

Room Width:	10' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	MICROBIOLOGY LABORATORY
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	N/A
Light Control:	ROOM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	No
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	No
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
ONE (1) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	Yes
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	2
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK - STANDING & ACCESSIBLE HEIGHT

Equipment:

MICRO BIO: 4 DOUBLE STACKED CO2 INCUBATORS, 4 SMALL REFRIDGERATORS, ICEMAKER
CELL BIO: -80C FREEZER, SHAKERS, BIOSAFETY CABINETS (SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

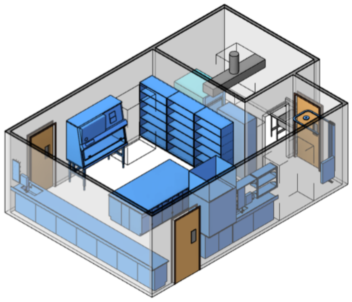
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

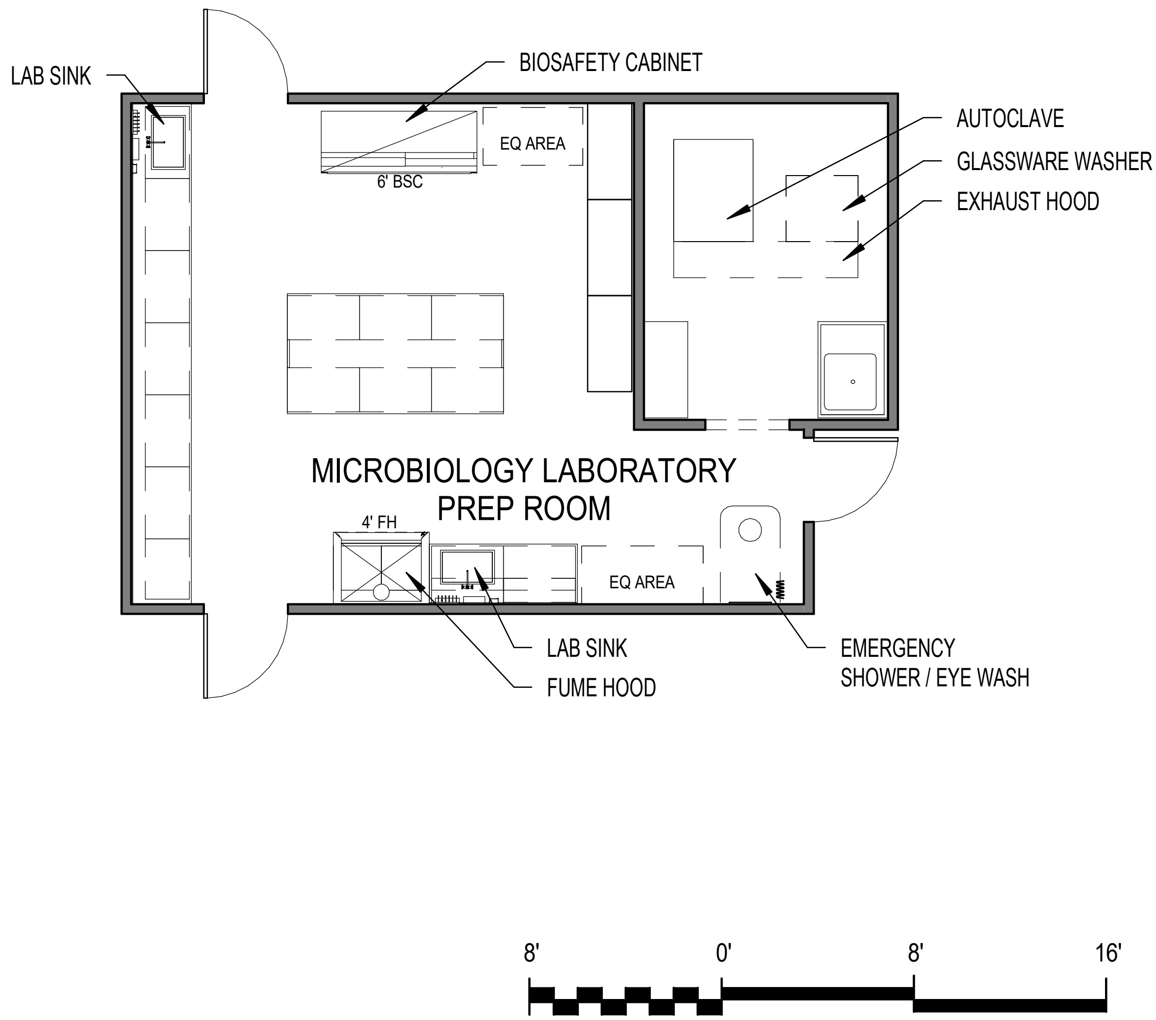
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-06
DRAWING NUMBER

MICROBIOLOGY LABORATORY PREP ROOM
DRAWING TITLE





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

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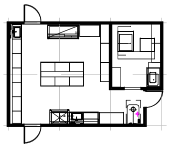


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 6

Planning Information

Program Space Name: MICROBIOLOGY LABORATORY PREP ROOM

Notes:

Program Space Number:	215
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	640 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	21' - 4"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	MICROBIOLOGY LABORATORY
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	ROOM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes (LOCAL POLISHER)
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	1
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK - STANDING & ACCESSIBLE HEIGHT
FULL HEIGHT GLASSWARE CABINETS

Equipment:

UV GOGGLE CABINET
BIOSAFETY CABINET, MEDIUM SIZE AUTOCLAVE, (2) MEDIUM SIZE GLASSWARE WASHER

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

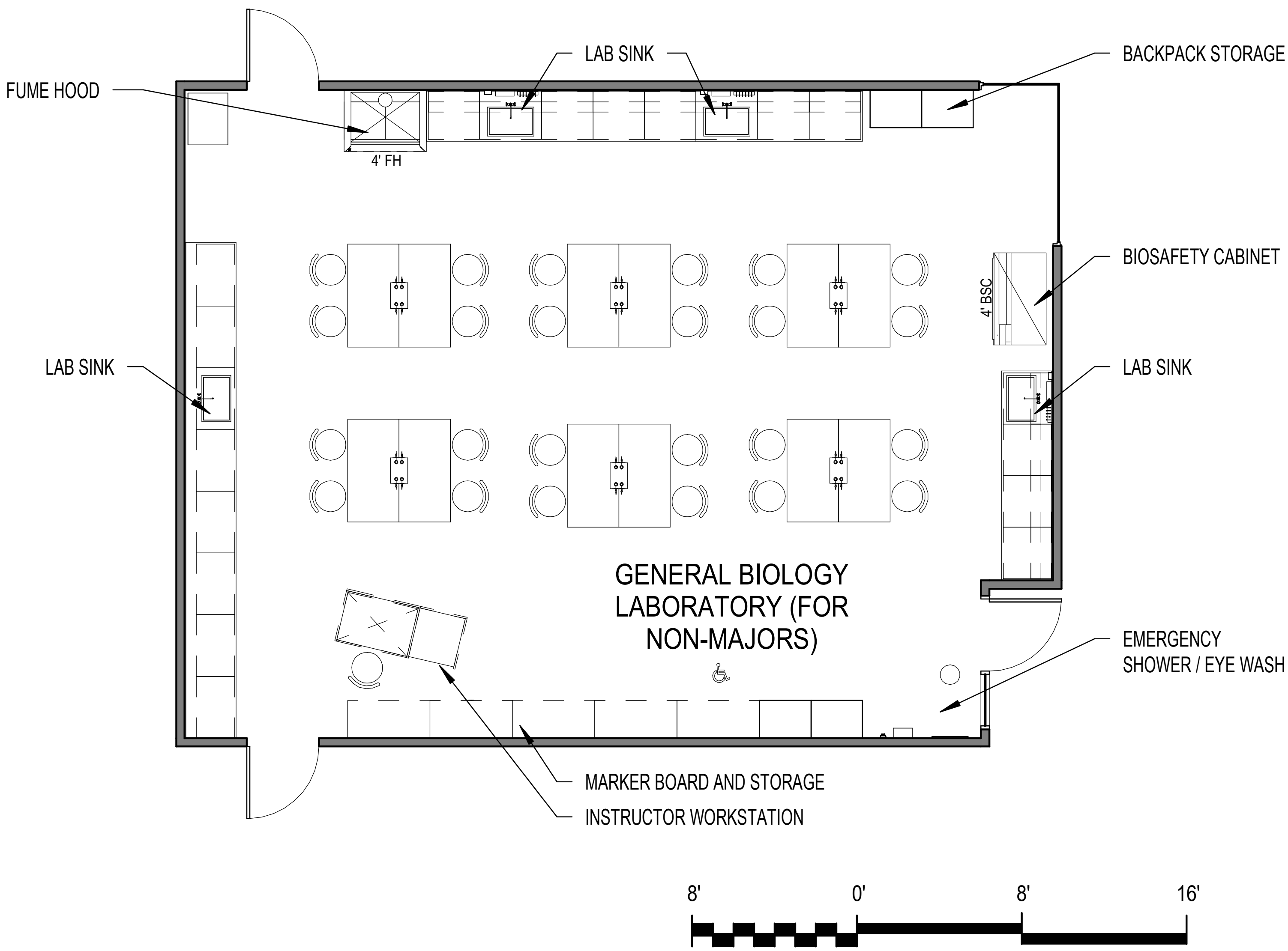
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-07
DRAWING NUMBER

GENERAL BIOLOGY LABORATORY (FOR NON-MAJORS)
DRAWING TITLE



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

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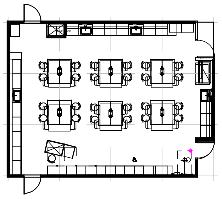


Program Space Types:
BIOLOGY LABS

RDS: 7

Planning Information

Program Space Name: GENERAL BIOLOGY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	2
Room Occupancy:	24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	PREP & CLASSROOM / RECITATION
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	ZONED & RM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	2

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK STANDING & ACCEPTIBLE HEIGHT
FULL HEIGHT STORAGE CABINETS
BACKPACK STORAGE

Equipment:

SMART INSTRUCTOR WORKSTATION
LATOP CART
(SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

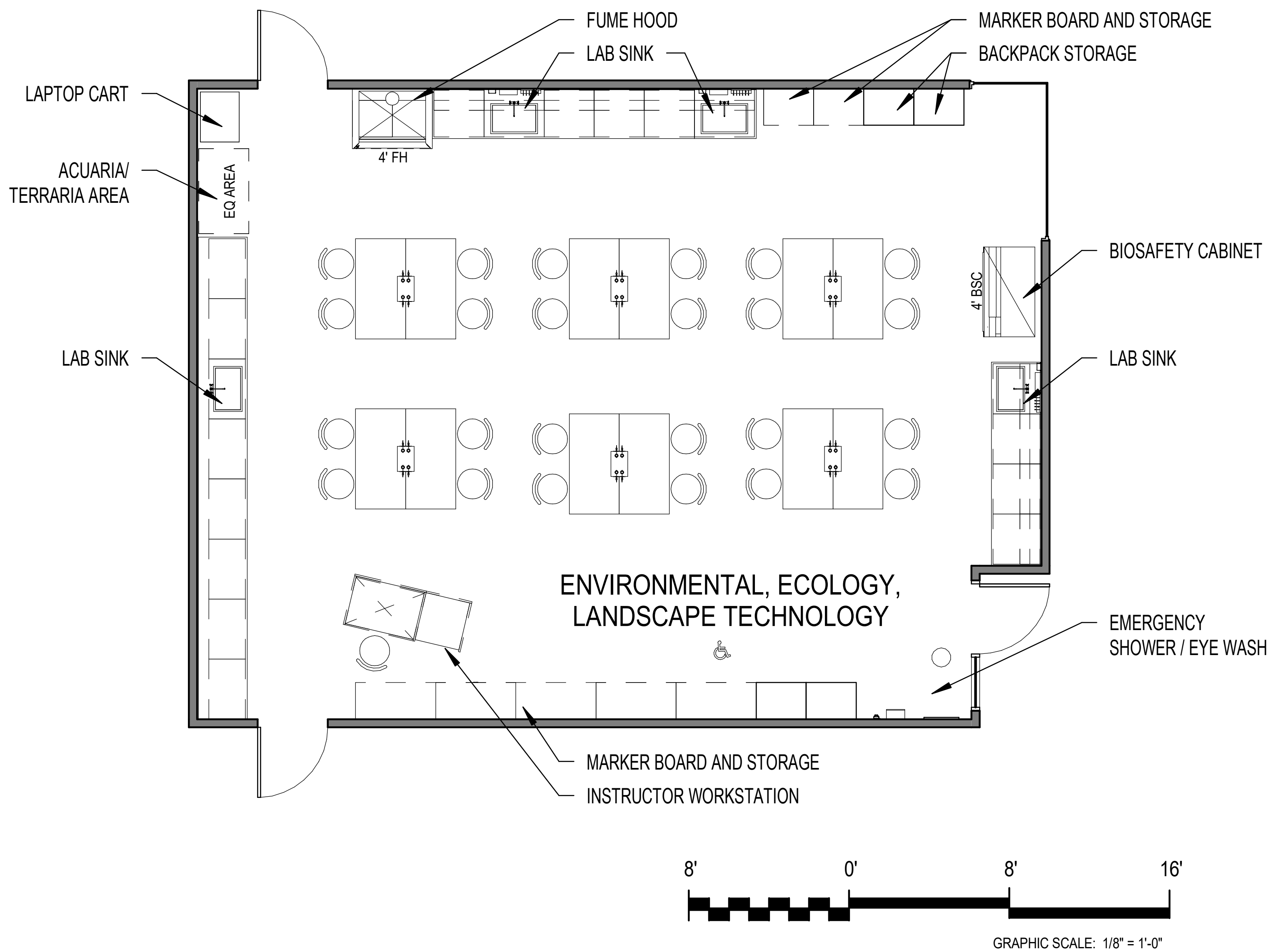
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-08
DRAWING NUMBER

ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECHNOLOGY
DRAWING TITLE



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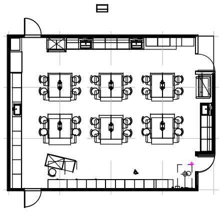


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 8

Planning Information

Program Space Name: ENVRIONMENTAL, ECOLOGY, LANDSCAPE TECHNOLOGY

Notes:

Program Space Number: 210
Program Space Type: BIOLOGY LABS
Program Space Area (NSF): 1280 SF
Program Space Qty: 1
Room Occupancy: 24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	Environmental Ecology, Landscape Tech Prep
Indirect Adjacency:	Greenhouse
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	Zoned & Rm Darkening
Shielding:	No
Equip Monitoring/Alarm:	No
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

SMART INSTRUCTOR WORKSTATION
LAPTOP CART
(SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

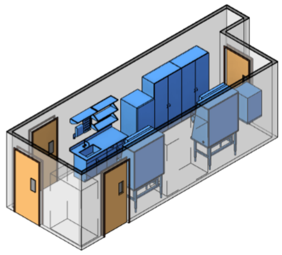
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

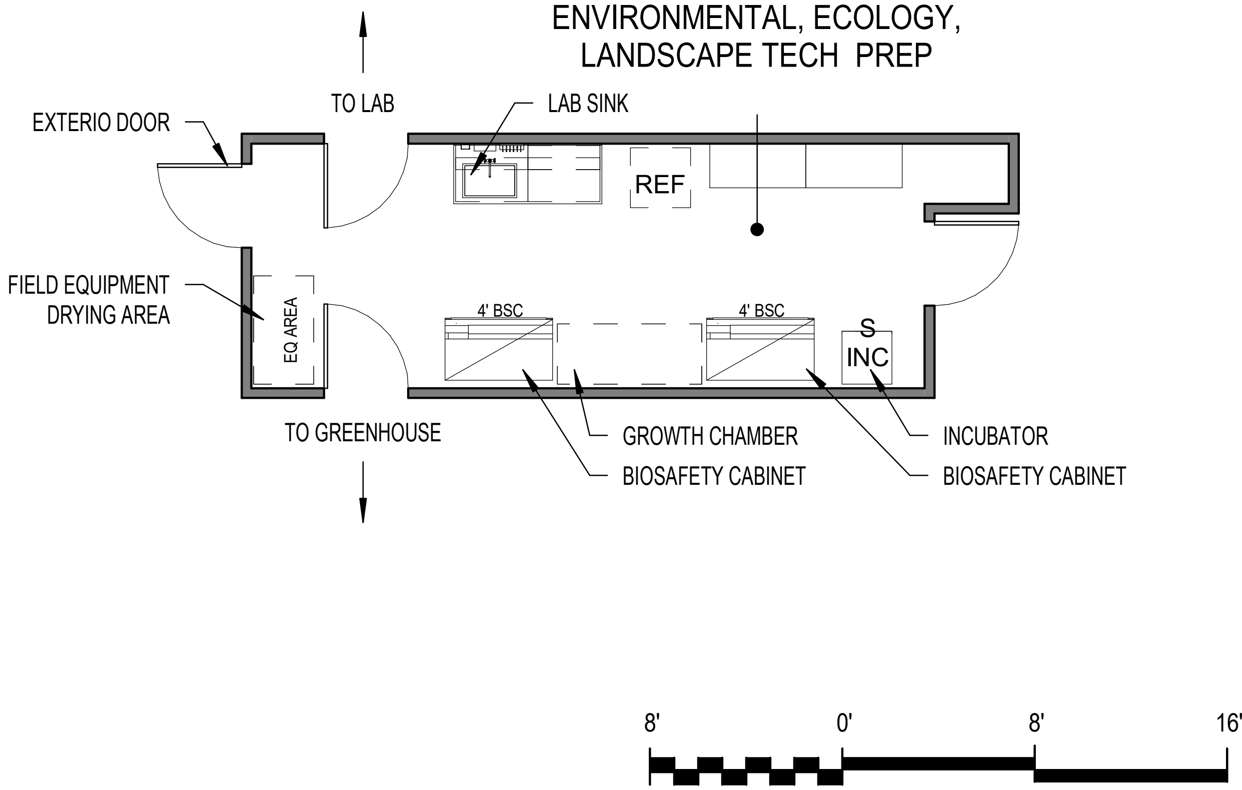
GUIDEPLATE SKETCH

GP-09
DRAWING NUMBER

GEN BIOLOGY/ ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECH PREP
DRAWING TITLE

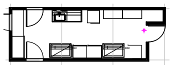


GEN BIOLOGY/ ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECH PREP



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

ROOM DATA SHEET



Program Space Types:
BIOLOGY LABS

RDS: 9

Planning Information

Program Space Name: ENVRIONMENTAL, ECOLOGY, LANDSCAPE TECH PREP

Notes:

Program Space Number:	215
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	320 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	10' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	Environmental, Ecology Landscape Tech & Outdoor
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	Room Darkening
Shielding:	
Equip Monitoring/Alarm:	No
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
TWO (2) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	2
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

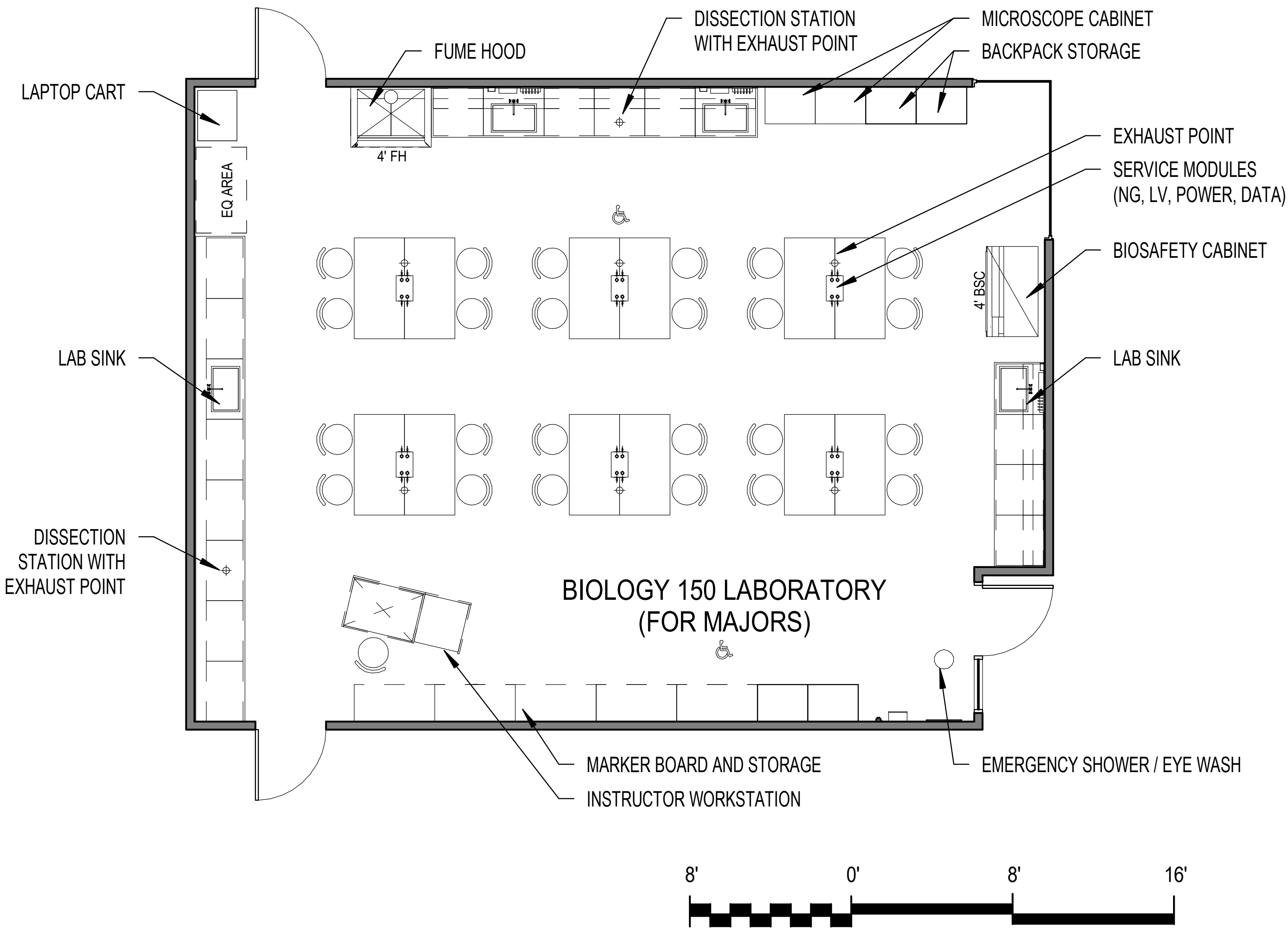
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

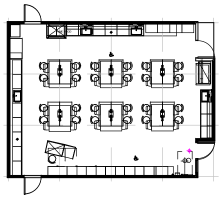
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-10
DRAWING NUMBER

BIOLOGY 150 LABORATORY (FOR MAJORS)
DRAWING TITLE





MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 10

Planning Information

Program Space Name: BIOLOGY 150 LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	4
Room Occupancy:	24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	BIOLOGY PREP
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes (LOCAL POLISHER)
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

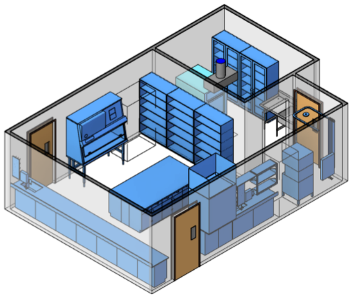
SMART INSTRUCTOR WORKSTATION
LAPTOP CART

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

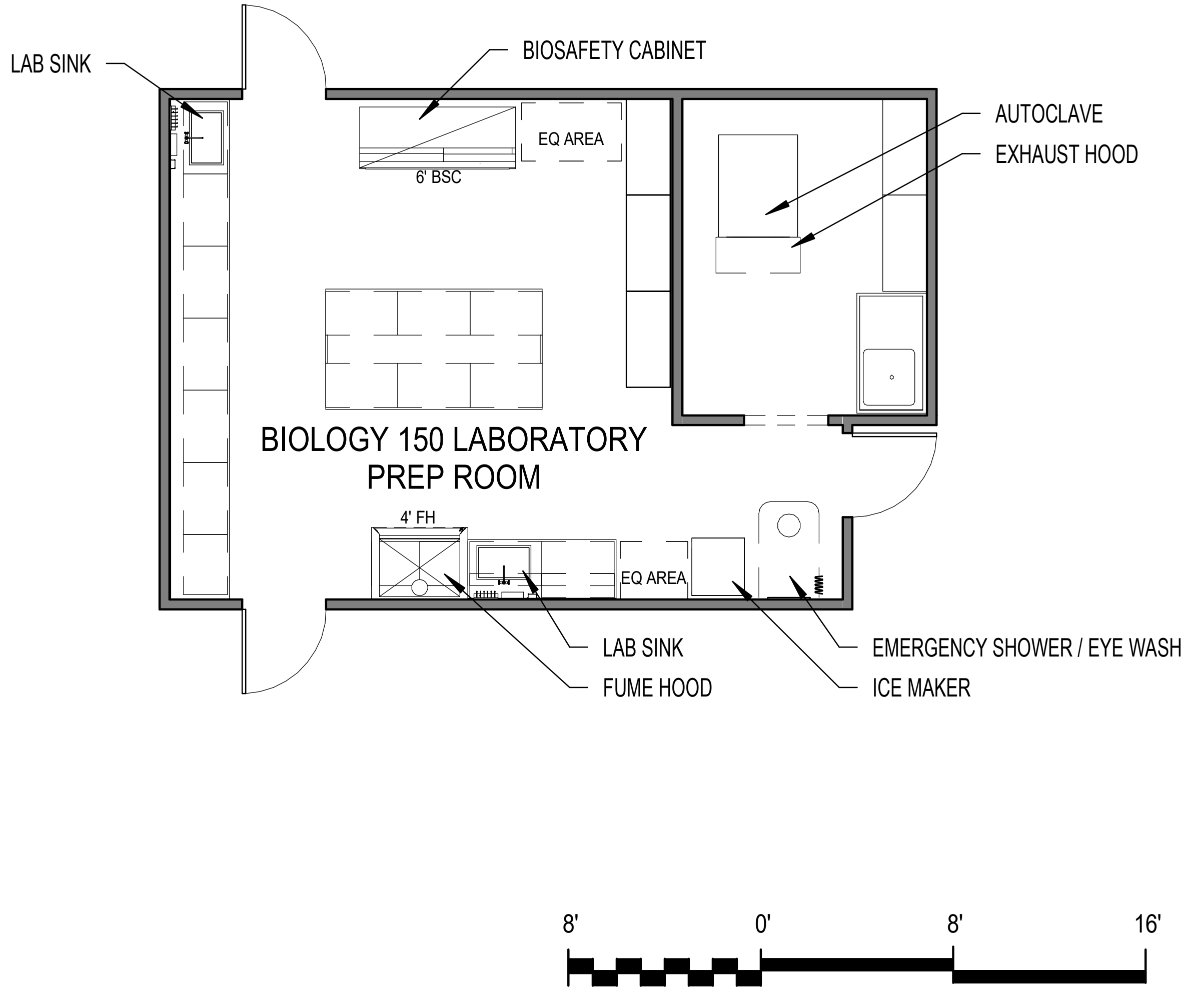
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



GUIDEPLATE SKETCH

GP-11
DRAWING NUMBER

BIOLOGY 150 LABORATORY PREP ROOM
DRAWING TITLE



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

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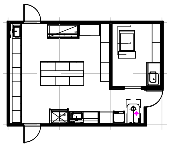


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 11

Planning Information

Program Space Name: BIOLOGY 150 LABORATORY PREP ROOM

Notes:

Program Space Number:	215
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	640 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	21' - 4"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	BIOLOGY LABS
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes (LOCAL POLISHER)
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	Yes
208V Emergency Power:	No
208V Standby Power:	Yes
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	1
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

ICEMAKER
BIOSAFETY CABINET

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

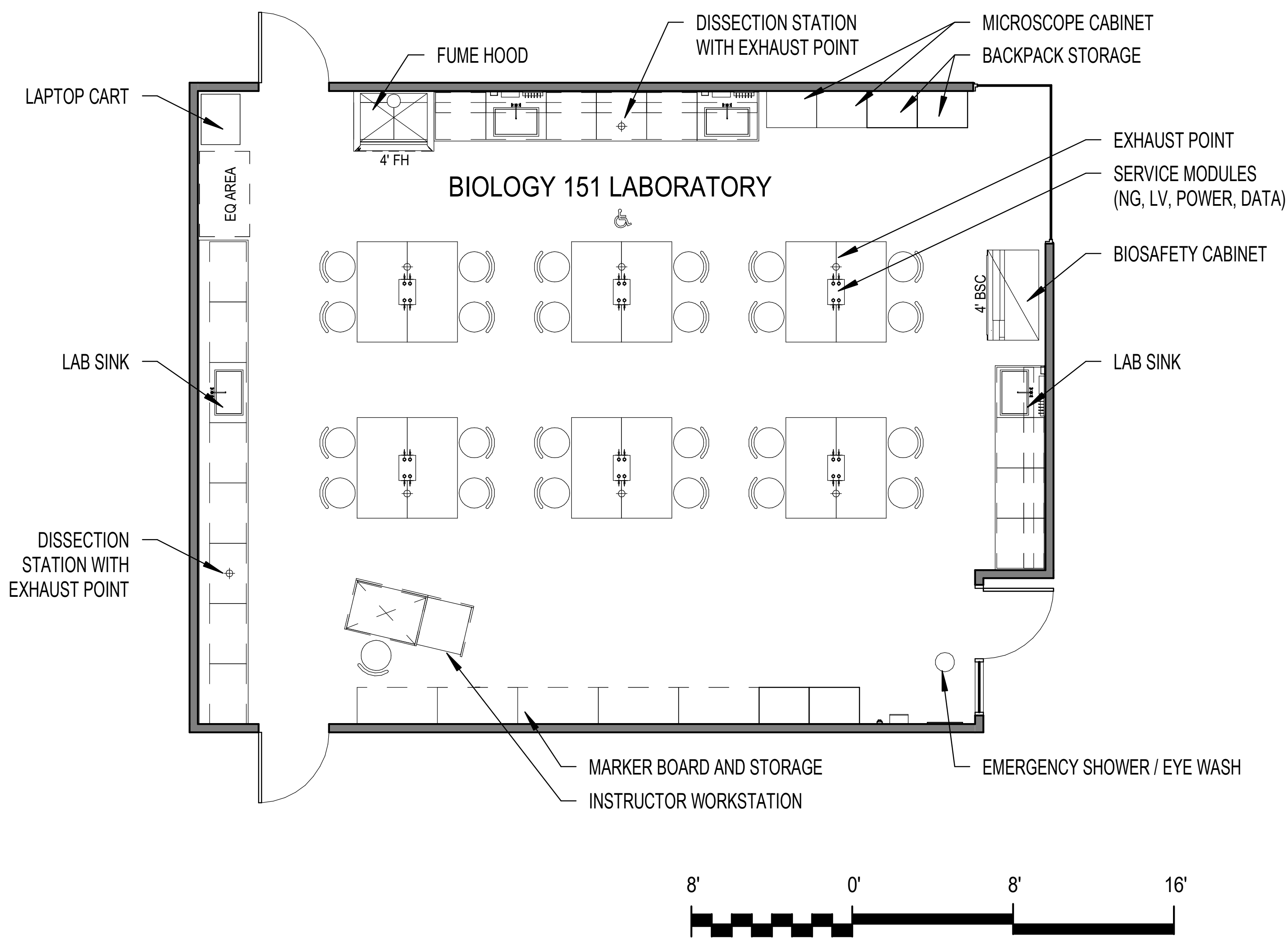
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-12
DRAWING NUMBER

BIOLOGY 151 LABORATORY
DRAWING TITLE



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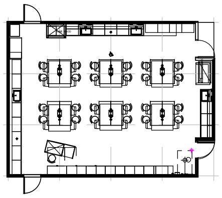


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 12

Planning Information

Program Space Name: BIOLOGY 151 LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	BIOLOGY PREP
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	8

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

SMART INSTRUCTOR WORK STATION
LAPTOP CART

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

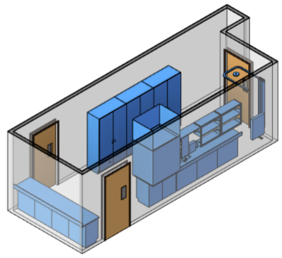
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

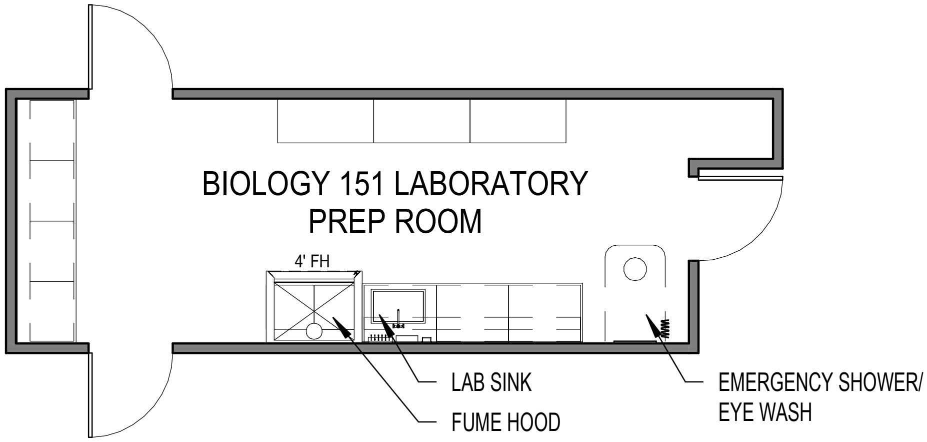
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-13
DRAWING NUMBER

BIOLOGY 151 LABORATORY PREP ROOM
DRAWING TITLE





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

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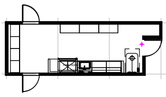


ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 13

Planning Information

Program Space Name: BIOLOGY 151 LABORATORY PREP ROOM

Notes:

Program Space Number:	215
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	320 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	10' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	BIOLOGY LABS
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes (LOCAL POLISHER)
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
ONE (1) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

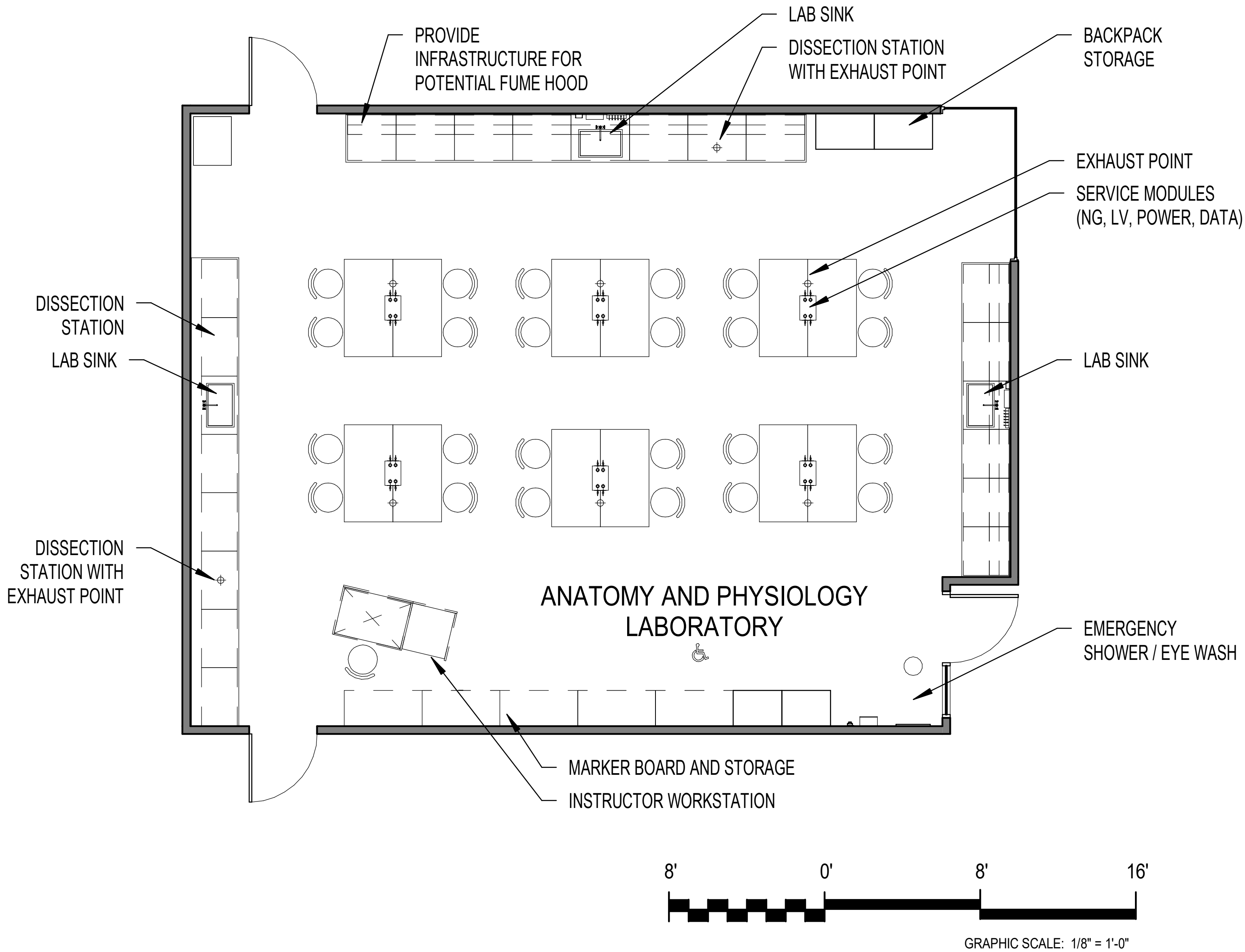
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

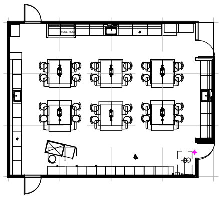
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-14
DRAWING NUMBER

ANATOMY AND PHYSIOLOGY LABORATORY
DRAWING TITLE





MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 14

Planning Information

Program Space Name: ANATOMY AND PHYSIOLOGY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	3
Room Occupancy:	24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
PROVIDE WITH CURTIANS AT ALL WINDOWS

Direct Adjacency:	
Indirect Adjacency:	SKELETON ROOM
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	8

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

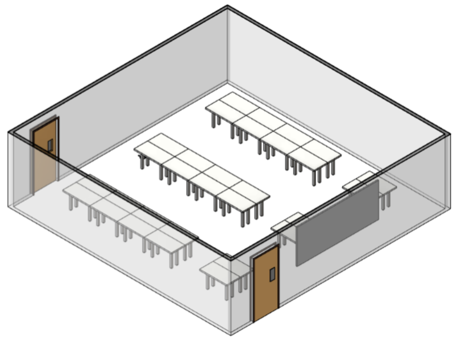
Equipment:

SMART INSTRUCTOR WORKSTATION
HIGH RESOLUTION PROJECTOR

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

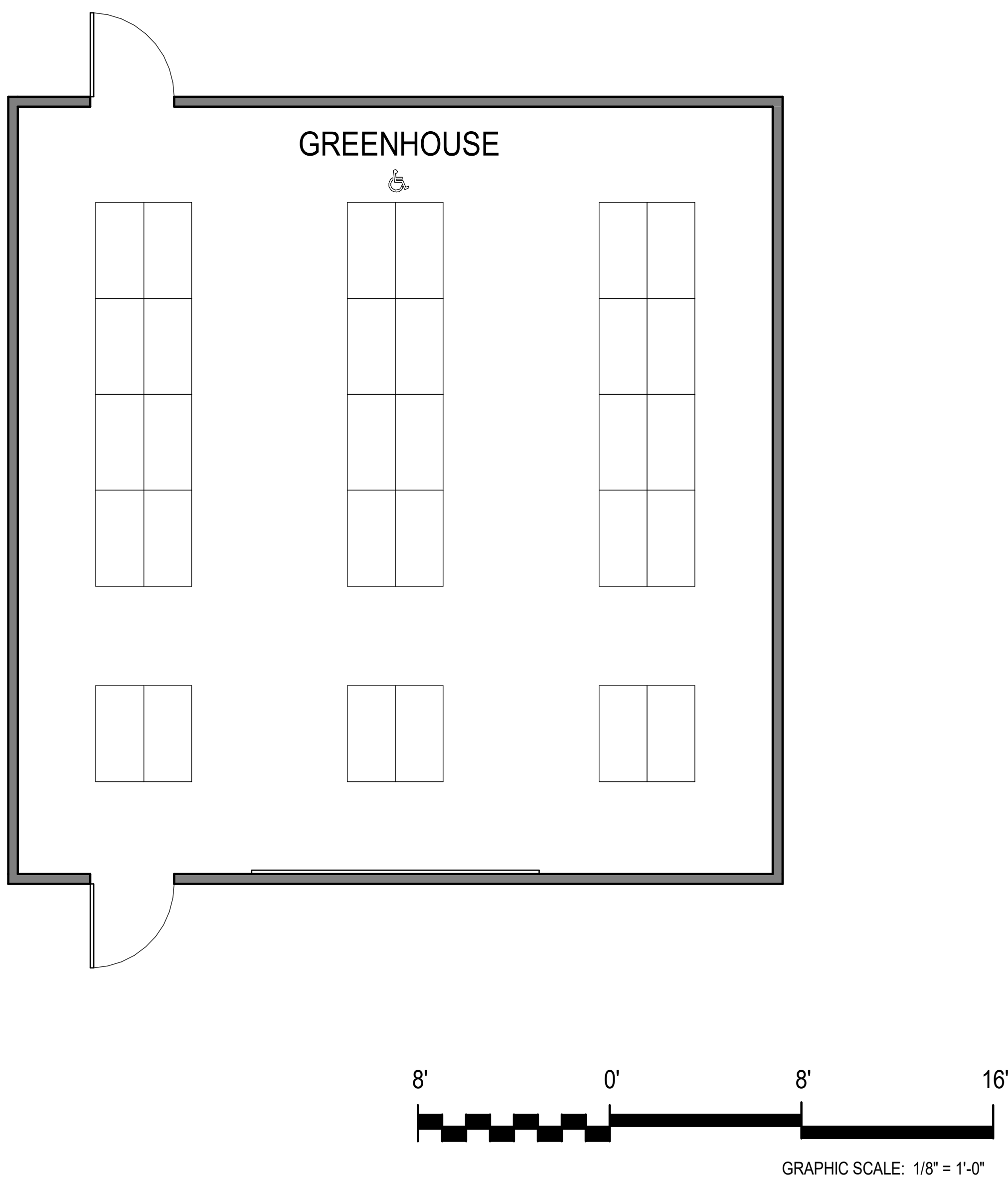


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-16
DRAWING NUMBER

GREENHOUSE
DRAWING TITLE



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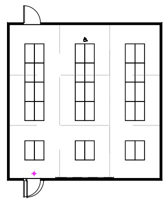


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 16

Planning Information

Program Space Name: GREENHOUSE

Notes:

Program Space Number:	580
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	960 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	32' - 0"
Room Height:	9' - 0"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	N/A
Security:	YES
Light Levels:	SPECIAL

Architectural Notes:
SUBDIVIDABLE INTO 3 ZONES

Direct Adjacency:	HEAD HOUSE
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	YES-SPECIAL
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:
HOSE BIB AND IRRIGATION SYSTEM
TWO (2) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
SPECIAL EXHAUST DURING PEST FUMIGATION

Equipment/Special Casework Requirements (per Room Type)

Casework:

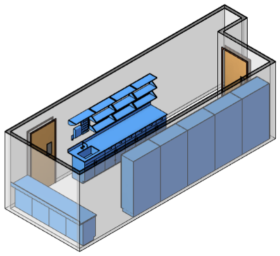
Equipment:

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	No
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

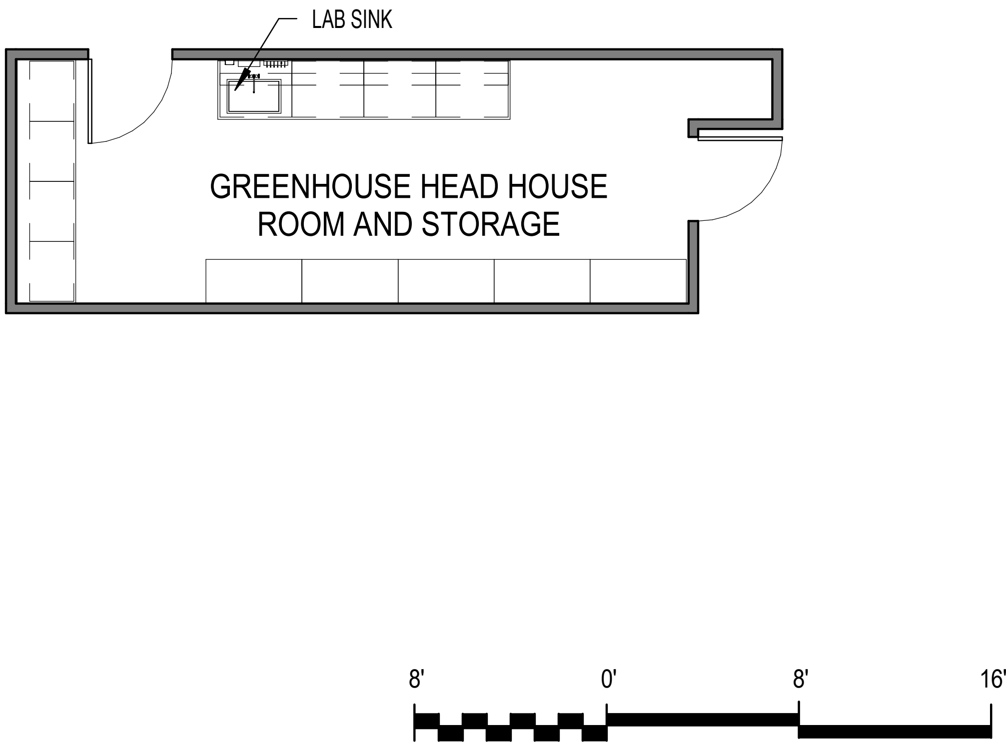
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



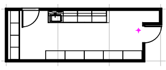
GUIDEPLATE SKETCH

GP-17
DRAWING NUMBER

GREENHOUSE HEAD HOUSE ROOM AND STORAGE
DRAWING TITLE



ROOM DATA SHEET



Program Space Types:
BIOLOGY LABS

RDS: 17

Planning Information

Program Space Name: GREENHOUSE HEADHOUSE

Notes:

Program Space Number:	585
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	320 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	10' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	N/A
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	GREENHOUSE / EXTERIOR
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	NO
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

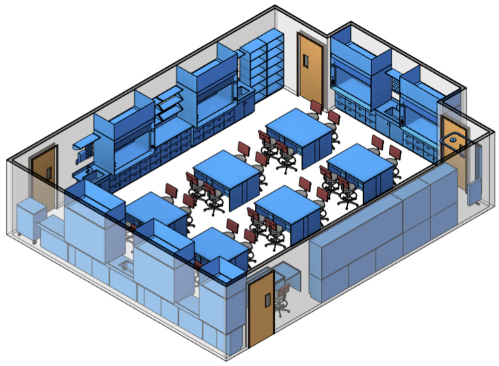
Casework:

Equipment:

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	No
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

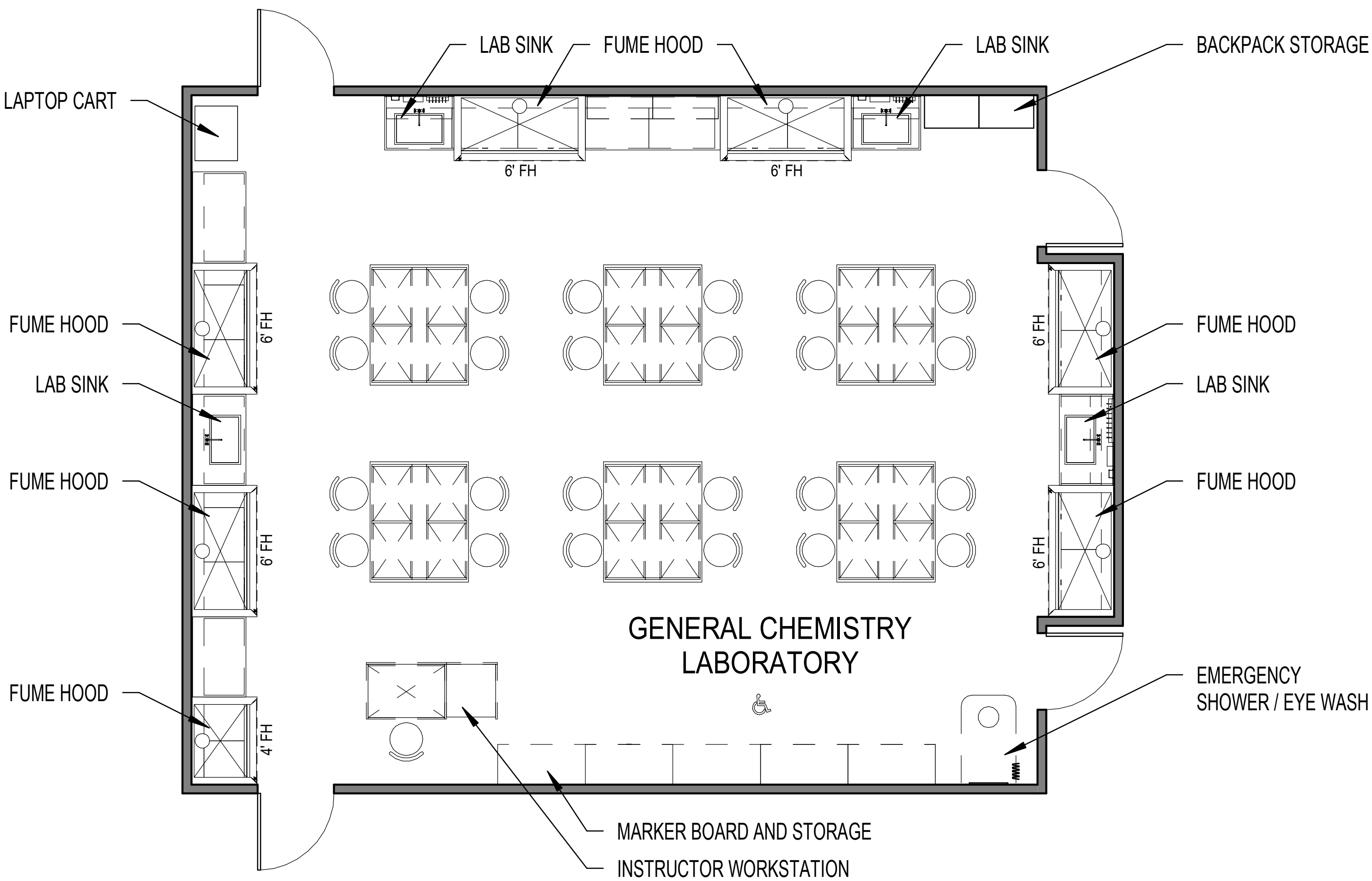


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-18
DRAWING NUMBER

GENERAL CHEMISTRY LABORATORY
DRAWING TITLE



NOTE: DISTILLATION RACK TO ALL FUME HOODS

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

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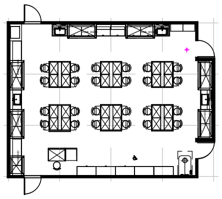


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 18

Planning Information

Program Space Name: GENERAL CHEMISTRY LAB

Notes:

Program Space Number:	210
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	1200 SF
Program Space Qty:	4
Room Occupancy:	24 STUDENTS + 1 INSTRUCTOR

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	CENTRAL CHEMISTRY PREP & STORAGE
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	SHIELDED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	Yes
208V Emergency Power:	No
208V Standby Power:	Yes
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	7
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD; SIX (6) 6'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

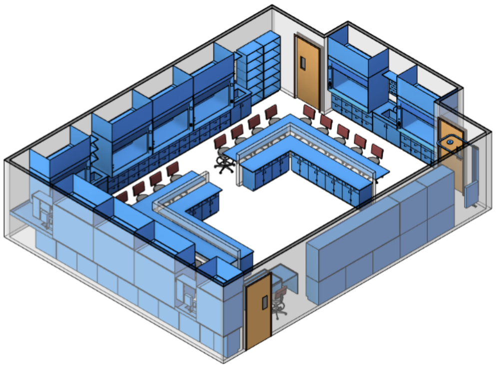
SMART INSTRUCTOR WORKSTATION
LAPTOP CART

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	MASS NOTIFICATION DEVICE

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

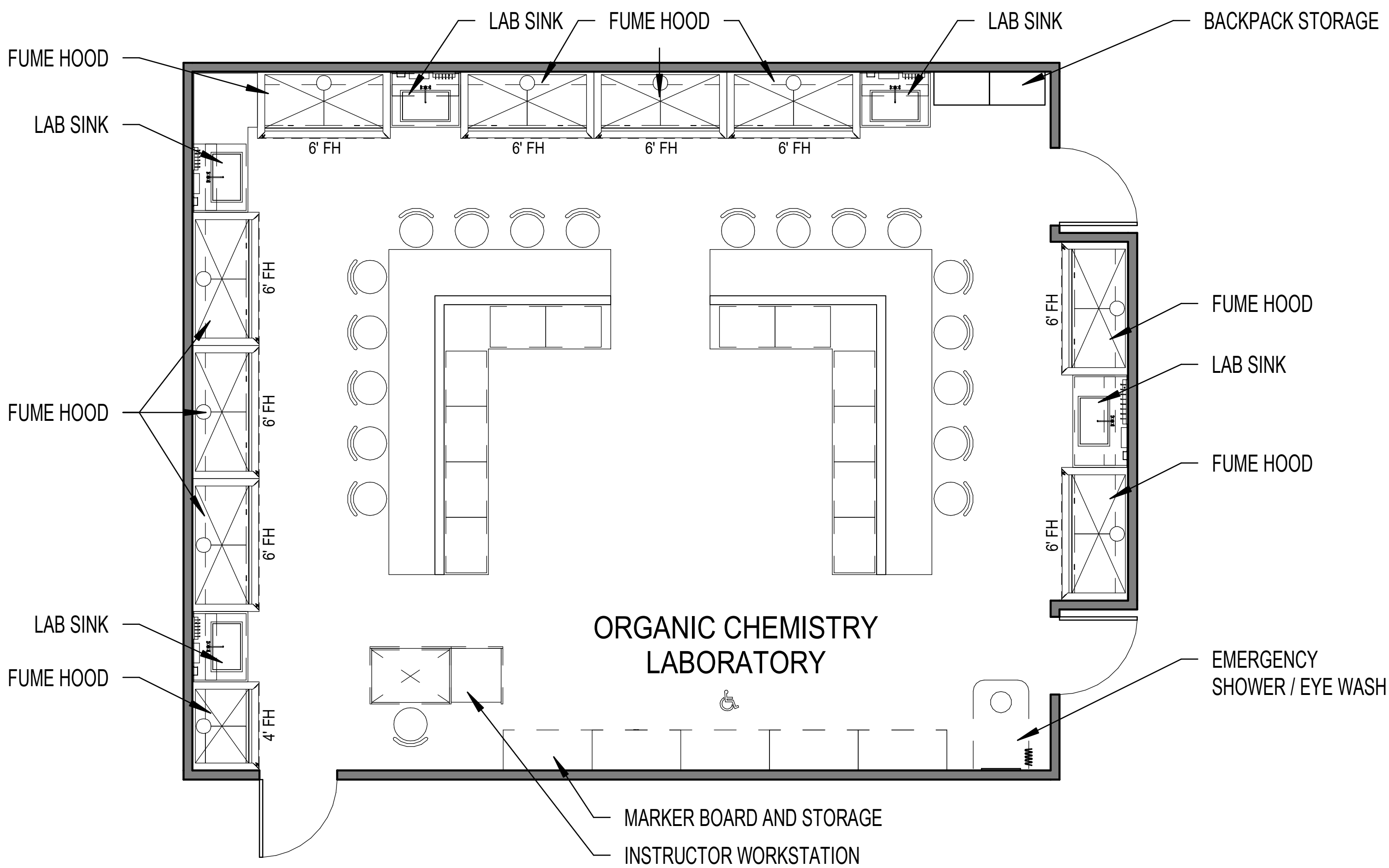
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



GUIDEPLATE SKETCH

GP-19
DRAWING NUMBER

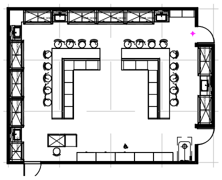
ORGANIC CHEMISTRY LABORATORY
DRAWING TITLE



NOTE: DISTILLATION RACK TO ALL FUME HOODS

8' 0' 8' 16'

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



MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 19

Planning Information

Program Space Name: ORGANIC CHEMISTRY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	1200 SF
Program Space Qty:	1
Room Occupancy:	16-18 STUDENTS + 1 INSTRUCTOR

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	INSTRUMENTATION ROOM
Indirect Adjacency:	CENTRAL CHEMISTRY PREP AND STORAGE
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FIVE (5) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	10
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD; NINE (9) 6'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

SMART INSTRUCTOR WORKSTATION

Accessories:

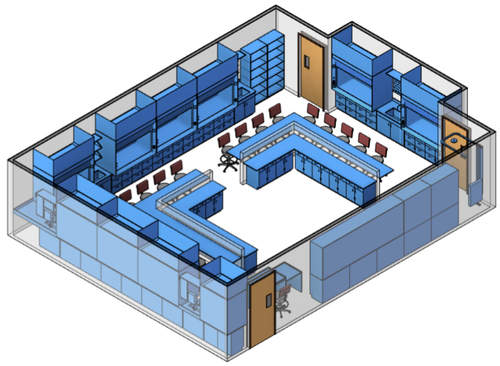
White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

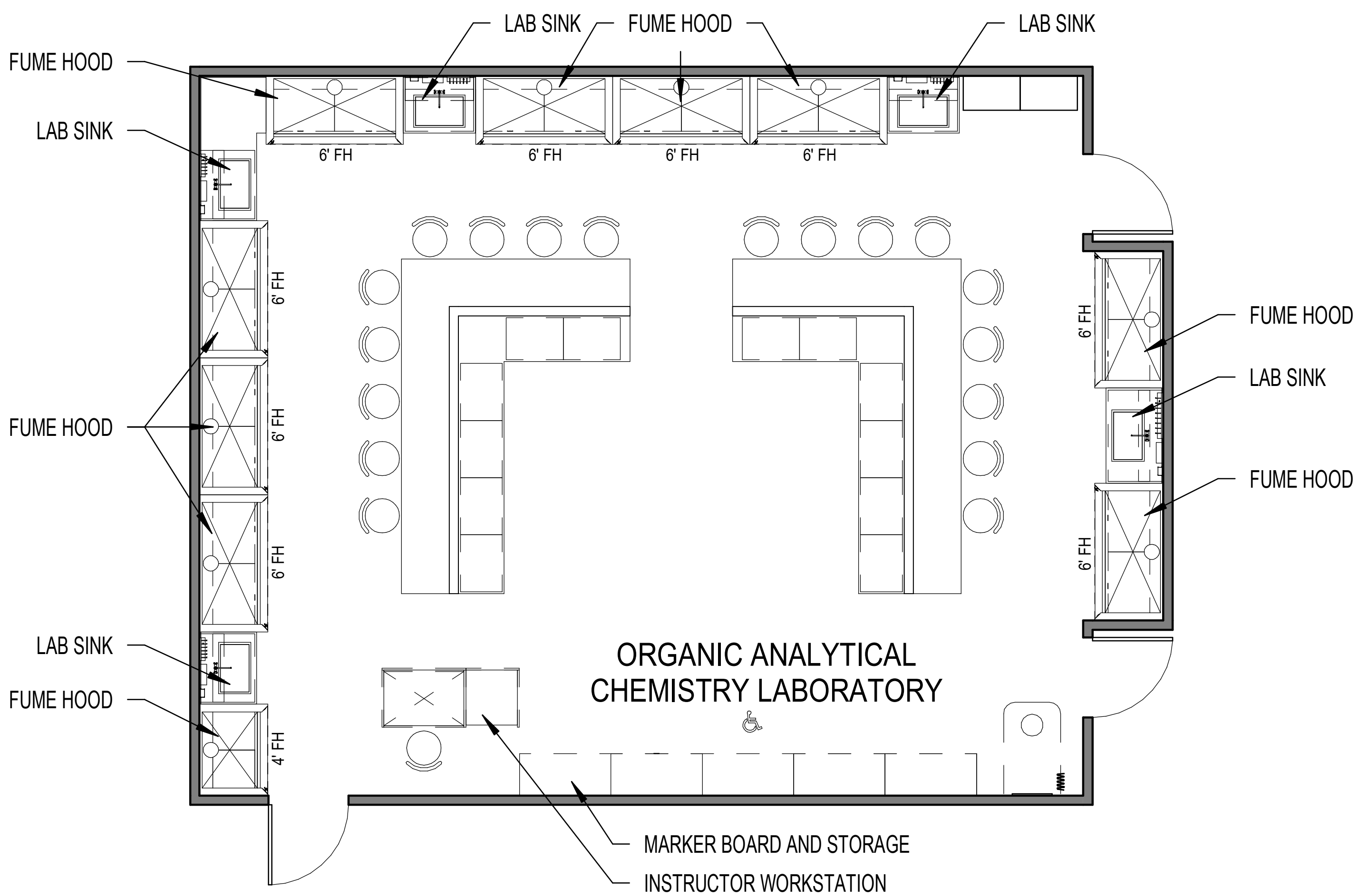
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-20
DRAWING NUMBER

ORGANIC ANALYTICAL CHEMISTRY LABORATORY
DRAWING TITLE

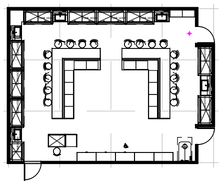




NOTE: DISTILLATION RACK TO ALL FUME HOODS

8' 0' 8' 16'

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



ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 20

Planning Information

Program Space Name: ORGANIC ANALYTICAL CHEMISTRY LAB

Notes:

Program Space Number:	210
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	1200 SF
Program Space Qty:	1
Room Occupancy:	16-18 STUDENTS + 1 INSTRUCTOR

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	INSTRUMENTATION ROOM
Indirect Adjacency:	CENTRAL CHEMISTRY PREP AND STORAGE
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FIVE (5) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	10
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD; NINE (9) 6'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:
SMART INSTRUCTOR WORKSTATION

Accessories:

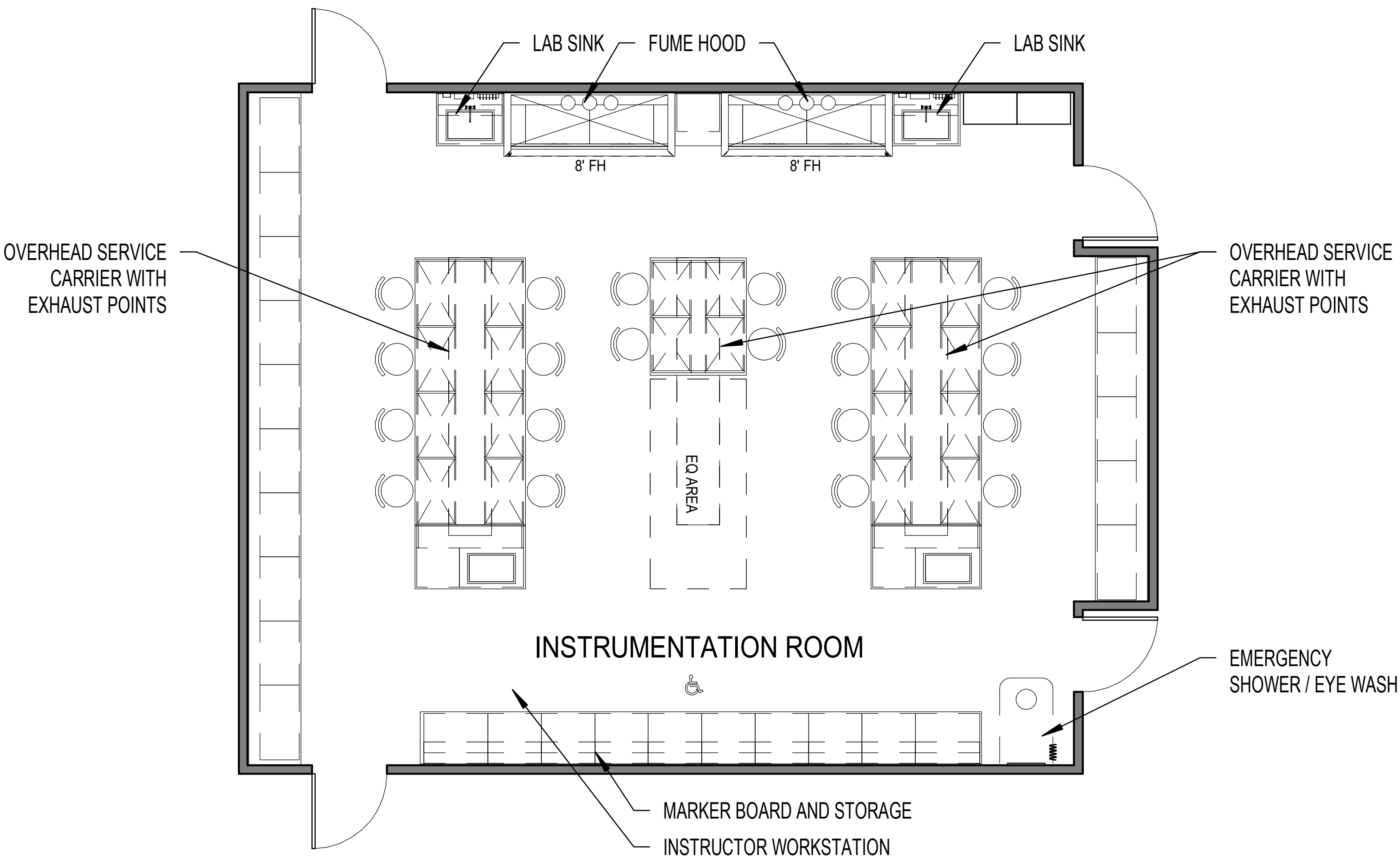
White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-21
DRAWING NUMBER

INSTRUMENTATION ROOM
DRAWING TITLE



NOTE: DISTILLATION RACK TO ALL FUME HOODS

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

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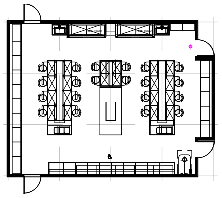
LEGGETT MATH AND SCIENCE BUILDING



ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 21

Planning Information

Program Space Name: INSTRUMENTATION ROOM

Notes:

Program Space Number:	210
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	ORGANIC/ANALYTICAL CHEMISTRY
Indirect Adjacency:	CENTRAL CHEMISTRY PREP AND STORAGE
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	Yes
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	2
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	2

Mechanical Notes:
TWO (2) 8'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

Casework:

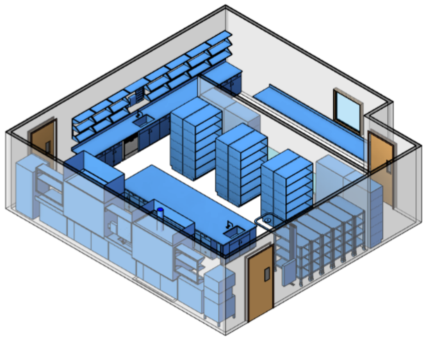
Equipment:

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

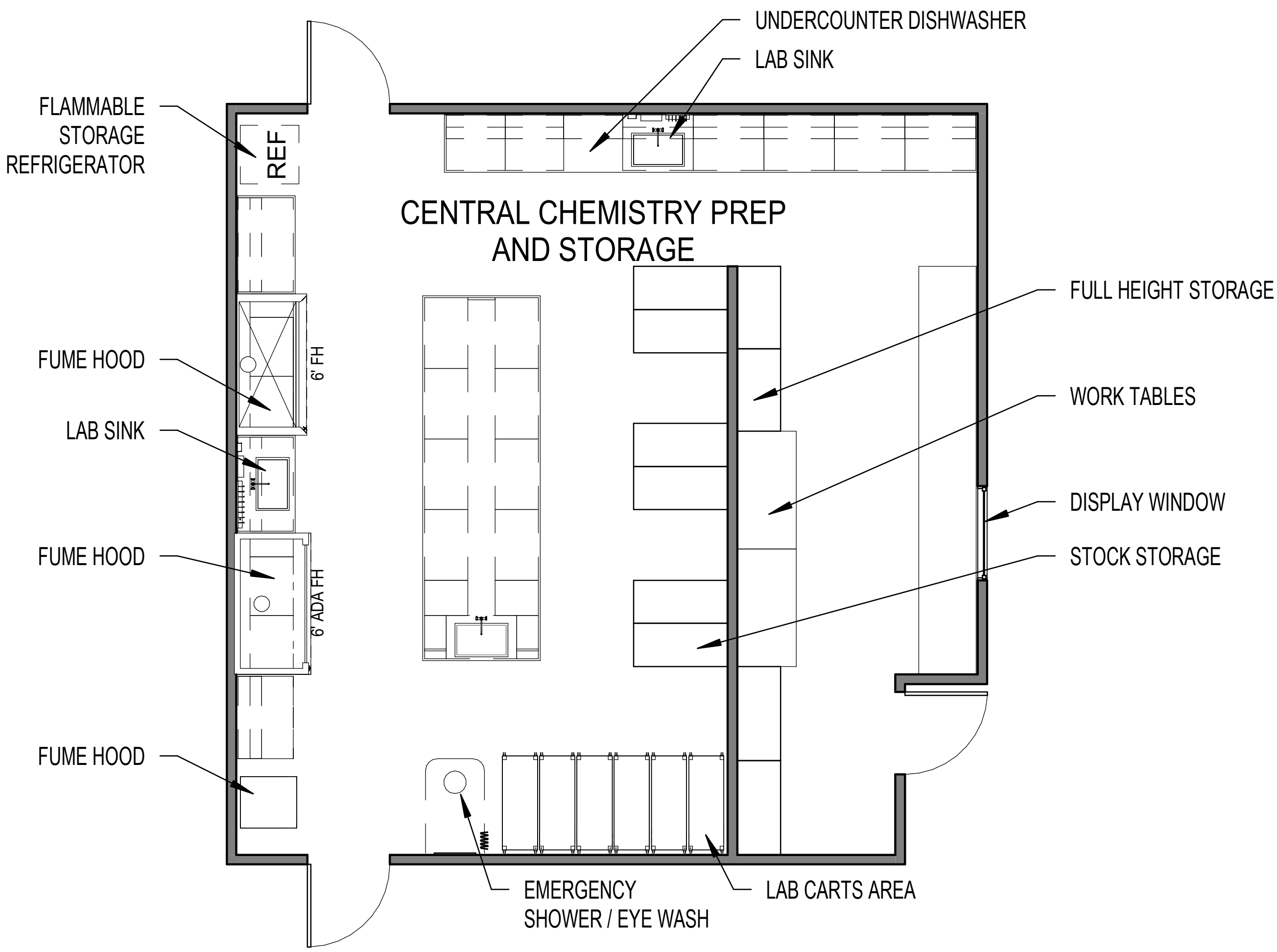
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



GUIDEPLATE SKETCH

GP-22
DRAWING NUMBER

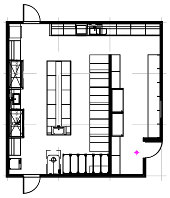
CENTRAL CHEMISTRY PREP AND STORAGE
DRAWING TITLE



NOTE: DISTILLATION RACK AND CUP SINK TO ALL FUME HOODS

8' 0' 8' 16'

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



MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 22

Planning Information

Program Space Name: CENTRAL CHEMISTRY PREP AND STORAGE

Notes:

Program Space Number:	215
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	960 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
DISPENSING WINDOW

Direct Adjacency:	
Indirect Adjacency:	CHEMISTRY LABS
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	Yes (LOCAL COLLECTION)

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	Yes
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	2
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
TWO (2) 6'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

DISH WASHER
FLAMMABLE STORAGE
STORAGE REFRIGERATOR

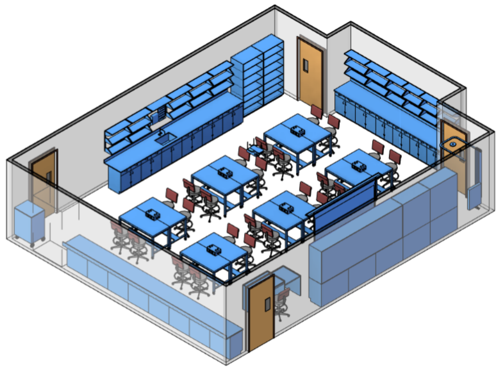
Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

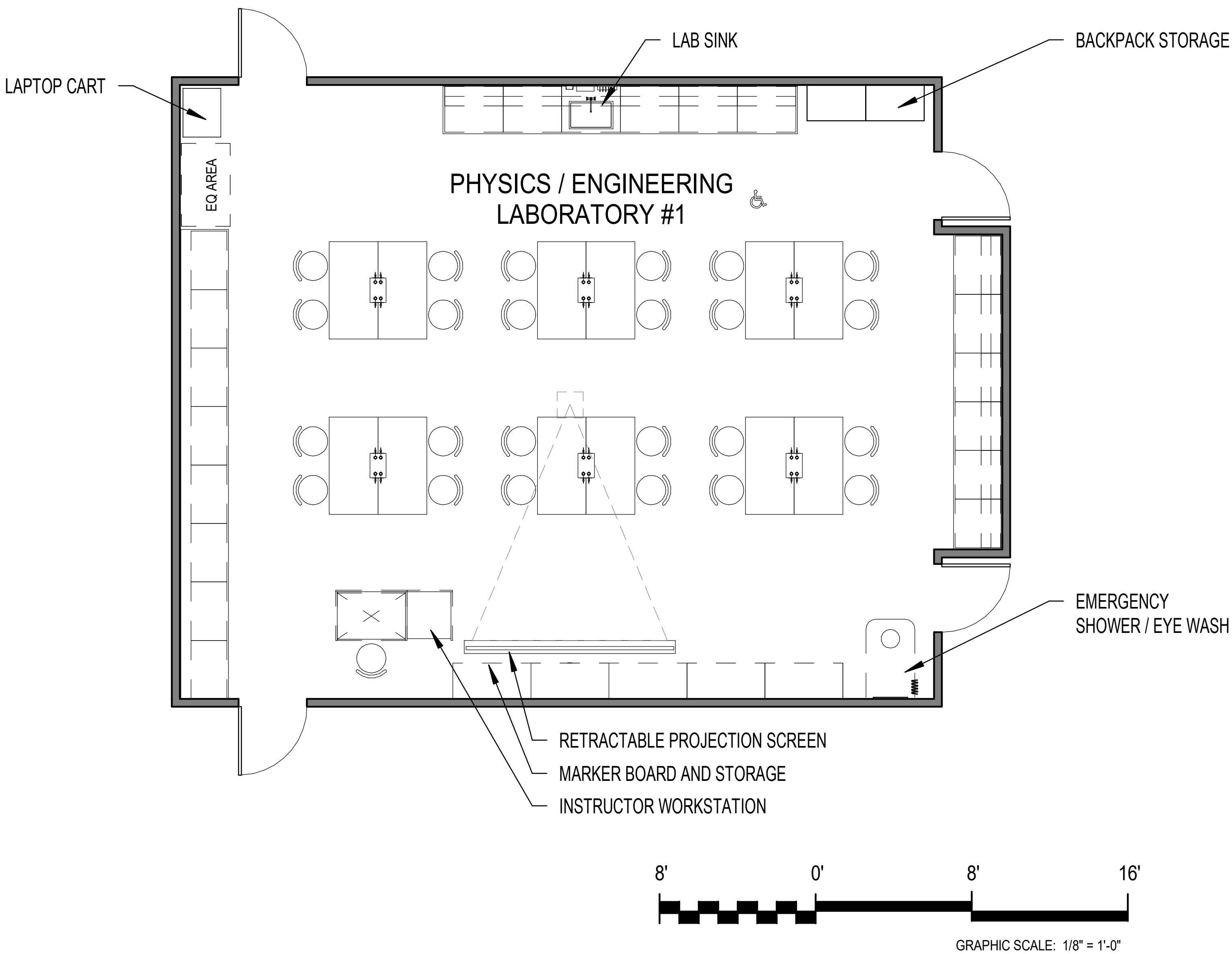
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH



GP-23
DRAWING NUMBER

PHYSICS / ENGINEERING LABORATORY #1
DRAWING TITLE



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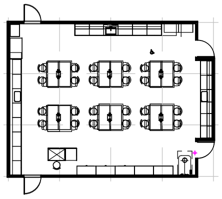


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: **RDS:** 23

ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

Planning Information

Program Space Name: PHYSICS/ENGINEERING LABORATORY #1

Notes:

Program Space Number:	
Program Space Type:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Direct Adjacency:	PHYSCIS PREP
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Architectural Notes:

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

SMART INSTRUCTOR WORKSTATION
LAPTOP CART
HIGH RESOLUTION PROJECTOR

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

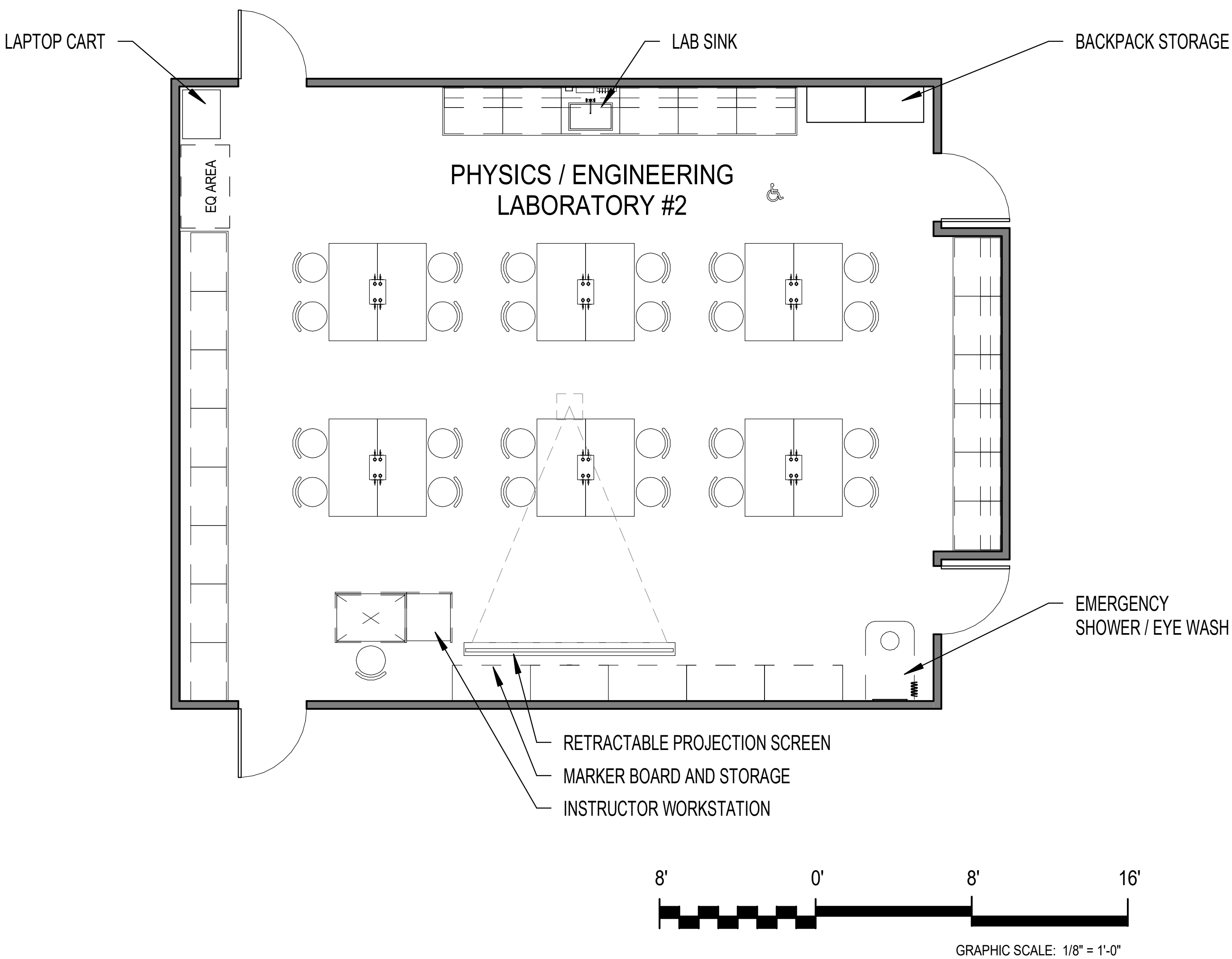
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-24
DRAWING NUMBER

PHYSICS / ENGINEERING LABORATORY #2
DRAWING TITLE



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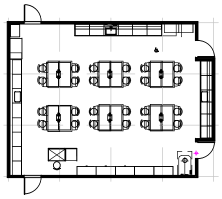


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 24

Planning Information

Program Space Name: PHYSICS/ENGINEERING LABORATORY #2

Notes:

Program Space Number:	
Program Space Type:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	PHYSCIS PREP
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

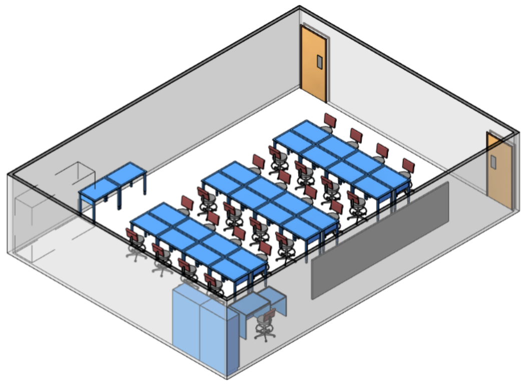
Equipment:

SMART INSTRUCTOR WORKSTATION
LAPTOP CART

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

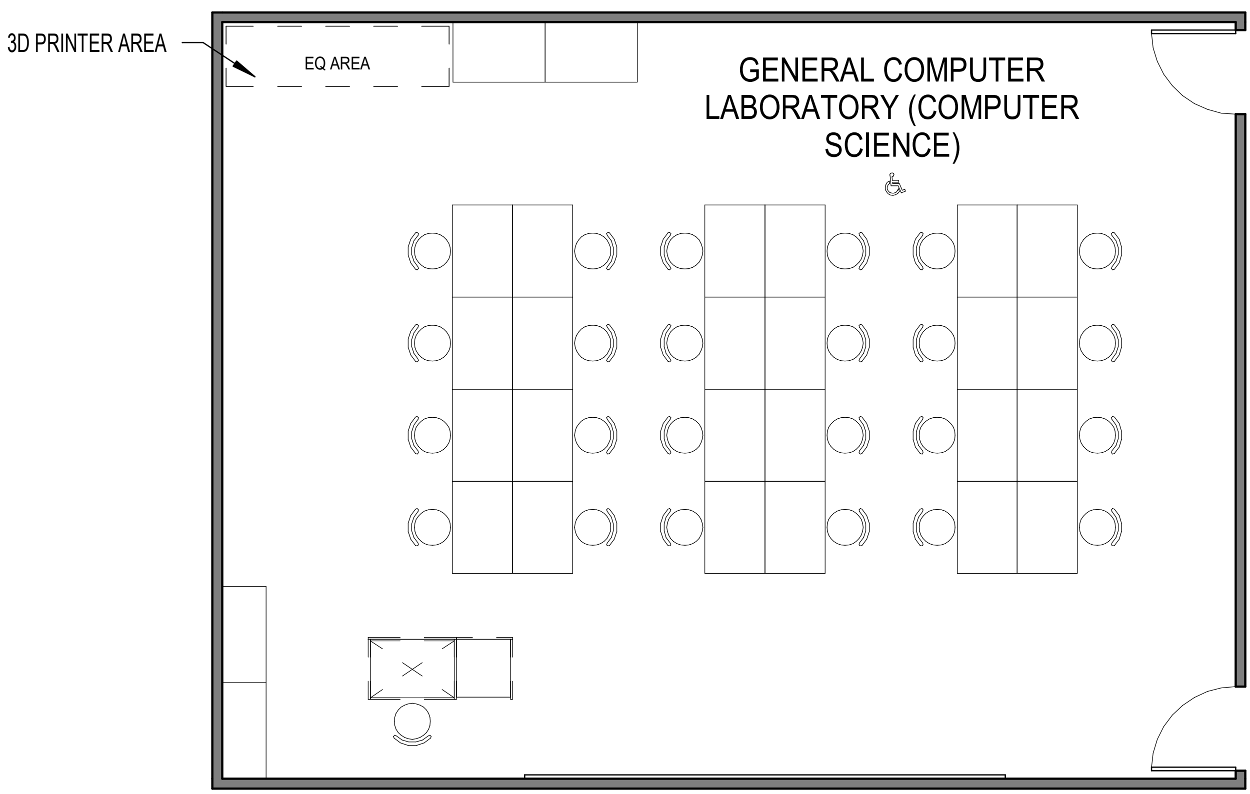


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-25
DRAWING NUMBER

GENERAL COMPUTER LABORATORY (COMPUTER SCIENCE)
DRAWING TITLE



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

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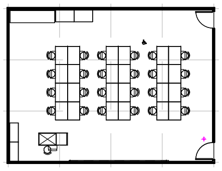


ROOM DATA SHEET

Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 25

Planning Information

Program Space Name: GENERAL COMPUTER LABORATORY (COMPUTER SCIENCE)

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	ENG / PHYSICS SHOP
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	NO
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	Yes
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

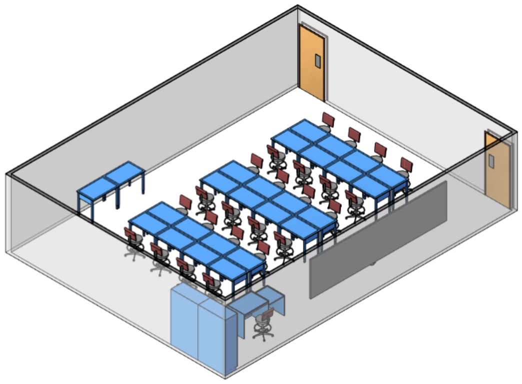
Casework:

Equipment:

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

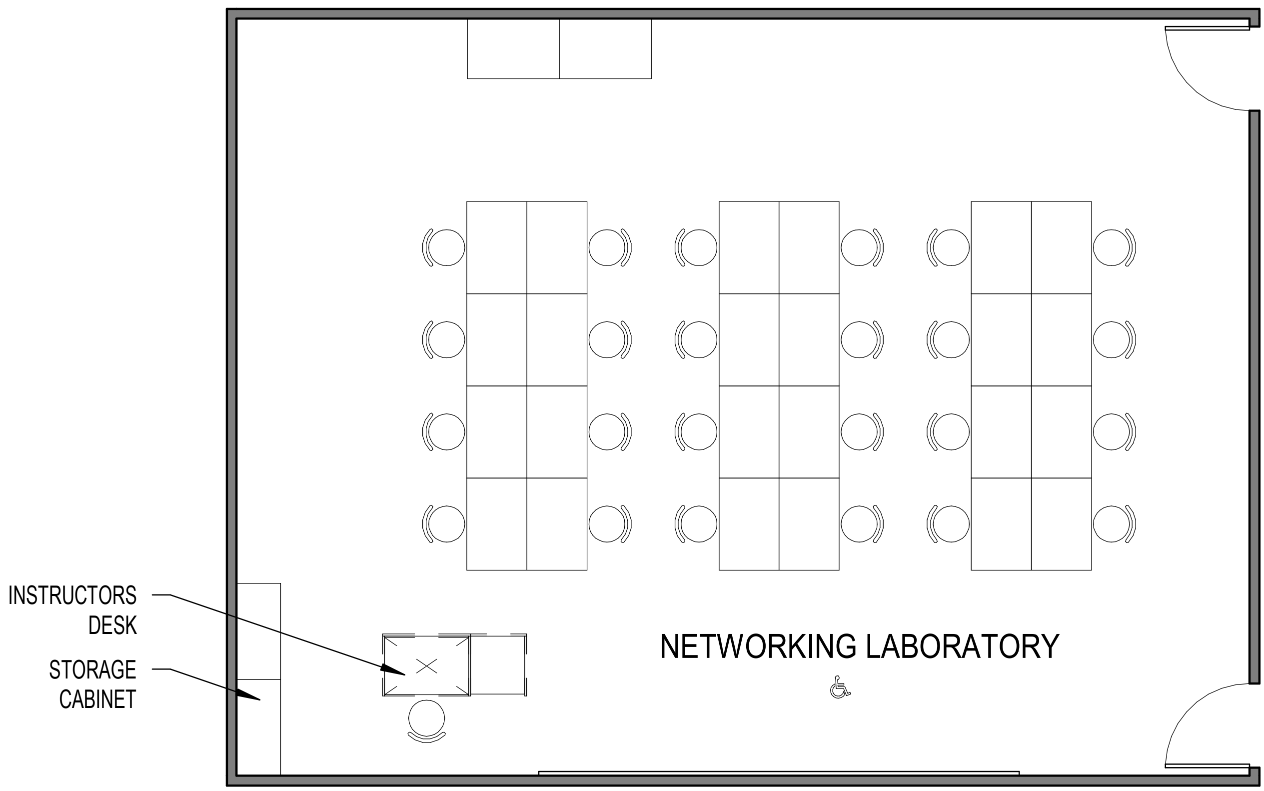


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-26
DRAWING NUMBER

NETWORKING LABORATORY
DRAWING TITLE



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

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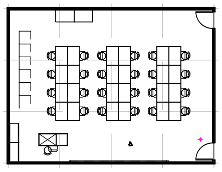


ROOM DATA SHEET

Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 26

Planning Information

Program Space Name: NETWORKING LABORATORY

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
RAISED FLOOR

Direct Adjacency:	
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

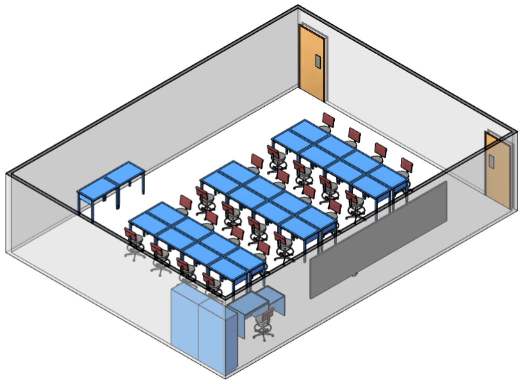
Casework:

Equipment:

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

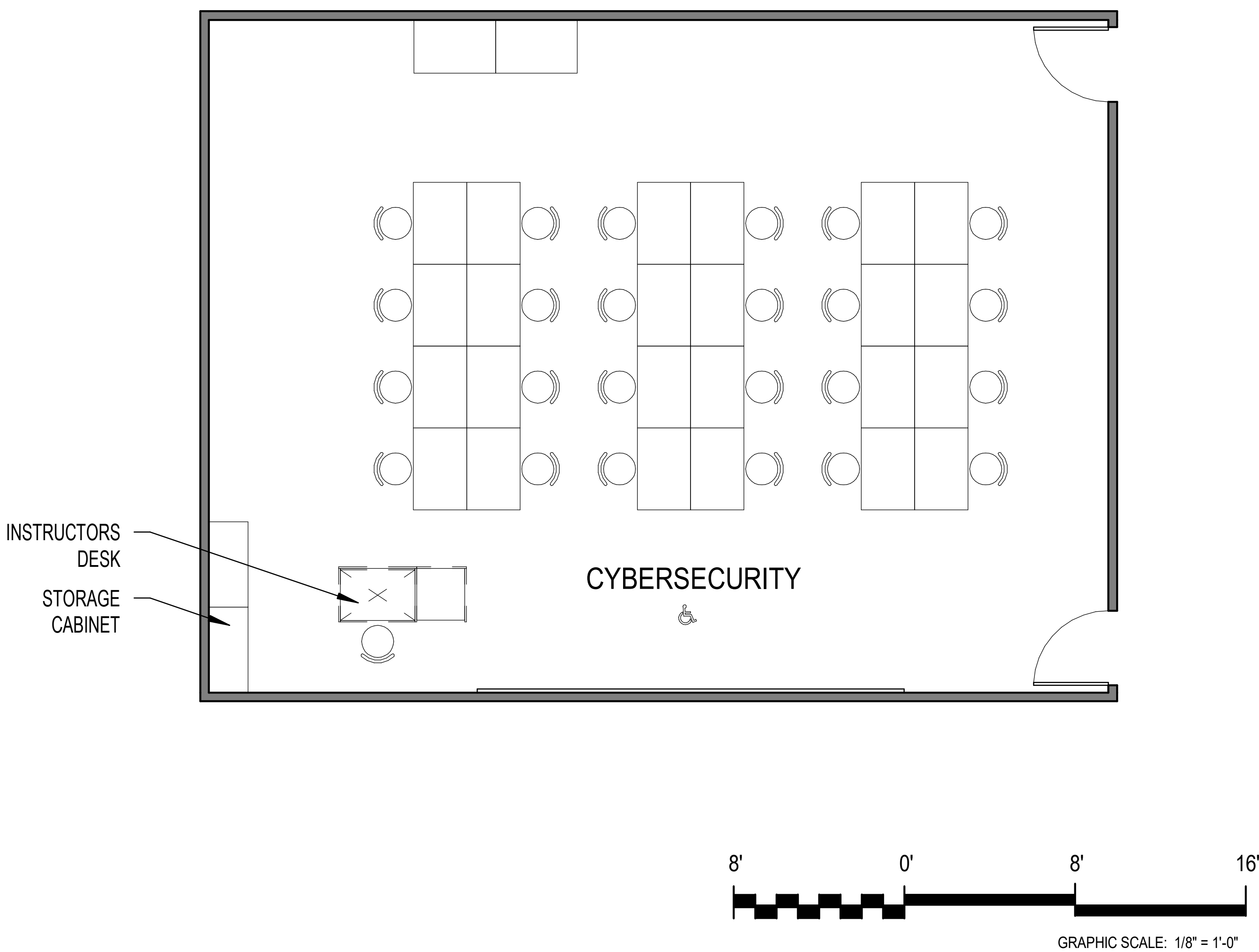


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-27
DRAWING NUMBER

CYBERSECURITY
DRAWING TITLE



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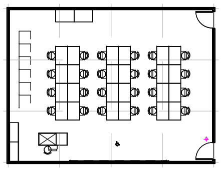


ROOM DATA SHEET

Program Space Types: **RDS:** 27

ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

Planning Information

Program Space Name: CYBERSECURITY

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Direct Adjacency:	
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Architectural Notes:

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:
RAISED FLOOR

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	10
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

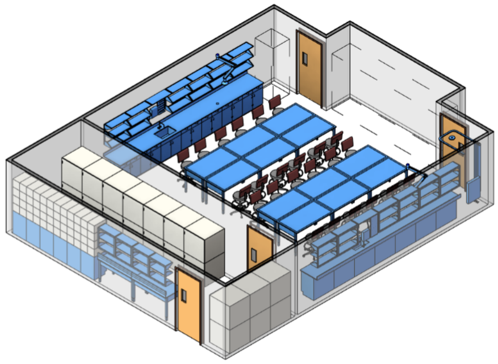
Casework:

Equipment:

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

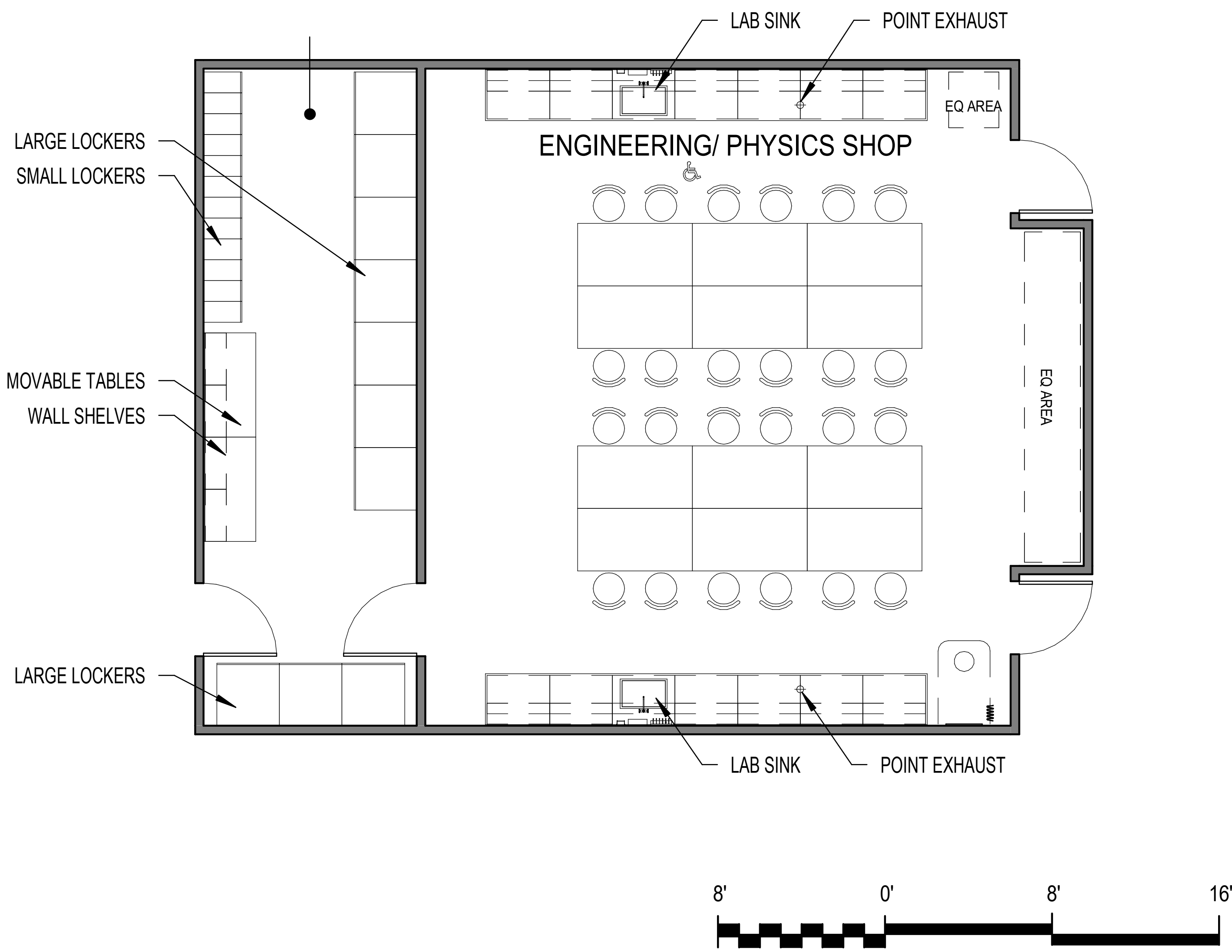


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-28
DRAWING NUMBER

ENGINEERING/ PHYSICS SHOP AND PROJECT STORAGE ROOM
DRAWING TITLE



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

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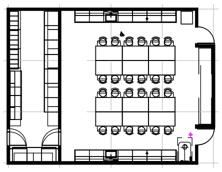
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



ROOM DATA SHEET

Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 28

Planning Information

Program Space Name: ENGINEERING/PHYSICS SHOP AND PROJECT STORAGE ROOM

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Direct Adjacency:	COMPUTER LAB
Indirect Adjacency:	MSLC
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	EMERGENCY POWER OFF
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Architectural Notes:
OVERHEAD UNISTRUT SUPPORT GRID

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	TBD
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.
EMERGENCY POWER OFF

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

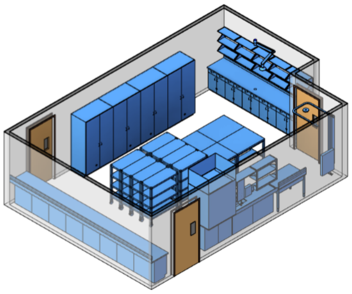
Casework:

Equipment:

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

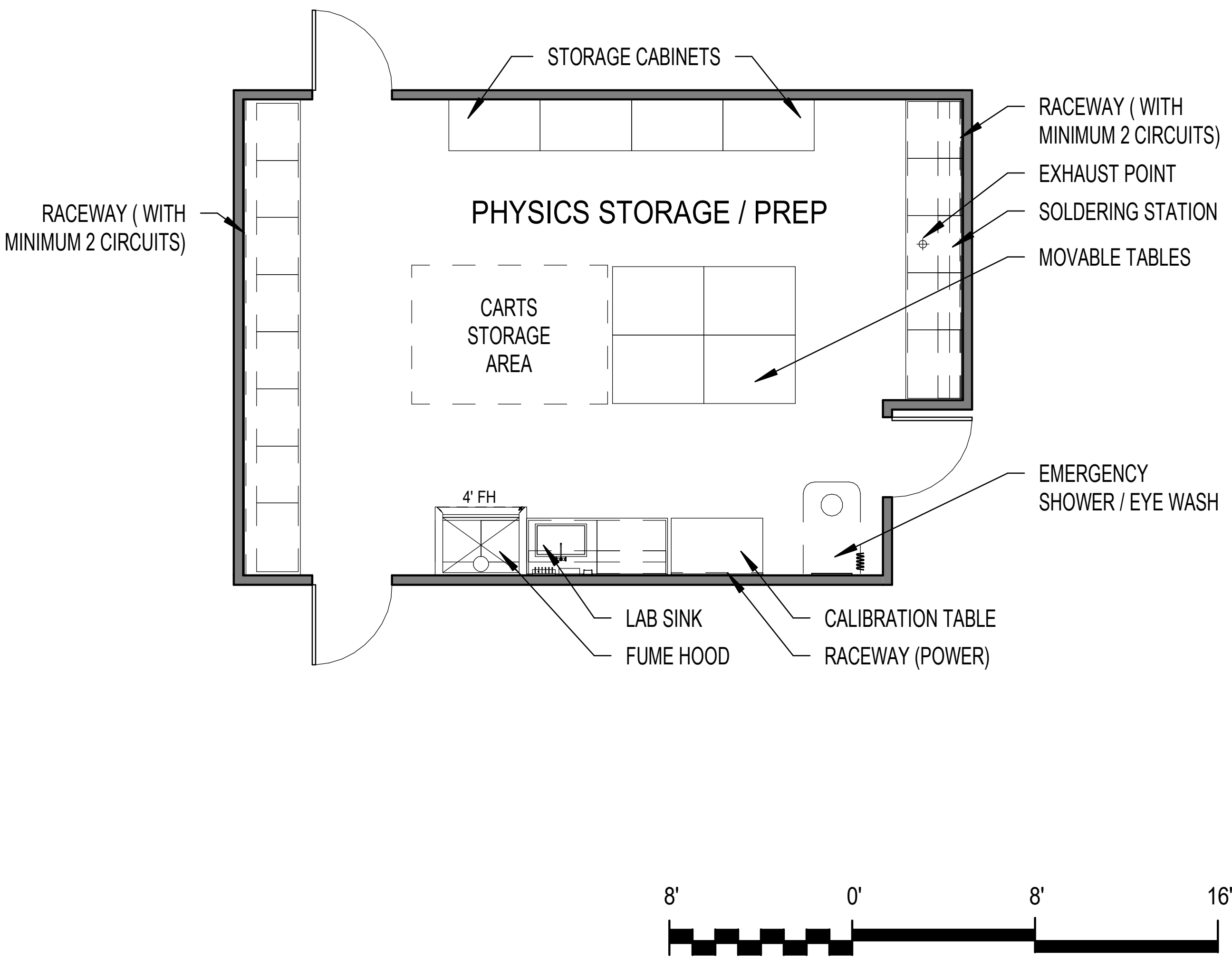
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.



GUIDEPLATE SKETCH

GP-29
DRAWING NUMBER

PHYSICS STORAGE / PREP
DRAWING TITLE



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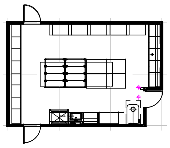

ROOM DATA SHEET

Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 29

Planning Information

Program Space Name: PHYSICS STORAGE/PREP

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	640 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	21' - 4"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	PHYSICS/ENGINEERING LABS
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	Yes (LOCAL COLLECTION)

Plumbing Notes:
ONE (1) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	1 SOLDERING STATION

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

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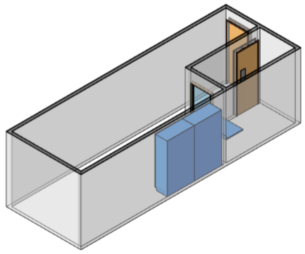
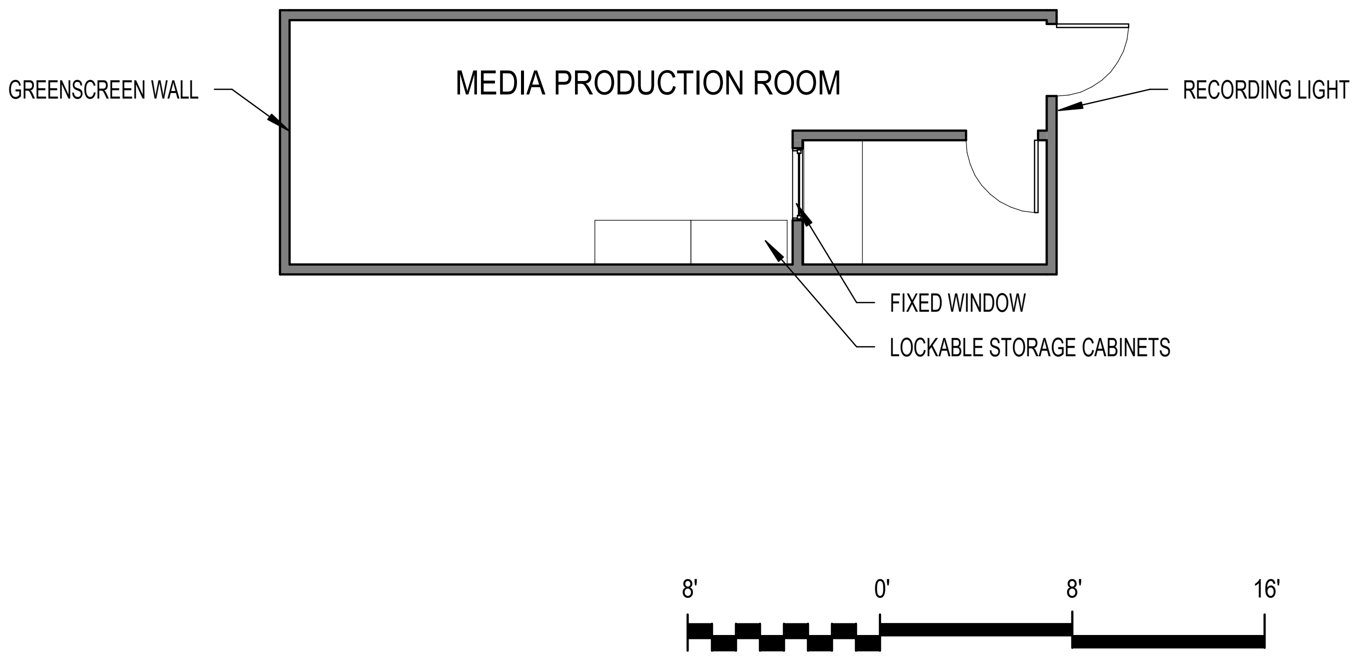
LEGGETT MATH AND SCIENCE BUILDING



GUIDEPLATE SKETCH

GP-31
DRAWING NUMBER

MEDIA PRODUCTION ROOM
DRAWING TITLE



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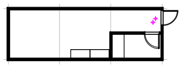


Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 31

Planning Information

Program Space Name: MEDIA PRODUCTION SUITE

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	320 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	11' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
SPECIAL FINISH TREATMENT FOR AUDIO AND VIDEO RECORDING.

Direct Adjacency:	
Indirect Adjacency:	MSLC
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ABILITY TO SILENCE HVAC DURING RECORDING TIMES UP TO 60 MIN.

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

Accessories:

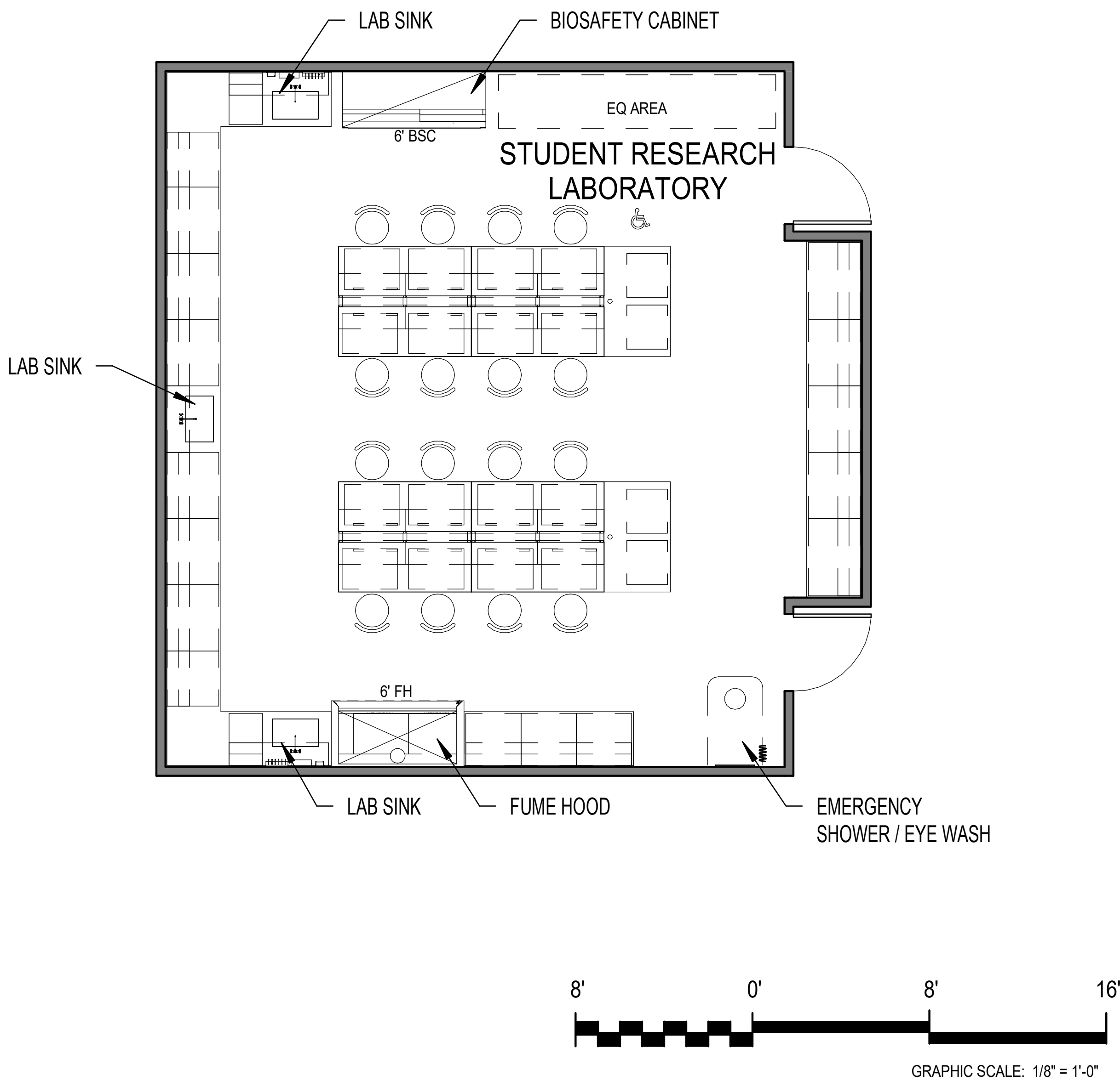
White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	No
Coat Hook:	No
Other:	GREEN SCREEN

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-32
DRAWING NUMBER

STUDENT RESEARCH LABORATORY
DRAWING TITLE



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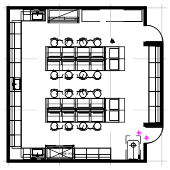


ROOM DATA SHEET

Program Space Types:
ACADEMIC SUPPORT

RDS: 32

Planning Information

Program Space Name: STUDENT RESEARCH LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	ACADEMIC SUPPORT
Program Space Area (NSF):	960 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	INSTRUMENTATION ROOM
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED LIGHTS & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
MEDIUM LAB SINKS, CUP SINKS IN FUME HOOD.
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 6'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

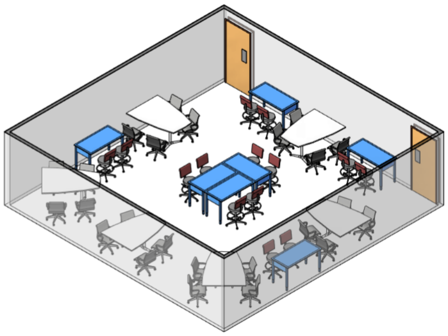
Equipment:

INCUBATORS
BIOSAFETY CABINET

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.



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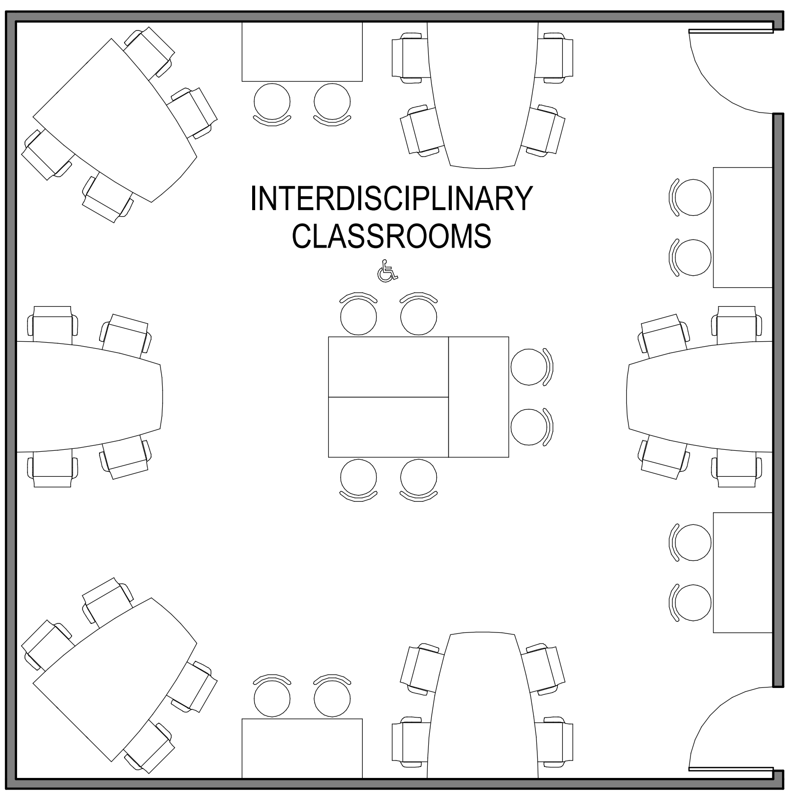
GUIDEPLATE SKETCH

GP-33
DRAWING NUMBER

INTERDISCIPLINARY CLASSROOMS
DRAWING TITLE



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

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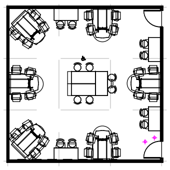


ROOM DATA SHEET

Program Space Types:
ACADEMIC SUPPORT

RDS: 33

Planning Information

Program Space Name: INTEGRDISCIPLINARY CLASSROOM

Notes:

Program Space Number:	110
Program Space Type:	ACADEMIC SUPPORT
Program Space Area (NSF):	960 SF
Program Space Qty:	2
Room Occupancy:	30

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	N/A
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	MSLC / PLANETARIUM
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	NO
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

SMART INSTRUCTOR WORKSTATION

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-00
DRAWING NUMBER

GUIDE PLATES INDEX
DRAWING TITLE

SHEET LIST - GUIDE PLATES

SHEET NUMBER	SHEET NAME
GP-00	GUIDE PLATES INDEX
GP-03	MICROBIOLOGY LABORATORY
GP-04	MICROBIOLOGY / CELL BIOLOGY LABORATORY
GP-05	MICROBIOLOGY SUPPORT ROOMS
GP-06	MICROBIOLOGY LABORATORY PREP ROOM
GP-07	GENERAL BIOLOGY LABORATORY (FOR NON-MAJORS)
GP-08	ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECHNOLOGY
GP-09	GEN BIOLOGY/ ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECH PREP
GP-10	BIOLOGY 150 LABORATORY (FOR MAJORS)
GP-11	BIOLOGY 150 LABORATORY PREP ROOM
GP-12	BIOLOGY 151 LABORATORY
GP-13	BIOLOGY 151 LABORATORY PREP ROOM
GP-14	ANATOMY AND PHYSIOLOGY LABORATORY
GP-16	GREENHOUSE
GP-17	GREENHOUSE HEAD HOUSE ROOM AND STORAGE
GP-18	GENERAL CHEMISTRY LABORATORY
GP-19	ORGANIC CHEMISTRY LABORATORY
GP-20	ORGANIC ANALYTICAL CHEMISTRY LABORATORY
GP-21	INSTRUMENTATION ROOM
GP-22	CENTRAL CHEMISTRY PREP AND STORAGE
GP-23	PHYSICS / ENGINEERING LABORATORY #1
GP-24	PHYSICS / ENGINEERING LABORATORY #2
GP-25	GENERAL COMPUTER LABORATORY (COMPUTER SCIENCE)
GP-26	NETWORKING LABORATORY
GP-27	CYBERSECURITY
GP-28	ENGINEERING/ PHYSICS SHOP AND PROJECT STORAGE ROOM
GP-29	PHYSICS STORAGE / PREP
GP-31	MEDIA PRODUCTION ROOM
GP-32	STUDENT RESEARCH LABORATORY
GP-33	INTERDISCIPLINARY CLASSROOMS

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

DS-00
DRAWING NUMBER

DATA SHEET INDEX
DRAWING TITLE

SHEET LIST - DATA SHEET

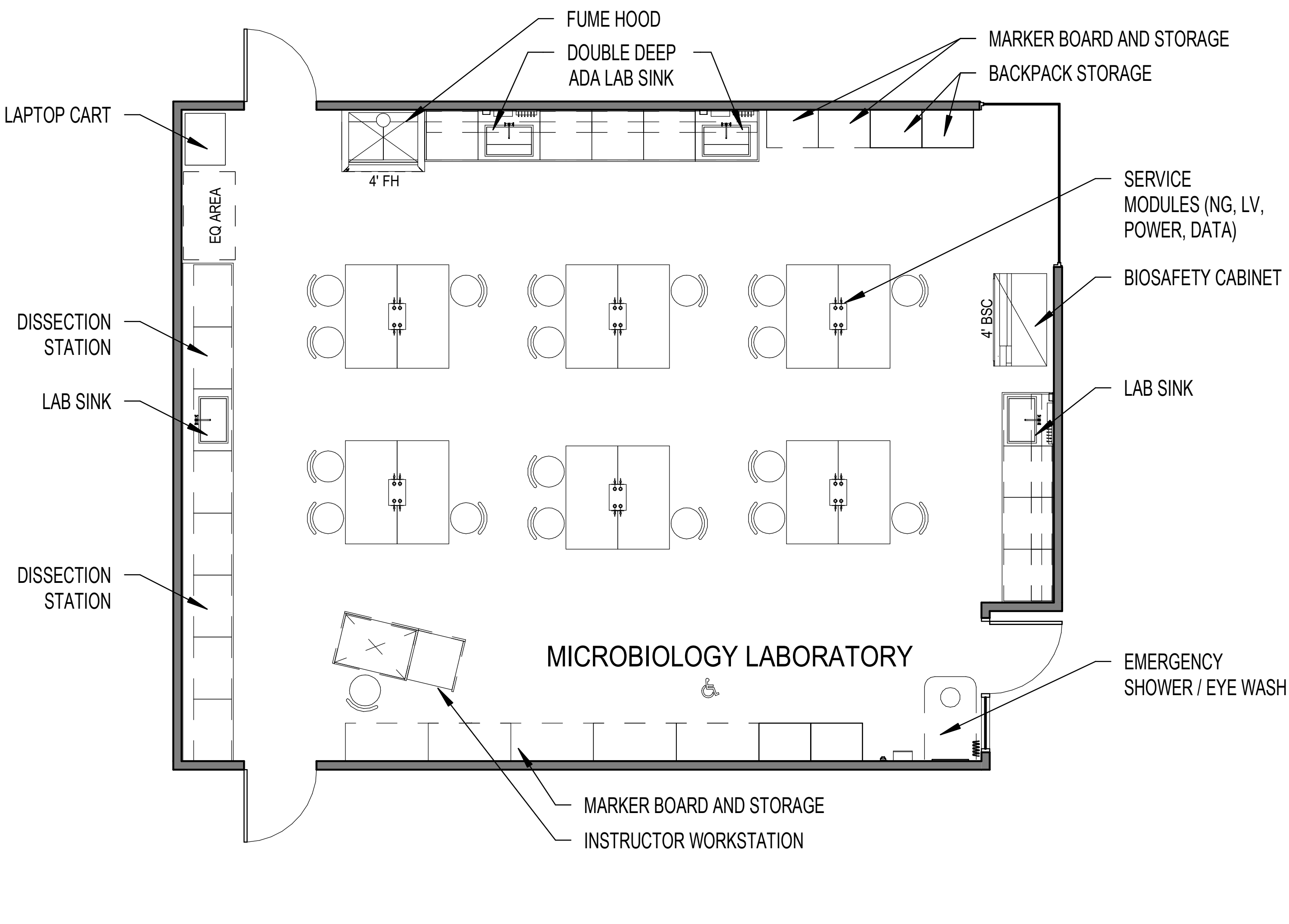
SHEET NUMBER	SHEET NAME
DS-00	DATA SHEET INDEX
DS-3	MICROBIOLOGY LABORATORY
DS-4	MICROBIOLOGY / CELL BIOLOGY LABORATORY
DS-5	MICROBIOLOGY SUPPORT ROOMS
DS-6	MICROBIOLOGY LABORATORY PREP ROOM
DS-7	GENERAL BIOLOGY LABORATORY (FOR NON-MAJORS)
DS-8	ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECHNOLOGY
DS-9	GEN BIOLOGY/ ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECH PREP
DS-10	BIOLOGY 150 LABORATORY (FOR MAJORS)
DS-11	BIOLOGY 150 LABORATORY PREP ROOM
DS-12	BIOLOGY 151 LABORATORY
DS-13	BIOLOGY 151 LABORATORY PREP ROOM
DS-14	ANATOMY AND PHYSIOLOGY LABORATORY
DS-16	GREENHOUSE
DS-17	GREENHOUSE HEAD HOUSE ROOM AND STORAGE
DS-18	GENERAL CHEMISTRY LABORATORY
DS-19	ORGANIC CHEMISTRY LABORATORY
DS-20	ORGANIC ANALYTICAL CHEMISTRY LABORATORY
DS-21	INSTRUMENTATION ROOM
DS-22	CENTRAL CHEMISTRY PREP AND STORAGE
DS-23	PHYSICS / ENGINEERING LABORATORY #1
DS-24	PHYSICS / ENGINEERING LABORATORY #2
DS-25	GENERAL COMPUTER LABORATORY (COMPUTER SCIENCE)
DS-26	NETWORKING LABORATORY
DS-27	CYBERSECURITY
DS-28	PROJECT STORAGE ROOM
DS-29	PHYSICS STORAGE / PREP
DS-31	MEDIA PRODUCTION ROOM
DS-32	STUDENT RESEARCH LABORATORY
DS-33	INTERDISCIPLINARY CLASSROOMS

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-03
DRAWING NUMBER

MICROBIOLOGY LABORATORY
DRAWING TITLE



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

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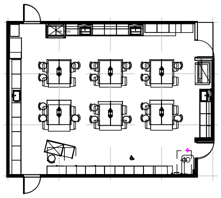


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: BIOLOGY LABS

RDS: 3

Planning Information

Program Space Name: MICROBIOLOGY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	2
Room Occupancy:	18

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Direct Adjacency:	MICRO BIO SUPPORT & PREP
Indirect Adjacency:	CLASS ROOM / RECITATION ROOM
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	ZONED & RM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Architectural Notes:

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	2 - DISSECTING STATION

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK- STANDING & ACCESSIBLE HEIGHT
MICROSCOPE CABINETS
BACKPACK STORAGE

Equipment:

SMART INSTRUCTOR WORKSTATION
LAPTOP CART
(SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

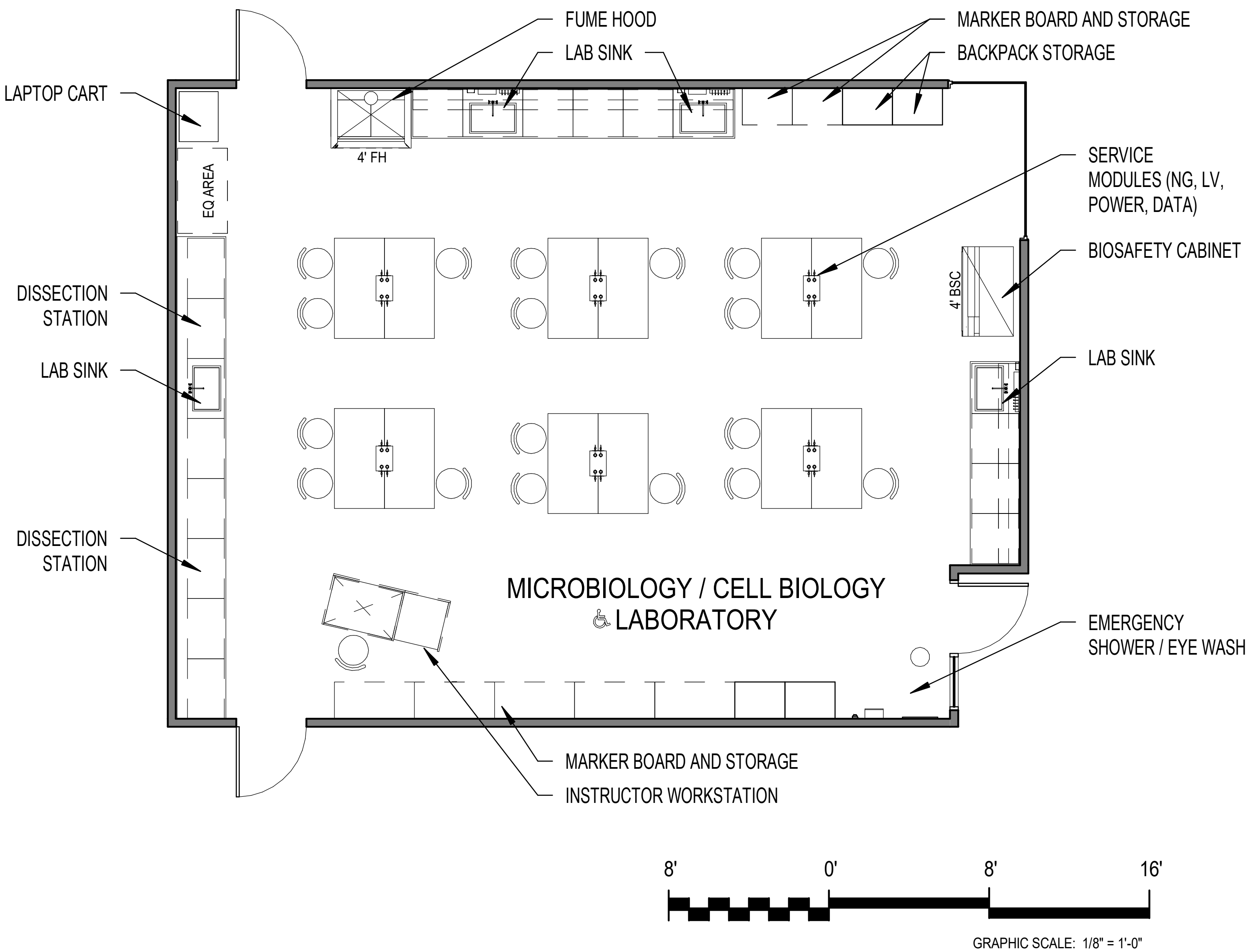
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

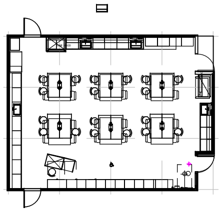
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-04
DRAWING NUMBER

MICROBIOLOGY / CELL BIOLOGY LABORATORY
DRAWING TITLE





MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: BIOLOGY LABS

RDS: 4

Planning Information

Program Space Name: MICROBIOLOGY / CELL BIOLOGY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	18

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	MICRO BIO SUPPORT / PREP
Indirect Adjacency:	CLASSROOM / RECITATION RM
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	ZONED & RM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	2 - DISSECTING STATION

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK - STANDING & ACCESSIBLE HEIGHT
MICROSCOPE CABINETS
BACKPACK STORAGE

Equipment:

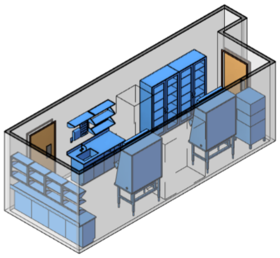
SMART INSTRUCTOR WORKSTATION
LAPTOP CART
(SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

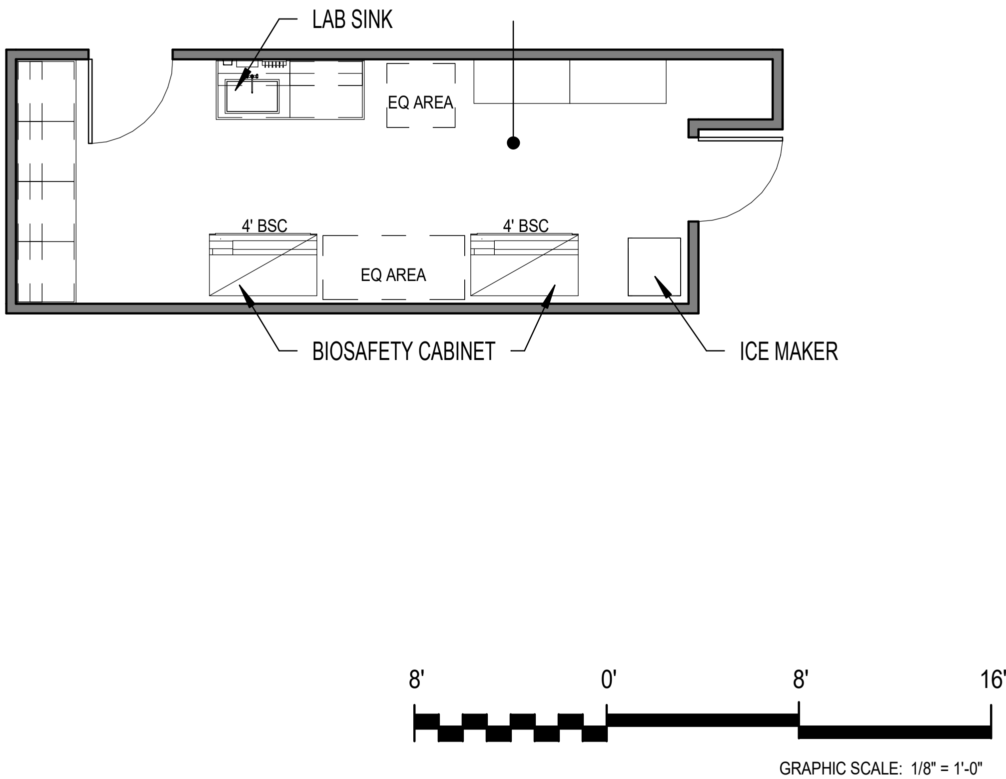


GUIDEPLATE SKETCH

GP-05
DRAWING NUMBER

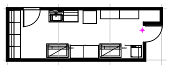
MICROBIOLOGY SUPPORT ROOMS
DRAWING TITLE

MICROBIOLOGY SUPPORT ROOMS



MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET



Program Space Types:
BIOLOGY LABS

RDS: 5

Planning Information

Program Space Name: MICROBIOLOGY SUPPORT ROOM

Notes: EQ SUPPORT RM FOR M.B. LABORATORY

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	320 SF
Program Space Qty:	3
Room Occupancy:	N/A

Architectural Requirements

Room Width:	10' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	MICROBIOLOGY LABORATORY
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	N/A
Light Control:	ROOM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	No
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	No
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
ONE (1) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	Yes
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	2
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK - STANDING & ACCESSIBLE HEIGHT

Equipment:

MICRO BIO: 4 DOUBLE STACKED CO2 INCUBATORS, 4 SMALL REFRIDGERATORS, ICEMAKER
CELL BIO: -80C FREEZER, SHAKERS, BIOSAFETY CABINETS (SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

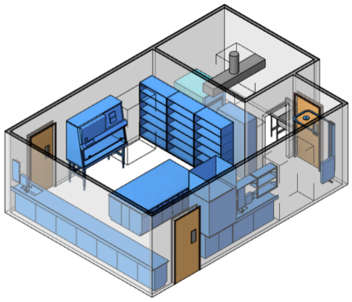
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

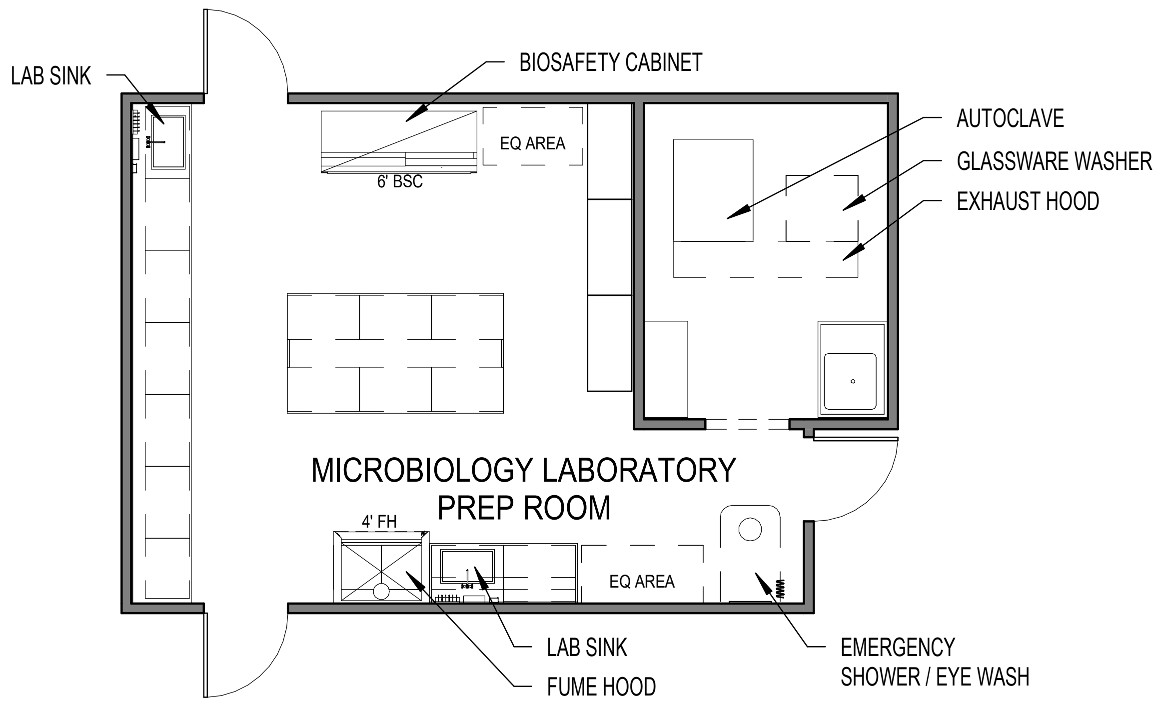
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-06
DRAWING NUMBER

MICROBIOLOGY LABORATORY PREP ROOM
DRAWING TITLE





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

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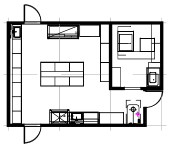


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 6

Planning Information

Program Space Name: MICROBIOLOGY LABORATORY PREP ROOM

Notes:

Program Space Number:	215
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	640 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	21' - 4"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	MICROBIOLOGY LABORATORY
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	ROOM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes (LOCAL POLISHER)
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	1
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK - STANDING & ACCESSIBLE HEIGHT
FULL HEIGHT GLASSWARE CABINETS

Equipment:

UV GOGGLE CABINET
BIOSAFETY CABINET, MEDIUM SIZE AUTOCLAVE, (2) MEDIUM SIZE GLASSWARE WASHER

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

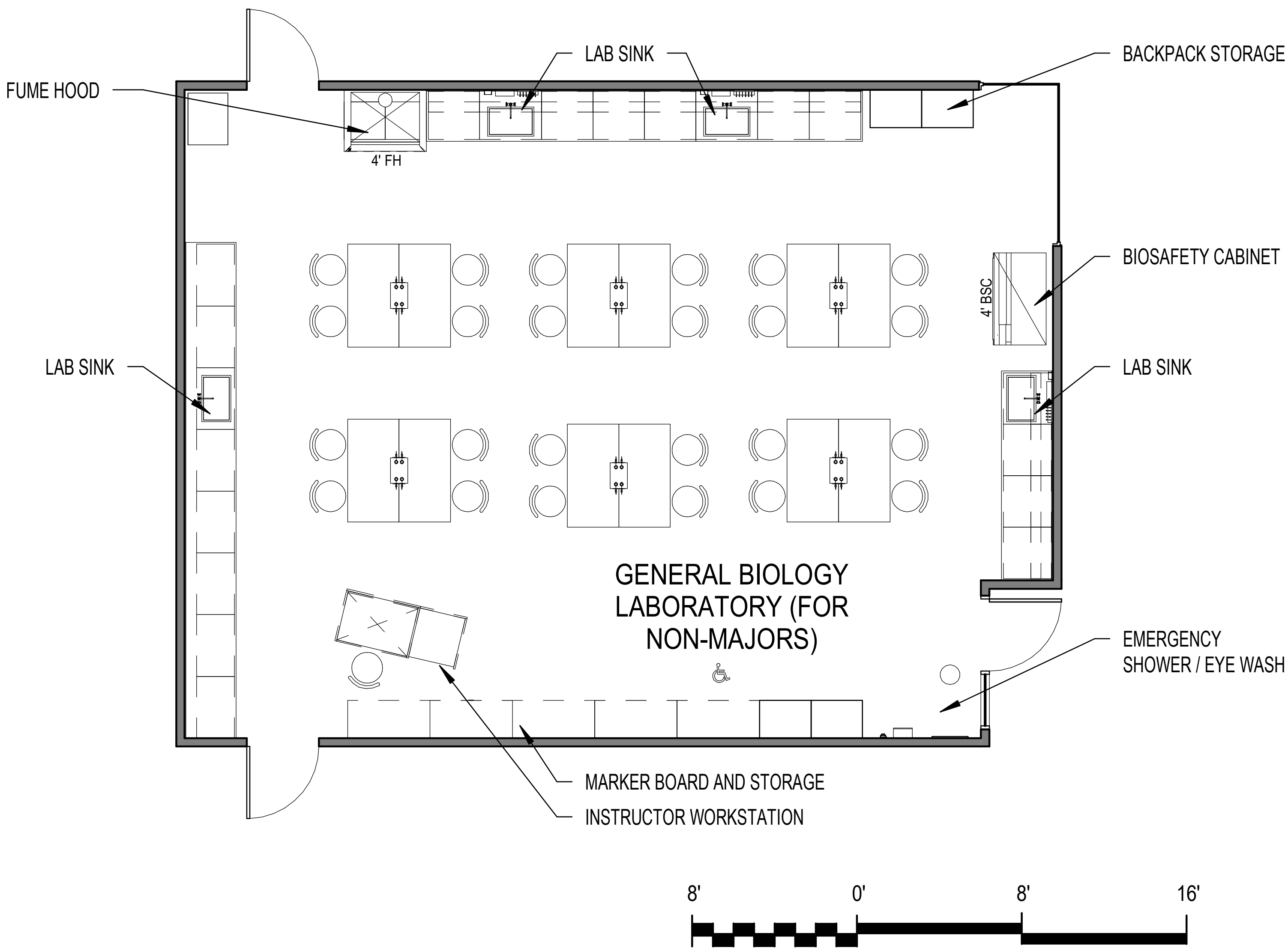
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-07
DRAWING NUMBER

GENERAL BIOLOGY LABORATORY (FOR NON-MAJORS)
DRAWING TITLE



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

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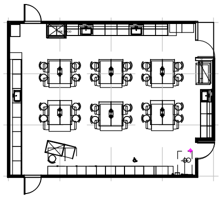


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: BIOLOGY LABS

RDS: 7

Planning Information

Program Space Name: GENERAL BIOLOGY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	2
Room Occupancy:	24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	PREP & CLASSROOM / RECITATION
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	ZONED & RM DARKENING
Shielding:	No
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	2

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

FIXED LAB CASEWORK STANDING & ACCEPTIBLE HEIGHT
FULL HEIGHT STORAGE CABINETS
BACKPACK STORAGE

Equipment:

SMART INSTRUCTOR WORKSTATION
LATOP CART
(SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

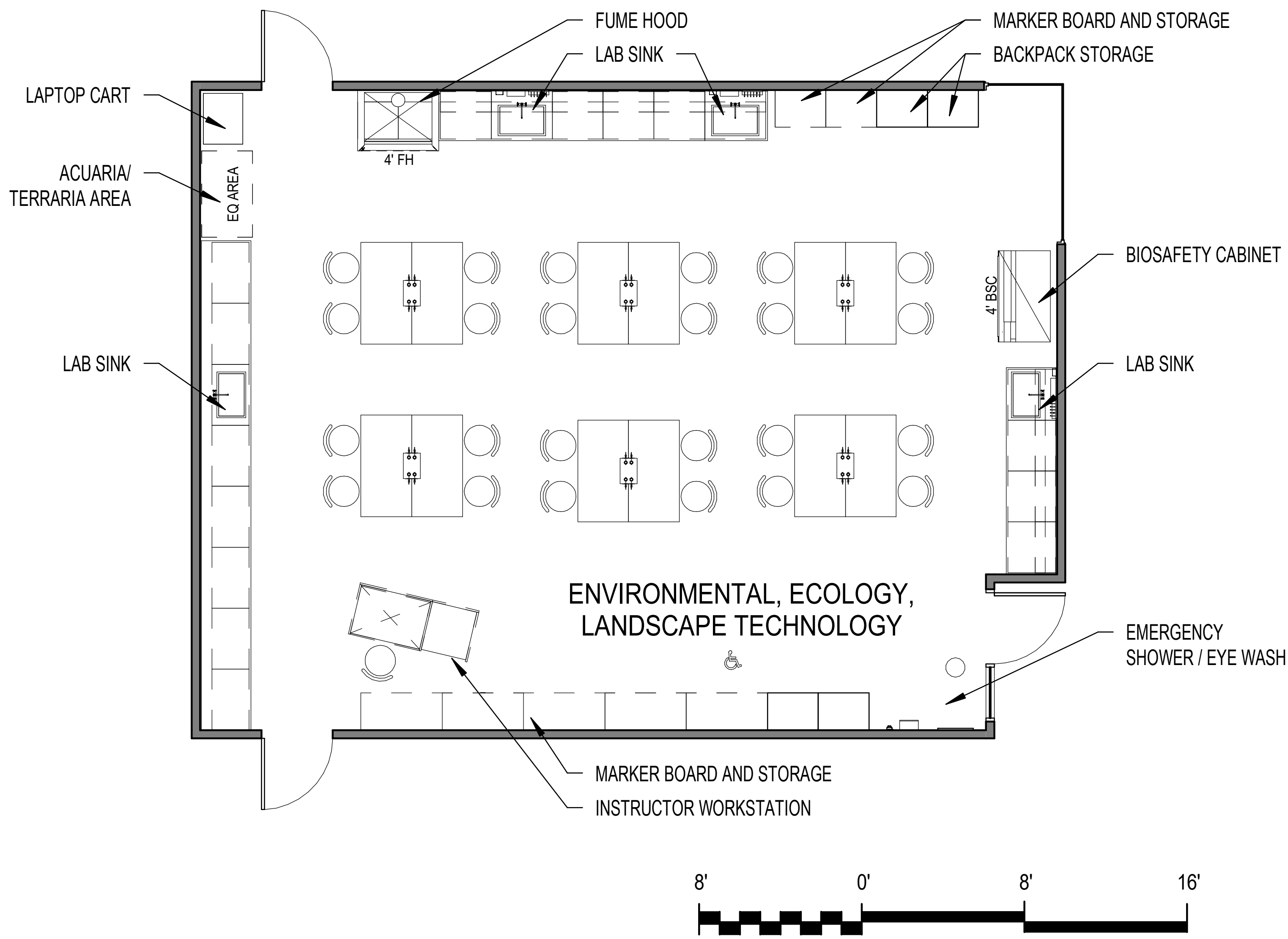
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-08
DRAWING NUMBER

ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECHNOLOGY
DRAWING TITLE



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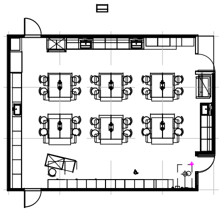


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 8

Planning Information

Program Space Name: ENVRIONMENTAL, ECOLOGY, LANDSCAPE TECHNOLOGY

Notes:

Program Space Number: 210
Program Space Type: BIOLOGY LABS
Program Space Area (NSF): 1280 SF
Program Space Qty: 1
Room Occupancy: 24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	Environmental Ecology, Landscape Tech Prep
Indirect Adjacency:	Greenhouse
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	Zoned & Rm Darkening
Shielding:	No
Equip Monitoring/Alarm:	No
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

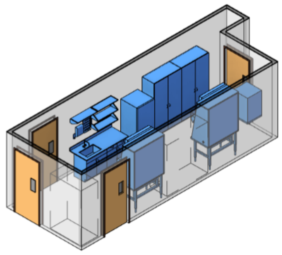
SMART INSTRUCTOR WORKSTATION
LAPTOP CART
(SEE LAB EQ LIST)

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



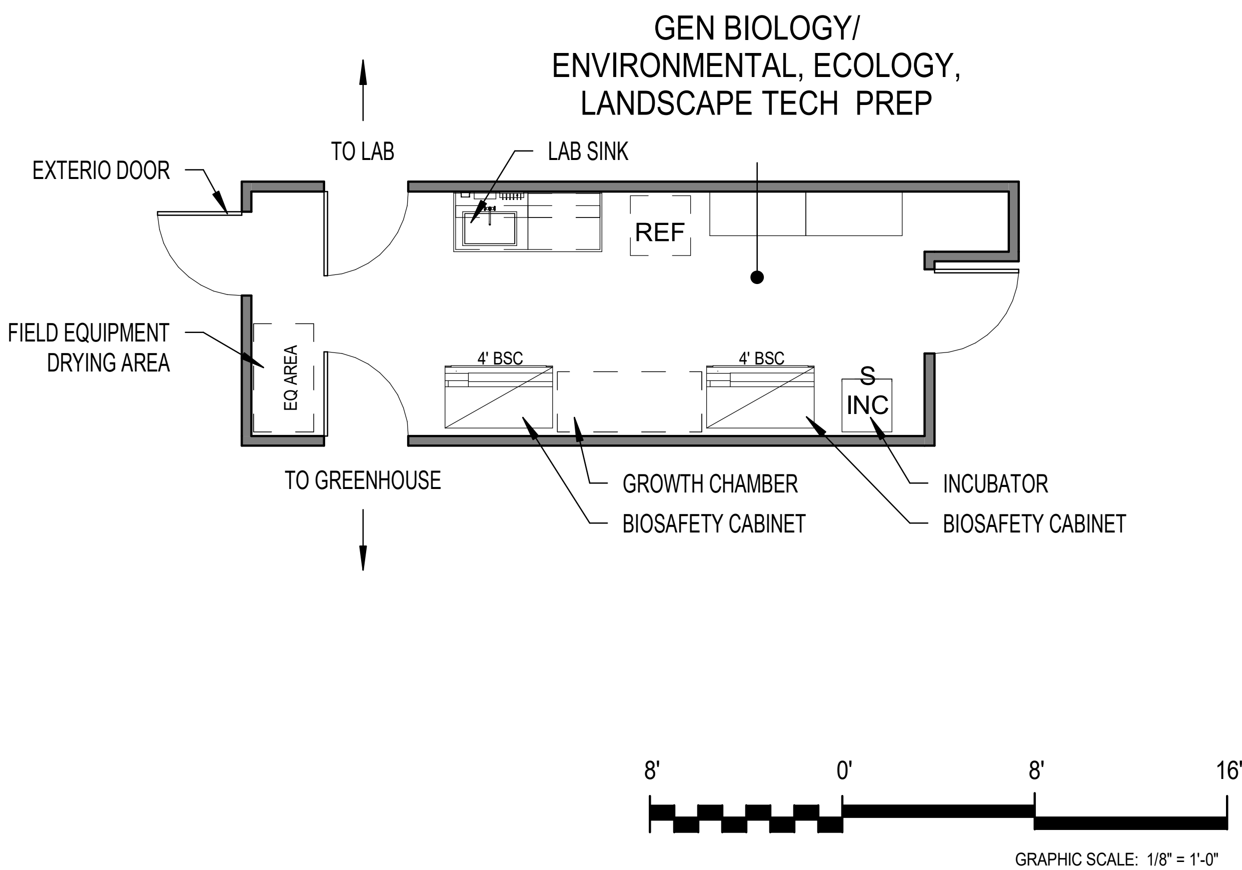
GUIDEPLATE SKETCH

GP-09

DRAWING NUMBER

GEN BIOLOGY/ ENVIRONMENTAL, ECOLOGY, LANDSCAPE TECH PREP

DRAWING TITLE



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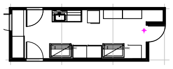
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET



Program Space Types: BIOLOGY LABS

RDS: 9

Planning Information

Program Space Name: ENVRIONMENTAL, ECOLOGY, LANDSCAPE TECH PREP

Notes:

Program Space Number:	215
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	320 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	10' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	Environmental, Ecology Landscape Tech & Outdoor
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	Yes
Light Control:	Room Darkening
Shielding:	
Equip Monitoring/Alarm:	No
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
TWO (2) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4 - 6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	2
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

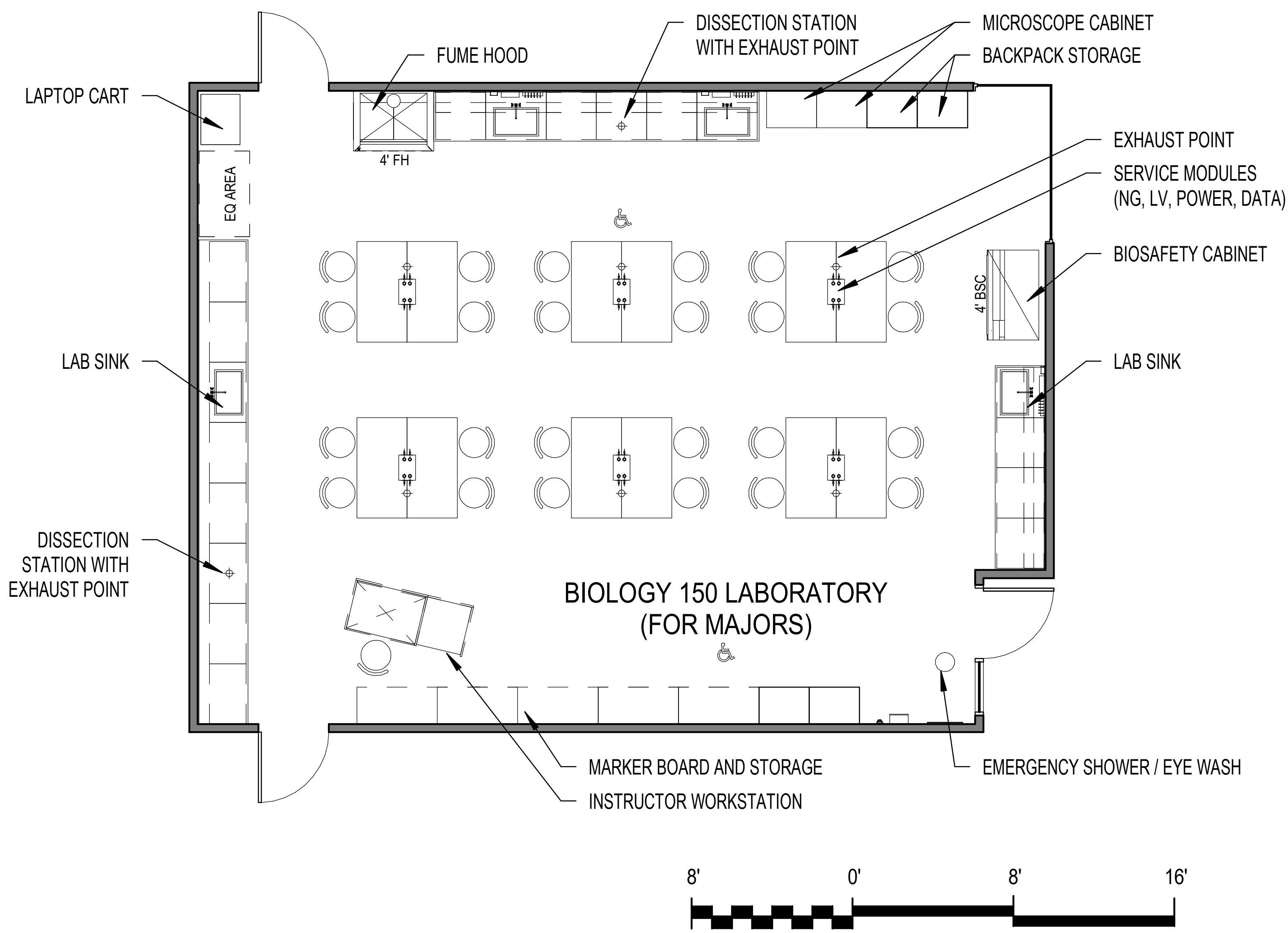
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-10
DRAWING NUMBER

BIOLOGY 150 LABORATORY (FOR MAJORS)
DRAWING TITLE



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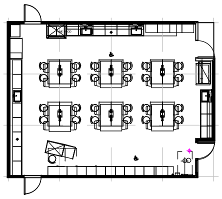


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: BIOLOGY LABS

RDS: 10

Planning Information

Program Space Name: BIOLOGY 150 LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	4
Room Occupancy:	24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50 - 100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	BIOLOGY PREP
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes (LOCAL POLISHER)
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

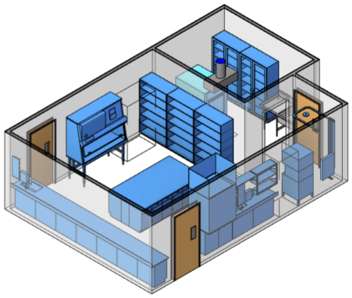
SMART INSTRUCTOR WORKSTATION
LAPTOP CART

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

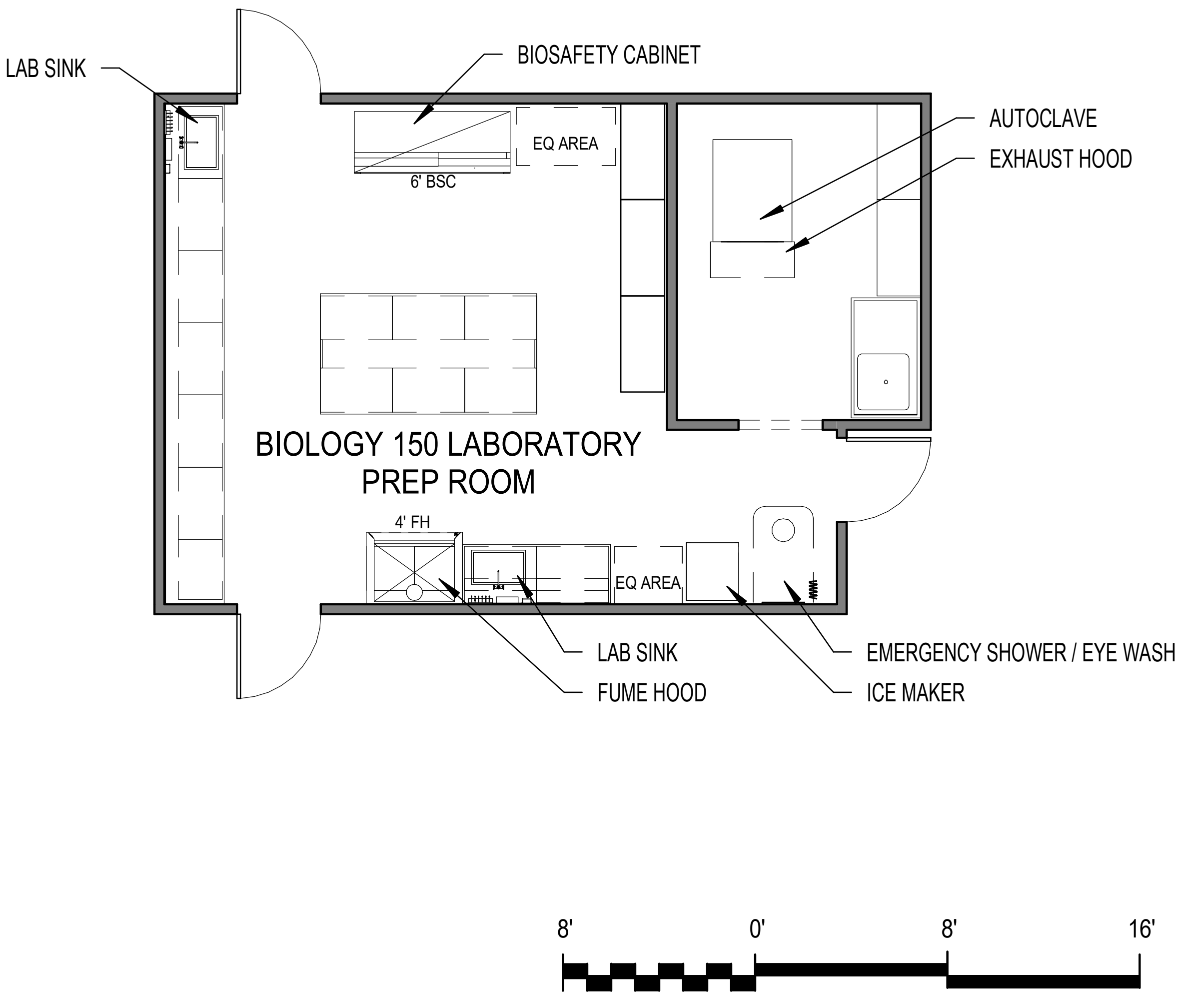
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



GUIDEPLATE SKETCH

GP-11
DRAWING NUMBER

BIOLOGY 150 LABORATORY PREP ROOM
DRAWING TITLE



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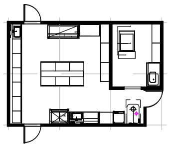


ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 11

Planning Information

Program Space Name: BIOLOGY 150 LABORATORY PREP ROOM

Notes:

Program Space Number:	215
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	640 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	21' - 4"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	BIOLOGY LABS
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes (LOCAL POLISHER)
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	Yes
208V Emergency Power:	No
208V Standby Power:	Yes
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	1
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

ICEMAKER
BIOSAFETY CABINET

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

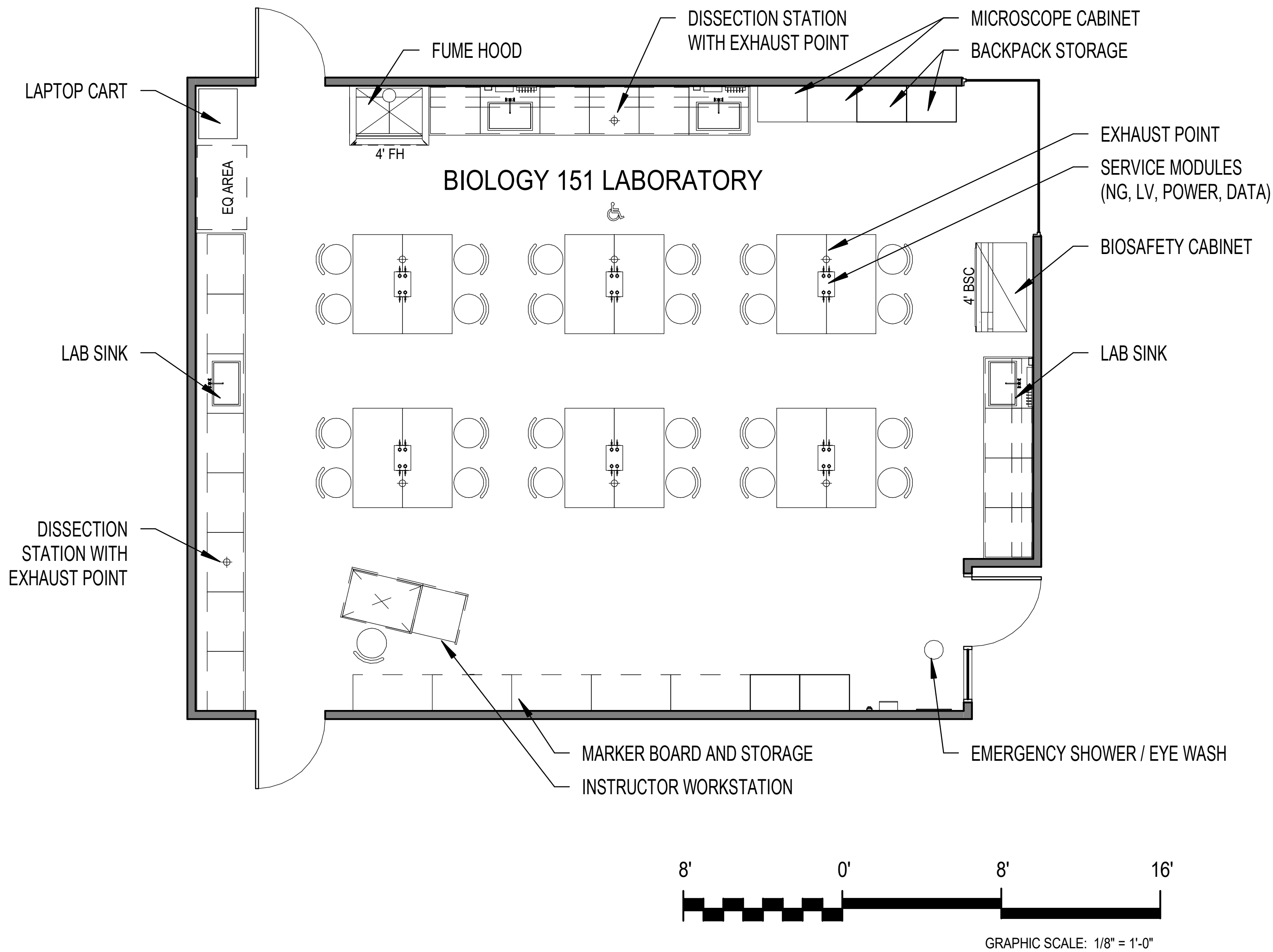
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

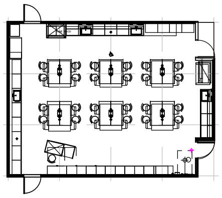
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-12
DRAWING NUMBER

BIOLOGY 151 LABORATORY
DRAWING TITLE





MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 12

Planning Information

Program Space Name: BIOLOGY 151 LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	BIOLOGY PREP
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	8

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

SMART INSTRUCTOR WORK STATION
LAPTOP CART

Accessories:

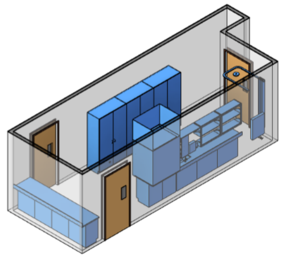
White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

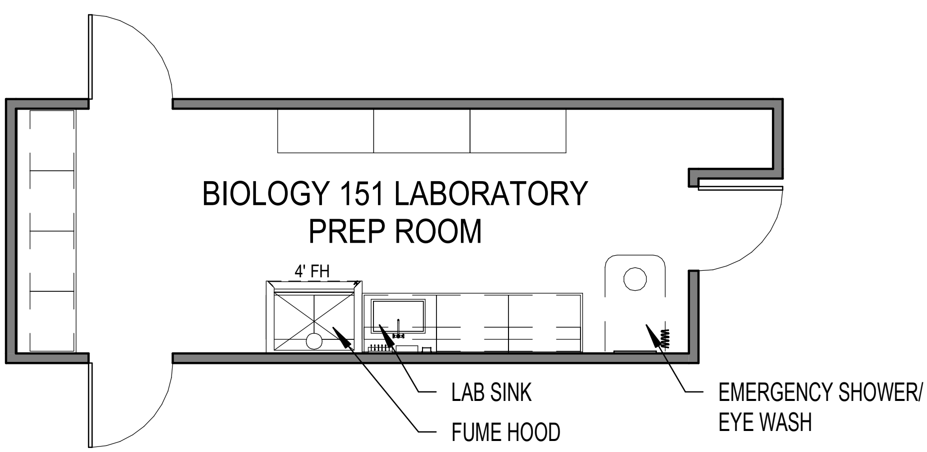
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-13
DRAWING NUMBER

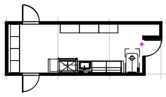
BIOLOGY 151 LABORATORY PREP ROOM
DRAWING TITLE





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

ROOM DATA SHEET



Program Space Types:
BIOLOGY LABS

RDS: 13

Planning Information

Program Space Name: BIOLOGY 151 LABORATORY PREP ROOM

Notes:

Program Space Number:	215
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	320 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	10' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	BIOLOGY LABS
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes (LOCAL POLISHER)
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
ONE (1) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

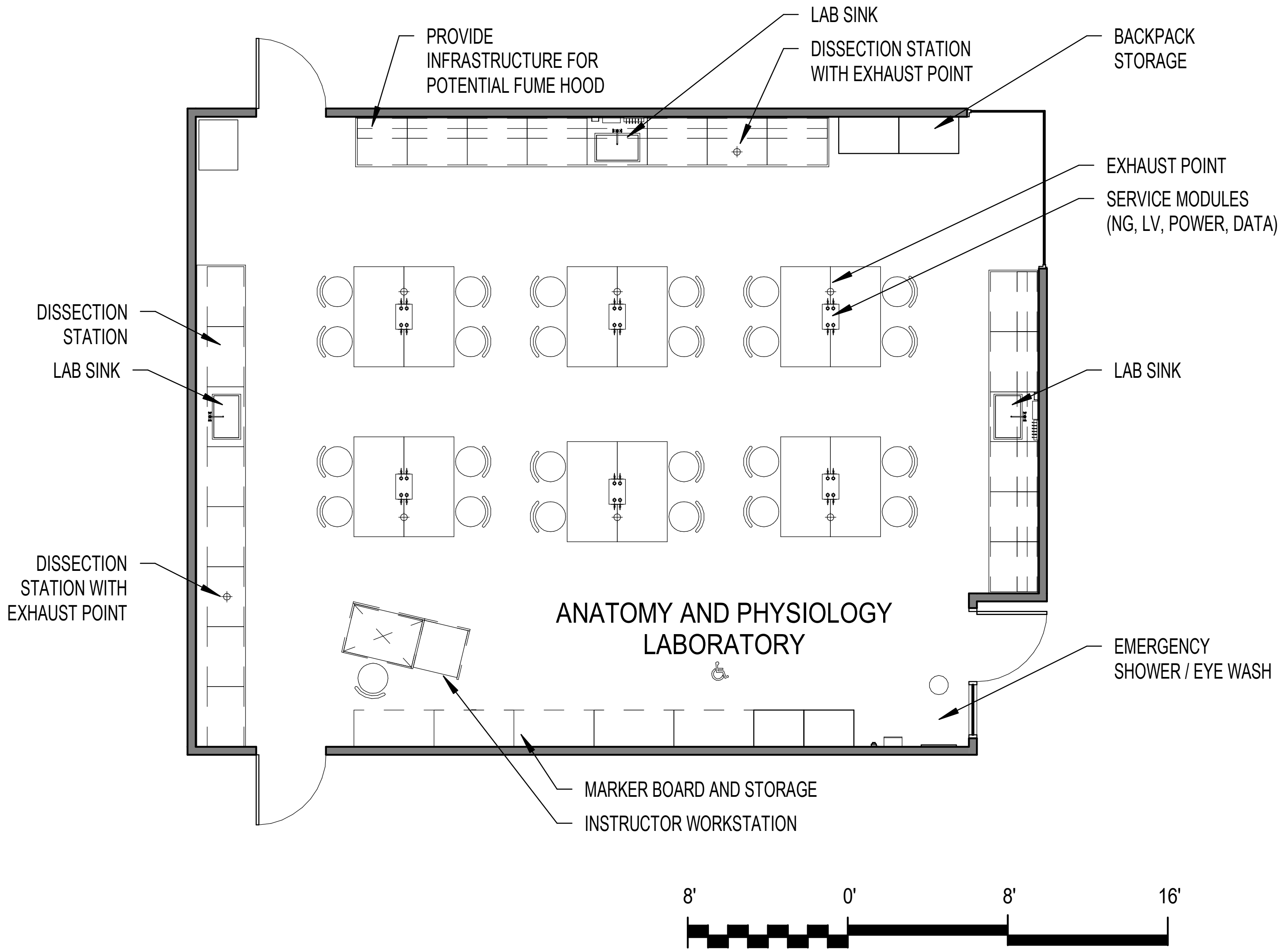
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-14
DRAWING NUMBER

ANATOMY AND PHYSIOLOGY LABORATORY
DRAWING TITLE



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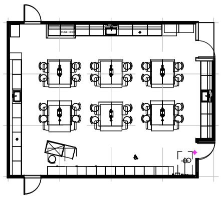


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 14

Planning Information

Program Space Name: ANATOMY AND PHYSIOLOGY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	3
Room Occupancy:	24

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
PROVIDE WITH CURTIANS AT ALL WINDOWS

Direct Adjacency:	
Indirect Adjacency:	SKELETON ROOM
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	8

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

Casework:

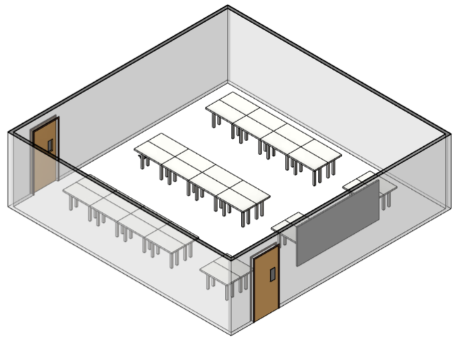
Equipment:

SMART INSTRUCTOR WORKSTATION
HIGH RESOLUTION PROJECTOR

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

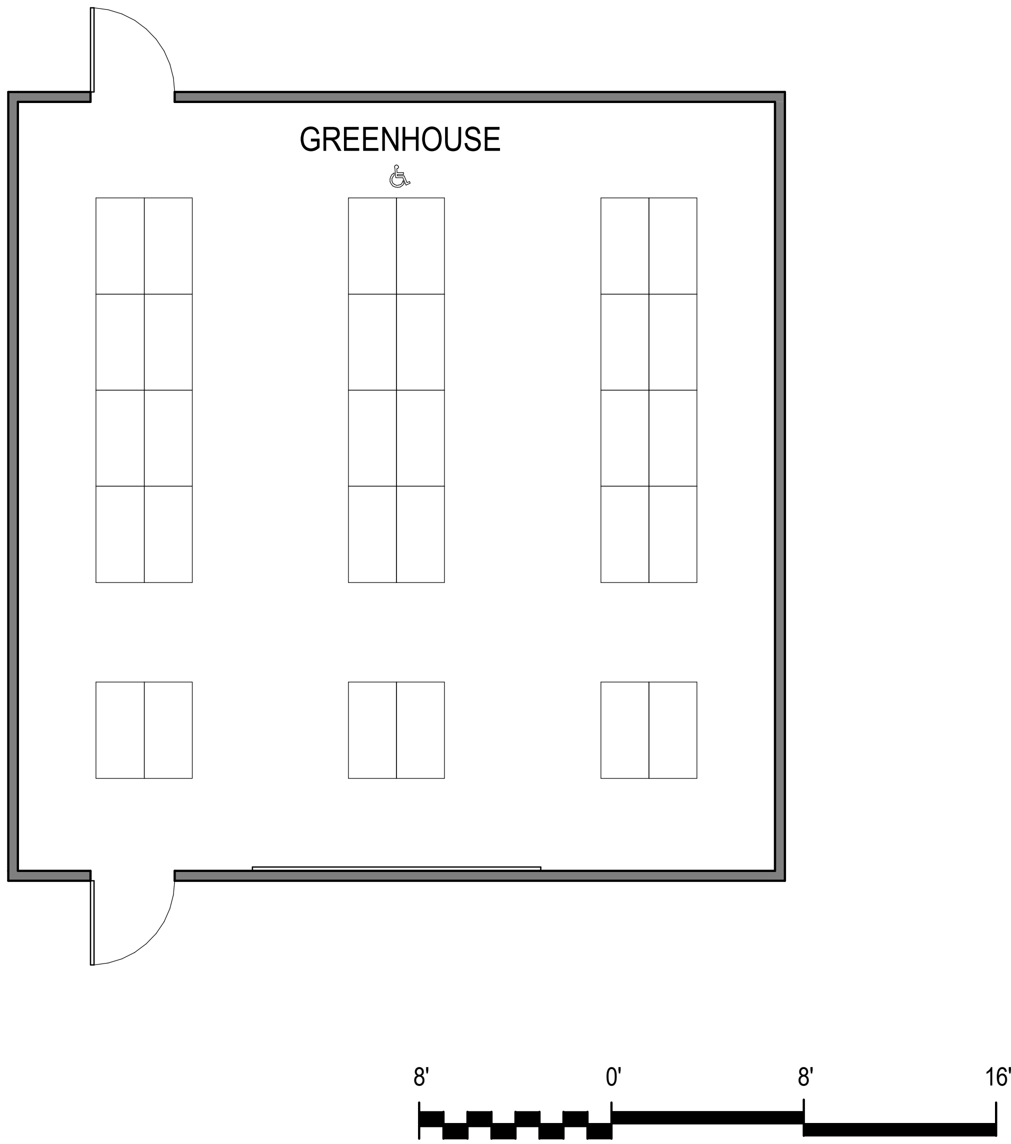


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-16
DRAWING NUMBER

GREENHOUSE
DRAWING TITLE



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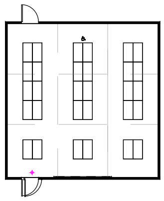


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
BIOLOGY LABS

RDS: 16

Planning Information

Program Space Name: GREENHOUSE

Notes:

Program Space Number:	580
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	960 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	32' - 0"
Room Height:	9' - 0"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	N/A
Security:	YES
Light Levels:	SPECIAL

Architectural Notes:
SUBDIVIDABLE INTO 3 ZONES

Direct Adjacency:	HEAD HOUSE
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	YES-SPECIAL
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:
HOSE BIB AND IRRIGATION SYSTEM
TWO (2) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
SPECIAL EXHAUST DURING PEST FUMIGATION

Equipment/Special Casework Requirements (per Room Type)

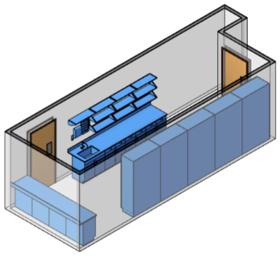
Casework:

Equipment:

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	No
Sink Accessories:	Yes
Coat Hook:	No
Other:	

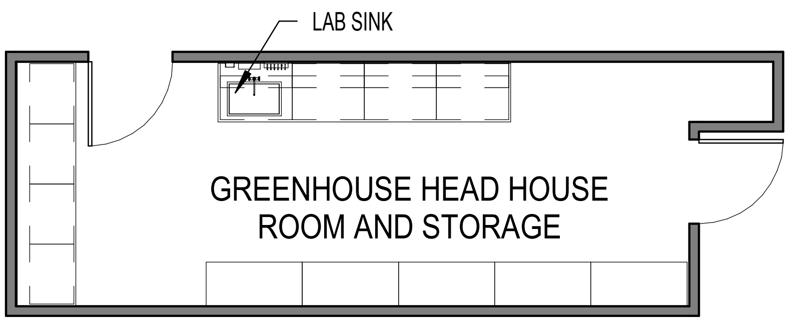
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.



GUIDEPLATE SKETCH

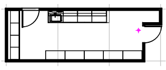
GP-17
DRAWING NUMBER

GREENHOUSE HEAD HOUSE ROOM AND STORAGE
DRAWING TITLE



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

ROOM DATA SHEET



Program Space Types:
BIOLOGY LABS

RDS: 17

Planning Information

Program Space Name: GREENHOUSE HEADHOUSE

Notes:

Program Space Number:	585
Program Space Type:	BIOLOGY LABS
Program Space Area (NSF):	320 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	10' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	N/A
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	GREENHOUSE / EXTERIOR
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	NO
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

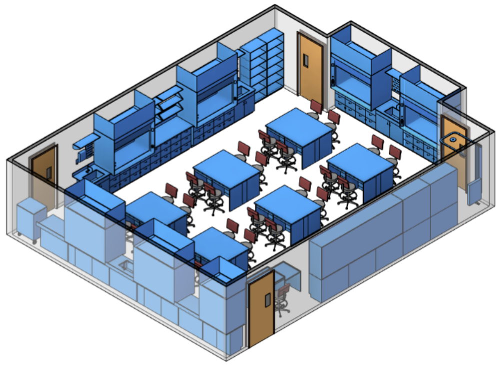
Casework:

Equipment:

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	No
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

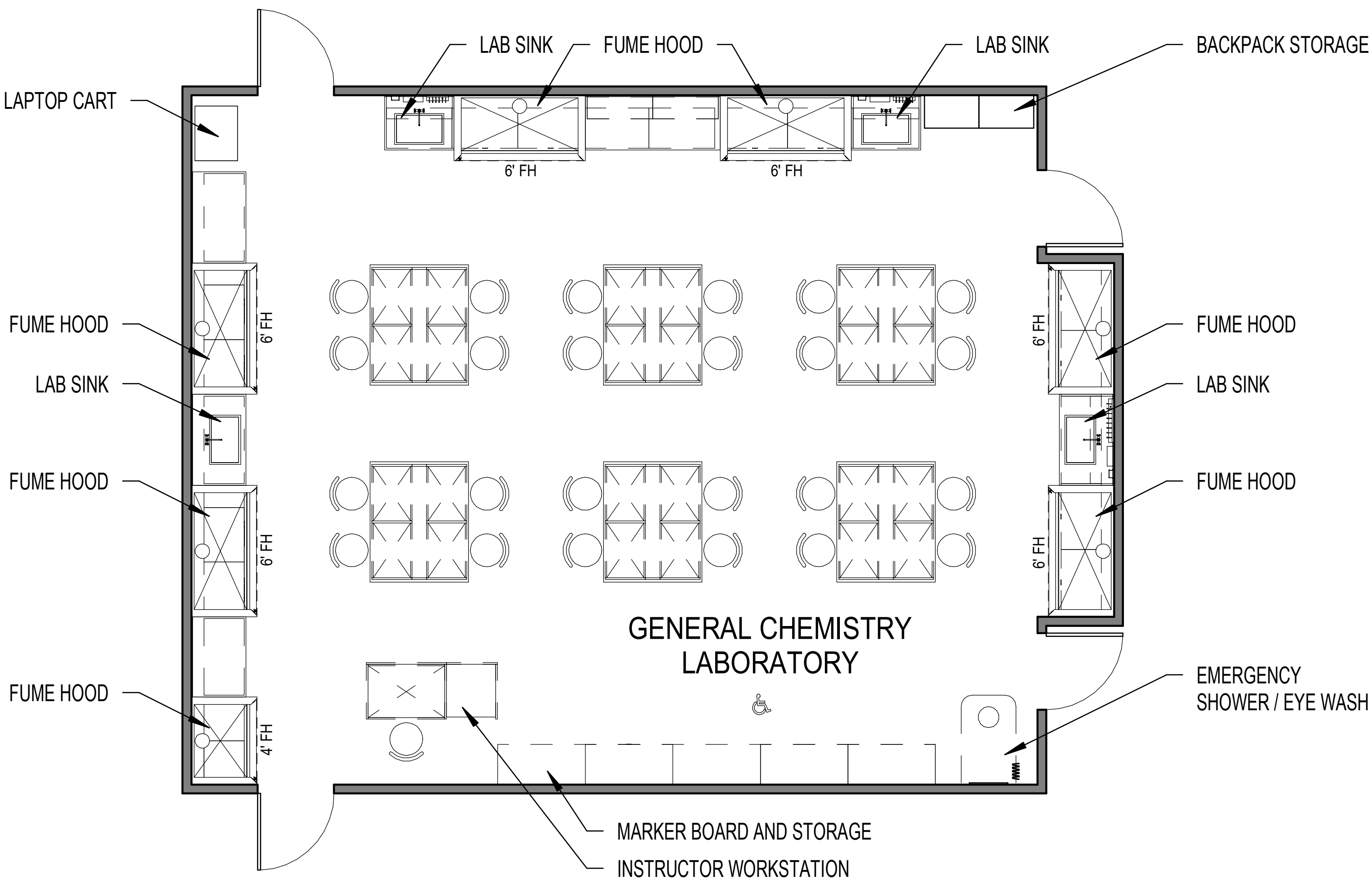


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-18
DRAWING NUMBER

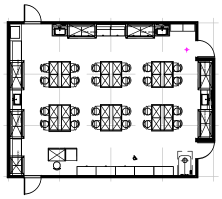
GENERAL CHEMISTRY LABORATORY
DRAWING TITLE



NOTE: DISTILLATION RACK TO ALL FUME HOODS

8' 0' 8' 16'

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



MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 18

Planning Information

Program Space Name: GENERAL CHEMISTRY LAB

Notes:

Program Space Number:	210
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	1200 SF
Program Space Qty:	4
Room Occupancy:	24 STUDENTS + 1 INSTRUCTOR

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	CENTRAL CHEMISTRY PREP & STORAGE
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	SHIELDED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FOUR (4) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	Yes
208V Emergency Power:	No
208V Standby Power:	Yes
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	7
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD; SIX (6) 6'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

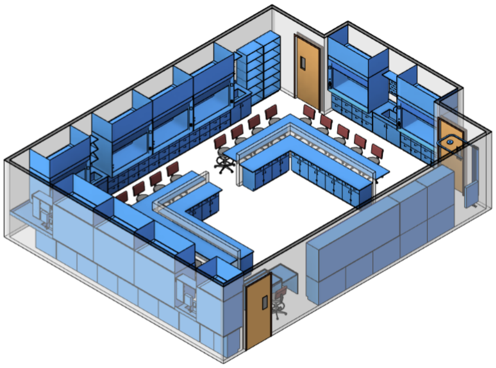
Casework:

Equipment:
SMART INSTRUCTOR WORKSTATION
LAPTOP CART

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	MASS NOTIFICATION DEVICE

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

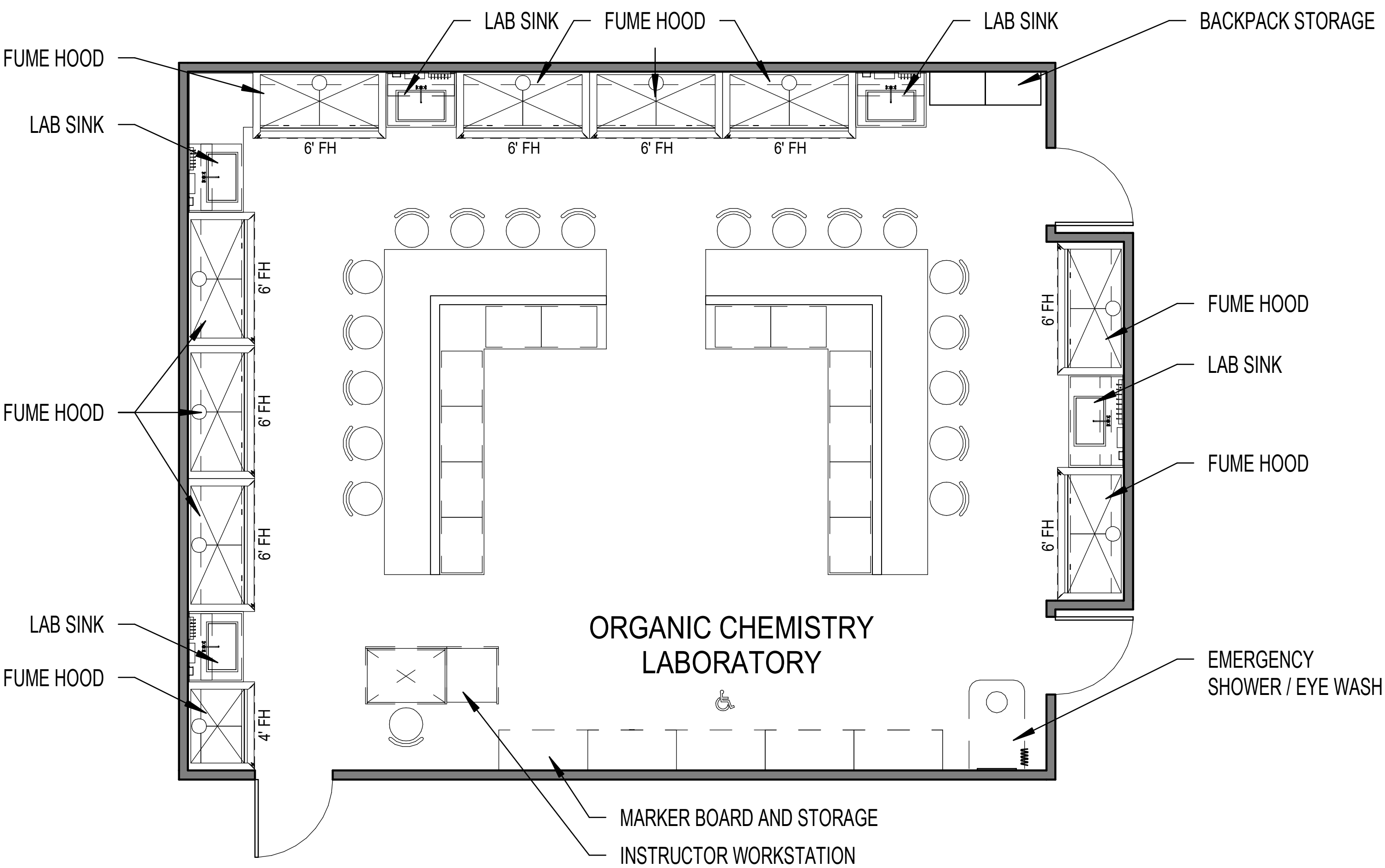


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-19
DRAWING NUMBER

ORGANIC CHEMISTRY LABORATORY
DRAWING TITLE



NOTE: DISTILLATION RACK TO ALL FUME HOODS

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

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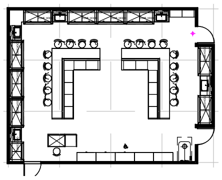


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 19

Planning Information

Program Space Name: ORGANIC CHEMISTRY LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	1200 SF
Program Space Qty:	1
Room Occupancy:	16-18 STUDENTS + 1 INSTRUCTOR

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	INSTRUMENTATION ROOM
Indirect Adjacency:	CENTRAL CHEMISTRY PREP AND STORAGE
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FIVE (5) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	10
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD; NINE (9) 6'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

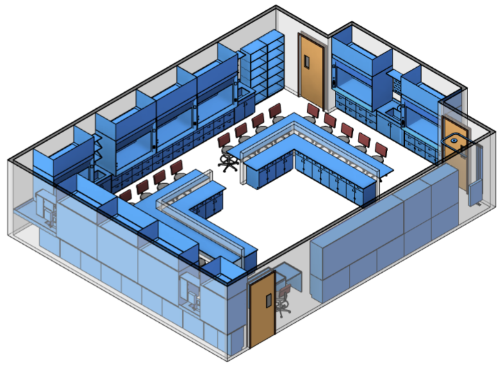
Casework:

Equipment:
SMART INSTRUCTOR WORKSTATION

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

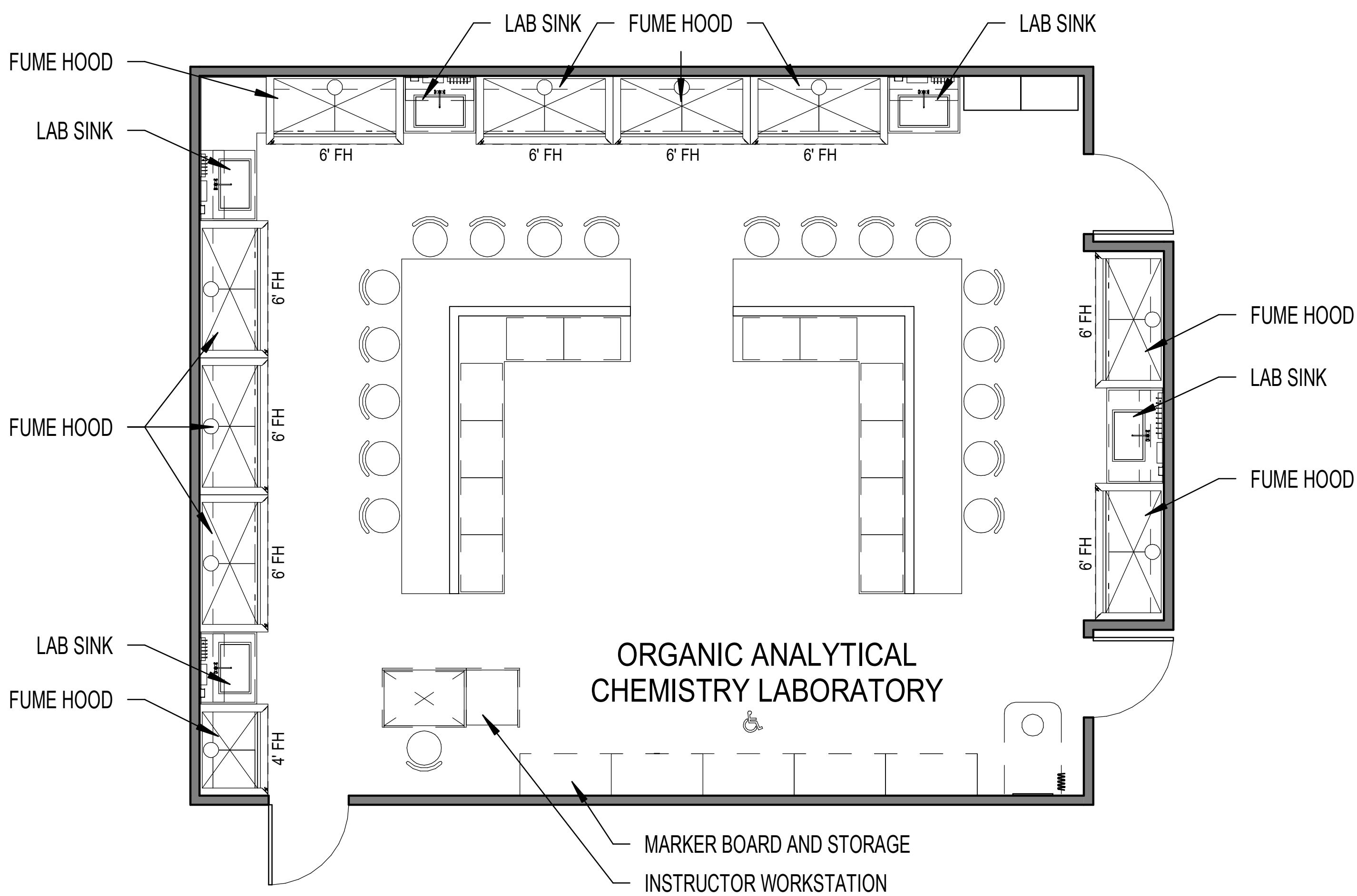


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-20
DRAWING NUMBER

ORGANIC ANALYTICAL CHEMISTRY LABORATORY
DRAWING TITLE



NOTE: DISTILLATION RACK TO ALL FUME HOODS

8' 0' 8' 16'

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

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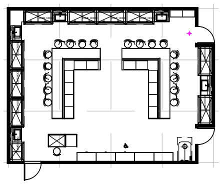


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 20

Planning Information

Program Space Name: ORGANIC ANALYTICAL CHEMISTRY LAB

Notes:

Program Space Number:	210
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	1200 SF
Program Space Qty:	1
Room Occupancy:	16-18 STUDENTS + 1 INSTRUCTOR

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	INSTRUMENTATION ROOM
Indirect Adjacency:	CENTRAL CHEMISTRY PREP AND STORAGE
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
FIVE (5) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	10
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD; NINE (9) 6'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

SMART INSTRUCTOR WORKSTATION

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

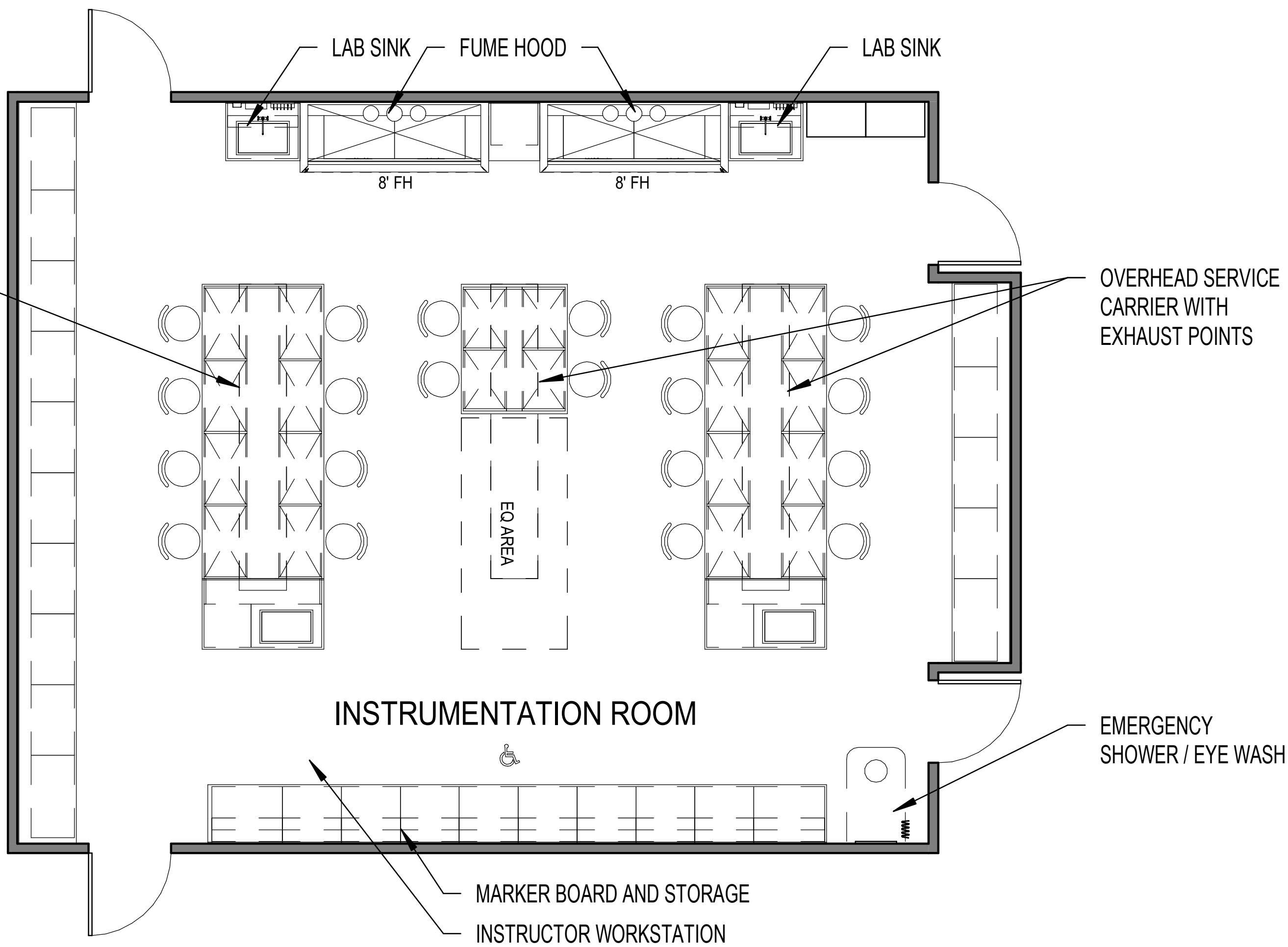
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

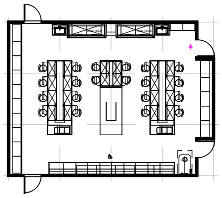
GP-21
DRAWING NUMBER

INSTRUMENTATION ROOM
DRAWING TITLE



NOTE: DISTILLATION RACK TO ALL FUME HOODS

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



ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 21

Planning Information

Program Space Name: INSTRUMENTATION ROOM

Notes:

Program Space Number:	210
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	42' - 8"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	ORGANIC/ANALYTICAL CHEMISTRY
Indirect Adjacency:	CENTRAL CHEMISTRY PREP AND STORAGE
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	Yes
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	2
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	2

Mechanical Notes:
TWO (2) 8'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

Casework:

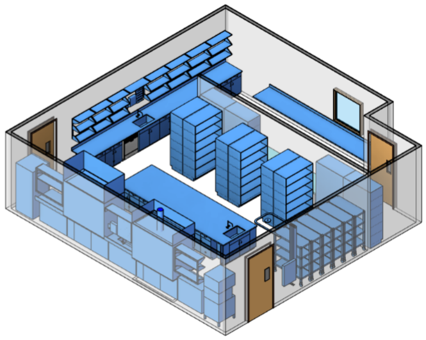
Equipment:

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

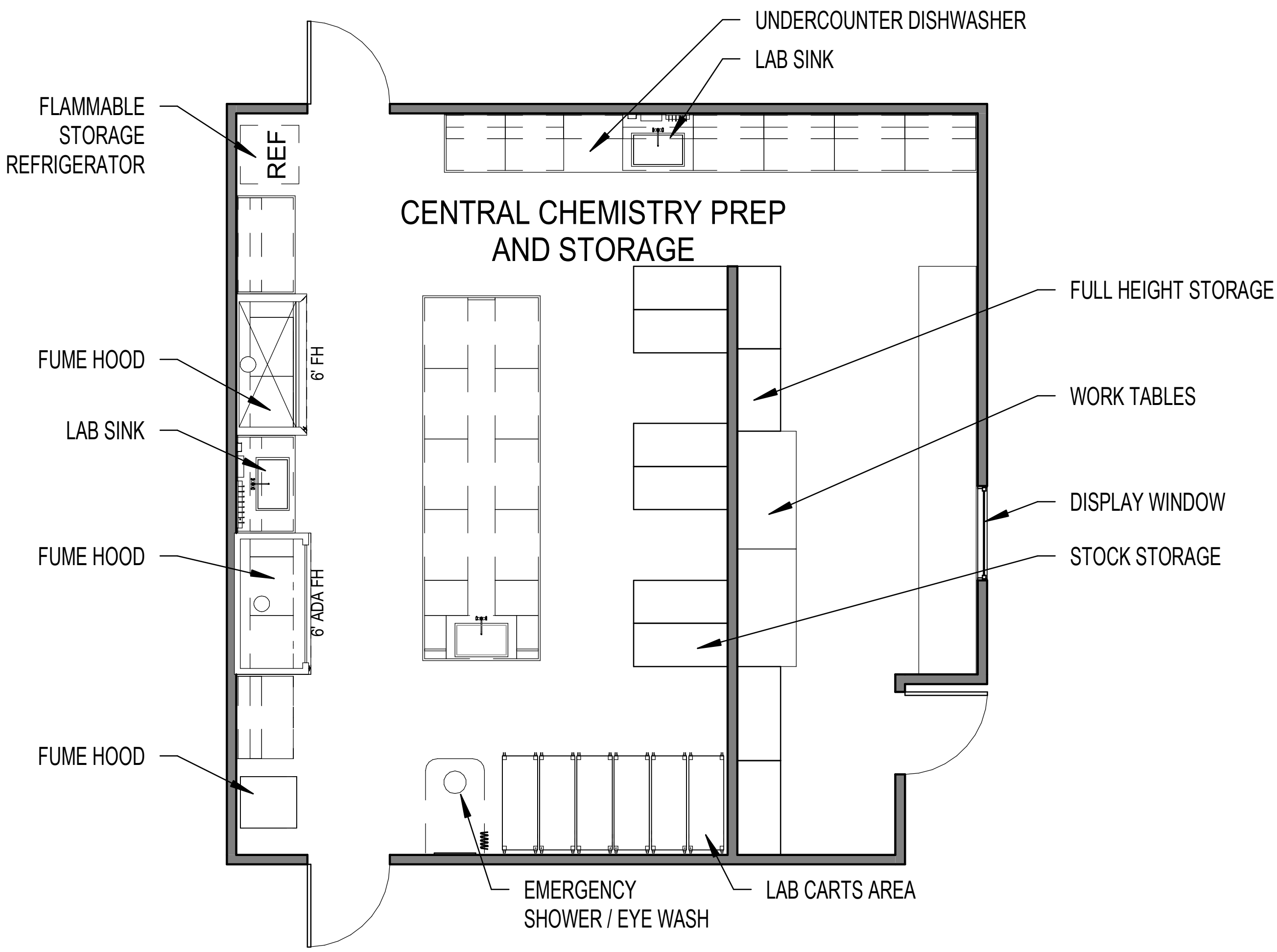
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



GUIDEPLATE SKETCH

GP-22
DRAWING NUMBER

CENTRAL CHEMISTRY PREP AND STORAGE
DRAWING TITLE



NOTE: DISTILLATION RACK AND CUP SINK TO ALL FUME HOODS

8' 0' 8' 16'

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

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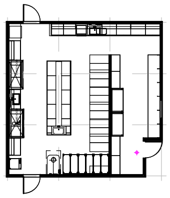


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
CHEMISTRY LABS

RDS: 22

Planning Information

Program Space Name: CENTRAL CHEMISTRY PREP AND STORAGE

Notes:

Program Space Number:	215
Program Space Type:	CHEMISTRY LABS
Program Space Area (NSF):	960 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
DISPENSING WINDOW

Direct Adjacency:	
Indirect Adjacency:	CHEMISTRY LABS
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	No
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	Yes (LOCAL COLLECTION)

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	Yes
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	2
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
TWO (2) 6'-0" WIDE FUME HOODS

Equipment/Special Casework Requirements (per Room Type)

Casework:

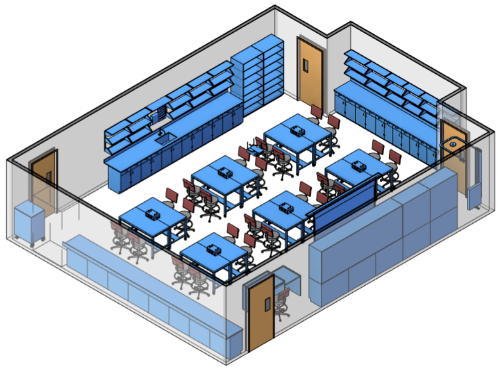
Equipment:

DISH WASHER
FLAMMABLE STORAGE
STORAGE REFRIGERATOR

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

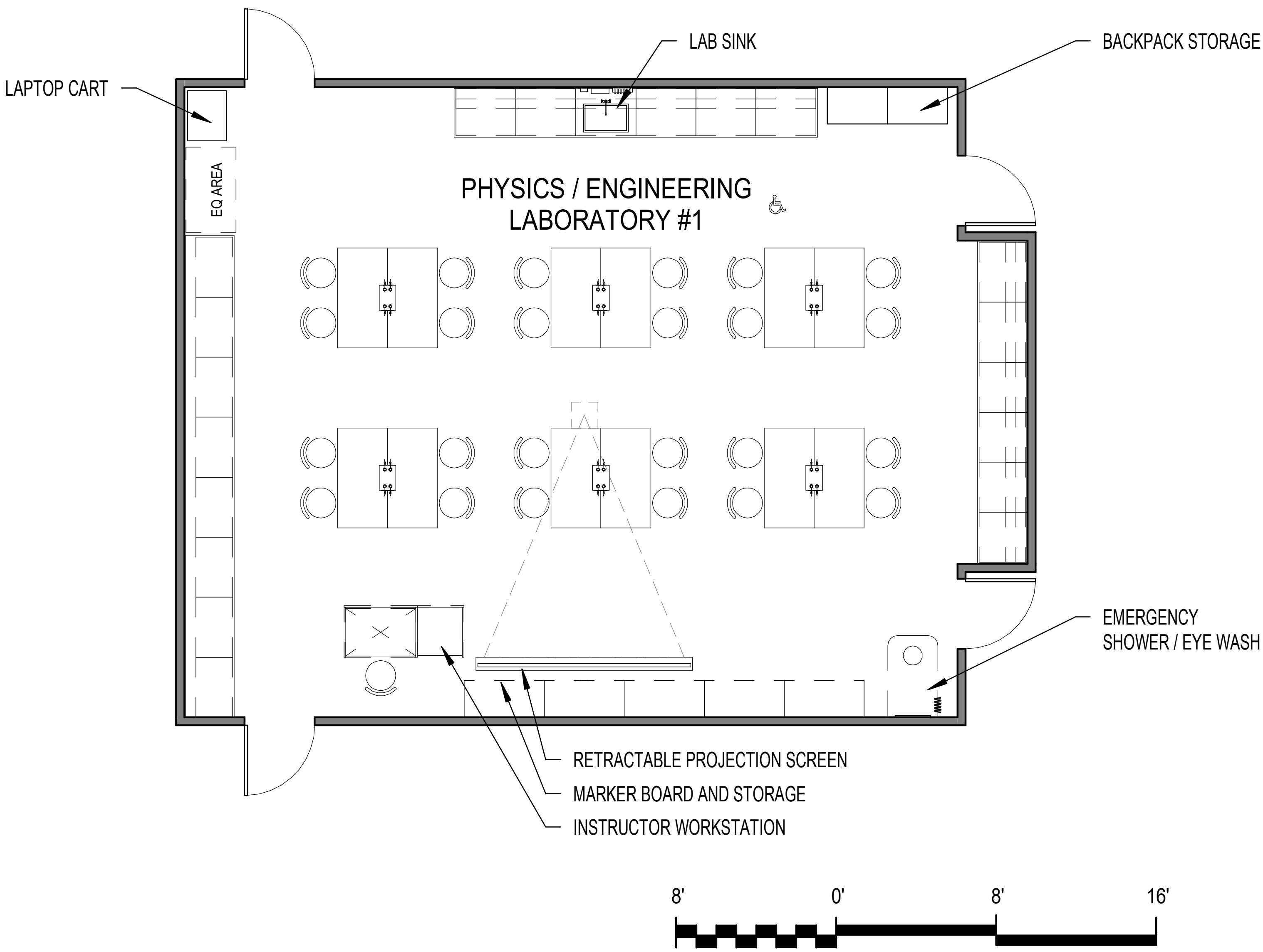


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-23
DRAWING NUMBER

PHYSICS / ENGINEERING LABORATORY #1
DRAWING TITLE



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

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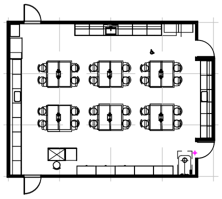


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 23

Planning Information

Program Space Name: PHYSICS/ENGINEERING LABORATORY #1

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	PHYSCIS PREP
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

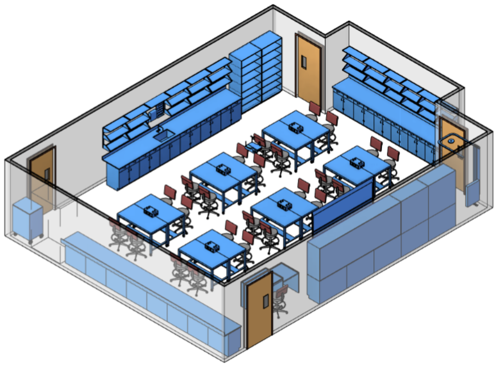
Equipment:

SMART INSTRUCTOR WORKSTATION
LAPTOP CART
HIGH RESOLUTION PROJECTOR

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

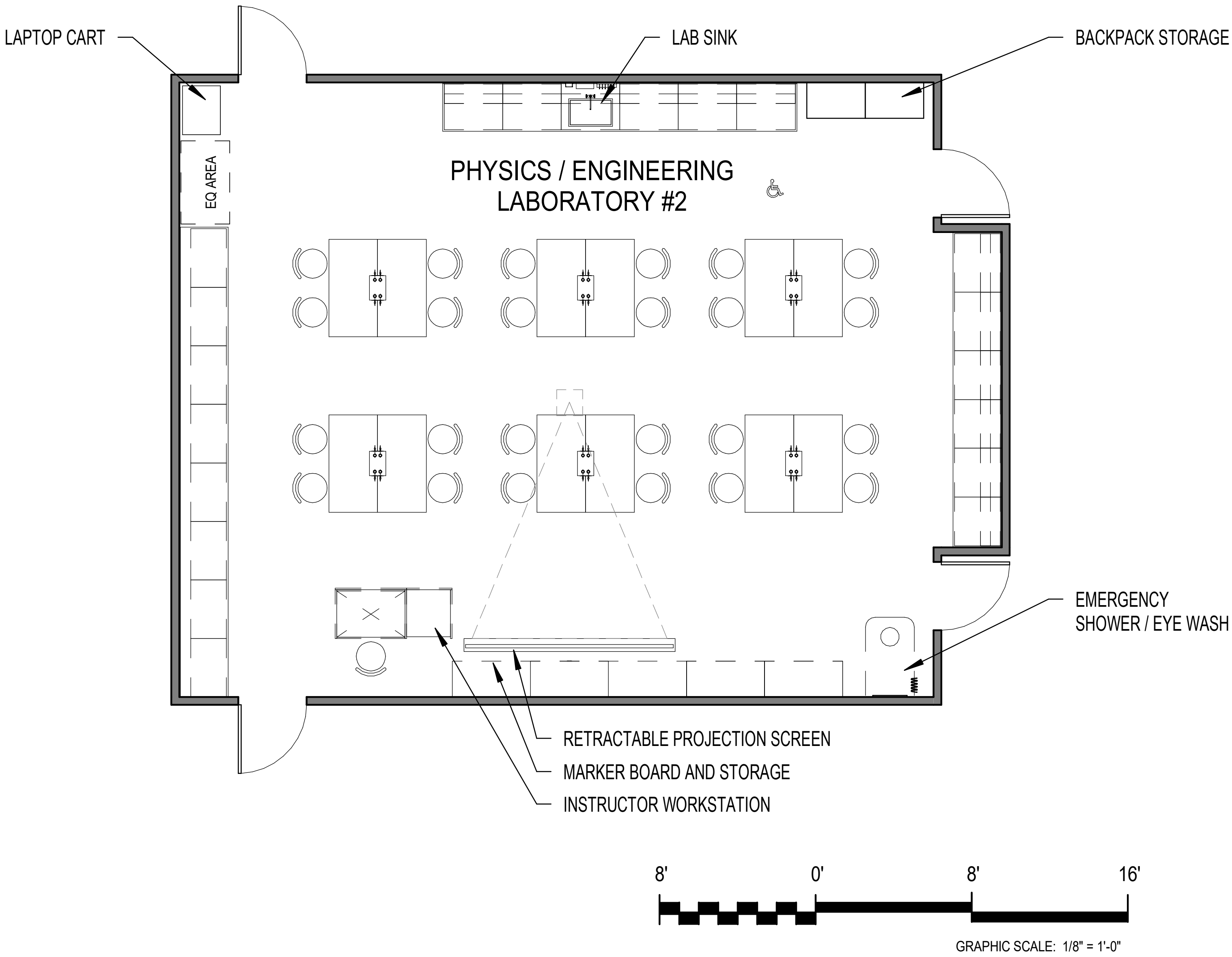


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-24
DRAWING NUMBER

PHYSICS / ENGINEERING LABORATORY #2
DRAWING TITLE



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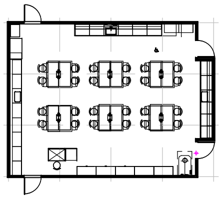


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: **RDS:** 24

ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

Planning Information

Program Space Name: PHYSICS/ENGINEERING LABORATORY #2

Notes:

Program Space Number:	
Program Space Type:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	PHYSCIS PREP
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

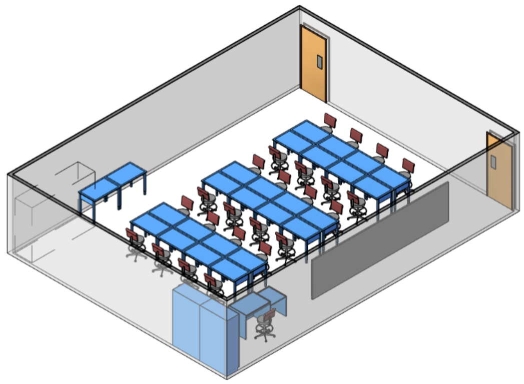
Equipment:

SMART INSTRUCTOR WORKSTATION
LAPTOP CART

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

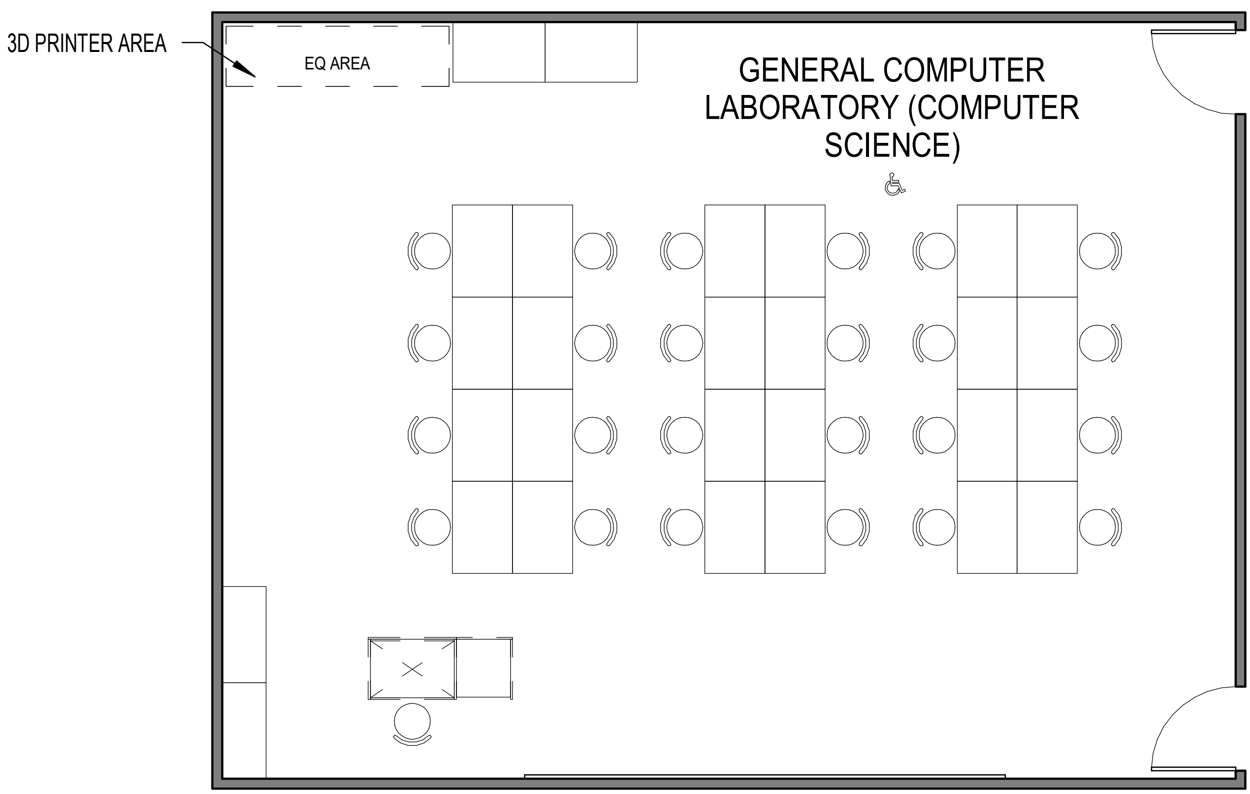


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-25
DRAWING NUMBER

GENERAL COMPUTER LABORATORY (COMPUTER SCIENCE)
DRAWING TITLE



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

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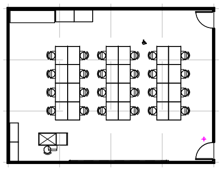


ROOM DATA SHEET

Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 25

Planning Information

Program Space Name: GENERAL COMPUTER LABORATORY (COMPUTER SCIENCE)

Notes:

Program Space Number:
Program Space Type: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Area (NSF): 1280 SF
Program Space Qty: 1
Room Occupancy: 24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC
Architectural Notes:	

Direct Adjacency:	ENG / PHYSICS SHOP
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	NO
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No
Plumbing Notes:	

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	Yes
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD
Electrical Notes:	

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0
Mechanical Notes:	

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

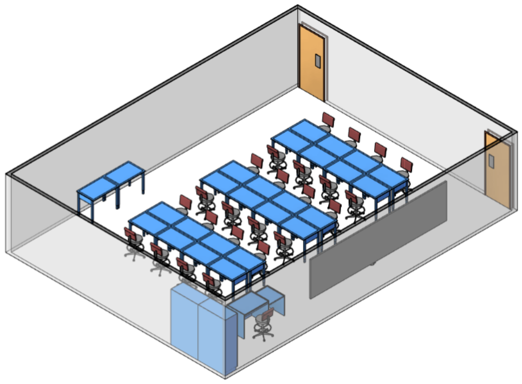
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

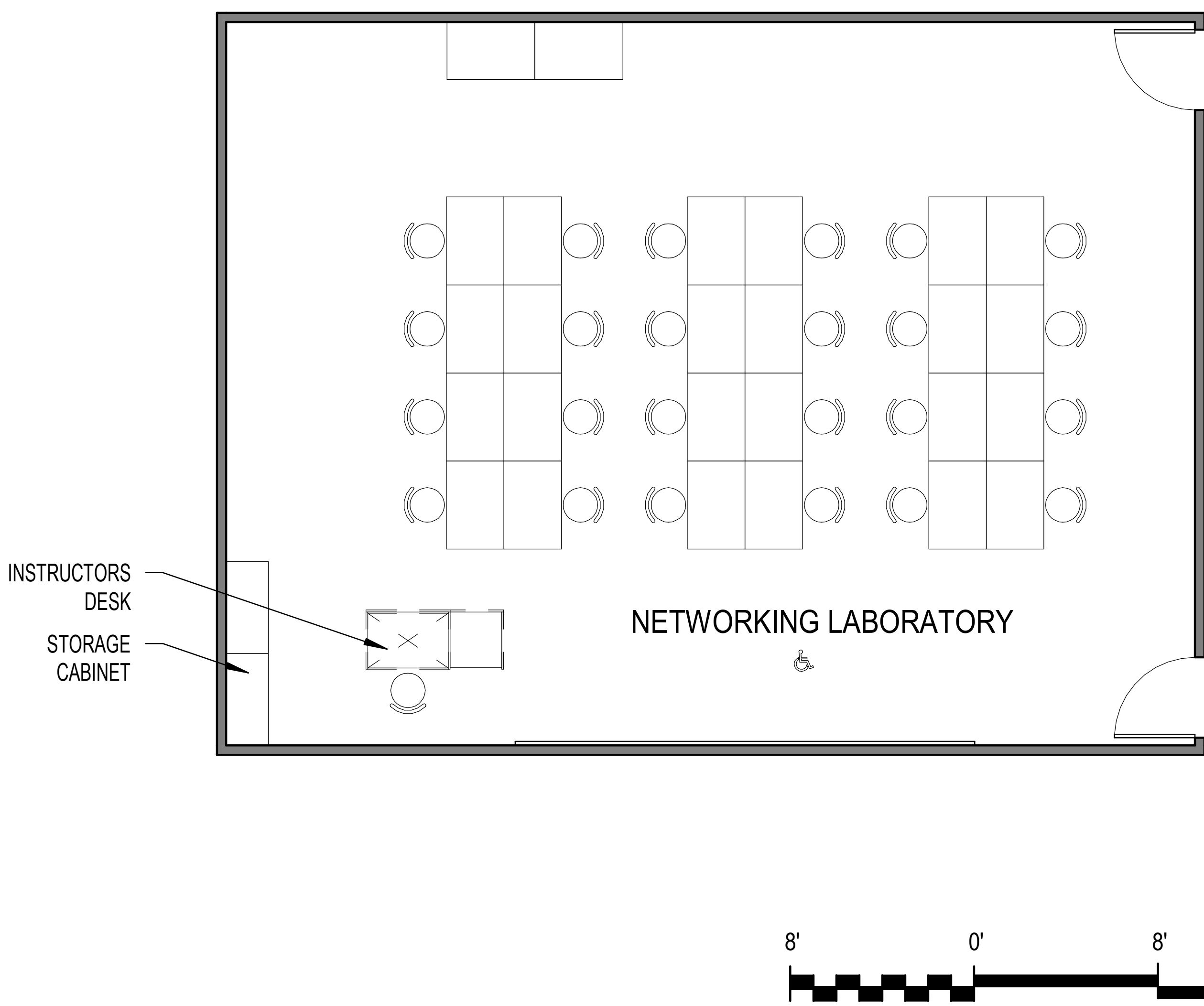
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-26
DRAWING NUMBER

NETWORKING LABORATORY
DRAWING TITLE





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

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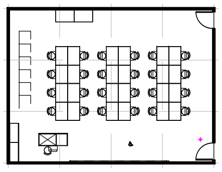


ROOM DATA SHEET

Program Space Types: **RDS:** 26

ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

Planning Information

Program Space Name: NETWORKING LABORATORY

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
RAISED FLOOR

Direct Adjacency:	
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

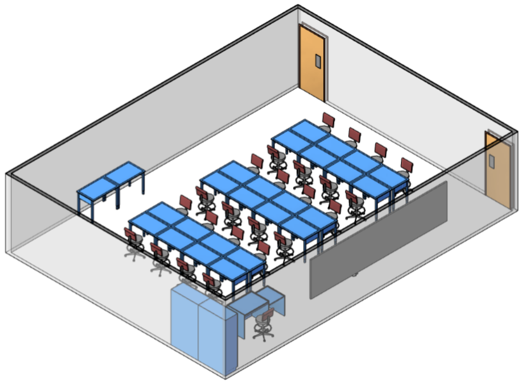
Casework:

Equipment:

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

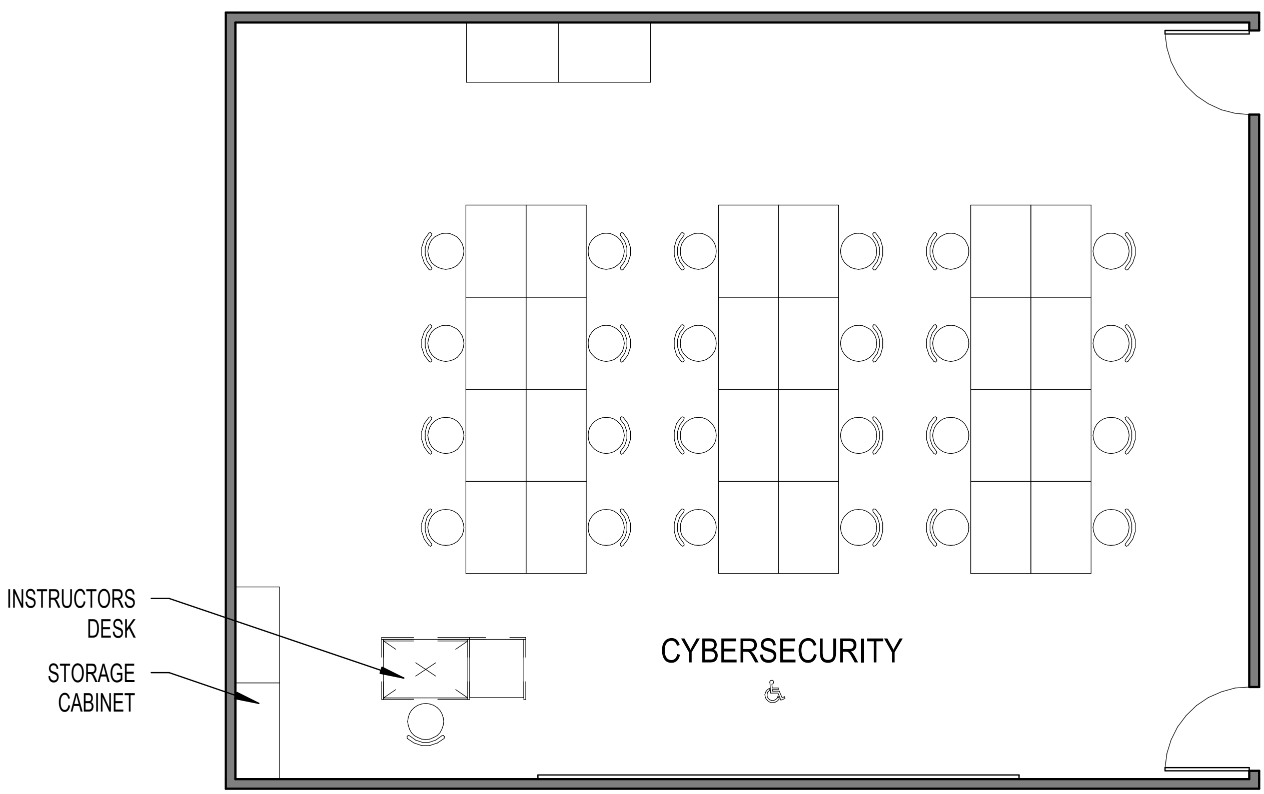


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-27
DRAWING NUMBER

CYBERSECURITY
DRAWING TITLE



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

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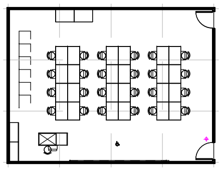


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 27

Planning Information

Program Space Name: CYBERSECURITY

Notes:

Program Space Number: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:
Program Space Area (NSF): 1280 SF
Program Space Qty: 1
Room Occupancy: 24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:
RAISED FLOOR

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	10
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

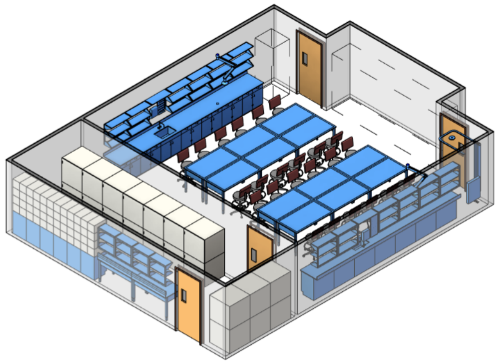
Casework:

Equipment:

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

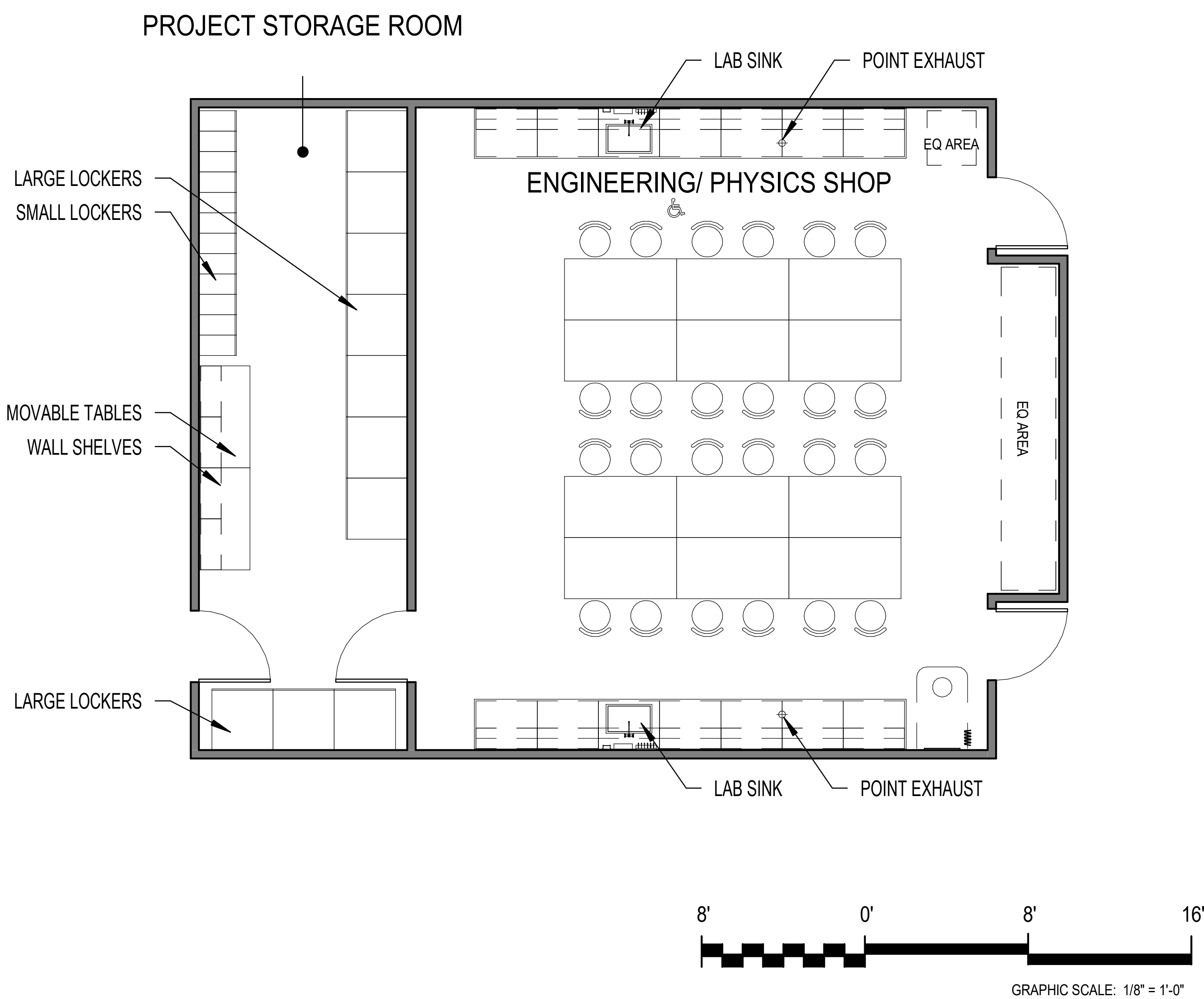


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

GP-28
DRAWING NUMBER

ENGINEERING/ PHYSICS SHOP AND PROJECT STORAGE ROOM
DRAWING TITLE



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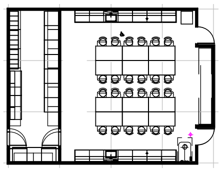


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types: **RDS:** 28

ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

Planning Information

Program Space Name: ENGINEERING/PHYSICS SHOP AND PROJECT STORAGE ROOM

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	1280 SF
Program Space Qty:	1
Room Occupancy:	24

Architectural Requirements

Room Width:	42' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
OVERHEAD UNISTRUT SUPPORT GRID

Direct Adjacency:	COMPUTER LAB
Indirect Adjacency:	MSLC
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	EMERGENCY POWER OFF
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	TBD
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.
EMERGENCY POWER OFF

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

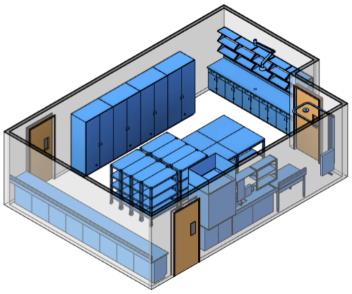
Equipment:

Accessories:

White Marker Board:	Yes (NON GLARE)
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

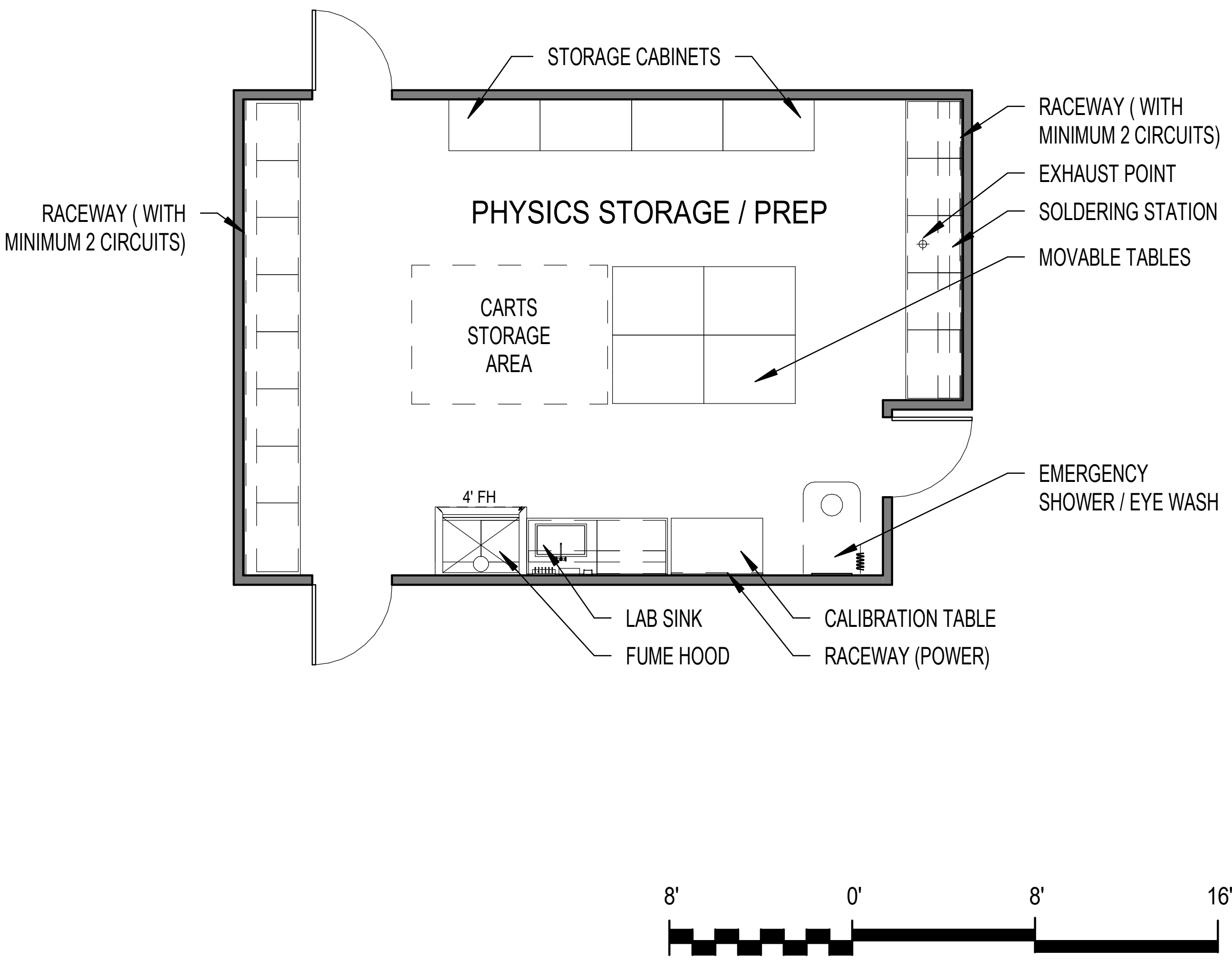
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



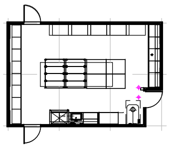
GUIDEPLATE SKETCH

GP-29
DRAWING NUMBER

PHYSICS STORAGE / PREP
DRAWING TITLE



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



ROOM DATA SHEET

Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 29

Planning Information

Program Space Name: PHYSICS STORAGE/PREP

Notes:

Program Space Number:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Type:	
Program Space Area (NSF):	640 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	21' - 4"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Direct Adjacency:	PHYSICS/ENGINEERING LABS
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Architectural Notes:

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	No
RO Water:	No
Floor Drain:	Yes
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	Yes (LOCAL COLLECTION)

Plumbing Notes:
ONE (1) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	1 SOLDERING STATION

Mechanical Notes:
ONE (1) 4'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

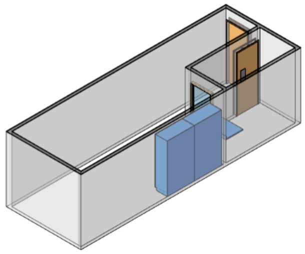
Casework:

Equipment:

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

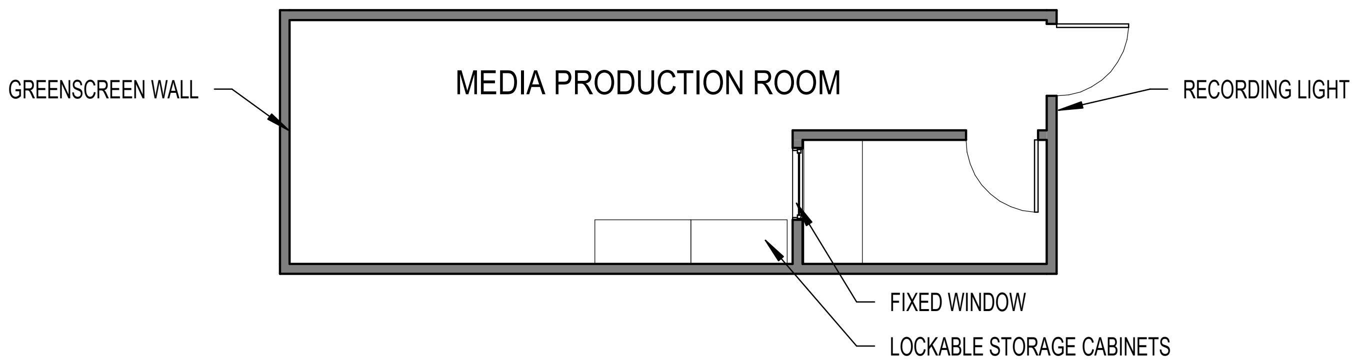
MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING



GUIDEPLATE SKETCH

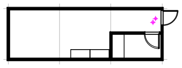
GP-31
DRAWING NUMBER

MEDIA PRODUCTION ROOM
DRAWING TITLE



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

ROOM DATA SHEET



Program Space Types: ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING

RDS: 31

Planning Information

Program Space Name: MEDIA PRODUCTION SUITE

Notes:

Program Space Number:	
Program Space Type:	ENGINEERING, PHYSICAL AND COMPUTER SCIENCE, CYBERSECURITY AND NETWORKING
Program Space Area (NSF):	320 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	11' - 8"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:
SPECIAL FINISH TREATMENT FOR AUDIO AND VIDEO RECORDING.

Direct Adjacency:	
Indirect Adjacency:	MSLC
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ABILITY TO SILENCE HVAC DURING RECORDING TIMES UP TO 60 MIN.

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	No
Coat Hook:	No
Other:	GREEN SCREEN

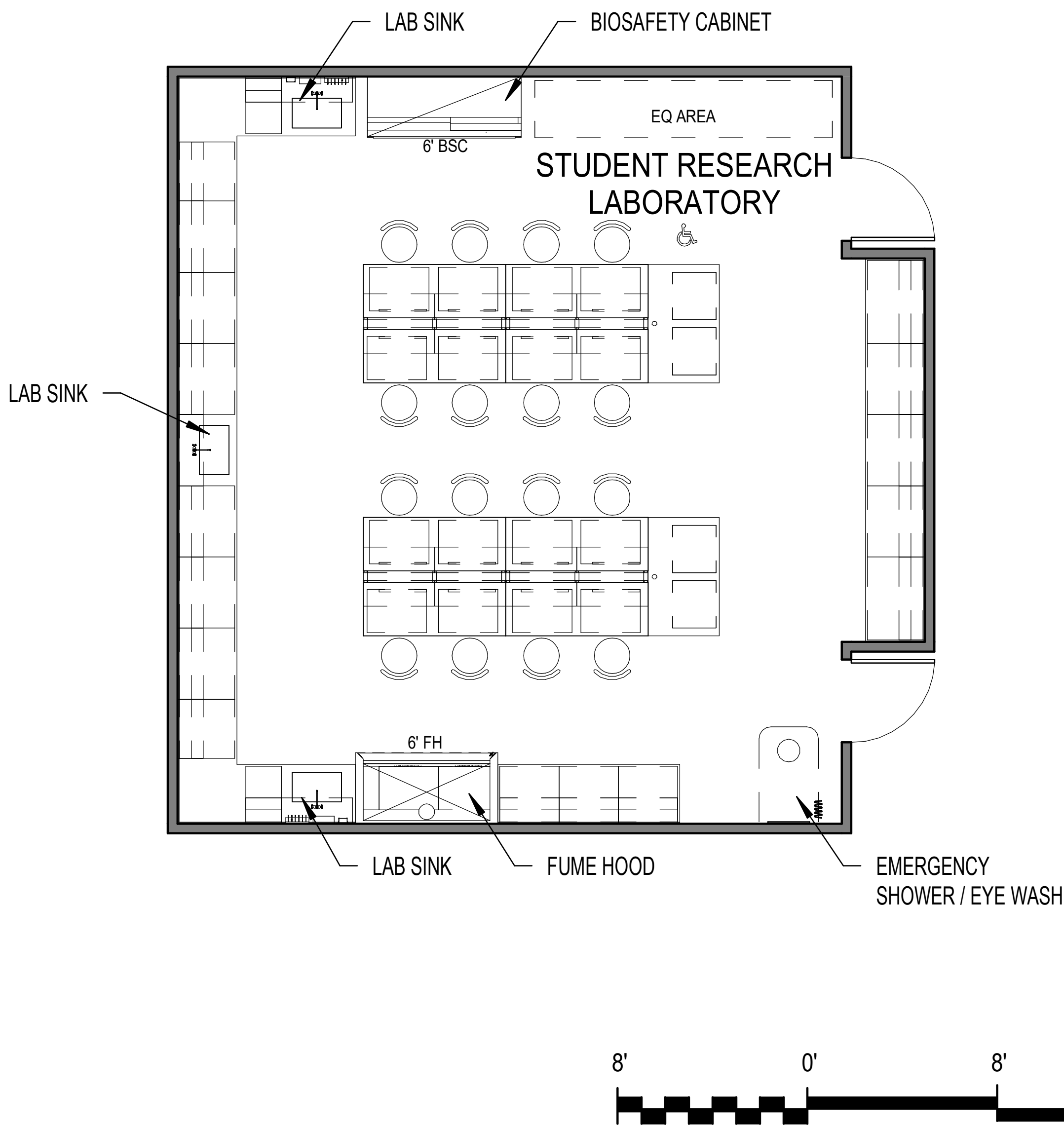
Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

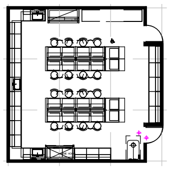
GUIDEPLATE SKETCH

GP-32
DRAWING NUMBER

STUDENT RESEARCH LABORATORY
DRAWING TITLE



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



MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

ROOM DATA SHEET

Program Space Types:
ACADEMIC SUPPORT

RDS: 32

Planning Information

Program Space Name: STUDENT RESEARCH LABORATORY

Notes:

Program Space Number:	210
Program Space Type:	ACADEMIC SUPPORT
Program Space Area (NSF):	960 SF
Program Space Qty:	1
Room Occupancy:	N/A

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	2000
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	
Indirect Adjacency:	INSTRUMENTATION ROOM
Non Adjacency:	
Natural Light Desired:	NO
Light Control:	ZONED LIGHTS & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	FH ALARM
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	Yes
Hot Water:	Yes
DI Water:	Yes
RO Water:	Yes
Floor Drain:	Yes
Compressed Air:	Yes
Compressed Air-High Pressure:	No
Natural Gas:	Yes
Specialty Gas:	TBD
Lab Vacuum:	Yes
Eye Wash:	Yes
Safety Shower:	Yes
Acid Waste:	No (LOCAL COLLECTION)

Plumbing Notes:
MEDIUM LAB SINKS, CUP SINKS IN FUME HOOD.
THREE (3) HOT/COLD WATER

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:
ELECTRICAL RACEWAYS WITH 120V AND DATA.

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	1
Biosafety Cabinet:	1
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:
ONE (1) 6'-0" WIDE FUME HOOD

Equipment/Special Casework Requirements (per Room Type)

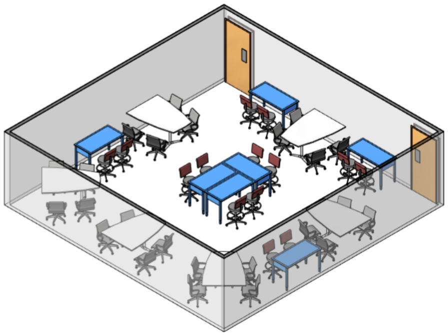
Casework:

Equipment:

INCUBATORS
BIOSAFETY CABINET

Accessories:

White Marker Board:	No
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	No
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

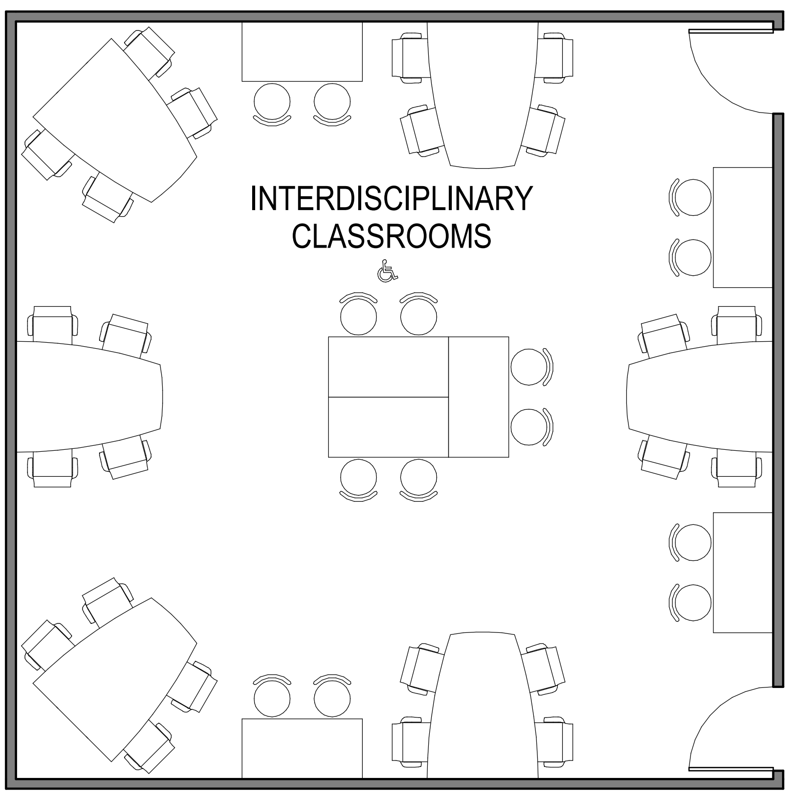


MONTGOMERY COLLEGE
LEGGETT MATH AND SCIENCE BUILDING

GUIDEPLATE SKETCH

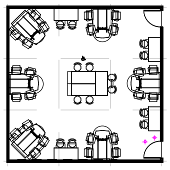
GP-33
DRAWING NUMBER

INTERDISCIPLINARY CLASSROOMS
DRAWING TITLE



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

SMITHGROUP
1700 NEW YORK AVENUE NW SUITE 100 WASHINGTON, DC 20006 T 202.842.2100 www.smithgroup.com



ROOM DATA SHEET

Program Space Types:
ACADEMIC SUPPORT

RDS: 33

Planning Information

Program Space Name: INTEGRDISCIPLINARY CLASSROOM

Notes:

Program Space Number:	110
Program Space Type:	ACADEMIC SUPPORT
Program Space Area (NSF):	960 SF
Program Space Qty:	2
Room Occupancy:	30

Architectural Requirements

Room Width:	32' - 0"
Room Depth:	32' - 0"
Room Height:	9' - 6"
Room Finish Class:	GROUP 1
Sound Transmission Class (STC):	45
Noise Coefficient (NC):	50
Vibration Sensitivity:	N/A
Security:	YES
Light Levels:	50-100 FC

Architectural Notes:

Direct Adjacency:	MSLC / PLANETARIUM
Indirect Adjacency:	
Non Adjacency:	
Natural Light Desired:	YES
Light Control:	ZONED & ROOM DARKENING
Shielding:	NO
Equip Monitoring/Alarm:	NO
Data/Communications:	RJ48 ETHERNET (CAT6), WIRELESS

Plumbing Requirements

Cold Water:	No
Hot Water:	No
DI Water:	No
RO Water:	No
Floor Drain:	No
Compressed Air:	No
Compressed Air-High Pressure:	No
Natural Gas:	No
Specialty Gas:	No
Lab Vacuum:	No
Eye Wash:	No
Safety Shower:	No
Acid Waste:	No

Plumbing Notes:

Electrical Requirements

120V Normal Power:	Yes
120V Emergency Power:	No
120V Standby Power:	No
120V Twist Connect:	No
208V Normal Power:	No
208V Emergency Power:	No
208V Standby Power:	No
208V Twist Connect:	No
480V Power:	No
DC Power:	No
Watts/SF:	STANDARD

Electrical Notes:

Mechanical Requirements

Room Pressurization:	NEG.
Temperature Req.:	74°F (+/- 2°F)
Relative Humidity Req.:	40% RH (+/- 5%)
CFM:	
Min. Air Changes:	4-6 ACH
Process Water:	No
Fume Hood:	0
Biosafety Cabinet:	0
Canopy Hood:	0
Laminar Flow Hood:	0
Point Exhaust:	0

Mechanical Notes:

Equipment/Special Casework Requirements (per Room Type)

Casework:

Equipment:

SMART INSTRUCTOR WORKSTATION

Accessories:

White Marker Board:	Yes
Stackable Marker Board:	No
Blackboard:	No
Single Projection Screen:	Yes
Dual Projection Screen:	No
Clock:	Yes
Sink Accessories:	Yes
Coat Hook:	No
Other:	

Refer to attached 'Guideplate and Datasheet Instructions/Keys' sheet for explanatory text, keys and abbreviations.

APPENDIX C

GEOTECHNICAL REPORT

REVISION NO. 1 - GEOTECHNICAL REPORT

The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Avenue
Takoma Park, Maryland

Schnabel Engineering DC, Inc.
CBE Licenses No. L22053052020

Schnabel Reference: 18C41041
January 23, 2019

Schnabel Engineering DC

4200 Wisconsin Avenue, NW, Suite LL9 / Washington, DC / 20016
CBE License No. L22053052020

January 23, 2019

Mr. Kevin Johnson, AIA, LEED AP
SmithGroup
1700 New York Avenue NW, Suite 100
Washington, DC 20006

Subject: **Project 18C41041, Revision No. 1 - Geotechnical Engineering Report, The Catherine and Isiah Leggett Building, Montgomery College, 7600 Takoma Ave, Takoma Park, Maryland**

Dear Mr. Johnson:

SCHNABEL ENGINEERING DC, INC. is pleased to submit our revised geotechnical engineering report for this project. This study was performed in accordance with our proposal dated January 18, 2018, as authorized by you via email of August 5, 2018. This report supersedes our draft reports dated September 14, 2018 and October 5, 2018, and final report issued on December 11, 2018. We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Sincerely,

SCHNABEL ENGINEERING DC, INC.

J. Bentel

Joan Bentel, PE
Associate

Bill Khouri, PE
Principal

"Professional Certification. I hereby certify that these documents were prepared or approved by me and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 17793, Expiration Date: 5-12-2020."

MK:SO:JB:BK:is

G:\2018\PROJECTS\18C41041 - MC MATH & SCIENCE CENTER\03-SE PRODUCTS\03-REPORTS\02-FINAL\FINAL GEOTECHNICAL REPORT_REV.1.DOCX

schnabelDC.com

T/ 202-677-4120
F/ 202-677-4121

REVISION NO. 1 - GEOTECHNICAL ENGINEERING REPORT
THE CATHERINE AND ISIAH LEGGETT BUILDING
TAKOMA PARK, MARYLAND

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APPENDICES

1.0 EXECUTIVE SUMMARY

This report presents the results of the geotechnical investigation and testing conducted by Schnabel Engineering DC, Inc. (SEDC) for the proposed Catherine and Isiah Leggett Building for SmithGroup. Based on our evaluation of the subsurface conditions revealed by our field investigation and the project data furnished to us, we have developed the following summary of our major conclusions and recommendations. Detailed recommendations are presented in the body of the report.

- Ten soil test borings were advanced in the general area of the proposed building and five soil borings were advanced at proposed stormwater management locations (one of the test building borings also served as a stormwater boring, SB-05/SWM-4). The subsurface investigation revealed that the site is underlain by terrace deposits (Strata B1 and B2) overlaying residual soils (Strata C1, C2, and D). Existing fill was also encountered and extended between 2 ft to 6 ft below surface grades in the majority of the borings, except at borings SB-08 and SB-10. At these locations, deeper fill was present and extended 13.5 ft to 23.5 ft below surface grades, respectively.

- The subject site is currently occupied by Falcon Hall with the lowest level at predominately EL +307 (ft) and some spaces with a lowest level at EL +302 (ft), and the Science South Building with a lowest level at EL +326 (ft). Both buildings will be demolished in their entirety and the buildings' foundation systems will be completely removed. Cuts of up to about 15 ft are expected, and the majority of the fill that was encountered in the borings will be removed as part of the demolition. At boring SB-10, where fill extended to EL +302.9 (ft), the fill material is believed to backfill of the present-day building. Boring SB-10 currently lies outside of the proposed building footprint and our recommendations have been tailored with this consideration.

- To reach the proposed lowest level of the new Catherine and Isiah Leggett Building at EL +320 (ft), up to about 15 ft to 18 ft of new compacted structural fill will need to be placed. Due to the large thickness of new fill being placed, settlement plates will need to be installed and the fill monitored to ensure that settlement has dissipated before the building can be constructed.

- Considering a maximum column load of about 200 kips to 300 kips, we recommend the new building be supported on spread footings founded on firm natural soils of Strata B1, B2, C1, or C2 or on compacted structural fill. In areas where existing natural soil is loose/soft or existing fill material is present, these materials should be removed and replaced with compacted structural fill or lean concrete. Spread footings can be designed for an allowable soil bearing pressure of 3,000 psf as discussed in detail in the report.

- The proposed floor slabs should be supported on suitable natural soils of Strata B1, B2, C1, and C2 or compacted structural fill. A modulus of subgrade reaction, k, of 100 kcf (kips per cubic foot) should be used in the design of floor slabs.

- We evaluated the Seismic Site Class for this project according to the International Building Code (IBC) Section 1613 2015. Our analysis indicates Site Class D for this location. This Site Class was evaluated based on the Standard Penetration Test (SPT) values.

- Building walls that extend below-grade need to be designed to withstand lateral earth pressures. Additional details are provided herein.

- Subdrainage below the floor slab and behind below-grade walls will be required. Dewatering during construction will also be required. Additional details are provided herein.

We are providing this executive summary solely for purposes of overview. Any party that relies on this report must read the full report. This executive summary omits several details, any one of which could be very important to the proper application of the report.

2.0 SCOPE OF SERVICES

Our proposal dated January 18, 2018, defines the scope of services for this project. The scope of services includes the following:

- Advancing ten soil test borings to depths between 40 ft and 55 ft each, five soil test borings to depths between 15 ft and 16 ft each, and conducting pressuremeter testing at two (2) of the building borings.
- Conducting falling head infiltration testing at six locations.
- Preparation of a report consisting of:
    - Project and site description, including relevant information relating to nearby foundations and structures, etc.
    - A boring location plan, indicating boring locations referenced to actual physical features and proposed locations of structures.
    - Boring logs with soil/rock description, classification, and depth of fill, groundwater observations, and any other observations made during the exploration, including the ground surface elevations at boring locations.
    - An estimate of subsurface conditions and groundwater levels within the area explored.
    - Foundation requirements including a net allowable soil bearing pressure, bearing grades and estimated settlements for spread footings.
    - Recommendations for floor slab support, including a recommended modulus of subgrade reaction for use in slab design.
    - Earthwork recommendations for construction of load-bearing fill including an assessment of site soils for use as fill, subgrade preparation, and compaction criteria.
    - Recommended Seismic Site Class in accordance with IBC 2015 for use in foundation design based on an extrapolation of data collected in the subsurface exploration.
    - Recommended static earth pressures, subdrainage and backfill requirements for basement walls, loading dock walls or retaining walls, if necessary.
    - Recommendations regarding permanent subdrainage design and installation, if necessary.
    - Construction considerations related to the implementation of our recommendations.

3.0 DESCRIPTION OF SITE AND PROPOSED CONSTRUCTION

3.1 Site Description

We understand that the project will consist of constructing The Catherine and Isiah Leggett Building at the Montgomery College Takoma Park/Silver Spring Campus in Takoma Park, Maryland. The project site is bounded by Fenton Street to the south and west, Takoma Avenue to the east, and New York Avenue to the north. A Site Vicinity Map is included as **Figure 1**.

Areas to be improved are currently asphalt lots, the Falcon Hall and Science South academic buildings, tennis courts, and landscaped grass areas between academic buildings. We understand that the lowest level elevation for the Science South building is at elevation EL +326 (ft), and the lowest level elevation for Falcon Hall is at approximate elevation EL +307 (ft). Both of these buildings are believed to be supported on spread footings. Existing grades in the area of the proposed building footprint range from about EL +315 (ft) to about EL +334 (ft).

We obtained the site information from our site visits and from the information provided by your office. The topographic information was supplied by A. Morton Thomas and Associates.

3.2 Proposed Construction

The proposed building will be located along the east portion of the Takoma Park/Silver Spring Campus in the area where present-day Falcon Hall, the Science South Building, Staff Parking Lot E1, and the tennis courts are situated. We understand that existing Falcon Hall and the Science South Building will be demolished in their entirety to provide an adequate footprint for the proposed building. The new building will be 134,000 net square feet in area and will extend into the area currently occupied by Lot E1, abutting the Fenton Street campus boundary and the Science North Building.

The proposed building will be two to three levels and will have up to one level below grade with a lowest level at EL +320 (ft). Based on the existing grades, we anticipate cuts of about 2 ft to 15 ft will be required to reach the lowest level elevation. Upon demolishing Falcon Hall, with lowest level ranging between EL +307 (ft) and EL +302 (ft), compacted structural fill of up to 18 ft will need to be placed to reach the proposed lowest level of the new building. We understand that the maximum column load will be about 200 kips to 300 kips and typical column spacing will be 30 ft by 30 ft.

The lowest level elevation and building layout information was supplied by your office and the structural loading information was provided by Cagley and Associates.

4.0 SUBSURFACE EXPLORATION PROGRAM

We performed a subsurface exploration and in-situ testing program to identify the subsurface stratigraphy underlying the site and to evaluate the geotechnical properties of the materials encountered. This program included drilling 15 standard penetration test (SPT) borings and conducting pressuremeter testing. Additionally, falling head infiltration testing was conducted at six locations selected by your Civil Engineer. **Appendix A** contains the results of our exploration and the borings logs.

4.1 Subsurface Exploration and Field Testing

4.1.1 Test Borings

Our subcontractor, Recon Drilling, drilled 15 soil test borings under our observation between August 6, 2018, and August 14, 2018. The Standard Penetration Test (SPT) was performed at selected depths. Borings SB-01 through SB-10 were drilled to depths between 38.5 ft and 53.5 ft in the proposed building area. Borings SWM-01 through SWM-06 were drilled to depths between 15 ft and 16 ft at the proposed infiltration areas.

Standard penetration testing was conducted at typical intervals from the ground surface to the bottom of each borehole. **Appendix A** includes specific observations, remarks, and logs for the borings, classification criteria, drilling methods, and sampling protocols. **Figure 2**, included at the end of this report, indicates the approximate test boring locations. We will retain soil samples up to 45 days beyond the issuance of this report unless you request other disposition.

4.1.2 Pressuremeter Testing

We performed four in-situ pressuremeter tests, two tests in an offset boring location adjacent to boring SB-05/SWM-04 and another two tests within boring SB-06 to evaluate the strength and deformation characteristics of soils. Details of the pressuremeter tests and test results are included in **Appendix B**. It should be noted that results for only three of the tests are included in **Appendix B**; the fourth test indicated that the material was disturbed and the test results are unreliable. **Table 4.1** below summarizes the pressuremeter tests results.

Table 4.1: Summary of Pressuremeter Tests Results

Boring Number	Pressuremeter Test Depth (ft)	Stratum	Limiting Pressure (tsf)	Pressuremeter Modulus (tsf)
SB-05/SWM-4	14	D (Disintegrated Rock)	18	308
SB-06	24	C2 (Residual)	12	86
SB-06	27.5	C2 (Residual)	12	105

4.1.3 Infiltration Testing

To evaluate the feasibility for groundwater infiltration at the site, six in-situ falling head infiltration tests were performed on August 8, 2018, and August 10, 2018, within augered probe-holes drilled adjacent to borings SWM-1 through SWM-6. The in-situ infiltration tests were performed at a depth of about 6 ft below surface grades. The in-situ infiltration test procedure included placing a solid 5-inch diameter PVC pipe in the offset probe-holes then pre-soaking the bottom of each hole by placing 24 inches of water in the bottom of the pipe for a minimum of 24 hours. After the pre-soak period, and after replacing any water that may have dropped during the pre-soak period, the infiltration tests were performed, which consisted of monitoring the drop in the water level at 1-hour intervals for 4 hours. Following each 1-hour reading, water was added to the pipe to return the water level to 24 inches. The results of the infiltration testing are summarized in **Section 5.4**.

4.2 Laboratory Testing

Select jar samples collected during drilling were submitted for laboratory testing. The results are incorporated in the generalized subsurface stratigraphy section of the report and are included in **Appendix C**.

5.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

5.1 Site Geology

The geologic stratigraphy consists of sand and clay terrace deposits overlying residual soils. Terrace deposits are typically a result of river currents. The residual soils are derived from weathering of the bedrock at the site. The parent bedrock at the site is believed to be schist of the Wissahickon Formation. Fill and probable fill was also encountered at the site and is believed to be associated with past grading and development at the site. During our exploration, we encountered the following stratigraphy:

- Stratum A: Existing Fill and Probable Fill
- Stratum B1: Terrace Group Fine-Grained Deposits
- Stratum B2: Terrace Group Coarse-Grained Deposits
- Stratum C1: Fine-Grained Residual Soil
- Stratum C2: Coarse-Grained Residual Soil
- Stratum D: Disintegrated Rock

5.2 Generalized Subsurface Stratigraphy

We characterized the following generalized subsurface stratigraphy based on our subsurface exploration included in the **Appendix A**. The strata designations do not imply continuity of materials encountered elsewhere on site but reflect the general description and characteristics of the subsurface materials at the boring locations.

Ground Cover: (Topsoil or Asphalt over Gravel Base)
Between about 2 to 4 inches of topsoil, or 5 to 6 inches of asphalt over about 6 to 7 inches of gravel base, was encountered at the ground surface of the boring locations. These depths may vary at other locations at the site.

Stratum A: Fill and Probable Fill
Below the ground cover materials, the borings encountered fill and probable fill soils generally consisting of sandy lean clay, sandy silt, silty sand, and clayey sand, containing various amounts of gravel, roots, glass fragments, rock fragments, quartz fragments, brick fragments, asphalt, mica, and organics. Fill and probable fill was encountered in all borings, except for boring SWM-6. The borings indicated that fill material extended to depths ranging between 2 ft and 23.5 ft below existing grades. Based on the Standard Penetration Tests (SPTs), this stratum exhibits generally variable density and consistency. Three jar samples of Stratum A were laboratory tested. One jar was tested for moisture content, Atterberg limits, and gradation. The soil sample classified as sandy LEAN CLAY (CL) with a liquid limit of 41 and a plasticity index of 18. The amount of material passing through No. 200 sieve was 50.6 percent. The other two jar samples were tested for moisture content only. Moisture contents for the three samples ranged between 9.6 percent and 17.7 percent. SPT N-values within the fill layer ranged from 2 blows per foot (bpf) to 33 bpf with the majority of the N-values between 5 bpf and 15 bpf, indicating that the soil in this stratum is generally loose to medium dense and medium stiff to stiff.

Stratum B1: Terrace Soil (Fine Grained)

Below Stratum A, and interlayered with Stratum B2 soils, the majority of the borings encountered a fine grained terrace deposit consisting of yellowish brown, yellowish red, reddish brown, red, gray, light gray, and white sandy LEAN CLAY (CL), LEAN CLAY with sand (CL), gravelly LEAN CLAY with sand (CL), sandy LEAN CLAY with gravel (CL), and sandy FAT CLAY with gravel (CH), containing trace amounts of roots. The thickness of this layer ranged from 5 ft to 12 ft and extended to depths of up to 23.5 ft below existing grades. The unconfined compressive strength of this stratum was measured using a pocket penetrometer. Pocket penetrometer measurements ranged from 0.5 tsf to 4 tsf. Two jar samples were laboratory tested for moisture content, Atterberg limits, and gradation. Both samples classified as LEAN CLAY with sand (CL) and exhibited liquid limits of 39 and 40, and a plasticity index of 15. The amount of material passing through the No. 200 sieve was 81.5 to 83.2 percent. The moisture contents for these samples were 12 percent and 19 percent. Based on the SPT results, this stratum exhibits generally stiff to very stiff consistency (SPT values varied from 5 bpf to 27 bpf).

Stratum B2: Terrace Soil (Coarse Grained)

Below Stratum A, and interlayered with Stratum B1, all borings, except borings SB-05/SWM-4 and SWM-5, encountered a coarse-grained terrace deposit consisting of yellowish red, yellowish brown, reddish brown, brown, white, red, gray, black, and tan poorly graded SAND with clay and gravel (SP-SC), clayey GRAVEL (GC), clayey GRAVEL with sand (GC), clayey SAND (SC), clayey SAND with gravel (SC), poorly graded GRAVEL (GP), silty SAND (SM), and poorly graded SAND with silt (SP-SM). The thickness of Stratum B2 varied between 2 ft and 21 ft and extended to depths of up to 28.5 ft below existing grades. Six jar samples of Stratum B2 were tested. Five jars were tested for moisture content, Atterberg limits, and gradation, and one jar sample was tested for moisture content only. Three soil samples classified as clayey SAND (SC) and two samples classified as clayey SAND with gravel (SC). Liquid limits varied between 34 and 39 and the plasticity indices varied between 13 and 15. The amount of material passing through No. 200 sieve was between 15.5 percent and 31.7 percent. Moisture contents for these samples ranged between 7.4 percent and 17 percent. SPT N-values varied from 6 bpf to 43 bpf. The majority of N-values were between 10 bpf and 30 bpf indicating that the majority of this stratum is firm to medium dense.

Stratum C1: Residual Soils (Fine Grained)

Below Stratum B2, and interlayered with Stratum C2, borings SB-02, SB-08, and SB-10 encountered fine grained residual soils consisting of yellowish red, yellowish brown, gray, brown, and light red sandy LEAN CLAY (CL) and sandy ELASTIC SILT (MH). The thickness of Stratum C1 was about 5 ft and extended to depths of up to 33 ft below existing grades. Pocket penetrometer measurements ranged from 1.4 tsf to 2.5 tsf. One jar sample of Stratum C1 was tested for moisture content, Atterberg limits, and gradation. The soil sample classified as sandy LEAN CLAY (CL) with a liquid limit of 49 and a plasticity index of 25. The amount of material passing through No. 200 sieve was 55.9 percent and the moisture content for the soil sample was 22.9 percent. SPT N-values for this stratum varied from 6 bpf to 56 bpf indicating that the majority of this stratum is generally medium stiff to hard. A possible boulder or rock ledge was encountered within Stratum C1 in boring SB-02 at about 27 ft below surface grade.

Stratum C2: Residual Soil (Coarse Grained)

Below Strata B1 and B2, and interlayered with Stratum C1, borings SB-01 through SB-10, SWM-3, and SWM-5 encountered coarse-grained residual soil consisting of brown, gray, black, yellowish brown, bluish gray, reddish brown, greenish gray, light yellowish brown, and light yellowish red silty SAND (SM), clayey SAND (SC), and sandy SILT (ML). Rock fragments were encountered within some of the soil samples obtained from Stratum C2. The thickness of this stratum varied between 2 ft and 20 ft and extended to depths of up to 43.5 ft below existing grades. Three jar samples of Stratum C2 were tested, one of these jar samples was tested for moisture only. Two of the soil samples classified as clayey SAND (SC) and exhibited liquid limits of 46 and 47 and plasticity indices of 22 and 24. The amount of material passing through No. 200 sieve was 42.3 percent and 42.4 percent. Moisture contents for the three samples ranged between 20.9 percent and 29.3 percent. The SPT N-values varied from 4 bpf to 59 bpf. The majority of N-values were between 10 bpf and 50 bpf indicating that the majority of this stratum is loose to very dense.

Stratum D: Residual (Disintegrated Rock)

Below Stratum C2, borings SB-01 through SB-10 encountered DISINTEGRATED ROCK sampling as silty sand and sandy silt, containing varying amounts of mica and rock fragments. Stratum D extended to depths of about 38.5 ft to about 53.5 ft below existing grades, the maximum depth of the building borings. SPT values varied from 61 bpf to 50 blows with no penetration. Based on the SPT results, this stratum is generally very dense. Auger refusal was also encountered during drilling in Stratum D.

Residual soils are derived through the in-place physical and chemical weathering of the underlying rock. Disintegrated rock is defined as residual material with SPT N-values between 60 blows per foot and refusal. Refusal is defined as an N value of 100 blows for a penetration of 2 inches or less.

The soil group symbol included on the boring logs in **Appendix A** and in the above-generalized subsurface stratigraphy represents the Unified Soil Classification System (USCS) group symbols and is based on visual identification of the soil samples collected at the site. Some variation can be expected between samples visually classified and samples classified in the laboratory. We will retain soil samples for up to 45 days beyond the issuance of this report, unless you request other disposition.

5.3 Groundwater

Groundwater was encountered during drilling at borings SB-01 through SB-07, SB-09, SB-10, and SWM-1 at depths between 13 ft and 23.7 ft below existing grades, or between about EL +315 (ft) to EL +293.8 (ft). Upon completion of the drilling, prior to pulling augers, groundwater was observed between depths of 13.7 ft and 40 ft, or between about EL +312.5 (ft) and EL +290.7 (ft). After pulling augers, borings SB-02, SB-04, SB-08, SB-10, and SWM-1 through SWM-6, were observed to be dry to the depth borings caved. After pulling augers, the groundwater was observed at SB-03, SB-05/SWM-4, SB-06, and SB-07 at depths between 6.8 ft and 27.5 ft or between EL +315.1 (ft) and EL +301.8 (ft). Boring sidewalls caved between depths of 1.3 ft and 33.5 ft, or between EL +326.4 (ft) and EL +294.5 (ft).

At borings SB-01 and SB-09, after casing was pulled, temporary, hand-slotted PVC pipe was installed in each boring. At these locations, after augers were pulled, groundwater was observed within the pipes at depths of 13.3 ft and 40.5 ft below existing grades, or between EL +319.7 (ft) and EL +279.3 (ft).

All the boreholes were left open and 24-hour groundwater readings were taken. Borings SB-02, SB-04, SWM-1 through SWM-3, and SWM-6 were dry to the depths of the borings sidewall cave-in, which ranged from 1.1 ft to 12.5 ft, or from about EL +326.9 (ft) to EL +318.63 (ft). After 24 hours, groundwater was observed in borings SB-03, SB-05/SWM-4, SB-06 through SB-8, SB-10, and SWM-5 between depths of 2.9 ft and 20.4 ft, or between EL +323.3 (ft) and EL +308.7 (ft). At these locations, the boring sidewalls caved at depths varying between 6.8 ft and 21.5 ft, or between about EL +315.3 (ft) to EL + 307.6 (ft).

Groundwater level readings were measured in the PVC pipes at SB-01 and SB-09 between 24 hours and 72 hours after drilling was completed. The groundwater was observed at a depth of 13.5 ft or EL + 319.5 (ft) in boring SB-01, and at a depth of 15.3 ft or EL + 304.5 (ft) in boring SB-09.

All borings were backfilled after at least 24 hours of drilling using the drilling spoil. Borings drilled in asphalt areas were patched.

Groundwater in this geology typically lies a few feet above the disintegrated rock/bedrock surface. However, the presence of the terrace soils above the residual profile indicates that groundwater could be between EL +320 (ft) and EL +305 (ft). The higher readings may also be indicative of a perched groundwater condition.

The groundwater levels on the logs indicate our estimate of the hydrostatic water table at the time of our subsurface exploration. The final design should anticipate the fluctuation of the hydrostatic water table depending on variations in precipitation, surface runoff, pumping, evaporation, leaking utilities, and similar factors.

5.4 In-Situ Infiltration Test Results

To evaluate subgrades for infiltration feasibility at the site, our subcontractor drilled six soil test borings (designated as SWM-1 through SWM-6) at the site to a depth of 15 ft to 16 ft below existing grades. Following the completion of the approximate 24-hour groundwater level readings in these borings, an offset probe-hole was drilled adjacent to each of the borings to depths of about 6 ft below surface grades. A 5-inch diameter PVC pipe was placed in the offset probe-hole and about 24 inches of water was placed in the bottom of the pipe. Following the approximate 24-hour pre-soaking period, the infiltration testing was performed by personnel from our office by monitoring the drop in the water level at 1-hour intervals for a total of 4 hours. The infiltration rate at each boring location is determined as the average of the water drop observed over the 4-hour period.

The results of the in-situ infiltration testing is summarized in the table below. The testing depths were selected by the Civil Engineer.

Table 5.1: Summary of In-Situ Infiltration Test Results

Boring Number	Approximate Ground Surface Elevation (ft)	Approximate Infiltration Test Depth Below Surface (ft)	Approximate Infiltration Test Elevation (ft)	Soil Classification at Test Depth (per USCS)	Infiltration Test Rate (inch/hour)
SWM-1	EL +326.2	6.0	EL +320.2	clayey SAND with gravel (SC)	2.1
SWM-2	EL +326.4	6.0	EL +320.4	clayey SAND (SC)	1.2
SWM-3	EL +324.5	6.0	EL +318.5	clayey SAND with gravel (SC)	2.1
SWM-4	EL +315.8	6.0	EL +309.8	clayey SAND (SC)	0.14
SWM-5	EL + 315.0	6.0	EL +309.0	LEAN CLAY with sand (CL)	0.2
SWM-6	EL + 328.8	6.0	EL +322.8	clayey SAND (SC)	1.1

Per Appendix D.1 of the Maryland Department of the Environment (MDE) Stormwater Design Manual, an infiltration rate greater than 0.52 inch per hour is considered to be suitable. It should be noted, however, that the infiltration rates may vary at other locations at the site due to variable conditions of soils, compactness, gradation, etc. The design should account for such variations.

5.5 USDA Classification and Correlated Infiltration Rates

United States Department of Agriculture (USDA) classification testing was conducted on jar samples obtained from 5.0 ft to 7.0 ft at the SWM-2 and SWM-6 locations and from 6.0 ft to 8.0 ft at the SWM-1 and SWM-3 through SWM-5 locations. The lab testing results are included in **Appendix C** and summarized in the table below.

Table 5.2: USDA Textural Classification and Minimum Infiltration Rates

Boring Number	Sample Depth (ft)	USDA Textural Classification	Minimum Infiltration Rate Per Published Correlations (inches/hour)
SWM-1	6-8	SANDY LOAM	1.02
SWM-2	5-7	SANDY LOAM	1.02
SWM-3	6-8	SANDY LOAM	1.02
SWM-4	6-8	SANDY LOAM	1.02
SWM-5	6-8	SILT LOAM	0.27
SWM-6	5-7	LOAMY SAND	2.41

5.6 Seismic Site Classification

We evaluated the Seismic Site Class for this project according to the 2015 International Building Code (IBC). Our analysis indicates Site Class D for this location. This Site Class was evaluated based on SPT values.

6.0 SITE GRADING AND EARTHWORK

In order to construct the new building, the existing Falcon Hall and Science South building will need to be demolished and their foundation systems removed in their entirety. All existing fill in the new building footprint will also need to be removed. Considering the existing building lowest levels of EL +307 (ft) to EL +302 (ft) for Falcon Hall and EL +326 (ft) for the Science South building, cuts of up to 15 ft and fills of up to 18 ft will be required to reach the new building's lowest level at EL +320 (ft). Existing fill removal should extend at least 2 ft beyond the bottom edges of the exterior footings of the building. Benching of the excavations is also recommended to provide for level placement and compaction of the backfill.

Recommendations for preparation of subgrades to receive new compacted fill, compacted fill soil requirements, placement, and compaction criteria, as well as fill settlement are presented in subsequent sections.

6.1 Preparation of Subgrades to Receive Compacted Fill

Subgrades to receive compacted structural fill for building or pavement support should be stripped of vegetation, topsoil, organic matter, and the fill soils of Stratum A. Our subsurface exploration indicated topsoil to depths of up to 5 inches below the ground surface in some locations. This depth may vary at other locations.

At the building boring locations, the highest suitable subgrade elevations where new compacted fill can be placed are presented in the table below:

Table 6.1: Estimated Elevation of Suitable Compacted Fill Subgrades

Boring Number	Estimated Elevation of Suitable Compacted Fill Subgrade (ft)
SB-01	EL +329
SB-02	EL +328
SB-03	EL +322
SB-04	EL +324
SB-05/SWM-4	EL +311
SB-06	EL +323
SB-07	EL +326
SB-08	EL +315
SB-09	EL +314
SB-10	EL + 302

The Geotechnical Engineer should evaluate the suitability of the fill subgrades. The stripped subgrades should be proofrolled with a loaded dump truck to evaluate the subgrade suitability for support of the compacted structural fill prior to any undercutting or initiation of fill placement. Areas that exhibit excessive pumping, weaving, or rutting should be scarified, dried and recompacted, or undercut and replaced with compacted structural fill as recommended by the Geotechnical Engineer. Subgrade evaluation techniques complementary to proofrolling could include a combination of probing with a penetrometer, drilling hand augers, or observing test pits.

When excavation of unsuitable materials is required, it should be performed in a manner to limit disturbance of the underlying suitable material. The excavation should be performed under the observation of the Geotechnical Engineer to evaluate the required excavation depths. Groundwater is expected to be encountered during fill placement and dewatering will be required during construction.

Compacted structural fill subgrades should be kept free of ponded water. If springs or other flowing water is present at the compacted structural fill subgrade level, the Contractor should direct water to discharge beyond the fill limits. Recommendations for discharging springs should be provided by the Geotechnical Engineer.

Compacted structural fill subgrades should be free of snow, ice, and frozen soils. If snow, ice, or frozen soils are present at subgrade levels, these materials should be removed as recommended by the Geotechnical Engineer.

The existing structures present on site will need to be removed before earthwork construction. Therefore, foundations and other associated debris will be encountered during grading activities and should be completely removed from the proposed building area. Existing foundations and walls in the proposed pavement areas should be removed to at least 2 ft below the design pavement subgrade level. Existing utilities and drainage structures within the building area should be removed and replaced with compacted structural fill.

Compacted structural fill subgrades should not be steeper than about 4H:1V. If steeper slopes are present, subgrades should be benched to permit placement of horizontal lifts of fill.

6.2 Compacted Fill

Compacted structural fill and backfill in building and pavement areas should consist of material classifying as SM, SP, SW, GC, GM, GP or GW according to ASTM D2487. In addition, fill materials should exhibit Liquid Limit and Plasticity Index values of less than 40 and 15, respectively. Fill materials should not contain particles larger than 3 inches. On-site soils of Strata B2 and C2 are generally expected to meet these criteria. Part of the fill soils of Stratum A can be considered for re-use as compacted structural fill provided they are free of deleterious materials and meet the criteria above. Importation of fill should be anticipated.

Compacted structural fill should be placed in maximum 8-inch thick horizontal, loose lifts. Fill should be compacted to at least 95 percent of the maximum dry density per ASTM D698 (Standard Proctor), except that the top 12 inches in pavement areas should be compacted to at least 100 percent of the same standard. Soil moisture contents at the time of compaction should be within 3 percent of the soils' optimum moisture content.

Backfill placed in excavations, trenches, and other areas that large compaction equipment cannot access should be placed in maximum 6-inch thick lifts. Backfill should meet the material, placement, and compaction requirements outlined above.

Successful re-use of the excavated, on-site soils as compacted structural fill will depend on their natural moisture contents during excavation. Scarifying and drying of these soils should be anticipated to achieve the recommended compaction. Drying of these soils will likely result in some delays, and may not be possible during cooler, wetter weather. We recommend that the earthwork be performed during the warmer, drier times of the year.

6.3 Fill Settlement

We anticipate as much as 18 ft of fill will be placed to reach the proposed lowest level of the building. The subgrade soils are expected to settle under the weight of the proposed fill and the new building. Construction of structures and pavement in fill areas should not begin until settlement has essentially ceased. Settlement plates should be installed on the subgrade prior to placing the compacted structural fill. We anticipate that settlement will take about one to three months to dissipate.

Settlement plates should consist of a 24 x 24 x ½ -inch steel plate with a 2-inch steel riser pipe welded to its center. The plate should be placed on the subgrade, and the elevation of the plate and top of the riser should be recorded before fill placement. As fill operations progress, the Contractor should extend the riser pipe to remain above the fill surface. The elevation of the top of the riser should be recorded immediately before and after attaching an extension. The elevation of the riser should be recorded daily. After completion of the fill, the elevation of the top of the riser should be recorded two times a week until settlement has essentially ceased. SEDC should review the settlement readings to confirm that settlement has dissipated, prior to foundation installation.

Settlement plate readings should be taken to the nearest 0.005 ft and referenced to a benchmark well beyond the influence of the fill placed. Precautions should be taken to prevent damaging the settlement plates during fill operations. The general Contractor should furnish all labor and materials, and perform all operations needed for installation and maintenance of the settlement plates.

Grading plans should be provided to SEDC for review to see if there are any changes to our recommendations.

7.0 FOUNDATION RECOMMENDATIONS

We based our geotechnical engineering analysis on the information developed from our subsurface investigation, along with the project development plans, site plans, and the structural loading furnished to our office. As noted in **Section 6.0**, present day Falcon Hall and the Science South building will be demolished and the building foundation systems removed in their entirety. New compacted structural fill will then be placed to reach the proposed building's lowest level at EL +320 (ft). The new building will have maximum column loads of about 200 kips to 300 kips and will have typical column spacing of about 30 ft by 30 ft.

Based on the above considerations, we recommend supporting the new building on spread footings founded on new compacted structural fill or medium dense and firm natural soils of Strata B1, B2, C1, and C2. The following sections of the report provide our detailed recommendations.

7.1 Spread Footings

We consider spread footings suitable for support of the proposed building. Footings should be founded on new compacted structural fill or suitable natural soils of Strata B1, B2, C1 and C2. We recommend footings supported on these materials be designed for a net allowable soil bearing pressure of 3,000 psf. These bearing pressures provide a factor of safety against general bearing capacity failure of at least 3.0.

The above allowable soil bearing pressures may be increased by 33 percent for wind and seismic loads when used in conjunction with load combinations defined in IBC Section 1605.3.2, Alternative Basic Load Combinations for use with allowable stress design. This increase is not applicable for other allowable stress load combinations, strength design or load and resistance factor design.

Suitable subgrade elevations where new compacted structural fill can be placed are detailed in **Section 6.1**. For planning purposes, the elevation of suitable materials between borings may be considered to vary linearly between boring locations.

All footing subgrades should be observed by the Geotechnical Engineer prior to placement of concrete to verify subgrade materials are as anticipated. If groundwater is encountered during footing excavation, dewatering will be required during construction. If unsuitable soils are encountered at the design bearing grade, these soils should be removed and replaced as recommended by the Geotechnical Engineer. Unsuitable soils should be replaced with new compacted fill, open graded crushed stone such as AASHTO No. 57, or lean concrete.

Settlements of shallow foundations supported on suitable natural soils are not expected to exceed about 1 inch. Differential settlements between similarly loaded footings are not expected to exceed about half this value.

Column and wall footings should be at least 24 and 16 inches wide, respectively, for shear considerations. Exterior footings should be founded at least 2.5 ft below final exterior grades for frost protection. Interior footings may be founded at nominal depths below the floor slabs. Where bearing grades between adjacent footings vary, the slope between the bottom edges of adjacent footings should not be steeper than 1.5H:1V. When available, SEDC should be allowed to review the design foundation drawings.

8.0 FLOOR SLAB RECOMMENDATIONS

The proposed floor slabs should be supported on suitable natural soils of Strata B1, B2, C1, and C2 or compacted structural fill. A modulus of subgrade reaction, k, of 100 kcf should be used in the design of floor slabs. The recommended modulus value is for a 1-ft-square plate. Some slab design software may consider different definitions of k for input. The Structural Engineer should contact our office if their software considers a different definition of k.

A 4-inch crushed stone or washed gravel capillary moisture barrier should underlie floor slabs on grade. Moisture barrier material should consist of AASHTO No. 57 crushed stone. The Contractor should compact the stone in place with at least two passes of suitable vibratory compaction equipment. A 10-mil polyethylene liner should be installed over the crushed stone layer as a vapor barrier and to prevent concrete intrusion into the stone. Floor-slab subgrades should be observed and approved by the Geotechnical Engineer prior to placing the washed gravel or crushed stone base.

The Contractor should compact floor slab subgrades before placing moisture barrier materials to repair any disturbance that may occur due to construction operations. Since floors will be slab-on-grade, utility excavations should be backfilled with compacted structural fill as defined in this report.

9.0 RETAINING STRUCTURE RECOMMENDATIONS

The proposed structure includes basement walls. Recommendations for the design of these walls are presented in the following sections. If loading docks or retaining walls are planned, these locations should be made known to us and recommendations can be provided.

9.1 Below-Grade Walls

The building below-grade walls must be designed to resist lateral earth pressures developed from the surrounding soil, backfill, and surcharge loads. We recommend an average fluid pressure of 50H (psf), where H is the height of the wall in feet, for the design of below-grade walls to account for soil pressures. The recommended equivalent fluid pressure assumes a horizontal backfill. The horizontal pressure from surcharges, if applicable, will be 0.42 times the vertical surcharge using a uniform pressure distribution in addition to the equivalent fluid pressure provided above.

A diagram illustrating the design earth pressure recommendations on below-grade walls is included as **Figure 3**. The pressures shown are expected to develop from surrounding soils and/or backfill retained by below-grade walls. Hydrostatic pressures are not included in the recommended lateral earth pressure, as foundation drains should be installed as discussed below. Any surcharge adjacent to the walls should be considered in the evaluation of lateral earth pressure as shown on the diagram. Any backfill placed along the back of the walls should meet the compaction requirements for backfill against below-grade or site retaining walls as detailed below.

9.2 Backfill for Below-Grade Walls

Backfill materials for walls should consist of material classifying as SM or more granular according to ASTM D2487. In addition, fill materials should exhibit Liquid Limit and Plasticity Index values of less than 40 and 15, respectively. This classification includes open-graded crushed stone such as AASHTO No. 57 crushed stone. Free-draining backfill should be placed in the zone extending from the base of the wall upwards at 45 degrees.

The Contractor should place backfill in maximum 8-inch thick loose lifts and compact each lift to at least 95 percent of maximum dry density according to ASTM D698 (Standard Proctor). The Contractor should place crushed stone backfill in maximum 12-inch thick lifts, and compact each lift using suitable vibratory equipment. Only light hand-operated equipment should be used to compact backfill against walls. The Structural Engineer of Record should approve the size of the compaction equipment.

10.0 SUBDRAINAGE RECOMMENDATIONS

Subdrainage below the floor slab and behind below-grade walls will be required. Dewatering during construction will also be required as discussed in **Section 11.3**.

10.1 Subdrainage for Below-Grade Walls

Earth pressure recommendations provided in this report do not include hydrostatic pressure since subdrainage will be provided behind the basement walls. If the excavation is sloped, subdrainage should consist of perimeter subdrains located on top of the wall footing, next to the wall. Subdrains should consist of 4-inch slotted, corrugated polyethylene tubing according to ASTM F405, surrounded by at least 4 inches of filter drainage material. A drainage geotextile should wrap around the drainage material. Subdrains should drain by gravity to an outlet, sump, or storm sewer.

For sloped and sheeting and shoring excavations, geocomposite drainage panels consisting of Miradrain G100N or equivalent should be installed continuously on all basement walls. Drainage panels should be placed along the entire wall face to within 1.5 ft of finished grade. The Contractor should bind the edges of the panels with drainage geotextile to limit the potential for soil intrusion into the drainage system.

Wall subdrainage may be provided using weepholes. Weepholes should be 3 inches in diameter and should be installed on 8-ft centers. A filter plug consisting of at least one cubic foot of drainage filter material wrapped in drainage geotextile should be placed behind each weephole.

Drainage filter material should consist of AASHTO No. 78 aggregate. Drainage geotextile should consist of a non-woven geotextile such as Mirafi 140N, or equivalent fabric.

10.2 Basement Subdrainage

Based on the groundwater level readings taken during the subsurface investigation, groundwater is anticipated to be at about the same elevation of the proposed lowest level. Therefore, we recommend installing a permanent subdrainage system to maintain groundwater levels below the lowest level floor slab elevations. In addition to the perimeter subdrains for the walls discussed above, the subdrainage system should include an underfloor drainage blanket and a series of interior underslab subdrains. Recommended subdrainage system details are shown on **Figure 4**.

The drainage blanket should consist of a 4-inch thick layer of drainage filter material placed beneath the floor slab. Since this layer is part of the subdrainage system, the drainage filter material should be protected from inclusion of non-filter materials.

Interior underslab subdrains should be constructed on a maximum spacing of 40-ft centers and connected to headers at both ends of the subdrain. Subdrains should consist of 4-inch diameter, corrugated, slotted, polyethylene pipe according to ASTM F405. Slot widths should not exceed ⅛ inch. Drainage pipes should be surrounded by at least 4 inches of drainage filter material on sides and bottom and 2 inches of drainage filter material on top. The drainage filter material should be wrapped with non-woven drainage geotextile. Pipe inverts should be set at least 10 inches below the bottom of the floor slab.

The subdrainage system should drain by gravity to a sump pit installed in the lowest level, where drainage can be discharged by pumping. For preliminary design, we recommend a pump capacity of about 30 gallons per minute be considered. We recommend that the pump be located in areas closest to the deepest excavation of the building. The final pump should be sized based on the results of field measurements during construction. A redundant pump system should be provided. Also, a backup power supply or non-electrical backup pump should be incorporated into the system.

Elevator pits and other portions of the structure that extend below the subdrainage system should be water-proofed and designed to resist full hydrostatic pressure. In occupied spaces, installation of both waterproofing and subdrainage will provide the best coverage.

The design and construction of a subdrainage system is not foolproof. System failures may occur due to various causes. Periodic maintenance, including flushing, and possible chemical treatment to flush out soil particles and remove mineral or bacterial deposits that may restrict flow in the pipes will be required. Adequate cleanouts should be included in the subdrainage system design to permit access to the entire system. Generally, cleanouts will also be located at upstream ends of laterals and at critical intersections. The subdrain system should be laid out to provide redundant flow paths where possible.

Subdrainage requirements have been prepared to assist in the design of a subdrainage system for this project. These recommendations are based on the subsurface and groundwater data reviewed herein. If substantially different groundwater flow quantities are encountered during construction or if the lowest floor levels are changed, we should be contacted so that we may evaluate effects on the recommendations given herein. Construction plans should depict the entire subdrainage system, including sump pumps and cleanout locations and the layout of interior collection or trunk lines. Our office can prepare subdrainage system design drawings upon request.

11.0 CONSTRUCTION CONSIDERATIONS

11.1 Site Grading and Earthwork

The test boring data indicate the approximate depth of topsoil and fill based on our visual identification procedures. Drying and reworking of the soils are likely to be difficult during periods of wet months. We recommend that the earthwork phases of this project be performed during the warmer, drier times of the year to limit the potential for disturbance of on-site soils.

Traffic on stripped or undercut subgrades should be limited to reduce disturbance of underlying soils. Also, using lightweight, track-mounted dozer equipment for stripping will limit the disturbance of underlying soils, and may reduce the undercut volume needed. The Contractor should provide site drainage to maintain subgrades free of water and to avoid saturation and disturbance of the subgrade soils before placing compacted structural fill, pavement base course or moisture barrier material. This will be important during all phases of the construction work. The Contractor should be responsible for reworking of subgrades and compacted structural fill that were initially considered suitable but were later disturbed by equipment and/or weather.

11.2 Foundations

11.2.1 Spread Footings

The Contractor should exercise care during excavation for spread footings so that as little disturbance as possible occurs at the foundation level. The Contractor should carefully clean loose or soft soils from the bottom of the excavation before placing concrete. A Geotechnical Engineer from our firm should observe actual footing subgrades during construction to evaluate whether subgrade soils meet the requirements as recommended in this report.

Footing subgrades needing undercut may be concreted at the elevation of undercut or backfilled to the original design subgrade elevation with new compacted structural fill, an open-graded crushed stone such as AASHTO No. 57 stone, or lean concrete. Concreting should take place the same day as the excavation of footings.

11.3 Construction Dewatering

The site geology consists of relatively low-permeability lenses and layers of finer grained soil zones separated by higher permeability lenses and layers of granular materials. Most site groundwater flow will come from saturated higher permeability layers and so-called "perched water zones" where groundwater rests on or in higher elevation lower-permeability materials. In addition, nodules, layers, and lenses of iron oxide cemented soils may be present that can have a weak rock-like consistency. The iron oxide zones may be in well-defined layers or may be erratically present both vertically and horizontally through the soil profile. These layers can act to perch water. Deeper permeable zones may also be present that have higher water pressure than the overlying saturated materials, which can result in "artesian" water conditions. This could cause soils in the excavation to soften and lose strength if not properly dewatered.

A deep-well dewatering system is typically used to dewater these sites. Dewatering by deep-wells will typically not fully dewater the site. Trenching and sumping from inside the excavation to collect perched water and site runoff is required in virtually all excavations and may be extensive depending on the amount of perched water. In some locations, deep-wells and trenching and sumping cannot sufficiently dewater all areas and well points may be required to lower the groundwater to allow site construction to progress. Precipitation and seasonal variation in groundwater levels will also impact the amount and depth of groundwater encountered and the extent and amount of dewatering and water control measures that must be taken.

Lower-permeability zones that can produce perched water conditions may not be readily evident from the boring logs. This is because thin, lower permeability layers may not be disclosed by the industry standard drilling and sampling processes that sample on 5-ft vertical intervals.

Dewatering at the site should be completed by a competent dewatering contractor with at least 5 years of experience in the region. Groundwater levels should be maintained at least 4 ft below the lowest excavation levels. Sufficient time must be allowed in the construction schedule for the dewatering contractor to install wells, begin well operation and pump wells to lower groundwater levels to the required elevation.

11.4 Subdrainage

The Contractor should exercise care when placing and backfilling subdrainage pipe to avoid damage to the subdrainage system during installation.

11.5 Engineering Services During Construction

The engineering recommendations provided in this report are based on the information obtained from the subsurface exploration and laboratory testing. However, conditions on the site may vary between the discrete locations observed at the time of our subsurface exploration. The nature and extent of variations between borings may not become evident until during construction.

To account for this variability, we should provide professional observation and testing of subsurface conditions revealed during construction as an extension of our engineering services. These services will also help in evaluating the Contractor's conformance with the plans and specifications. Because of our unique position to understand the intent of the geotechnical engineering recommendations, retaining Schnabel for these services will allow us to provide consistent service throughout the project construction.

12.0 GENERAL SPECIFICATION RECOMMENDATIONS

An allowance should be established to account for possible additional costs that may be required to construct earthwork and foundations, as recommended in this report. Additional costs may be incurred for a variety of reasons including variation of soil and rock conditions between borings, wet on-site soils, groundwater, etc. The project specifications should indicate the contractor's responsibility for providing adequate site drainage during construction. Inadequate drainage could lead to disturbance of soils by construction traffic, which could result in the need to undercut disturbed soils.

This report may be made available to prospective bidders for informational purposes. We recommend that the project specifications contain the following statement:

> *Schnabel Engineering DC, Inc. has prepared this geotechnical engineering report for this project. This report is for informational purposes only and is not part of the contract documents. The opinions expressed represent the Geotechnical Engineer's interpretation of the subsurface conditions, tests, and the results of analyses conducted. Should the data contained in this report not be adequate for the Contractor's purposes, the Contractor may make, before bidding, independent exploration, tests, and analyses. This report may be examined by bidders at the office of the Owner, or copies may be obtained from the Owner at nominal charge.*

The contract documents should include the boring data provided in **Appendix A**.

Additional data and reports prepared by others that could have an impact upon the contractor's bid should also be made available to prospective bidders for informational purposes.

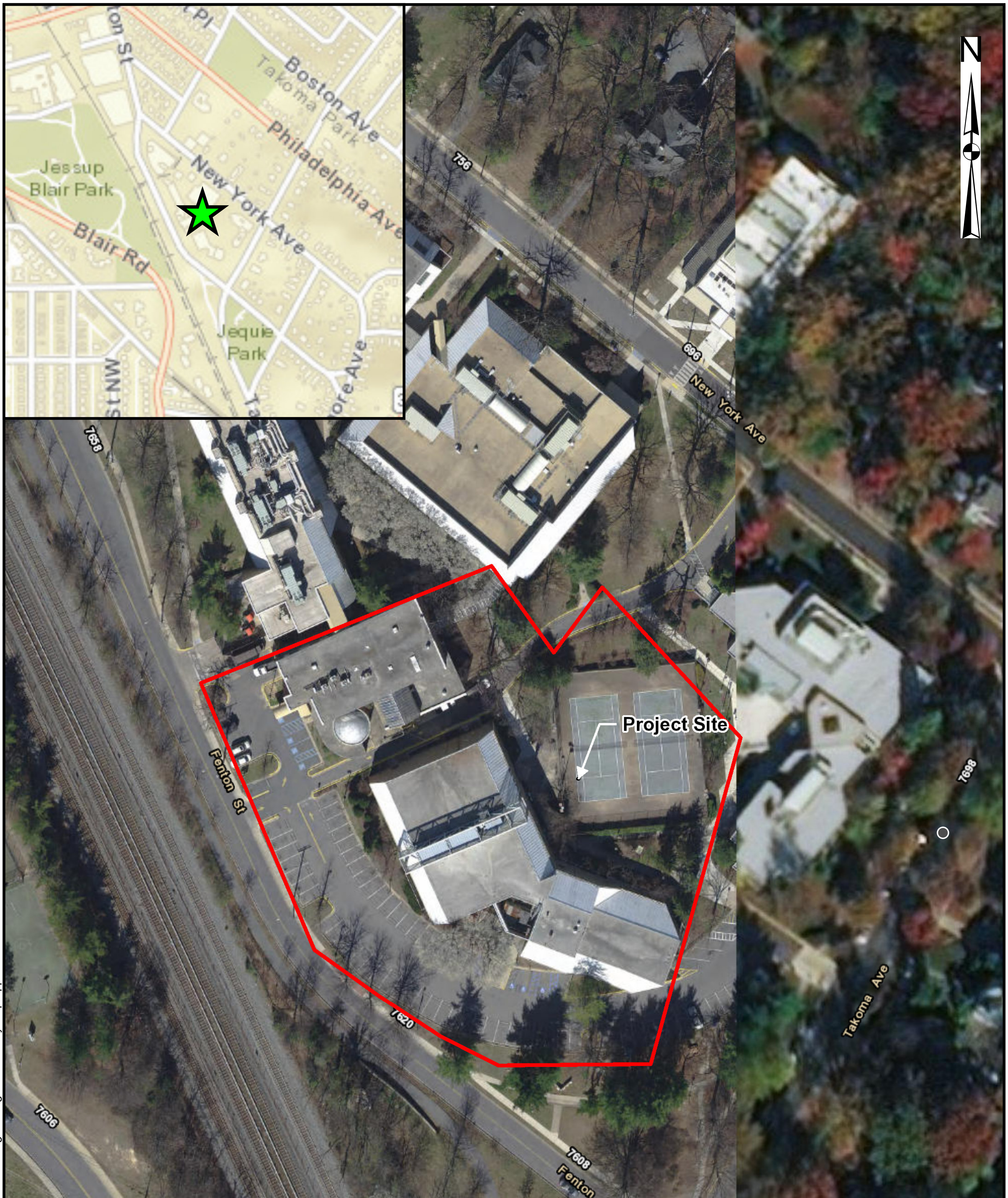
13.0 LIMITATIONS

We based the analyses and recommendations submitted in this report on the information revealed by our exploration. We attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction.

This report has been prepared to aid in the evaluation of this site and to assist in the design of the project. It is intended for use concerning this specific project. We based our recommendations on information on the site and proposed construction as described in this report. Substantial changes in loads, locations, or grades should be brought to our attention so we can modify our recommendations as needed. We would appreciate an opportunity to review the plans and specifications as they pertain to the recommendations contained in this report, and to submit our comments to you based on this review.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report, or other instrument of service.

FIGURES



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NOT TO SCALE

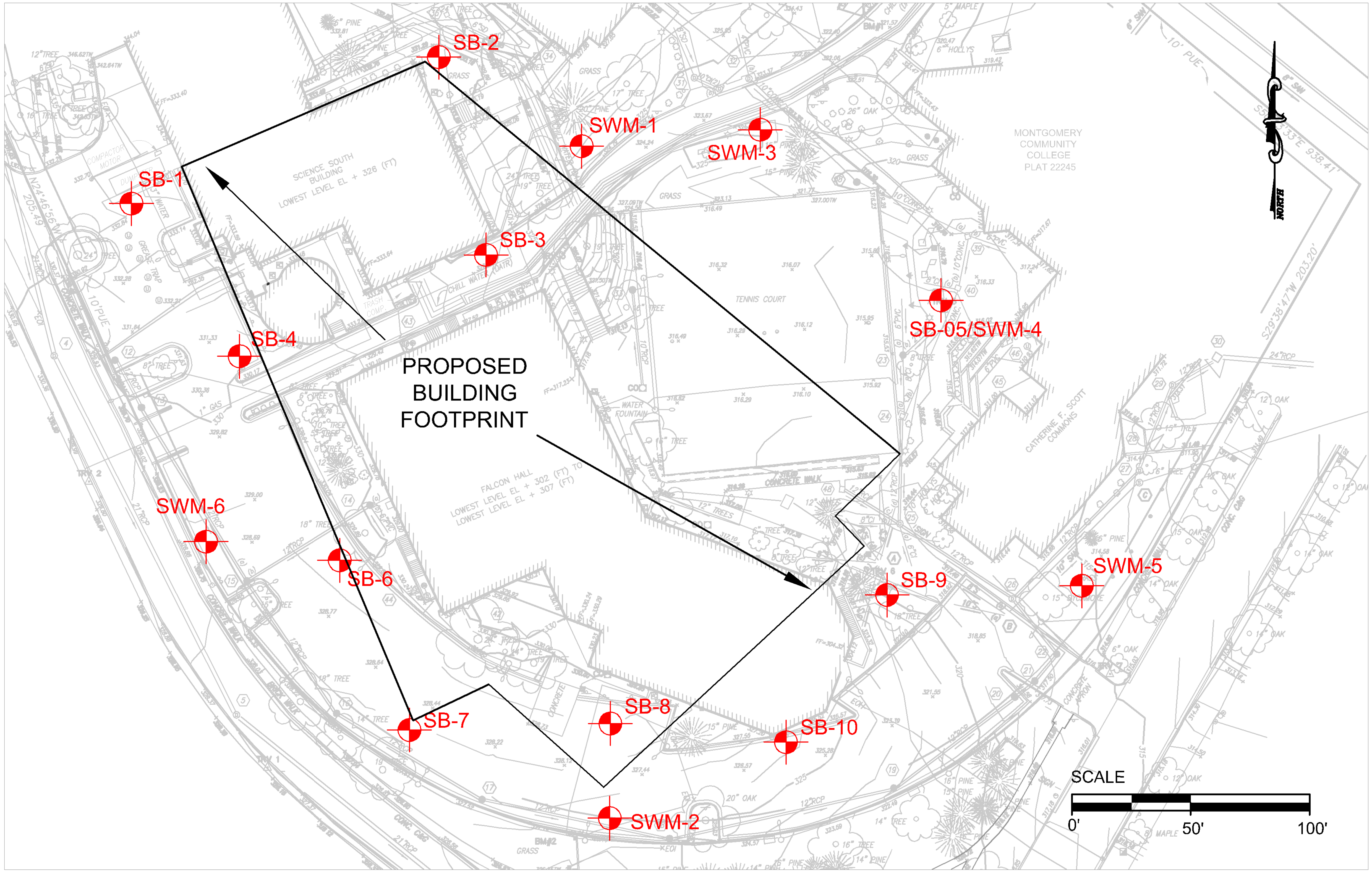
Schnabel Engineering DC	THE CATHERINE AND ISIAH LEGGETT BUILDING MONTGOMERY COLLEGE TAKOMA PARK, MARYLAND 18C41041	SITE VICINITY MAP FIGURE 1

9/11/2018 This Map was Created In Schnabel Engineerings Site Vicinity Map Application

arcgis

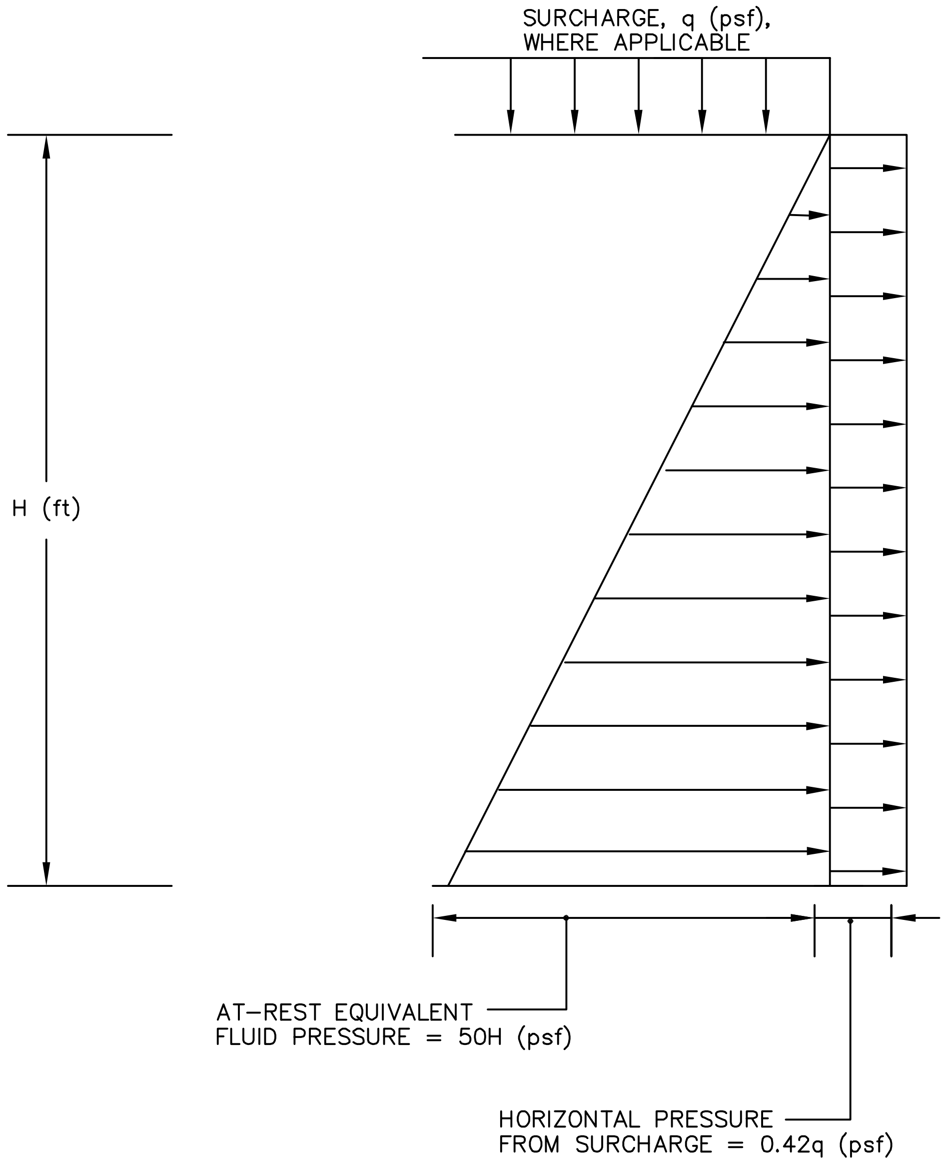
LEGEND

APPROXIMATE SEDC BORING LOCATION



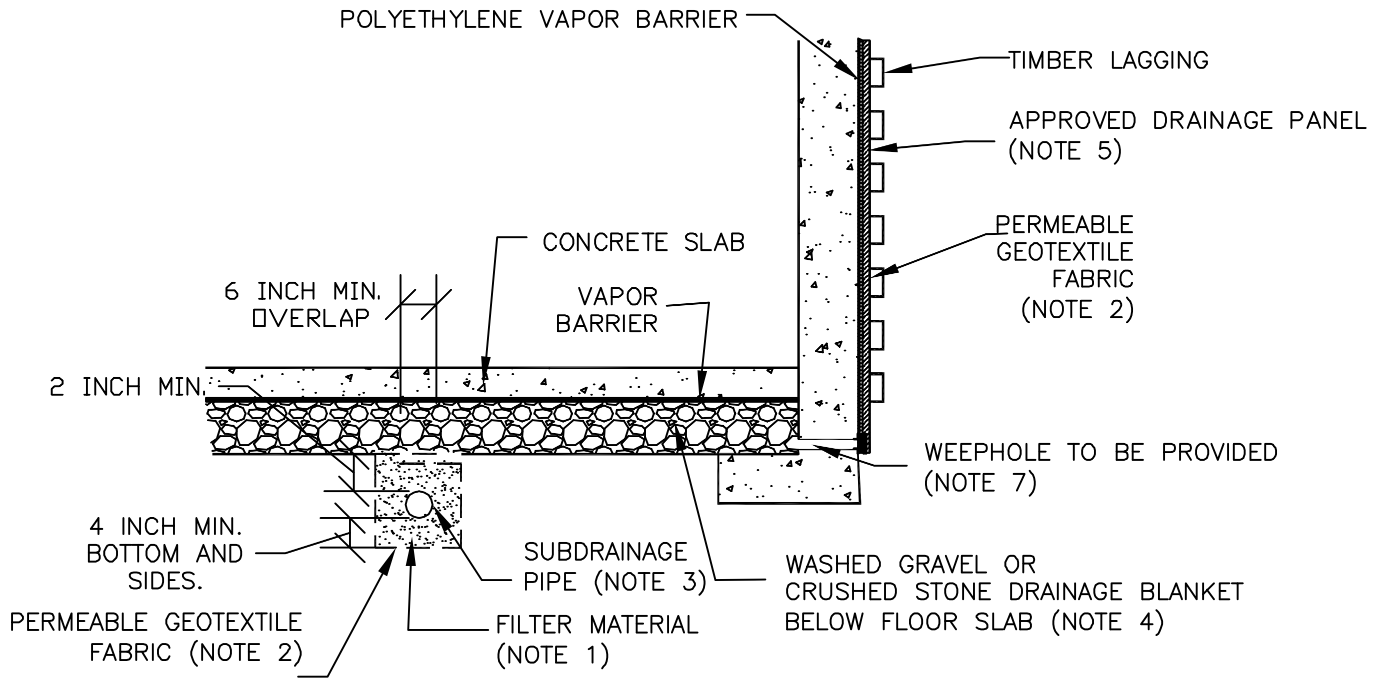
BASE PLAN PROVIDED BY A. MORTON THOMAS AND ASSOCIATES, INC.

Schnabel Engineering DC	THE CATHERINE AND ISIAH LEGGETT BUILDING MONTGOMERY COLLEGE TAKOMA PARK, MARYLAND	APPROXIMATE BORING LOCATION PLAN	DRAWN BY: M. KHACHAN	APPROXIMATE SCALE: AS SHOWN
		PROJECT NO. 18C41041 FIGURE 2	REVIEWED BY: J. BENTEL	DATE: DECEMBER 2018

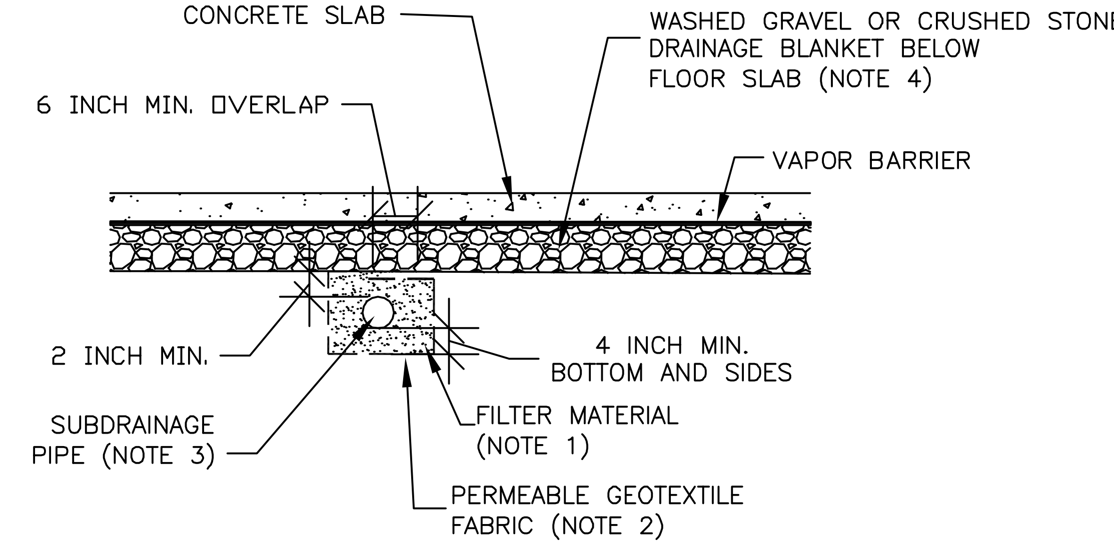


NOTES:
1) EARTH PRESSURE DIAGRAM SHOWN ASSUMES FULL DRAINAGE OF HYDROSTATIC PRESSURE AS A SUBDRAINAGE SYSTEM SHOULD BE UTILIZED.

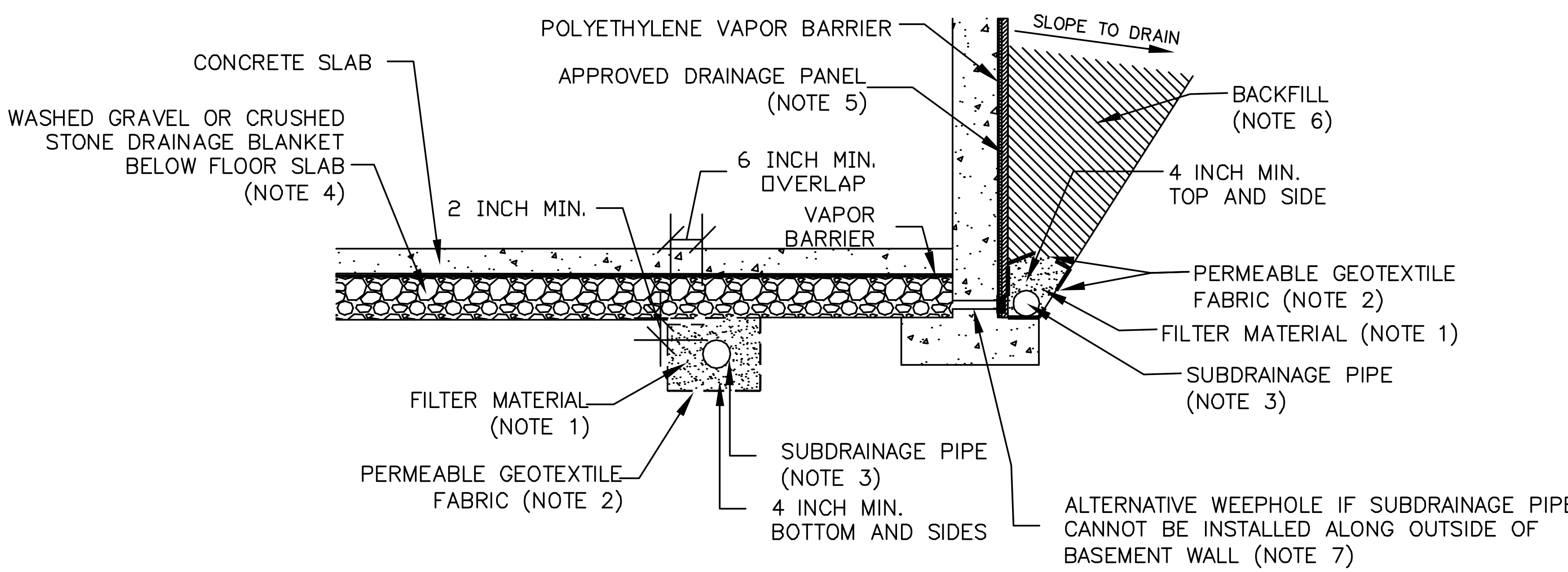
Schnabel Engineering DC	THE CATHERINE AND ISIAH LEGGETT BUILDING MONTGOMERY COLLEGE TAKOMA PARK, MARYLAND	LATERAL EARTH PRESSURE DIAGRAM (BELOW-GRADE WALLS) PROJECT NO.: 18C41041 DECEMBER 2018 — FIGURE NO. 3



DRAINAGE DETAIL



INTERIOR FLOOR SLAB DRAINAGE DETAIL



ALTERNATIVE DRAINAGE DETAIL FOR SLOPED EXCAVATION

FOUNDATION DRAIN NOTES

1. FILTER MATERIAL GRADATION SHOULD SATISFY REQUIREMENTS FOR AASHTO NO.78 COARSE AGGREGATE.
2. PERMEABLE FABRIC SHOULD HAVE EQUIVALENT OPENING SIZE NOT LARGER THAN THE NO. 70 U.S. STANDARD SIEVE SIZE.
3. SUBDRAINAGE PIPING SHOULD BE 4 INCH DIAMETER SLOTTED CORRUGATED POLYETHYLENE (P.E. TUBING) ACCORDING TO ASTM F-405 WITH MAXIMUM 1/8 INCH SLOT WIDTH FOR AT LEAST THE LOWER 120° SECTOR. PIPING SHOULD BE INSTALLED TO OUTLET INTO A STORM SEWER OR SUMP WITH A PUMP.
4. WASHED GRAVEL OR CRUSHED STONE DRAINAGE BLANKET SHOULD SATISFY GRADATION REQUIREMENTS FOR AASHTO NO.57 STONE AND BE AT LEAST 4 INCHES THICK.
5. APPROVED DRAINAGE PANEL SHOULD SATISFY MINIMUM THICKNESS OR FLOW CAPACITY REQUIREMENTS AS DETERMINED BY THE GEOTECHNICAL ENGINEER. GEOTEXTILE FILTER CLOTH SHOULD BE PLACED SUCH THAT IT IS IN CONTACT WITH THE SOIL BACKFILL OR EXCAVATION SHEETING.
6. BACKFILL MATERIAL TO MEET REQUIREMENTS IN PROJECT SPECIFICATIONS.
7. WEEPHOLES WHEN USED TO BE PROVIDED AT MAXIMUM SPACING OF 8 FEET ON CENTER ALONG BASE OF WALL. WEEPHOLES SHALL CONSIST OF 3 INCH I.D. SOLID POLYETHYLENE PIPE.
8. DRAINGREAT™ SHALL BE USED FOR CONNECTION BETWEEN WEEPHOLE AND DRAINAGE BOARD AS SHOWN ON DETAIL. INSTALLATION TO BE DONE IN ACCORDANCE WITH MANUFACTURERS RECOMENDATIONS.

Schnabel Engineering DC	THE CATHERINE AND ISIAH LEGGETT BUILDING MONTGOMERY COLLEGE TAKOMA PARK, MARYLAND	DRAWN BY: M. KHACHAN	FIGURE NUMBER: 4	SUBDRAINAGE DETAILS
		REVIEWED BY: B. KHOURI	DATE: DECEMBER 2018	PROJECT NUMBER: 18C41041

APPENDIX A

SUBSURFACE EXPLORATION DATA

SUBSURFACE EXPLORATION PROCEDURES

Test Borings – Hollow Stem Augers

The borings are advanced by turning an auger with a center opening of 2¼ or 3¼ inches. A plug device blocks off the center opening while augers are advanced. Cuttings are brought to the surface by the auger flights. Sampling is performed through the center opening in the hollow stem auger by standard methods after removal of the plug. Usually, no water is introduced into the boring using this procedure.

Standard Penetration Test Results

The Standard Penetration Test (SPT) is performed in the borings at regular depth intervals to collect soil samples. The numbers in the Sampling Data column of the boring logs represent SPT results. Each number represents the blows needed to drive a 2-inch O.D., 1⅜-inch I.D. split-spoon sampler 6 inches, using a 140-pound hammer falling 30 inches. The sampler is typically driven a total of 18 or 24 inches. The first 6 inches are considered a seating interval. The total of the number of blows for the second and third 6-inch intervals is the SPT "N value." The Standard Penetration Test is performed according to ASTM D1586.

Soil Classification Criteria

The group symbols on the logs represent the Unified Soil Classification System Group Symbols (ASTM D2487) based on visual observation and limited laboratory testing of the samples. Criteria for visual identification of soil samples are included in this appendix. Some variation can be expected between samples visually classified and samples classified in the laboratory.

Temporary PVC Pipe

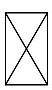
Temporary PVC pipe was installed in boring SB-01 and SB-09 by inserting a hand-slotted, 1¼-inch PVC pipe in each of these borings. After obtaining 24-hour groundwater level readings, these pipes were removed and the boreholes were backfilled with soil spoils.

Boring Locations and Elevations

Boring locations were staked by A. Morton Thomas and Associates (AMT). Coordinates and elevations were provided to us by AMT. Approximate boring locations are shown on **Figure 2**. Ground surface elevations are indicated on the boring logs. Locations and elevations should be considered no more accurate than the methods used to determine them.

GENERAL NOTES FOR SUBSURFACE EXPLORATION LOGS

1. Numbers in sampling data column next to Standard Penetration Test (SPT) symbols indicate blows required to drive a 2-inch O.D., 1⅜-inch I.D. sampling spoon 6 inches using a 140-pound hammer falling 30 inches. The Standard Penetration Test (SPT) N value is the number of blows required to drive the sampler 12 inches, after a 6-inch seating interval. The Standard Penetration Test is performed in general accordance with ASTM D1586.
2. Visual classification of soil is in accordance with terminology set forth in “Identification of Soil.” The ASTM D2487 group symbols (e.g., CL) shown in the classification column are based on visual observations.
3. Estimated water levels indicated on the logs are only estimates from available data and may vary with precipitation, porosity of the soil, site topography, and other factors.
4. Refusal at the surface of rock, boulder, or other obstruction is defined as an SPT resistance of 50 blows for 1 inch or less of penetration.
5. The logs and related information depict subsurface conditions only at the specific locations and at the particular time when drilled or excavated. Soil conditions at other locations may differ from conditions occurring at these locations. Also, the passage of time may result in a change in the subsurface soil and water level conditions at the subsurface exploration location.
6. The stratification lines represent the approximate boundary between soil and rock types as obtained from the subsurface exploration. Some variation may also be expected vertically between samples taken. The soil profile, water level observations and penetration resistances presented on these logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.
7. Key to symbols and abbreviations:



S-1, SPT	Sample No., Standard Penetration Test
5+10+1	Number of blows in each 6-inch increment

LL	Liquid Limit
MC	Moisture Content (percent)
PL	Plastic Limit
%Passing#200	Percent by weight passing a No. 200 Sieve

IDENTIFICATION OF SOIL

I. DEFINITION OF SOIL GROUP NAMES (ASTM D2487)

			SYMBOL	GROUP NAME
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels – More than 50% of coarse fraction retained on No. 4 sieve Coarse, ¾" to 3" Fine, No. 4 to ¾"	Clean Gravels Less than 5% fines	GW	WELL GRADED GRAVEL
			GP	POORLY GRADED GRAVEL
		Gravels with fines More than 12% fines	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	Sands – 50% or more of coarse Fraction passes No. 4 sieve Coarse, No. 10 to No. 4 Medium, No. 40 to No. 10 Fine, No. 200 to No. 40	Clean Sands Less than 5% fines	SW	WELL GRADED SAND
			SP	POORLY GRADED SAND
		Sands with fines More than 12% fines	SM	SILTY SAND
			SC	CLAYEY SAND
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays – Liquid Limit less than 50 Low to medium plasticity	Inorganic	CL	LEAN CLAY
			ML	SILT
		Organic	OL	ORGANIC CLAY
				ORGANIC SILT
	Silts and Clays – Liquid Limit 50 or more Medium to high plasticity	Inorganic	CH	FAT CLAY
			MH	ELASTIC SILT
		Organic	OH	ORGANIC CLAY
				ORGANIC SILT
Highly Organic Soils	Primarily organic matter, dark in color and organic odor		PT	PEAT

II. DEFINITION OF SOIL COMPONENT PROPORTIONS (ASTM D2487)

			Examples
Adjective Form	GRAVELLY SANDY	>30% to <50% coarse-grained component in a fine-grained soil	GRAVELLY LEAN CLAY
	CLAYEY SILTY	>12% to <50% fine grained component in a coarse-grained soil	SILTY SAND
"With"	WITH GRAVEL WITH SAND	>15% to <30% coarse-grained component in a fine-grained soil	FAT CLAY WITH GRAVEL
	WITH GRAVEL WITH SAND	>15% to <50% coarse-grained component in a coarse-grained soil	POORLY GRADED GRAVEL WITH SAND
	WITH SILT WITH CLAY	>5% to <12% fine grained component in a coarse-grained soil	POORLY GRADED SAND WITH SILT

III. GLOSSARY OF MISCELLANEOUS TERMS

SYMBOLS .... Unified Soil Classification Symbols are shown above as group symbols. A dual symbol "-" indicates the soil belongs to two groups. A borderline symbol "/" indicates the soil belongs to two possible groups.

FILL .... Man-made deposit containing soil, rock and often foreign matter.

PROBABLE FILL .... Soils which contain no visually detected foreign matter but which are suspect with regard to origin.

DISINTEGRATED ROCK (DR) .... Residual materials with a standard penetration resistance (SPT) between 60 blows per foot and refusal. Refusal is defined as an SPT of 100 blows for 2" or less penetration.

PARTIALLY WEATHERED ROCK (PWR)......................... Residual materials with a standard penetration resistance (SPT) between 100 blows per foot and refusal. Refusal is defined as an SPT of 100 blows for 2" or less penetration.

BOULDERS & COBBLES..... Boulders are considered rounded pieces of rock larger than 12 inches, while cobbles range from 3 to 12-inch size.

LENSES................................ 0 to ½-inch seam within a material in a test pit.

LAYERS .... ½ to 12-inch seam within a material in a test pit.

POCKET .... Discontinuous body within a material in a test pit.

MOISTURE CONDITIONS..... Wet, moist or dry to indicate visual appearance of specimen.

COLOR .... Overall color, with modifiers such as light to dark or variation in coloration.

Schnabel Engineering DC **TEST BORING LOG**

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: **SB-01**
Contract Number: 18C41041
Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: U. Rodas
Schnabel Representative: M. Khachan
Equipment: CME-45B (Truck)
Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)
Dates Started: 8/9/18 **Finished:** 8/10/18
Location: See Location Plan

Ground Surface Elevation: 333± (ft) **Total Depth:** 43.9 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	8/9	---	18.0'	---	---
Completion	8/10	---	Dry	---	---
Casing Pulled	8/10	---	13.3'	---	PIPE
After Drilling	8/13	---	13.5'	---	PIPE

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.5	Asphalt; 6 inches		332.5					
1.0	GRAVEL BASE; 6 inches		332.0	A		S-1, SS 5+5+7 REC=18", 100%		
	PROBABLE FILL, sampled as sandy lean clay; moist, yellowish red, contains gravel, contains roots	FILL						
3.5	SANDY LEAN CLAY; moist, yellowish red, yellowish brown, and red, estimated 5-10% gravel	CL	329.5	B1	5	S-2, SS 3+4+5 REC=18", 100%	PP = 3.50 tsf	
6.0	LEAN CLAY WITH SAND; moist, yellowish brown, gray, and red	CL	327.0			S-3, SS 3+4+7 REC=18", 100%	LL = 39 PI = 15 MC = 19.0% % Passing #200 = 83.2 PP = 1.50 tsf	
8.5	POORLY GRADED SAND WITH CLAY AND GRAVEL; moist, yellowish red and white	SP-SC	324.5		10	S-4, SS 6+6+11 REC=18", 100%		
13.5	CLAYEY GRAVEL WITH SAND; moist, yellowish brown and white	GC	319.5	B2	15	S-5, SS 12+13+14 REC=18", 100%		
18.5	SILTY SAND; moist, light yellowish brown and gray, estimated 30-45% mica	SM	314.5	C2	20	S-6, SS 23+10+8 REC=18", 100%		
23.5	SANDY SILT; moist, light yellowish red and gray, estimated 30 - 45% mica, estimated <5% rock fragments	ML	309.5			S-7, SS 8+8+8 REC=18", 100%		

(continued)

TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: **SB-01** Contract Number: 18C41041 Sheet: 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
	Change: gray, streaks of black	ML		C2	30	S-8, SS 5+7+10 REC=18", 100%		
33.5	DISINTEGRATED ROCK, sampled as sandy silt; moist, gray and black, streaks of yellowish brown, estimated 15-25% mica		299.5		35	S-9, SS 16+35+38 REC=18", 100%		
	Change: streaks of tan and yellowish red, estimated < 5% mica	DR		D	40	S-10, SS 37+50/5" REC=11", 100%		
43.9	Change: estimated 30 - 45% mica		289.1			S-11, SS 50/5" REC=5", 100%		

Bottom of Boring at 43.9 ft.

Schnabel Engineering DC TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: SB-02 Contract Number: 18C41041 Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: W. Rodas

Schnabel Representative: M. Khachan

Equipment: CME 550 ATV

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 8/13/18 **Finished:** 8/14/18

Location: See Location Plan

Ground Surface Elevation: 331± (ft) **Total Depth:** 38.5 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	8/14	---	17.0'	---	---
Completion	8/14	---	Dry	---	---
Casing Pulled	8/14	---	Dry	---	12.5'
End of Day	8/14	---	Dry	---	12.5'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.3	Topsoil; 3 inches		330.9					
	PROBABLE FILL, sampled as sandy silt; moist, light brown, contains roots	FILL		A		S-1, SS 9+7+5 REC=16", 89%		
2.5	CLAYEY GRAVEL; moist, yellowish red, white, and brown	GC	328.6			S-2, SS 11+20+23 REC=18", 100%		
5.0	CLAYEY SAND WITH GRAVEL; moist, yellowish red and white	SC	326.1		5	S-3, SS 6+8+14 REC=18", 100%		
8.5	CLAYEY GRAVEL WITH SAND; moist, reddish brown	GC	322.6	B2	10	S-4, SS 11+16+12 REC=18", 100%		
	Change: mottles of yellowish brown				15	S-5, SS 11+14+16 REC=18", 100%		
18.5	POORLY GRADED GRAVEL; moist, white	GP	312.6		20	S-6, SS 15+11+9 REC=1", 6%		Poor Recovery
23.5	SANDY LEAN CLAY; wet, yellowish brown and gray, est 10 -15% mica	CL	307.6	C1		S-7, SS 19+26+30 REC=2", 11%	PP =NA tsf	

(continued)

Schnabel Engineering DC TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: SB-02 Contract Number: 18C41041 Sheet: 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
		CL		C1				Possible Boulder or Rock Ledge at 27 ft
28.5	SANDY SILT; moist, yellowish red, brown and black, estimated 30-45% mica	ML	302.6	C2	30	S-8, SS 20+20+20 REC=2", 11%		
33.5	DISINTEGRATED ROCK, sampled as sandy silt with gravel; moist, black, gray, olive and white, estimated 50-100% rock fragments, estimated 5-10% mica	DR	297.6	D	35	S-9, SS 50/2" REC=1", 50%		
38.5			292.6			S-10, SS 50/0.5" REC=0.5", 100%		

Bottom of Boring at 38.5 ft.

TEST BORING LOG; P:18C41041 GINT LOGS.GPJ; D: L:GINT LIBRARY_2018_06_018(NCO).GLB; Print:12/10/18

Schnabel Engineering DC TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: **SB-03** Contract Number: 18C41041 Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: U. Rodas

Schnabel Representative: M. Khachan

Equipment: CME-45B (Truck)

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 8/10/18 **Finished:** 8/10/18

Location: See Location Plan

Ground Surface Elevation: 326± (ft) **Total Depth:** 48.5 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	8/10	---	21.0'	---	---
Completion ▼	8/10	---	16.3'	---	---
Casing Pulled ▼	8/10	---	11.1'	---	20.9'
After Drilling ▼	8/13	---	2.9'	---	12.7'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Asphalt; 5 inches		325.8					
1.0	GRAVEL BASE; 7 inches		325.2					
	FILL, sampled as silty sand; moist, olive brown and brown, contains gravel and mica	FILL		A		S-1, SS 6+4+4 REC=18", 100%	MC = 17.7%	
3.5	SANDY LEAN CLAY; dry to moist, yellowish red and red	CL	322.7	B1	5	S-2, SS 4+5+7 REC=18", 100%	PP = 0.50 tsf	
6.0	CLAYEY SAND; moist, yellowish red, yellowish brown and red	SC	320.2	B2		S-3, SS 7+7+7 REC=18", 100%	MC = 17.0%	
	Change: WITH GRAVEL; yellowish red, yellowish brown, red, and gray				10	S-4, SS 4+4+4 REC=18", 100%		
13.5	SANDY SILT; moist, yellowish brown to yellowish red with mottles of gray and white, estimated 30-45% mica	ML	312.7	C2	15	S-5, SS 3+4+5 REC=18", 100%	MC = 23.3%	
	Change: reddish brown				20	S-6, SS 7+11+11 REC=18", 100%		
23.5	CLAYEY SAND; moist, yellowish red and yellowish brown with mottles of gray and red and with streaks of black, estimated	SC	302.7			S-7, SS 4+7+8 REC=18", 100%	LL = 47 PI = 24 MC = 29.3%	

(continued)

Schnabel Engineering DC TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: **SB-03** Contract Number: 18C41041 Sheet: 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
	15-25% mica	SC					% Passing #200 = 42.4 PP = 1.50 tsf	
28.5	SANDY SILT; moist, yellowish brown with streaks of yellowish red and black, estimated 5-10% mica	ML	297.7	C2	30	S-8, SS 7+8+12 REC=18", 100%		
	Change: gray, black, and light greenish gray, estimated < 5% quartz fragments, estimated 15-25% mica				35	S-9, SS 18+22+28 REC=18", 100%		
	Change: bluish gray with mottles of black				40	S-10, SS 18+18+27 REC=18", 100%		
43.5	DISINTEGRATED ROCK, sampled as sandy silt; moist, gray and black with olive streaks, estimated 15-25% mica	DR	282.7	D	45	S-11, SS 50/5" REC=5", 100%		
48.5			277.7			S-12, SS 50/0" REC=0"		

Bottom of Boring at 48.5 ft.
Boring offset 5 ft to the south to avoid concrete. The offset borings has the same elevation as the original location.
Spoon Refusal at 48.5 ft.

Schnabel Engineering DC	TEST BORING LOG	Project: The Catherine and Isiah Leggett Building, Montgomery College, 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: SB-04 Contract Number: 18C41041 Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: W. Rodas

Schnabel Representative: M. Khachan

Equipment: CME 550 ATV

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 8/14/18 **Finished:** 8/14/18

Location: See Location Plan

Ground Surface Elevation: 331± (ft) **Total Depth:** 51.0 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	8/14	---	17.5'	---	---
Completion	8/14	---	40.0'	---	---
Casing Pulled	8/14	---	Dry	---	5.0'
End of Day	8/14	---	Dry	---	5.0'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Asphalt; 5 inches		330.3					
1.0	GRAVEL BASE; 7 inches		329.7			S-1, SS 4+4+4 REC=18", 100%		
	FILL, sampled as sandy silt; moist, brown and black, contains gravel, mica, brick, and organics	FILL		A				
3.5	PROBABLE FILL, sampled as sandy silt; moist, tan	FILL	327.2	A	5	S-2, SS 2+12+21 REC=18", 100%		
6.0	SANDY LEAN CLAY; moist, yellowish brown and yellowish red	CL	324.7	B1		S-3, SS 5+7+7 REC=18", 100%	PP = 2.25 tsf	
8.5	CLAYEY SAND; moist, yellowish brown, and red	SC	322.2	B2	10	S-4, SS 3+5+6 REC=18", 100%		
13.5	LEAN CLAY WITH SAND; moist, light gray, streaks of yellowish brown	CL	317.2	B1	15	S-5, SS 3+5+6 REC=18", 100%	PP = 2.25 tsf	
18.5	CLAYEY GRAVEL WITH SAND; wet, yellowish brown, mottles of white	GC	312.2	B2	20	S-6, SS 5+7+12 REC=10", 56%		
23.5	SANDY SILT; moist, yellowish brown, estimated 30-45% mica	ML	307.2	C2		S-7, SS 2+3+3 REC=18", 100%		

(continued)

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
	Change: yellowish brown, black, and gray	ML		C2	30	S-8, SS 8+9+10 REC=18", 100%		
	Change: yellowish red with streaks of black				35	S-9, SS 8+12+13 REC=18", 100%		
38.5	SILTY SAND; moist, bluish gray, black and yellowish red, estimated 30-45% mica	SM	292.2		40	S-10, SS 7+11+17 REC=18", 100%		
43.5	DISINTEGRATED ROCK, sampled as sandy silt; moist, black, bluish gray and olive, estimated 30-45% mica, estimated 10-15% rock fragments and quartz fragments	DR	287.2	D	45	S-11, SS 15+31+50/5" REC=17", 100%		
	Change: estimated 50-100% rock fragments				50	S-12, SS 50/0.5" REC=0.5", 100%		
51.0	Bottom of Boring at 51.0 ft. Spoon Refusal at 51.0 ft.		279.7			S-13, SS 50/0" REC=0"		

Schnabel Engineering DC TEST BORING LOG	Project: The Catherine and Isiah Leggett Building, Montgomery College, 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: SB-05/SWM-4
		Contract Number: 18C41041
		Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: W. Rodas

Schnabel Representative: M. Khachan

Equipment: CME-45B (Truck)

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 8/6/18 **Finished:** 8/6/18

Location: See Location Plan

Ground Surface Elevation: 316± (ft) **Total Depth:** 48.7 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	8/6	---	21.0'	---	---
Completion ▼	8/6	---	10.9'	---	---
Casing Pulled ▼	8/6	---	6.8'	---	7.2'
After Drilling ▼	8/7	---	4.6'	---	7.3'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.2	Topsoil; 2 inches		315.6			S-1, SS 2+2+6+8 REC=10", 42%		
2.0	FILL, sampled as sandy lean clay with gravel; moist, brown, gray, and white, contains brick fragments and roots	FILL	313.8	A				
	SANDY LEAN CLAY; moist, yellowish brown and gray, estimated < 5% gravel					S-2, SS 2+3+2+3 REC=20", 83%	PP = 0.50 tsf	
6.0	Change: estimated 15-25% gravel	CL	309.8	B1	5	S-3, SS 2+3+4+6 REC=24", 100%	PP = 0.75 tsf	
8.0	CLAYEY SAND; moist, light whitish gray, estimated 50 - 100% mica	SC	307.8			S-4, SS 3+2+2+3 REC=18", 75%	LL = 46 PI = 22 MC = 20.9% % Passing #200 = 42.3	
10.0	SANDY SILT; moist, yellowish brown and whitish gray, estimated 30 - 45% mica, estimated 10-15% rock fragments	ML	305.8			S-5, SS 2+2+2+3 REC=24", 100%		
15.5	SILTY SAND; moist, yellowish brown and light gray with streaks of yellowish red, estimated 30-45% mica Change: brown and yellowish red Change: brown and reddish brown, estimated 10-15% rock fragments	SM	300.3	C2	10 15	S-6, SS 1+2+3+8 REC=24", 100% S-7, SS 10+19+30+40 REC=24", 100% S-8, SS 18+20+34+50/5" REC=23", 100%		
	DISINTEGRATED ROCK, sampled as silty sand; moist, brown and reddish brown, estimated 15-25% mica, estimated 15-25% rock fragments Change: brown and grayish brown, with streaks of black and mottles of yellowish red Change: brown, gray, olive brown and black	DR		D	20	S-9, SS 34+50/4" REC=10", 100% S-10, SS 50/6" REC=6", 100%		

(continued)

TEST BORING LOG; P:18C41041 GINT LOGS.GPJ; D: L:GINT LIBRARY_2018_06_018(NCO).GLB; Print:12/10/18

Schnabel Engineering DC TEST BORING LOG	**Project:** The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	**Boring Number:** SB-05/SWM-4 **Contract Number:** 18C41041 **Sheet:** 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
	Change: moist to wet, brown, yellowish red, yellowish brown, and gray, estimated < 5% mica, no rock fragments	DR		D	30	S-11, SS 32+50/4" REC=10", 100%		
	Change: gray, brown, yellowish red, and black, estimated 15-25% mica, estimated 5-10% rock fragments				35	S-12, SS 50/6" REC=6", 100%		
					40	S-13, SS 50/5" REC=5", 100%		
	Change: gray, estimated 50 - 100% rock fragments				45	S-14, SS 50/2" REC=2", 100%		
48.7	Change: olive and bluish gray, no rock fragments		267.2			S-15, SS 50/2" REC=2", 100%		

Bottom of Boring at 48.7 ft.

TEST BORING LOG; P:18C41041 GINT LOGS.GPJ; D: L:GINT LIBRARY_2018_06_018(NCO).GLB; Print:12/10/18

Schnabel Engineering DC **TEST BORING LOG**

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: **SB-06**
Contract Number: 18C41041
Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: U. Rodas
Schnabel Representative: M. Khachan
Equipment: CME 550 ATV
Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)
Dates Started: 8/13/18 **Finished:** 8/13/18
Location: See Location Plan

Ground Surface Elevation: 329± (ft) **Total Depth:** 43.6 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	8/13	---	23.5'	---	---
Completion	8/13	---	38.5'	---	---
Casing Pulled	8/13	---	27.5'	---	30.7'
After Drilling	8/14	---	14.7'	---	19.5'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Asphalt; 5 inches		329.0					
1.0	GRAVEL BASE; 7 inches		328.4			S-1, SS 7+8+8 REC=18", 100%		
	FILL, sampled as sandy lean clay; moist, brown, black, and gray, contains brick fragments, contains gravel and asphalt	FILL		A				
3.5	LEAN CLAY WITH SAND; dry to moist, yellowish brown	CL	325.9	B1	5	S-2, SS 2+3+3 REC=18", 100%	PP = 0.75 tsf	
6.0	SILTY SAND; dry to moist, yellowish brown	SM	323.4			S-3, SS 12+17+12 REC=18", 100%		
8.5	CLAYEY SAND WITH GRAVEL; moist, yellowish brown and yellowish red	SC	320.9	B2	10	S-4, SS 5+5+7 REC=18", 100%		
13.5	GRAVELLY LEAN CLAY WITH SAND; moist, yellowish brown, gray, and red	CL	315.9	B1	15	S-5, SS 5+5+10 REC=18", 100%	PP = 2.00 tsf	
					20	S-6, SS 7+4+4 REC=0", 0%		No Recovery
22.0	SANDY SILT; moist, yellowish brown, light red, and gray, estimated 30-45% mica Change: yellowish brown, black, gray, estimated 15-25% mica	ML	307.4	C2		S-7, SS 7+7+8 REC=18", 100% S-8, SS 7+10+15 REC=18", 100%		Pressurmeter Test conducted at 24

(continued)

TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: **SB-06** Contract Number: 18C41041 Sheet: 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
	Change: yellowish brown, gray, and black, estimated 15-25% mica Change: yellowish red, mottles of gray Change: bluish gray and black	ML		C2	30	S-9, SS 7+10+14 REC=18", 100% S-10, SS 11+14+17 REC=18", 100% S-11, SS 9+14+18 REC=18", 100%		ft. Pressurmeter Test conducted at 27.5 ft.
33.5	DISINTEGRATED ROCK, sampled as silty sand with gravel; moist, black and olive, estimated 15-25% rock fragments, estimated 5-10% mica	DR	295.9	D	35 40	S-12, SS 50/2" REC=2", 100% S-13, SS 50/1" REC=1", 100%		
43.6	Change: estimated 50-100% rock fragments		285.8			S-14, SS 50/1" REC=1", 100%		

Bottom of Boring at 43.6 ft.

Schnabel Engineering DC TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: SB-07 Contract Number: 18C41041 Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: U. Rodas

Schnabel Representative: M. Khachan

Equipment: CME-45B (Truck)

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 8/9/18 **Finished:** 8/9/18

Location: See Location Plan

Ground Surface Elevation: 328± (ft) **Total Depth:** 43.5 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	8/9	---	18.5'	---	---
Completion ▼	8/9	---	Dry	---	---
Casing Pulled ▼	8/9	---	16.0'	---	33.5'
After Drilling ▼	8/10	---	13.8'	---	19.7'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.5	Asphalt; 6 inches		327.5	A				
1.0	GRAVEL BASE; 6 inches		327.0					
1.8	FILL, sampled as sandy lean clay; moist, brown and black, contains gravel, contains brick fragments	FILL	326.2			S-1, SS 2+2+2 REC=18", 100%		
	SANDY LEAN CLAY; moist, yellowish brown Change: mottles of yellowish red, estimated < 5% roots, estimated < 5% gravel	CL			5	S-2, SS 4+6+7 REC=18", 100%	PP = 4.00 tsf	
6.0	LEAN CLAY WITH SAND; moist, yellowish red, red, and gray, estimated <5% gravel Change: no gravel	CL	322.0	B1	10	S-3, SS 4+5+6 REC=18", 100% S-4, SS 4+5+8 REC=18", 100%	PP = 2.00 tsf PP = 3.00 tsf	
13.5	CLAYEY SAND; moist, yellowish red, yellowish brown, and red, estimated 5-10% gravel	SC	314.5		15	S-5, SS 4+5+5 REC=18", 100%		
18.5	CLAYEY GRAVEL WITH SAND; wet, light yellowish brown, white, black, and gray	GC	309.5	B2	20	S-6, SS 7+8+5 REC=3", 17%		
23.5	SANDY SILT; moist, yellowish red, and gray, estimated 30-45% mica	ML	304.5	C2		S-7, SS 2+3+7 REC=18", 100%		

(continued)

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
	Change: yellowish brown, yellowish red, and gray, estimated 30-45% mica	ML		C2	30	S-8, SS 8+15+20 REC=18", 100%		
33.5	DISINTEGRATED ROCK, sampled as silty sand; moist, black and gray, estimated 15-25% rock fragments	DR	294.5	D	35	S-9, SS 50/2" REC=2", 100%		
	Change: estimated 50-100% rock fragments				40	S-10, SS 50/1" REC=1", 100%		
43.5			284.5			S-11, SS 50/0" REC=0"		

Bottom of Boring at 43.5 ft.
Spoon Refusal at 43.5 ft.

TEST BORING LOG

Schnabel Engineering DC

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: SB-08
Contract Number: 18C41041
Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: U. Rodas

Schnabel Representative: M. Khachan

Equipment: CME-45B (Truck)

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 8/7/18 **Finished:** 8/8/18

Location: See Location Plan

Ground Surface Elevation: 329± (ft) **Total Depth:** 53.5 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	8/8	---	None	---	---
Completion ▼	8/8	---	Dry	---	---
Casing Pulled ▼	8/8	---	Dry	---	29.3'
After Drilling ▼	8/9	---	20.4'	---	21.5'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Asphalt; 5 inches		328.7					
1.0	GRAVEL BASE; 7 inches		328.1					
	FILL, sampled as silty sand; moist, olive brown, gray, and black, contains gravel, mica	FILL		A		S-1, SS 3+10+12 REC=18", 100%		
3.5	FILL, sampled as sandy lean clay with gravel; moist, yellowish brown, contains mica	FILL	325.6	A		S-2, SS 4+3+3 REC=18", 100%		
					5			
	Change: gray, black, and olive brown, contains brick fragments			A		S-3, SS 2+3+4 REC=18", 100%	LL = 41 PI = 18 MC = 14.5% % Passing #200 = 50.6	
	Change: yellowish brown					S-4, SS 3+1+3 REC=10", 56%		
					10			
13.5	CLAYEY SAND; moist, yellowish brown, red and tan	SC	315.6	B2		S-5, SS 7+7+8 REC=18", 100%		
					15			
18.5	LEAN CLAY WITH SAND; moist, yellowish brown, light gray, and red, estimated <5% gravel ▼	CL	310.6	B1		S-6, SS 4+7+9 REC=18", 100%	PP = 2.50 tsf	
					20			
23.5	SANDY LEAN CLAY; moist, light brown, gray, and light red, estimated 30-45% mica	CL	305.6	C1		S-7, SS 3+3+3 REC=18", 100%	LL = 49 PI = 25 MC = 22.9%	

(continued)

Schnabel Engineering DC TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: SB-08 Contract Number: 18C41041 Sheet: 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
		CL		C1			% Passing #200 = 55.9 PP = 1.50 tsf	
28.5	SANDY SILT; moist, yellowish red and yellowish brown with mottles of light gray and black, esimated 15-25% mcia	ML	300.6	C2	30	S-8, SS 5+7+12 REC=18", 100%		
	Change: gray, black, and brown with streaks of yellowish red, estimated 30-45% mica				35	S-9, SS 6+11+13 REC=18", 100%		
38.5	DISINTEGRATED ROCK, sampled as silty sand; moist, black and gray, estimated 30 - 45% mica	DR	290.6	D	40	S-10, SS 50/6" REC=6", 100%		
	Change: dry to moist, estimated 50 - 100% rock fragments				45	S-11, SS 50/1" REC=1", 100%		
					50	S-12, SS 50/1" REC=1", 100%		
53.5			275.5			S-13, SS 50/0.5" REC=0.5", 100%		

Bottom of Boring at 53.5 ft.

Schnabel Engineering DC **TEST BORING LOG**

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: **SB-09**
Contract Number: 18C41041
Sheet: 1 of 2

Contractor: Recon Drilling

Contractor Foreman: U. Rodas
Schnabel Representative: M. Khachan
Equipment: CME-45B (Truck)
Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)
Dates Started: 8/7/18 **Finished:** 8/7/18
Location: See Location Plan

Ground Surface Elevation: 320± (ft) **Total Depth:** 52.6 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	8/7	---	26.0'	---	---
Completion	8/7	---	23.7'	---	---
Casing Pulled	8/7	---	40.5'	---	PIPE
After Drilling	8/8	---	15.3'	---	PIPE

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.3	Topsoil; 3 inches		319.6			S-1, SS 2+3+3 REC=10", 56%		
	FILL, sampled as sandy silt with gravel; moist, brown, contains roots Change: yellowish brown and brown	FILL		A		S-2, SS 7+11+12 REC=18", 100%	MC = 9.6%	
5.0	SANDY LEAN CLAY; moist, yellowish brown, estimated 5-10% gravel, estimated < 5% roots	CL	314.8	B1	5	S-3, SS 2+3+5 REC=18", 100%	PP = NA tsf	
8.5	CLAYEY SAND; moist, yellowish brown, yellowish red, and gray, estimated 5-10% gravel	SC	311.3	B2	10	S-4, SS 4+9+11 REC=18", 100%	LL = 39 PI = 14 MC = 14.7% % Passing #200 = 27.5	
13.5	SANDY LEAN CLAY; moist, white, gray, and yellowish brown, estimated 5-10% gravel	CL	306.3	B1	15	S-5, SS 3+4+5 REC=18", 100%	PP = 1.25 tsf	
18.5	SILTY SAND WITH GRAVEL; moist to wet, light brown, yellowish brown, and gray, estimated 30-45% mica, estimated 15-25% quartz fragment and and quartz gravel	SM	301.3	C2	20	S-6, SS 3+7+5 REC=18", 100%		
23.5	SILTY SAND; moist, yellowish brown and reddish brown, estimated 15 - 25% mica	SM	296.3			S-7, SS 7+9+11 REC=18", 100%		

(continued)

Schnabel Engineering DC	TEST BORING LOG	Project: The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	Boring Number: SB-09 Contract Number: 18C41041 Sheet: 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
		SM		C2				
28.5	DISINTEGRATED ROCK, sampled as silty sand; moist, bluish gray and black, estimated 30-45% mica, estimated 5-10% rock fragments	DR	291.3	D	30	S-8, SS 19+30+44 REC=18", 100%		
	Change: olive gray, yellowish brown, and black				35	S-9, SS 29+40+50 REC=18", 100%		
	Change: gray and black, estimated 15 - 25% rock fragments				40	S-10, SS 30+45+50/4" REC=16", 100%		
	Change: brown and gray				45	S-11, SS 50/2" REC=2", 100%		
	Change: yellowish brown, yellowish red, gray, and black, estimated 15-25% mica				50	S-12, SS 32+25+27 REC=18", 100%		
52.6	Change: brown, gray, and black, estimated 50-100% rock fragments		267.2			S-13, SS 50/1" REC=1", 100%		

Bottom of Boring at 52.6 ft.

Schnabel Engineering DC TEST BORING LOG	**Project:** The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	**Boring Number:** **SB-10** **Contract Number:** 18C41041 **Sheet:** 1 of 2

Contractor: Recon Drilling

Contractor Foreman: U. Rodas

Schnabel Representative: M. Khachan

Equipment: CME-45B (Truck)

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 8/9/18 **Finished:** 8/9/18

Location: See Location Plan

Ground Surface Elevation: 326± (ft) **Total Depth:** 43.8 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	8/9	---	23.7'	---	---
Completion ▼	8/9	---	35.4'	---	---
Casing Pulled ▼	8/9	---	Dry	---	18.1'
After Drilling ▼	8/10	---	9.6'	---	11.1'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Asphalt; 5 inches		326.0					
1.0	GRAVEL BASE; 7 inches		325.4					
	FILL, sampled as clayey sand with gravel; moist, gray and brown, contains quartz fragments, mica and rock fragments	FILL		A		S-1, SS 3+7+4 REC=6", 33%		
3.5	FILL, sampled as sandy silt; moist, brown, gray, and black, contains gravel, rock fragments and mica	FILL	322.9			S-2, SS 1+2+3 REC=5", 28%		
					5			
	Change: olive brown and gray					S-3, SS 3+4+4 REC=18", 100%		Potential Chemical Odor
8.5	FILL, sampled as sandy lean clay; moist, brown and black, contains gravel, mica, glass fragments, and organics ▼	FILL	317.9			S-4, SS 2+2+2 REC=18", 100%		
					10			
	Change: yellowish brown and gray					S-5, SS 1+2+4 REC=8", 44%		
					15			
18.5	PROBABLE FILL, sampled as clayey gravel; moist, yellowish brown and white	FILL	307.9			S-6, SS 1+2+3 REC=4", 22%		
					20			
23.5	▽ CLAYEY SAND; moist, yellowish brown and yellowish red, streaks of white	SC	302.9	B2		S-7, SS 2+3+3 REC=18", 100%		

(continued)

Schnabel Engineering DC	TEST BORING LOG	**Project:** The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	**Boring Number:** SB-10 **Contract Number:** 18C41041 **Sheet:** 2 of 2

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
		SC		B2				
28.5	ELASTIC SILT WITH SAND; moist to wet, yellowish brown with streaks of yellowish red, est 10 -15% mica	MH	297.9	C1	30	S-8, SS 5+8+12 REC=18", 100%	PP = 2.50 tsf	
33.5	SANDY SILT; moist, black and bluish gray, estimated 30 - 45% mica	ML	292.9	C2	35	S-9, SS 12+18+25 REC=18", 100%		
38.5	DISINTEGRATED ROCK, sampled as sandy silt; moist, black, bluish gray, and brown, estimated 30-45% mica, estimated 10-15% rock fragments	DR	287.9	D	40	S-10, SS 16+31+47 REC=18", 100%		
43.8	Change: brown and gray Bottom of Boring at 43.8 ft.		282.7			S-11, SS 50/3" REC=3", 100%		

TEST BORING LOG; P:18C41041 GINT LOGS.GPJ; D: L:GINT LIBRARY_2018_06_018(NCO).GLB; Print:12/10/18

Schnabel Engineering DC

TEST BORING LOG

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: **SWM-1**
Contract Number: 18C41041
Sheet: 1 of 1

Contractor: Recon Drilling

Contractor Foreman: U. Rodas

Schnabel Representative: M. Khachan

Equipment: CME-45B (Truck)

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates **Started:** 8/8/18 **Finished:** 8/8/18

Location: See Location Plan

Ground Surface Elevation: 326± (ft) **Total Depth:** 15.8 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	8/8	---	13.0'	---	---
Completion ▼	8/8	---	13.7'	---	---
Casing Pulled ▼	8/8	---	Dry	---	4.5'
After Drilling ▼	8/9	---	Dry	---	4.1'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.3	Topsoil; 4 inches		325.9			S-1, SS 2+3+2+3 REC=24", 100%		
	FILL, sampled as sandy lean clay; moist, yellowish brown, contains roots and gravel	FILL		A				
2.0	CLAYEY SAND; moist, yellowish brown and red, estimated 5 - 10% gravel, estimated <5% roots	SC	324.2			S-2, SS 3+4+5+9 REC=24", 100%		
	Change: WITH GRAVEL; yellowish red, yellowish brown and white				5	S-3, SS 3+8+14+16 REC=24", 100%		
6.0	CLAYEY SAND WITH GRAVEL; moist, yellowish brown and yellowish red	SC	320.2	B2		S-4, SS 9+12+16+21 REC=18", 75%	LL = 36 PI = 13 MC = 7.4% % Passing #200 = 15.5	
						S-5, SS 8+12+16+16 REC=3", 13%		
					10	S-6, SS 6+8+12+16 REC=18", 75%		
	Change: yellowish brown ▽ ▼					S-7, SS 9+11+13+10 REC=14", 58%		
					15	S-8, SS 4+5+16+50/4" REC=20", 91%		
15.8			310.4					

Bottom of Boring at 15.8 ft.
Offset 4 ft to the east and auger probed for infiltration testing. PVC pipe installed to 6.0 ft.

Schnabel Engineering DC **TEST BORING LOG**

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: **SWM-2**
Contract Number: 18C41041
Sheet: 1 of 1

Contractor: Recon Drilling

Contractor Foreman: U. Rodas
Schnabel Representative: M. Khachan
Equipment: CME-45B (Truck)
Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)
Dates Started: 8/6/18 **Finished:** 8/6/18
Location: See Location Plan

Ground Surface Elevation: 326± (ft) **Total Depth:** 15.0 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	8/6	---	None	---	---
Completion ▼	8/6	---	Dry	---	---
Casing Pulled ▼	8/6	---	Dry	---	10.0'
After Drilling ▼	8/6	---	Dry	---	2.0'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Asphalt; 5 inches		326.1					
1.0	GRAVEL BASE; 7 inches		325.5					
	FILL, sampled as sandy silt with gravel; moist, brown, contains roots and asphalt	FILL		A		S-1, SS 2+3+3+3 REC=20", 83%		
3.0	PROBABLE FILL, sampled as clayey sand with gravel; moist, yellowish brown and dark red	FILL	323.5			S-2, SS 1+1+3+4 REC=18", 75%		
5.0	CLAYEY SAND; moist, yellowish red and yellowish brown, estimated < 5% roots, estimated < 5% gravel	SC	321.5	B2	5	S-3, SS 1+3+7+9 REC=18", 75%	LL = 34 PI = 13 MC = 13.3% % Passing #200 = 31.7	
	Change: no roots, no gravel					S-4, SS 7+8+10+11 REC=24", 100%		
	Change: estimated < 5% thin, light gray clay seams				10	S-5, SS 7+8+9+9 REC=24", 100%		
11.0	POORLY GRADED SAND WITH SILT; moist, yellowish red and yellowish brown	SP-SM	315.5			S-6, SS 4+6+7+7 REC=24", 100%		
	Change: yellowish brown and gray					S-7, SS 4+5+6+6 REC=24", 100%		
15.0			311.5		15			

Bottom of Boring at 15.0 ft.
Offset 5 ft to the west and auger probed for infiltration testing. PVC pipe installed to 6.0 ft.

Schnabel Engineering DC **TEST BORING LOG**

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: **SWM-3**
Contract Number: 18C41041
Sheet: 1 of 1

Contractor: Recon Drilling

Contractor Foreman: U. Rodas
Schnabel Representative: M. Khachan
Equipment: CME-45B (Truck)
Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)
Dates Started: 8/8/18 **Finished:** 8/8/18
Location: See Location Plan

Ground Surface Elevation: 324± (ft) **Total Depth:** 16.0 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	8/8	---	None	---	---
Completion	8/8	---	Dry	---	---
Casing Pulled	8/8	---	Dry	---	1.3'
After Drilling	8/9	---	Dry	---	1.1'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.4	Topsoil; 4 inches		324.1			S-1, SS 2+3+4+4 REC=18", 75%		
2.0	FILL, sampled as clayey sand with gravel; moist, dark brown and reddish brown, contains brick fragments and roots	FILL	322.5	A				
4.0	FILL, sampled as sandy lean clay with gravel; moist, yellowish brown, contains roots	FILL	320.5			S-2, SS 6+5+6+11 REC=24", 100%		
6.0	SANDY LEAN CLAY WITH GRAVEL; moist, dark yellowish brown and yellowish red	CL	318.5	B1	5	S-3, SS 3+12+15+18 REC=12", 50%	PP = 3.50 tsf	
10.0	CLAYEY SAND WITH GRAVEL; moist, yellowish red, white, and yellowish brown Change: yellowish red and white	SC	314.5	B2	10	S-4, SS 3+5+12+21 REC=14", 58% S-5, SS 12+11+11+19 REC=24", 100%	LL = 35 PI = 14 MC = 10.5% % Passing #200 = 26.3	
12.0	CLAYEY SAND WITH GRAVEL; moist, yellowish red and yellowish brown	SC	312.5			S-6, SS 6+15+8+10 REC=24", 100%		
16.0	SANDY SILT; moist, yellowish brown and gray, estimated 30 - 45% mica	ML	308.5	C2	15	S-7, SS 4+4+4+5 REC=18", 75% S-8, SS 2+4+5+5 REC=24", 100%		

Bottom of Boring at 16.0 ft.
Offset 5 ft to the east and auger probed for infiltration testing. PVC pipe installed to 6.0 ft.

Schnabel Engineering DC

TEST BORING LOG

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: **SWM-5**
Contract Number: 18C41041
Sheet: 1 of 1

Contractor: Recon Drilling

Contractor Foreman: U. Rodas
Schnabel Representative: M. Khachan
Equipment: CME-45B (Truck)
Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)
Dates Started: 8/7/18 **Finished:** 8/7/18
Location: See Location Plan

Ground Surface Elevation: 315± (ft) **Total Depth:** 16.0 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	8/7	---	None	---	---
Completion	8/7	---	Dry	---	---
Casing Pulled	8/7	---	Dry	---	7.2'
After Drilling	8/8	---	6.0'	---	6.8'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.3	Topsoil; 3 inches		314.8			S-1, SS 2+1+1+3 REC=20", 83%		
	FILL, sampled as sandy lean clay; moist, brown, contains roots	FILL		A				
2.0	SANDY LEAN CLAY; moist, yellowish brown with mottles of light gray, estimated < 5% gravel		313.0			S-2, SS 1+3+3+8 REC=24", 100%	PP = 2.40 tsf	
	Change: estimated <5% roots	CL				S-3, SS 7+7+9+11 REC=24", 100%	PP = 2.50 tsf	
					5			
6.0	LEAN CLAY WITH SAND; moist, yellowish brown with mottles of light gray and yellowish red, no roots		309.0			S-4, SS 3+4+7+9 REC=24", 100%	LL = 40 PI = 15 MC = 12.0% % Passing #200 = 81.5	
	Change: gray, yellowish brown, and reddish brown, estimated 10-15% gravel, estimated <5% mica	CL		B1		S-5, SS 4+7+9+11 REC=24", 100%	PP = 3.50 tsf PP = 3.50 tsf	
10.0	SANDY FAT CLAY WITH GRAVEL; moist, whitish brown, yellowish gray, brown, and red, estimated <5% mica		305.0		10	S-6, SS 4+5+9+11 REC=10", 42%	PP =NA tsf	
		CH				S-7, SS 3+3+5+5 REC=0", 0%		No Recovery
14.0	SILTY SAND; moist, yellowish brown, estimated 5 - 10% mica	SM	301.0	C2	15	S-8, SS 5+4+5+6 REC=12", 50%		
16.0			299.0					

Bottom of Boring at 16.0 ft.
Offset 5 ft to the north east and auger probed for infiltration testing. Pipe installed to 6.0 ft.

Schnabel Engineering DC **TEST BORING LOG**

Project: The Catherine and Isiah Leggett Building
Montgomery College
7600 Takoma Ave, Takoma Park, Maryland

Boring Number: **SWM-6**
Contract Number: 18C41041
Sheet: 1 of 1

Contractor: Recon Drilling

Contractor Foreman: U. Rodas

Schnabel Representative: M. Khachan

Equipment: CME-45B (Truck)

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 8/8/18 **Finished:** 8/8/18

Location: See Location Plan

Ground Surface Elevation: 329± (ft) **Total Depth:** 15.0 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered ▽	8/8	---	Ne	---	---
Completion ▼	8/8	---	Dry	---	---
Casing Pulled ▼	8/8	---	Dry	---	2.5'
After Drilling ▼	8/9	---	Dry	---	2.0'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
0.5	Asphalt; 6 inches		328.4	B2				
1.0	GRAVEL BASE; 6 inches		327.9					
	CLAYEY SAND; moist, yellowish brown, estimated <5% gravel	SC				S-1, SS 9+9+9+9 REC=24", 100%		
	Change: yellowish brown and yellowish red					S-2, SS 5+7+9+12 REC=24", 100%		
	Change: yellowish brown and light reddish brown				5	S-3, SS 3+8+9+11 REC=24", 100%	LL = 37 PI = 15 MC = 11.1% % Passing #200 = 28.3	
7.0	CLAYEY GRAVEL WITH SAND; moist, yellowish red, yellowish brown, and white	GC	321.9			S-4, SS 9+14+13+14 REC=24", 100%		
	Change: yellowish brown and white					S-5, SS 6+14+15+18 REC=6", 25%		
	Change: yellowish brown, white, and gray				10	S-6, SS 6+12+30+50/5" REC=12", 50%		
	Change: yellowish brown and white					S-7, SS 32+12+12+12 REC=14", 58%		
15.0			313.9		15			

Bottom of Boring at 15.0 ft.
Boring was offset 9 ft North from the original location due to electrical lines above the original location, and a sewer line 5 ft from the original location. No elevation change.
Infiltration boring was offset 4 ft to the north. Pipe installed to 6.0 ft.

Schnabel Engineering DC **TEST BORING LOG**	**Project:** The Catherine and Isiah Leggett Building Montgomery College 7600 Takoma Ave, Takoma Park, Maryland	**Boring Number:** **SB-05 (PMT)** **Contract Number:** 18C41041 **Sheet:** 1 of 1

Contractor: Recon Drilling

Contractor Foreman: U. Rodas

Schnabel Representative: M. Khachan

Equipment: CME 550 ATV

Method: 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates **Started:** 8/13/18 **Finished:** 8/13/18

Location: See Location Plan

Ground Surface Elevation: 316± (ft) **Total Depth:** 15.0 ft

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	8/8	---	10.5'	---	---
Completion	8/8	---	7.9'	---	---
Casing Pulled	8/8	---	7.8'	---	11.0'

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOL	ELEV (ft)	STRATUM	SAMPLING DEPTH	SAMPLING DATA	TESTS	REMARKS
	No SPT samples were collected. Augered to 8.5 ft.				5			
8.5	SILTY SAND; moist, whitish gray, contains 50-100% mica Change: yellowish brown, with mottles of black, contains 15-25% mica	SM	307.3	C2	10	S-1, SS 4+4+3 REC=9", 50% S-2, SS 1+1+3 REC=18", 100% S-3, SS 15+25+34 REC=18", 100%	PP = 0.50 tsf PP = 0.50 tsf	Pressurmeter Test conducted at 10.5 ft.
13.5	DISINTEGRATED ROCK, sampled as silty sand; moist, yellowish red, brown, and black, estimated 30-45% mica, estimated 15-25% rock fragments	DR	302.3	D		S-4, SS 21+30+31 REC=18", 100%		Pressurmeter Test conducted at 14 ft.
15.0	Bottom of Boring at 15.0 ft.		300.8		15			

SB-05 (PMT) is a pressuremeter test boring that was drilled 3 ft to the SW of the original SB-05/SWM-4 boring location, and at the same ground elevation.

TEST BORING LOG; P:18C41041 GINT LOGS.GPJ; D: L:GINT LIBRARY_2018_06_018(NCO).GLB; Print:12/10/18

APPENDIX B

IN-SITU TEST RESULTS

Pressuremeter Test Method (1 sheet)
Pressuremeter Test Curves (3 sheets)

PRESSUREMETER TEST METHOD

Brief Description of the Pressuremeter Test

The test is performed in a borehole with a short cylindrical metal probe covered with a rubber membrane. The probe is inflated with water under pressure from a surface control apparatus. Pressure is increased in steps and deformations are recorded. The procedure represents a load test on the walls of the borehole. Volume changes for a particular loading step are recorded at 30 seconds and one minute after load application.

Results of Pressuremeter Tests

The tests furnish information relating to the undrained shear strength and deformation characteristics of the material. Results provide a basis to predict bearing capacity and settlement of foundations.

The result of the test is the Pressuremeter curve. The curve shows a volume increase of the probe versus the pressure applied considering readings at the end of each loading step. This curve also represents the deformation of the soil under lateral radial stresses. The initial portion represents the adjustments of the probe to the borehole and to the restoration of the original horizontal pressures. The straight-line portion of the curve that follows is the elastic deformation of the soil and can be measured by the slope of the line, resulting in the Pressuremeter Modulus E_P. This modulus is evaluated for each test and is shown in units of tons per square foot. The Pressuremeter Modulus is similar to the Modulus of Elasticity except it is measured in the horizontal direction. Rheological corrections for isotropy are necessary in most soils to obtain elasticity in the vertical direction.

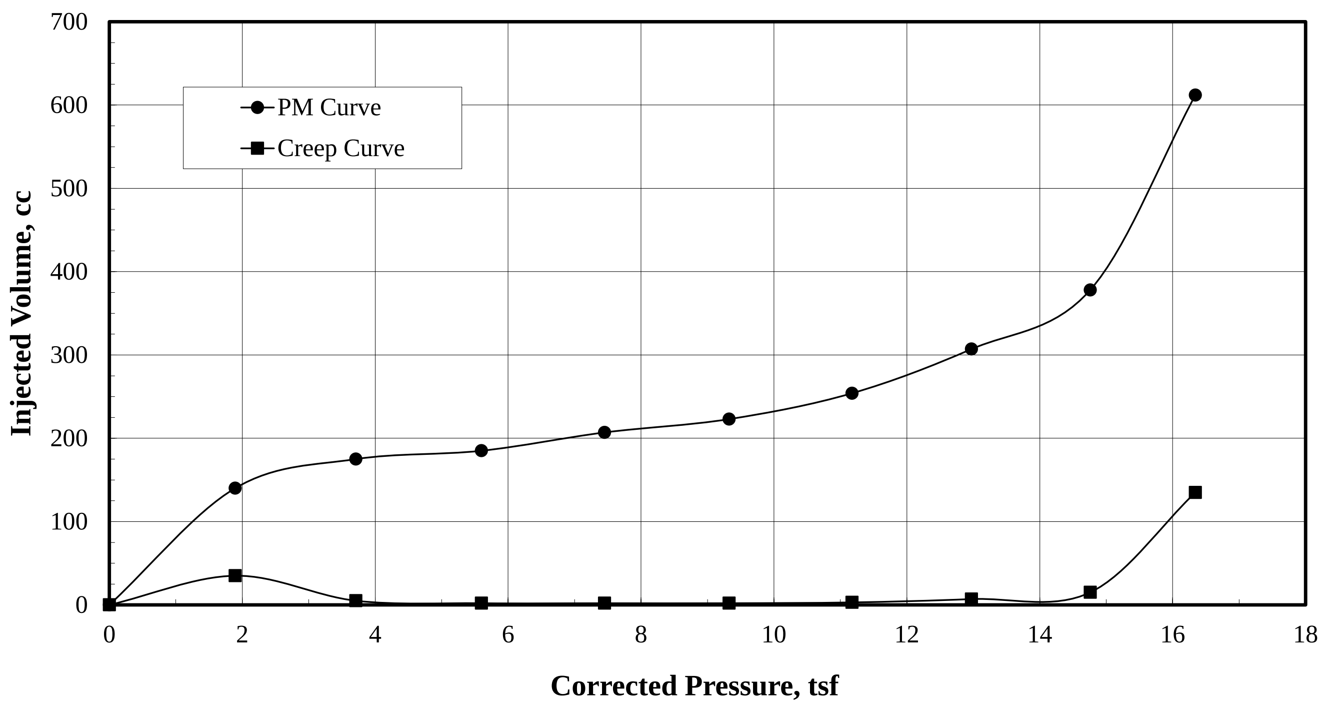
After the straight-line portion, the Pressuremeter curve shows an increased rate of deformation in the range of plastic deformations, and the curve approaches a limit pressure where no further loading is necessary to cause continuous volume change. This pressure is estimated as the vertical asymptote of the Pressuremeter curve and is presented as the Limit Pressure in units of tons per square foot.

Schnabel Engineering

Pressuremeter Test Results

Project Name:	Montgomery Coll. Math and Sci. Bldg.	**Schnabel Rep.:**	M.S.
Location:	Takoma Park, Maryland	**Date:**	8/13/2018
Contract No.:	18C41041		

Pressuremeter Test Curves



Pressuremeter Test Data

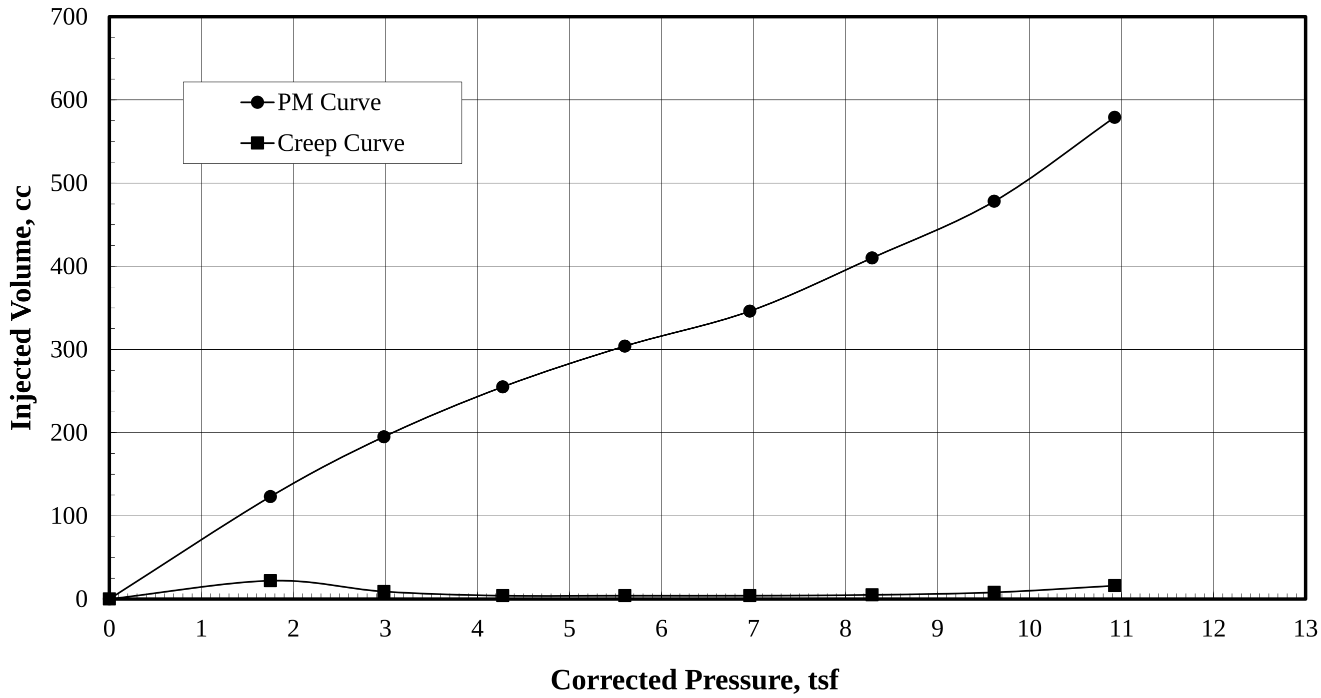
Boring No.:	SB-5	**Ground Surface Elevation:**	315.8 ft
Test No:	2	**Test Elevation:**	301.8 ft
Test Depth:	14	**Ground Water Elevation:**	307.8 ft
Soil Description:	Sandy Silt, orangish brown, wet, contains mica and rock fragments (Disintegrated Rock)		
Geology:	Residual	**Soil Classification:**	ML
N-Value:	61		
Pressuremeter Modulus:	308 tsf		
Estimated Limit Pressure:	18 (Visual Estimate Only)		

Schnabel Engineering

Pressuremeter Test Results

Project Name:	Montgomery Coll. Math and Sci. Bldg.	**Schnabel Rep.:**	M.S.
Location:	Takoma Park, Maryland	**Date:**	8/13/2018
Contract No.:	18C41041		

Pressuremeter Test Curves



Pressuremeter Test Data

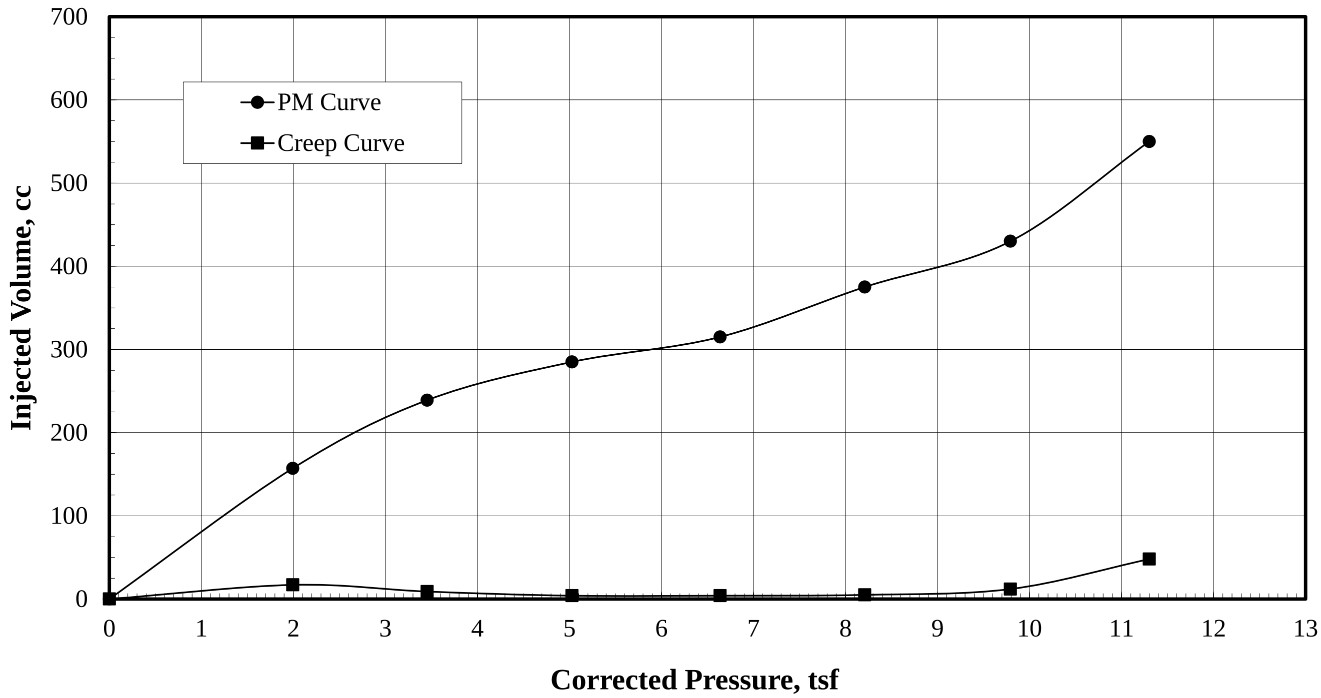
Boring No.:	SB-7	**Ground Surface Elevation:**	329.4 ft
Test No:	3	**Test Elevation:**	305.4 ft
Test Depth:	24	**Ground Water Elevation:**	305.9 ft
Soil Description:	Sandy Silt, whitish gray, wet, contains mica		
Geology:	Residual	**Soil Classification:**	ML
N-Value:	25		
Pressuremeter Modulus:	86 tsf		
Estimated Limit Pressure:	12 (Visual Estimate Only)		

Schnabel Engineering

Pressuremeter Test Results

Project Name:	Montgomery Coll. Math and Sci. Bldg.	**Schnabel Rep.:**	M.S.
Location:	Takoma Park, Maryland	**Date:**	8/13/2018
Contract No.:	18C41041		

Pressuremeter Test Curves



Pressuremeter Test Data

Boring No.:	SB-7	**Ground Surface Elevation:**	329.4 ft
Test No:	4	**Test Elevation:**	301.9 ft
Test Depth:	27.5	**Ground Water Elevation:**	305.9 ft
Soil Description:	Sandy Silt, whitish gray, wet, contains mica		
Geology:	Residual	**Soil Classification:**	ML
N-Value:	31		
Pressuremeter Modulus:	105 tsf		
Estimated Limit Pressure:	13 (Visual Estimate Only)		

APPENDIX C

SOIL LABORATORY TEST DATA

SUMMARY OF LABORATORY RESULTS

CLIENT The Catherine and Isiah Leggett Building
PROJECT NAME The Catherine and Isiah Leggett Building
PROJECT NUMBER 18C41041
PROJECT LOCATION The Catherine and Isiah Leggett Building

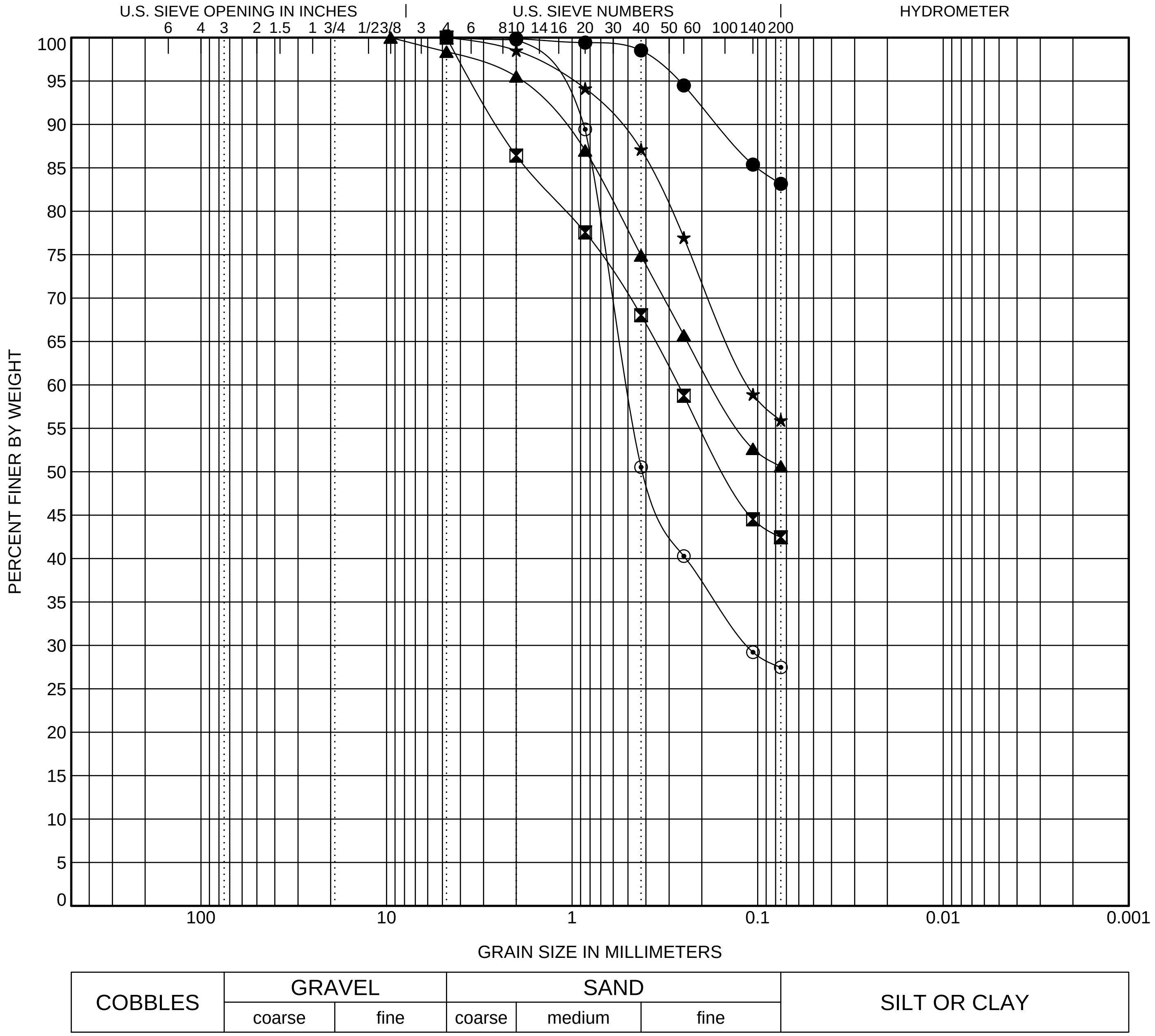
Borehole	Depth(ft)	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	Saturation (%)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Void Ratio
SB-1	6-7.5	39	24	15	4.75		83	CL	19.0		
SB-3	1-2.5								17.7		
SB-3	6-7.5								17.0		
SB-3	13.5-15								23.3		
SB-3	23.5-25	47	23	24	4.75		42	SC	29.3		
SB-8	6-7.5	41	23	18	9.5		51	CL	14.5		
SB-8	23.5-25	49	24	25	4.75		56	CL	22.9		
SB-9	2.5-4								9.6		
SB-9	8.5-10	39	25	14	4.75		27	SC	14.7		
SWM-1	6.0-8.0	36	23	13	37.5		16	SC	7.4		
SWM-2	5.0-7.0	34	21	13	9.5		32	SC	13.3		
SWM-3	6.0-8.0	35	21	14	19		26	SC	10.5		
SWM-4	6.0-8.0	46	24	22	19		42	SC	20.9		
SWM-5	6.0-8.0	40	25	15	2		82	CL	12.0		
SWM-6	5.0-7.0	37	22	15	2		28	SC	11.1		

Schnabel Engineering DC

GRAIN SIZE DISTRIBUTION
ASTM D422

CLIENT The Catherine and Isiah Leggett Building **PROJECT NAME** The Catherine and Isiah Leggett Building

PROJECT NUMBER 18C41041 **PROJECT LOCATION** The Catherine and Isiah Leggett Building



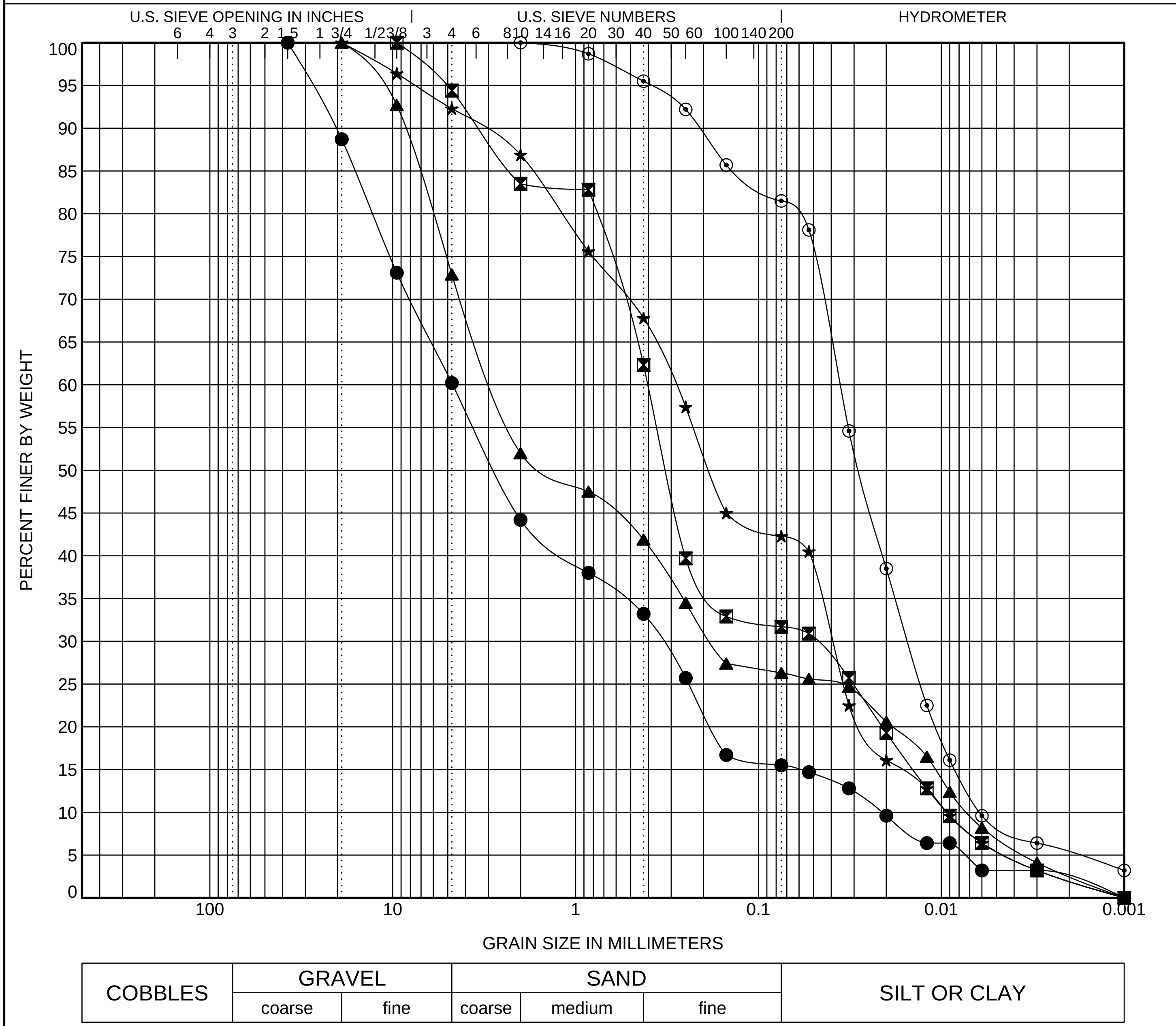
	SAMPLE No.	DEPTH(ft)	Classification	LL	PL	PI	Cc	Cu
●	**SB-1**	**6-7.5**	**LEAN CLAY with SAND(CL), A-6(13)**	**39**	**24**	**15**		
⊠	**SB-3**	**23.5-25**	**CLAYEY SAND(SC), A-7-6(6)**	**47**	**23**	**24**		
▲	**SB-8**	**6-7.5**	**SANDY LEAN CLAY(CL), A-7-6(6)**	**41**	**23**	**18**		
★	**SB-8**	**23.5-25**	**SANDY LEAN CLAY(CL), A-7-6(11)**	**49**	**24**	**25**		
⊙	**SB-9**	**8.5-10**	**CLAYEY SAND(SC), A-2-6(0)**	**39**	**25**	**14**		

	SAMPLE No.	DEPTH(ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SB-1**	**6-7.5**	**4.75**				**0.0**	**16.8**	**83.2**	
⊠	**SB-3**	**23.5-25**	**4.75**	**0.269**			**0.0**	**57.6**	**42.4**	
▲	**SB-8**	**6-7.5**	**9.5**	**0.172**			**1.6**	**47.8**	**50.6**	
★	**SB-8**	**23.5-25**	**4.75**	**0.112**			**0.0**	**44.1**	**55.9**	
⊙	**SB-9**	**8.5-10**	**4.75**	**0.503**	**0.113**		**0.0**	**72.5**	**27.5**	

GRAIN SIZE DISTRIBUTION
ASTM D422

Schnabel Engineering DC

CLIENT The Catherine and Isiah Leggett Building
PROJECT NAME The Catherine and Isiah Leggett Building
PROJECT NUMBER 18C41041
PROJECT LOCATION The Catherine and Isiah Leggett Building



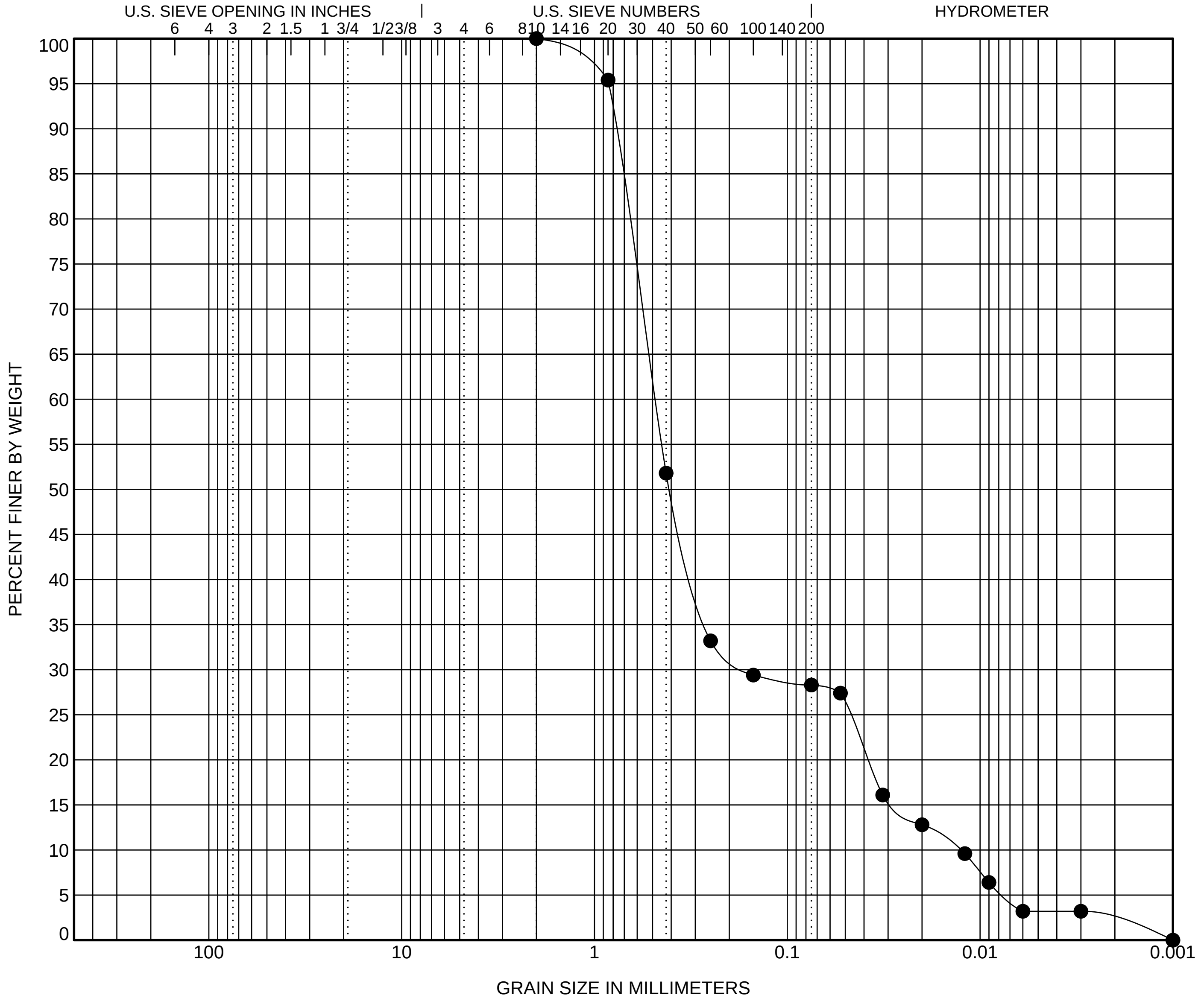
SAMPLE No.	DEPTH(ft)	Classification	LL	PL	PI	Cc	Cu
● SWM-1	6.0-8.0	**CLAYEY SAND with GRAVEL(SC), A-1-b(0)**	36	23	13	1.15	221.54
⊠ SWM-2	5.0-7.0	**CLAYEY SAND(SC), A-2-6(1)**	34	21	13	0.63	43.16
▲ SWM-3	6.0-8.0	**CLAYEY SAND with GRAVEL(SC), A-2-6(0)**	35	21	14	1.65	390.13
★ SWM-4	6.0-8.0	**CLAYEY SAND(SC), A-7-6(5)**	46	24	22	0.59	30.60
⊙ SWM-5	6.0-8.0	**LEAN CLAY with SAND(CL), A-6(13)**	40	25	15	1.05	5.84

SAMPLE No.	DEPTH(ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● SWM-1	6.0-8.0	37.5	4.699	0.339	0.021	39.8	44.7	12.3	3.2
⊠ SWM-2	5.0-7.0	9.5	0.403	0.049	0.009	5.6	62.7	26.1	5.6
▲ SWM-3	6.0-8.0	19	2.785	0.181	0.007	27.1	46.6	19.2	7.1
★ SWM-4	6.0-8.0	19	0.285	0.039	0.009	7.7	50.0	36.7	5.6
⊙ SWM-5	6.0-8.0	2	0.036	0.015	0.006	0.0	18.5	72.7	8.8

GRAIN SIZE DISTRIBUTION
ASTM D422

CLIENT The Catherine and Isiah Leggett Building **PROJECT NAME** The Catherine and Isiah Leggett Building

PROJECT NUMBER 18C41041 **PROJECT LOCATION** The Catherine and Isiah Leggett Building



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	SAMPLE No.	DEPTH(ft)	Classification	LL	PL	PI	Cc	Cu
●	**SWM-6**	**5.0-7.0**	**CLAYEY SAND(SC), A-2-6(1)**	**37**	**22**	**15**	**4.27**	**37.85**

	SAMPLE No.	DEPTH(ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**SWM-6**	**5.0-7.0**	**2**	**0.484**	**0.163**	**0.013**	**0.0**	**71.7**	**25.1**	**3.2**

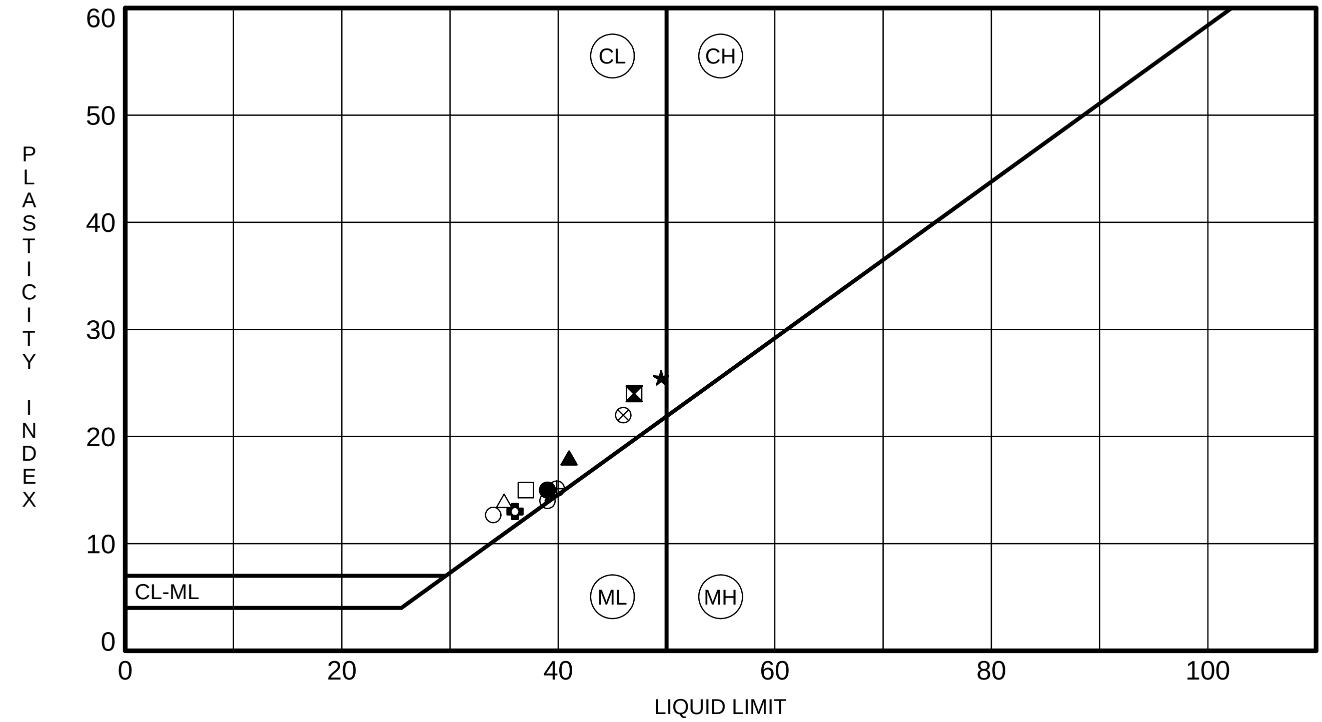
ATTERBERG LIMITS' RESULTS
ASTM D4318 - 17

CLIENT The Catherine and Isiah Leggett Building

PROJECT NAME The Catherine and Isiah Leggett Building

PROJECT NUMBER 18C41041

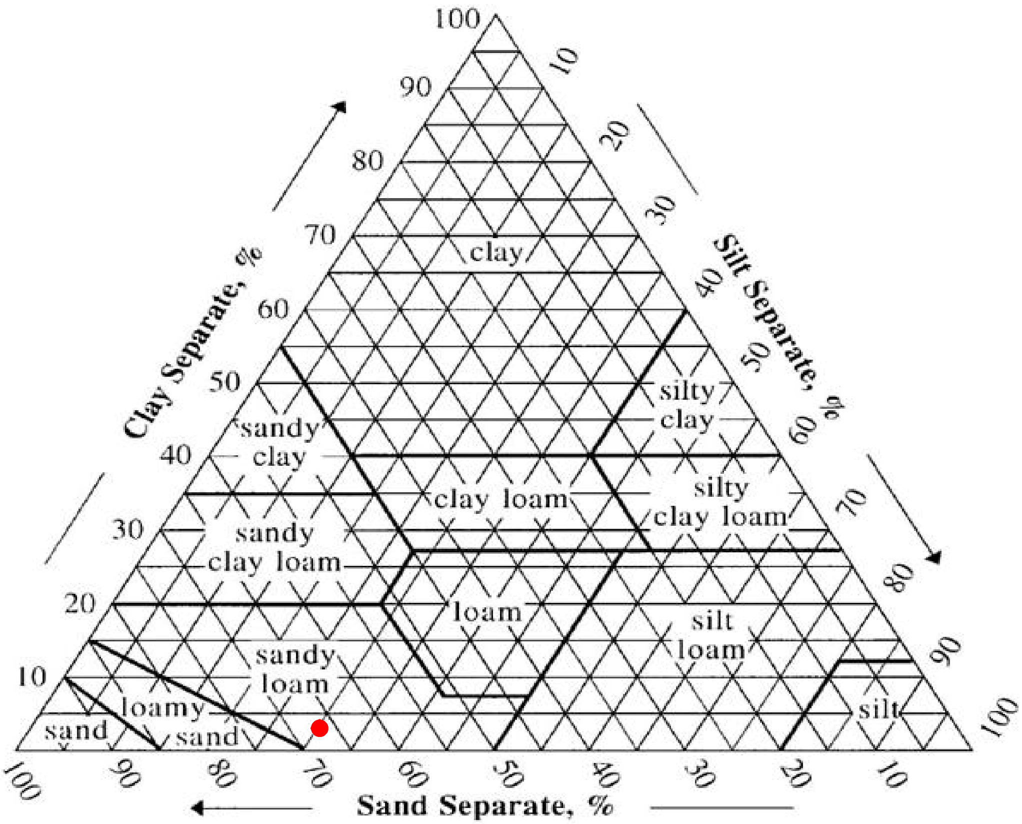
PROJECT LOCATION The Catherine and Isiah Leggett Building



	SAMPLE No.	DEPTH(ft)	LL	PL	PI	Fines	Classification
●	**SB-1**	**6-7.5**	**39**	**24**	**15**	**83**	**LEAN CLAY with SAND(CL), A-6(13)**
⧗	**SB-3**	**23.5-25**	**47**	**23**	**24**	**42**	**CLAYEY SAND(SC), A-7-6(6)**
▲	**SB-8**	**6-7.5**	**41**	**23**	**18**	**51**	**SANDY LEAN CLAY(CL), A-7-6(6)**
★	**SB-8**	**23.5-25**	**49**	**24**	**25**	**56**	**SANDY LEAN CLAY(CL), A-7-6(11)**
⊙	**SB-9**	**8.5-10**	**39**	**25**	**14**	**27**	**CLAYEY SAND(SC), A-2-6(0)**
✿	**SWM-1**	**6.0-8.0**	**36**	**23**	**13**	**16**	**CLAYEY SAND with GRAVEL(SC), A-1-b(0)**
○	**SWM-2**	**5.0-7.0**	**34**	**21**	**13**	**32**	**CLAYEY SAND(SC), A-2-6(1)**
△	**SWM-3**	**6.0-8.0**	**35**	**21**	**14**	**26**	**CLAYEY SAND with GRAVEL(SC), A-2-6(0)**
⊗	**SWM-4**	**6.0-8.0**	**46**	**24**	**22**	**42**	**CLAYEY SAND(SC), A-7-6(5)**
⊕	**SWM-5**	**6.0-8.0**	**40**	**25**	**15**	**82**	**LEAN CLAY with SAND(CL), A-6(13)**
□	**SWM-6**	**5.0-7.0**	**37**	**22**	**15**	**28**	**CLAYEY SAND(SC), A-2-6(1)**

USDA Soil Classification	Sandy Loam
Minimum Infiltration Rate (iph)	1.02
Hydrologic Soil Grouping	B

Soil Texture Triangle

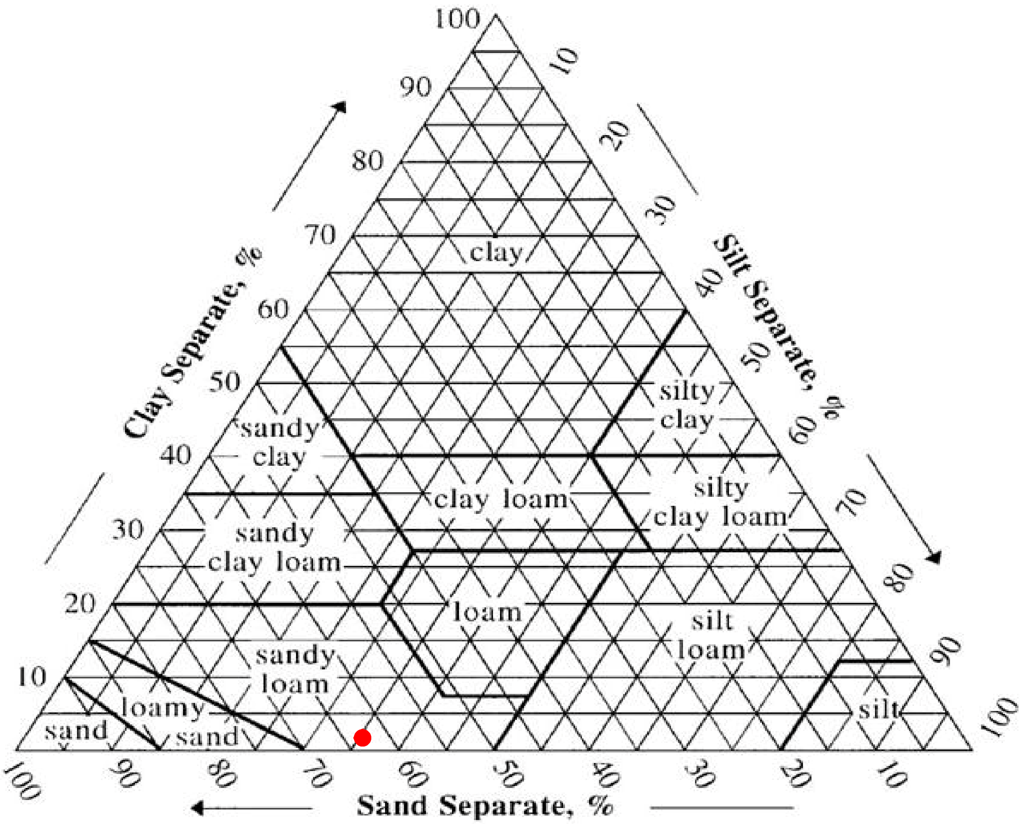


Boring No.	Depth (ft.)	USDA Soil Percentages (corrected for gravel)			Classification
		Sand	Silt	Clay	
SWM-1	6-8	66.7%	30.6%	2.7%	Sandy Loam

Client:	The Catherine and Isiah Leggett Building
Project Name:	The Catherine and Isiah Leggett Building
Project No.:	18C41041
Location:	The Catherine and Isiah Leggett Building
Date:	9/1/18

USDA Soil Classification	Sandy Loam
Minimum Infiltration Rate (iph)	1.02
Hydrologic Soil Grouping	B

Soil Texture Triangle

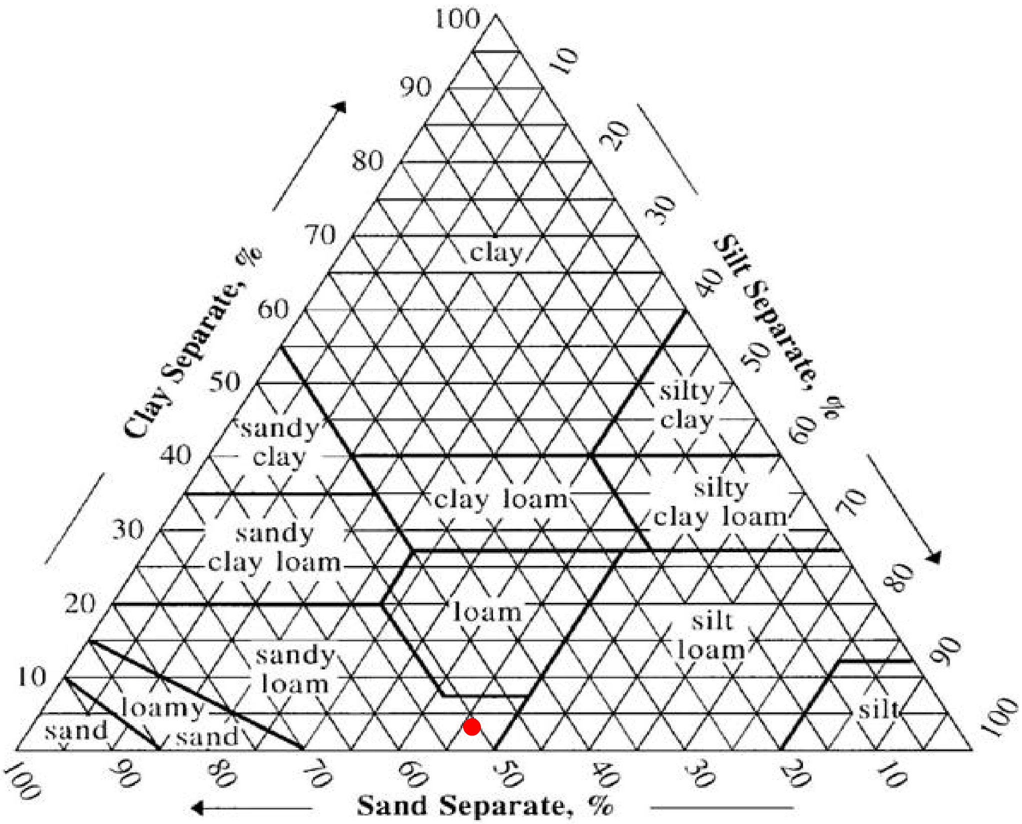


Boring No.	Depth (ft.)	USDA Soil Percentages (corrected for gravel)			Classification
		Sand	Silt	Clay	
SWM-2	5-7	62.9%	35.6%	1.4%	Sandy Loam

Client:	The Catherine and Isiah Leggett Building
Project Name:	The Catherine and Isiah Leggett Building
Project No.:	18C41041
Location:	The Catherine and Isiah Leggett Building
Date:	9/1/18

USDA Soil Classification	Sandy Loam
Minimum Infiltration Rate (iph)	**1.02**
Hydrologic Soil Grouping	**B**

Soil Texture Triangle

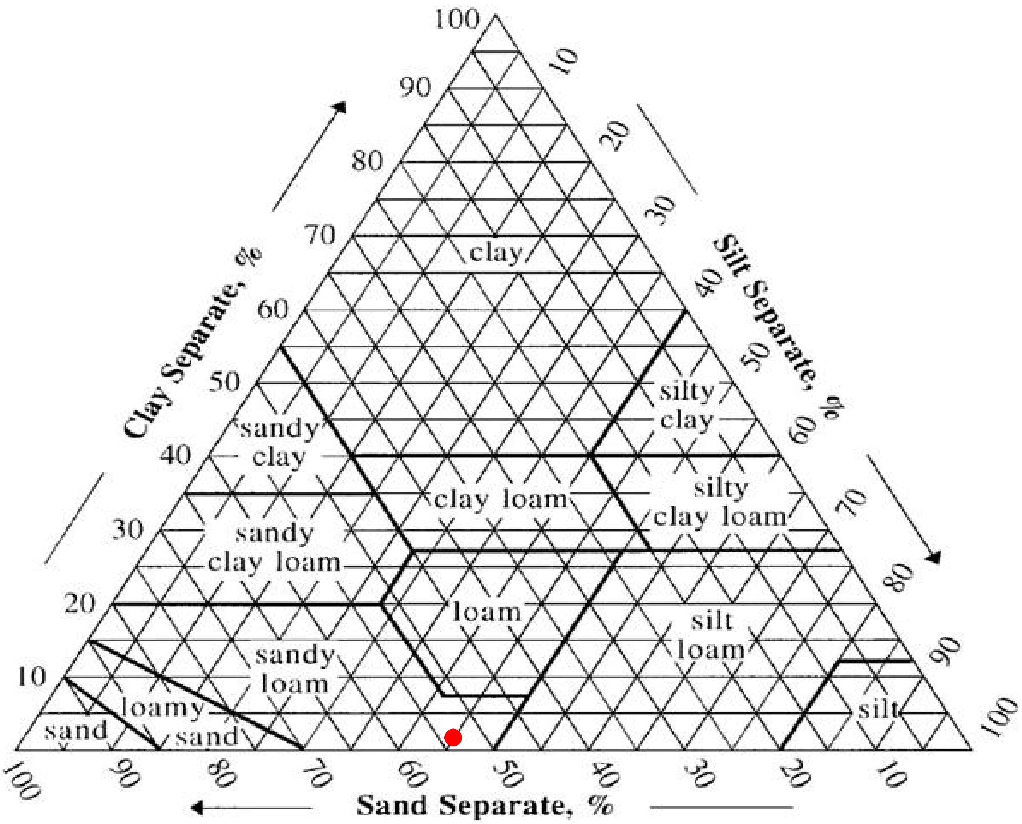


Boring No.	Depth (ft.)	USDA Soil Percentages (corrected for gravel)			Classification
		Sand	Silt	Clay	
SWM-3	6-8	50.7%	46.4%	2.9%	Sandy Loam

Client:	The Catherine and Isiah Leggett Building
Project Name:	The Catherine and Isiah Leggett Building
Project No.:	18C41041
Location:	The Catherine and Isiah Leggett Building
Date:	9/1/18

USDA Soil Classification	Sandy Loam
Minimum Infiltration Rate (iph)	1.02
Hydrologic Soil Grouping	B

Soil Texture Triangle



Boring No.	Depth (ft.)	USDA Soil Percentages (corrected for gravel)			Classification
		Sand	Silt	Clay	
SWM-4	6-8	53.4%	45.2%	1.4%	Sandy Loam

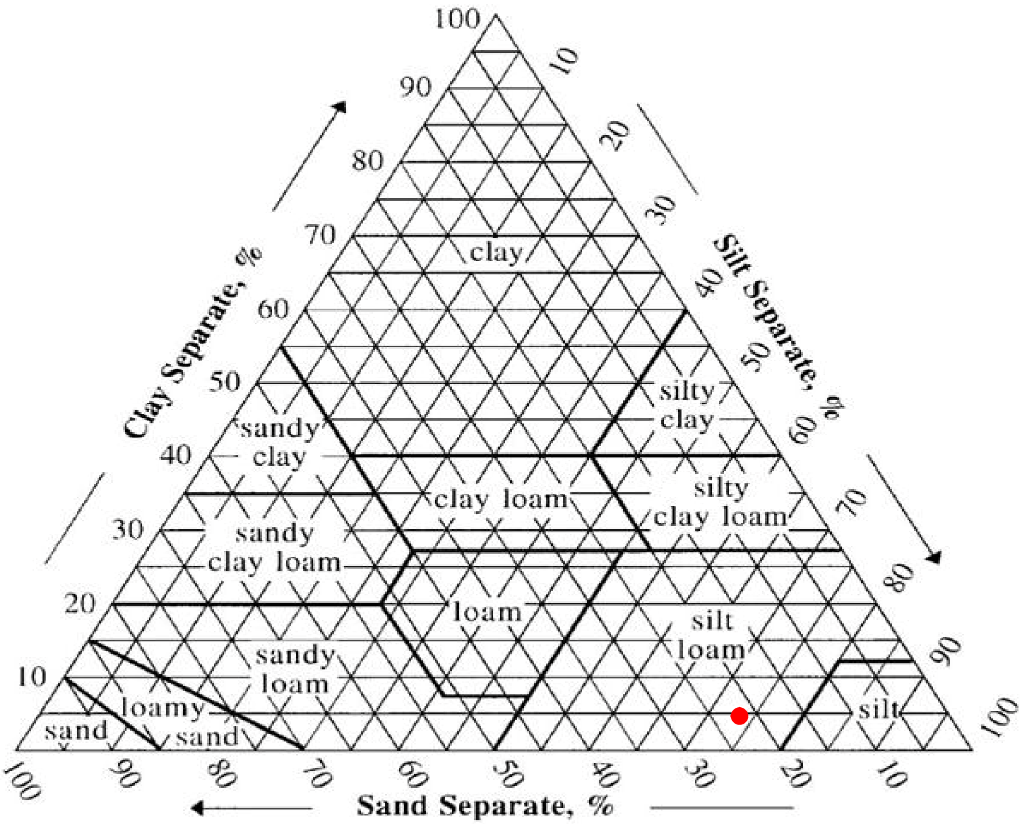
Client:	The Catherine and Isiah Leggett Building
Project Name:	The Catherine and Isiah Leggett Building
Project No.:	18C41041
Location:	The Catherine and Isiah Leggett Building
Date:	9/1/18

USDA Soil Classification	Silt Loam

Minimum Infiltration Rate (iph)	0.27

Hydrologic Soil Grouping	C

Soil Texture Triangle



Boring No.	Depth (ft.)	USDA Soil Percentages (corrected for gravel)			Classification
		Sand	Silt	Clay	
SWM-5	6-8	21.9%	73.7%	4.4%	Silt Loam

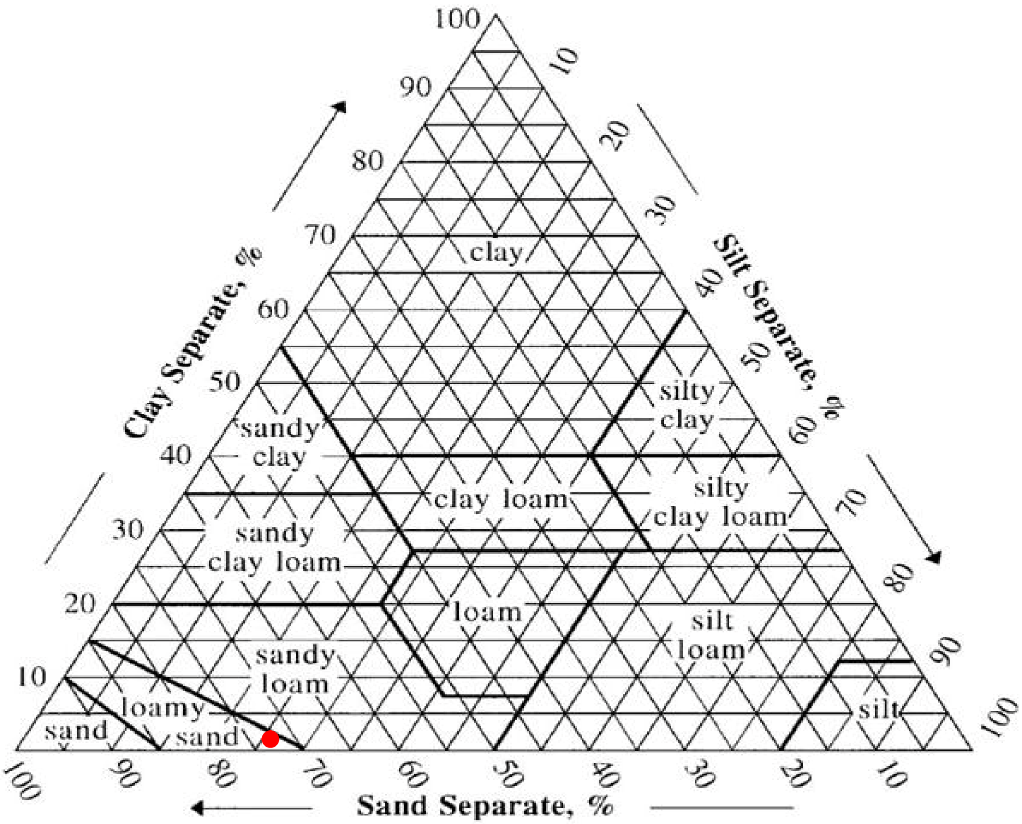
Client:	The Catherine and Isiah Leggett Building
Project Name:	The Catherine and Isiah Leggett Building
Project No.:	18C41041
Location:	The Catherine and Isiah Leggett Building
Date:	9/1/18

USDA Soil Classification	Loamy Sand

Minimum Infiltration Rate (iph)	2.41

Hydrologic Soil Grouping	A

Soil Texture Triangle



Boring No.	Depth (ft.)	USDA Soil Percentages (corrected for gravel)			Classification
		Sand	Silt	Clay	
SWM-6	5-7	72.6%	26.2%	1.2%	Loamy Sand

Client:	The Catherine and Isiah Leggett Building
Project Name:	The Catherine and Isiah Leggett Building
Project No.:	18C41041
Location:	The Catherine and Isiah Leggett Building
Date:	9/1/18

APPENDIX D

BUIDLING CODE STUDY DATA- ATTACHMENT 10

ATTACHMENT 10
BUILDING CODE STUDY DATA

DESIGN PHASE: ~ Schematic Design **DATE: 01/22/2019**

1) PROJECT: Montgomery College PROJECT NO.: 12543

FACILITY: Math and Science Building – Montgomery College

2) **APPLICABLE CODES:**

A)	Building Code	IBC - 2015 IRC - 2015 IEBC - 2015
B)	Fire Code	NFPA - 101(Life Safety Code) 2015 NFPA - 1 2015 (Fire Code) NFPA - 13 (Sprinkler Code) 2013
C)	Mechanical Code	IMC - 2015
D)	Plumbing Code	National Standard Plumbing Code - 2015
E)	Electric Code	NEC - 2014
F)	Energy Standard	ASHRAE 90.1 (Latest Edition)
G)	Elevator and Escalator Safety Code	ANSI/ASME A17.1 2013
H)	Accessibility Code	MAC (COMAR 05.02.02 & 2010 ADA Standards)
I)	Energy Conservation Code	IECC - 2015

3) **BUILDING USE, CONSTRUCTION CLASSIFICATIONS AND HEIGHT:**

		IBC 2015	NFPA 2015
Use Group	(Sect. 302):	B, A-3, S-2	B, A-3, S-2
Special Use and Occupancy	(Chapter 4):	N/A	N/A
Building Height Allowable	(Table 504.3):	85 ft	N/A
Number of Stories	(Table 504.4):	4	4
Allowable Area Factor	(Table 506.2)	46,500 sq.ft.	N/A
Actual Building Height:		31 ft	
Unlimited Area Building	(Sec. 507):	N/A	N/A
Required Separation for Mixed Use Occupancy	(Table 508.4):	N/A	N/A

ATTACHMENT 10
BUILDING CODE STUDY DATA

Incidental Use Areas	(Table 509):	N/A	N/A
Fire Separation Distance	(Table 602):	Less than 10 ft	N/A

4) BUILDING AREAS:

BUILDING ACTUAL GROSS AREAS:

Ground Floor	:	50,500 sq.ft
First Floor	:	38,300 sq.ft
Second Floor	:	37,970 sq.ft
Mech. Penthouse	:	3260 sq.ft
Total (GSF)	:	130,030 sq.ft

MAXIMUM ALLOWABLE AREAS:

Per IBC Table 506.2	:	46,500 sq.ft Allowable Area Factor	+	10,850 sq.ft Frontage Increase (506.3)

BUILDING AREA MODIFICATION : 57,350 sq.ft
(List Total Area per Floor Sec. 506.2)

5) OCCUPANCY LOADS:

USE	IBC (Table 1004.1.2)	LIFE SAFETY (Table - 7.3.1.2)
Assembly, Business, and Storage	2,458	2,458

6) EGRESS WIDTH:

		IBC (Section 1005)	LIFE SAFETY (Table 7.2.2.2 7.2.1.1)	PROVIDED
Egress Width at Stairs:	(1005.3.1)	44 inches	44 inches	60 inches
Egress Width at Doors:	(1005.3.2)	32 inches	32 inches	44 inches
Egress Width at Corridors:	(1005.3.2)	44 inches	44 inches	84 inches

7) OCCUPANCY LOADS AND EGRESS REQUIREMENTS:

Location (Spaces):	**See Life safety drawings**
Area in Square Feet:	**See Life safety drawings**
Maximum Floor Area Allowance Per Occupant (Table 1004.1.2):	100 gross Business / 15 net Assembly unconcentrated 300 gross Accessory storage areas, mechanical equipment 20 net Educational (Classroom area) 50 net Educational (Shops and other vocational room)

Egress Width Required (Section 1005):
Ground floor - 200 inches
First Floor - 143 inches
Second Floor – 112 inches

Egress Width Provided (in inches):
Ground Floor - 220 inches
First Floor - 308 inches
Second Floor - 132 inches

Egress Width Required (Section 1005):
Two (1-500 occupant load)
Three (501-1000 occupant load)
Four (More than 1000)

Egress Width Provided (in inches):
Ground Floor – Four
First Floor – Four
Second Floor – Three

8) <u>FIRE PROTECTION SYSTEM REQUIREMENTS</u>:

	IBC	System Req. (Yes/No)	IBC 2015	NFPA 101-2015 (Ch. 8)
Automatic Sprinklers	(Sec. 903)	Yes	Yes	Yes
Fire Extinguishing System	(Sec. 904)	No	No	No
Standpipe System	(Sec. 905)	Yes	Yes	Yes
Portable Fire Extinguishers	(Sec. 906)	Yes	Yes	Yes
Fire alarm System	(Sec. 907)	Yes	Yes	Yes
Emergency Alarm System	(Sec. 908)	No	No	No
Smoke Control System	(Sec. 909)	No	No	No
Smoke and Heat Vents	(Sec. 910)	No	No	No
Fire Command Center	(Sec. 911)	No	No	No
Fire Dept. Connection	(Sec. 912)	Yes	Yes	Yes
Fire Pumps	(Sec. 913)	Yes	Yes	Yes
Emergency Safety Factor	(Sec. 914)	No	No	No
Carbon Monoxide Detection	(Sec. 915)	No	No	No

9) MAXIMUM DEAD END DISTANCE :

Use Group	:	Business / Assembly / Storage S-2
IBC - 2015 (Table 1020.4)	:	50 ft / 20 ft / 50 ft
NFPA – 2015	:	50 ft / 20 ft / 50 ft

10) INTERIOR FINISH REQUIREMENTS:

Assembly Occupancy

	Class	**Flame Spread**	**Smoke Development**
Exit Enclosures:	Class A	0-25	0-450
Corridors:	Class B	26-75	0-450
Rooms and enclosed spaces:	Class B	26-75	0-450
Interior floor finish:	Class II	N/A	N/A

Building Remainder

Exit Enclosures:	Class B	0-25	0-450
Corridors:	Class C	76-200	0-450
Rooms and enclosed spaces:	Class C	76-200	0-450
Interior floor finish:	Class II	N/A	N/A

11) MAXIMUM TRAVEL DISTANCE TO EXIT:

Actual: Show on Life Safety Plan

	IBC – 2015 (Table - 1017.2)	**NFPA – 2015 (Sec 7.6.1)**
Allowable:	**250 ft-Assembly**	**250 ft-Assembly**
Allowable:	**300 ft-Business**	**300 ft-Business**
Allowable:	**400 ft-Storage S-2**	**400 ft-Storage S-2**

12) MINIMUM CORRIDOR WIDTH REQUIREMENTS:

Occupancy (Table 1020.2)	Width	IBC Reference	NFPA-101 Reference
Business/Assembly/Storage	44 inches	1020.2	38.2.3.2
Occupant load less than 50	36 inches	1020.2	7.3.4

ATTACHMENT 10
BUILDING CODE STUDY DATA

CORRIDOR FIRE RESISTANCE RATING (Table 1020.1)

Occupancy Load	Fire Resistance Rating (Sprinkler)	Fire Resistance Rating (Non-Sprinkler)
Greater than 30	0 hour	1 hour

13) <u>PANIC HARDWARE</u>:

Location	Required	IBC - 2015 (1010.1.10)	NFPA – 101 2015 (7.2.1.7)
Classrooms, Lab, and Planetatrium	Yes	Occupant load more than 50	Occupant load more than 100

14) <u>STAIR DATA:</u>

	IBC 2015	NFPA-101 2015 (Table 7.2.2.2.1.1)
Stair Width (Section 1009.3)	60 inches	60 inches
Capacity	300	220
Rated Enclosure (Section 1023.2)	1 hour	1 hour

15) <u>AREA OF REFUGE:</u> **(Section 1009.6) (NFPA SEC 7.2.12)** **Yes**________ **No** __X__

16) <u>ELEVATOR</u> : **IBC 2015** **NFPA 2015** **ASME A17.1 2013**

17) <u>BUILDING FIRE RATINGS</u>:

	IBC 2015 (Table 601- 602)	NFPA–101 2015 (Table 8.3.4.2)
STRUCTURAL FRAME Including Columns, Girders, Trusses	1 hour	1 hour
EXTERIOR BEARING WALL	1 hour	1 hour
EXTERIOR NON-BEARING WALL	1 hour	1 hour
INTERIOR BEARING WALL	1 hour	1 hour

INTERIOR NON-BEARING WALL	0 hour	0 hour
FLOOR CONSTRUCTION Including Supporting Beams and Joists	1 hour	1 hour
ROOF CONSTRUCTION Including Supporting Beams and Joists	1 hour	1 hour
FIRE WALLS - USE GROUP Fire Barrier Assemblies (Table 707.3.10) Fire Resistance Rating (Table 706.4)	N/A	N/A
VERTICAL EXIT ENCLOSURES Fire Resistance Rating (IBC Section 1023.2 NFPA - 2015 Table 8.3.4.2)	1 hour	1 hour
SHAFTS AND ELEVATOR HOIST WAYS Fire Resistance Rating (IBC Section 712 & 713, NFPA - 2015 Table 8.3.4.2)	1 hour	1 hour
EXIT PASSAGEWAY (Sec 1024)	N/A	N/A
SMOKE BARRIER (Sec 709)	N/A	N/A
EXIT PASSAGEWAY (Sec 1024)	N/A	N/A
	IBC-2015 (Table 601 - 602)	
PROTECTIVE OPENING RATING	N/A	N/A
FIRE DOOR Fire Resistance Rating (Table 716.5)	60 minutes	60 minutes
FIRE WINDOWS Fire Resistance Rating (Table 716.6)	N/A	N/A
DRAFT STOPPING Concealed Spaces (Section 718)	N/A	N/A

18) MD HIGH PERFORMANCE BUILDING ACT:

New public construction and major renovation projects of 7,500 square feet or greater shall be designed to earn a LEED Silver Certification from the U. S. Green Building Council.

19) ENERGY CODE: **MARYLAND CLIMATE ZONE 4A**
EXCEPT GARRETT COUNTY 5A

BUILDING ENVELOPE REQUIREMENT

	Required 'U' Value U = 1/R	Required 'R' Value R = 1/U	Provided
Roofs			
Insulation entirely above deck	U 0.032	R 30 CI (Cont Insul)	R30
Metal Building	U 0.035	R 19 + 11	
Attic Insulation	U 0.027	R 38	
Walls			
Mass	U 0.104	R 9.5 CI (Cont. Insul)	R9.5
Metal Framed	U 0.064	R 13 + R 7.5 CI	
Metal Building	U 0.052	R 13 + R 13 CI	
Wood Framed	U 0.064	R 13 + R 3.8 CI or R 20	
Below Grade Wall	U 0.119	R 7.5 CI	R7.5

	Required 'U' Value U = 1/R	Required 'R' Value R = 1/U	Provided
Joist Framing (steel or wood)	U 0.033	R30	
Slab on Grade			
Heated Slab	F 0.65	R 15 for 24" below	
Unheated Slab	F 0.54	R 10 for 24" below	R10
Doors			
Entrance Door	U 0.77	R 1.29	R1.29

Un-insulated Metal Door	**1.20**	**R 1.66**	
Insulated Metal Door	**0.60**		U 0.60
Wood Door	**0.50**	**R 2.00**	
Windows			
Fixed Fenestration	**U 0.38**	**R 2.63**	U 0.38
Operable Fenestration	**U 0.45**	**R 2.22**	U 0.45
Sky Light	**U 0.50**	**R 2.0**	U 0.50
Curb	**U 0.20**	**R 5.0**	
Minimum Roof Reflectance/Emittance			
(3 yr. Aged) Solar Reflectance	**0.55**		U 0.55
(3 yr. Aged) Thermal Emittance	**0.75**		U 0.75

Appendix E: Energy Analysis

SCHEMATIC DESIGN

EXECUTIVE SUMMARY

This report documents the energy analysis methodology and design approach for the proposed Catherine and Isiah Leggett Math & Science Building located at Montgomery College's Takoma Park/Silver Spring campus. The analysis is grounded in the calculation of the estimated annual energy costs associated with the proposed design compared to the ASHRAE Standard 90.1-2010 Appendix "G" baseline building. Additionally, this report establishes the performance of the proposed design with respect to the Building Energy Budget assigned by Montgomery College. Lastly, the report evaluates the feasibility of several Energy Conservation Measures (ECM) for application on this project. The analysis was conducted using Integrated Environmental Solutions Virtual Environment (IESVE), Version 2017.4.0.0. The design weather data is based on TMY3 data from Ronald Reagan Washington National, VA, USA (WMO: 724050).

Table 1 - Appendix G Energy Modeling Results

LEED v4 (ASHRAE 90.1-2010 Appendix G)	**Energy Cost** *$/yr*	**Energy Cost Savings** *% Improvement*	**EUI (Site)** *Btuh/gsf-yr*
Baseline	$788,465	---	304
Proposed	$602,813	23.55%	211

The College assigns all new construction projects an Energy Budget of 40 kBtu/GSF-yr, which includes all metered energy use at the building. This project is requesting a variance from the assigned Energy Budget to a proposed Building Energy budget of 228 kBtuh/GSF-yr. As outlined in Appendix E1, this Energy Budget target is supported by the energy modeling process and a benchmarking study of relevant projects of similar program and location. The Request for Energy Budget Variance is included in Appendix E1.

Table 2 summarizes the Energy Conservation Measures (ECMs) that were analyzed as part of the Schematic Design energy analysis. Based on the Schematic Design cost modeling, the results of the ECM analysis will be updated to include first cost, maintenance cost and life cycle cost data. At this stage in the evaluation, the energy data of each ECM is present for review and discussion with the College. Additional ECMs may be reviewed and incorporated into the Energy Analysis during the design development phase. The ECMs in this evaluation have been broken down for detailed discussion based on the area of impact, including Thermal Envelope, Lighting, HVAC and Renewables.

Recommendations

Recommendations for ECM implementation, beyond those incorporated into the proposed model (highlighted in Table 2) necessary to achieve compliance with ASHRAE 90.1-2013, will be forthcoming with information from the SD cost estimate used to evaluate the ECMs in a life cycle cost analysis.

Table 2 - Energy Conservation Measures (ECM)

ECM #	Category	Description	First Cost	Energy Cost Savings	Simple Payback	Persistence	Accepted
			$	*$/Yr*	*Yrs*	*H/M/L*	*Y/N*
1a	Envelope	Increase roof insulation from 4" to 6" (R-20 to R-30)		$9,331	N/A	H	
1b	Envelope	Increase roof insulation from 4" to 8" (R-20 to R-40)		$11,658	N/A	H	
2a	Envelope	Increase mass wall insulation from 2" to 2.5" (R-9.5 to R-12.5)		$6,289	N/A	H	
2b	Envelope	Increase mass wall insulation from 2" to 3" (R-9.5 to R-15)		$7,709	N/A	H	
3	Envelope	Add 1.5" insulation to below grade walls		$4,356	N/A	H	
4	Envelope	Add wall insulation to slab on grade floors		$4,474	N/A	H	
5a	Envelope	Increase punched window glazing performance (West and South) from U-0.55 to U-0.5		$4,859	N/A	H	
5b	Envelope	Increase punched window glazing performance (West and South) from U-0.55 to U-0.42		$6,685	N/A	H	
5c	Envelope	Increase punched window glazing performance (West and South) from SHGC-0.4 to SHGC-0.36		$4,476	N/A	H	
6	Envelope	Increase curtain wall glazing performance (South and East) from U-0.5 to U-0.42		$5,262	N/A	H	
7a	Envelope	Provide 50% frit on punched windows (West)		$5,648	N/A	H	
7b	Envelope	Provide 50% frit on punched windows (South)		$4,266	N/A	H	

ECM #	Category	Description	First Cost	Energy Cost Savings	Simple Payback	Persistence	Accepted
			$	$/Yr	Yrs	H/M/L	Y/N
8a	Envelope	Provide 50% frit on curtain wall (South)		$4,398	N/A	H	
8b	Envelope	Provide 50% frit on curtain wall (East)		$4,797	N/A	H	
9a	Shading	Provide horizontal shading devices on punched windows (West)		$5,377	N/A	H	
9b	Shading	Provide horizontal shading devices on punched windows (South)		$4,207	N/A	H	
10	Lighting	10% reduction from ASHRAE 90.1-2010 SBS		$7,967	N/A	M	
11	Lighting	20% reduction from ASHRAE 90.1-2010 SBS		$11,842	N/A	M	
12a	HVAC	Provide 55F LAT at AHU-1		-$2,466	N/A	M	
12b	HVAC	Provide 55F LAT at AHU-2		-$4,127		M	
13	HVAC	Increase efficiency of exhaust air energy recovery to 75% (sensible)		$6,008	N/A	M	
14	HVAC	Provide AHU-2 relief air (office / classroom) as makeup air to AHU-1 (Lab)		$1,185	N/A	M	
15	HVAC	Provide total energy recovery (wheel) for AHU-2 (office / classroom)		$398	N/A	M	
16	HVAC	Increase chiller efficiency to COP = 6.6		$7,329	N/A	M	
17	Renewables	Provide roof-mounted PV array (50 kW)	$201,600	$6,661	30	H	

**Note: Items highlighted in yellow have been included in the proposed modeling to ensure compliance with ASHRAE 90.1-2013 requirements.

I. PROPOSED BUILDING OVERVIEW

A. Existing Conditions

The proposed Math and Science Building will be located on southern end the east campus. The building will be connected to the existing campus chilled water and heating hot water service, such that the building can either draw from the existing Nunley Building central plant capacity, stand alone with local heating and cooling capacity, or provide excess capacity back into the campus loop(s). For the purposes of this energy analysis, the building will be modeled exclusively with operation of the local chiller and boiler plant. Should additional energy savings be required for code compliance as the design progresses, the project team will reassess the assumption on campus infrastructure.

B. Building Occupancy and Space

The Leggett Math and Science Building will house both instructional and student research laboratories. The building's lower floors shall be organized around the instructional laboratories and with a showcase location of the student research laboratory. The number and type of instructional laboratories was determined by the courses offered by the departments, the semester(s) that the courses are offered, the number of students enrolled in each course, the desired numbers of students per session and the number of rooms required. Attention was given to maximize the room utilization.

Chemistry Instructional Laboratories are fume hood intensive rooms, requiring adequate space between benches and equipment. Due to the nature of their work, they also required extensive glassware and equipment storage. Additionally, many of the rooms require space to conduct pre-lab instruction or lectures as a separate space from the area where the fume hoods and chemicals are located.

Also included as part of these instructional labs are the Organic/Analytical shared Instrument Lab, microbiology support rooms and Greenhouse Headhouse. Prep spaces, staff offices, and a central stock room will support these areas.

In order to create a fully interactive and collaborative facility, program elements shall relate to one another. To achieve this goal, the following key planning areas were studied:

1. Instructional laboratory locations
2. Preparation lab concept and locations
3. Dry/computational laboratory locations
4. Interdisciplinary student research laboratory location
5. Faculty offices
6. Student space
7. Interaction spaces
8. Connectivity concepts

The planning also considers the provision and location of interaction spaces. In addition to interactive labs and office blocks, spaces were also provided where the students and faculty can formally or informally interact with each other. These include formal interaction spaces such as small and large conference rooms, and informal interaction spaces such as large and small interaction areas located and supporting each floor, a STEM Concourse adjacent to the instructional labs, a STEM Forum adjacent to the learning center and interdisciplinary classrooms and an Innovation Hub.

The last program element included in the planning of the Math and Science Building is the Planetarium. This space will be used for classes, Planetarium presentations and will have the capability to open up into a larger pre-function space to act as an event space capable of accommodating up to 400 people.

Refer to Appendix E4 for 11x17 level by level floor plans that show the proposed air handling unit service areas of AHU-1, AHU-2 and AHU-3. For information on the mechanical systems refer to Section I.F of this report and Chapter 7 of the Schematic Design Narrative.

C. Building Operating Characteristics

The building is expected to operate throughout the year with both day and evening classes. Based on the 2018-2019 Montgomery College Academic Year Calendar, the College's academic year includes Fall, Spring, and Summer sessions. From information provided by the college, during the Fall and Spring sessions, classes are expected to be held Monday through Saturday, while classes during the Summer session are expected to be held Monday through Friday. The energy simulation calendar was customized to include Montgomery College's Summer session schedule, holidays, and semester breaks. This provides a more realistic occupancy for the building than assuming a generic academic schedule.

Detailed building operational information has been gathered from the College and used to develop custom operational schedules for the building's occupancy, lighting, plug loads, and HVAC operation. Separate schedules have been developed for the major functional areas of the building including classrooms, laboratory and greenhouse, planetarium, and academic support areas which includes office space, conference rooms, and Math and Science Learning Center. The daily hours of operation for each functional area are listed in Table 3.

Table 3 - Hours of Operation (by Program Type)

Major Functional Area	Weekly Operation	Hours of Operation	
Laboratory and Greenhouse	Mon to Sat	7:00 AM	11:00 PM
Classroom	Mon to Sat	7:00 AM	12:00 AM
Planetarium	Mon to Sat	7:00 AM	10:00 PM
Academic Support Space	Mon to Fri	7:00 AM	11:00 PM

The classroom classification was used for multipurpose classroom, computer and math labs while the laboratory classification was reserved for other teaching labs and the greenhouse. The data used to develop the laboratory and classroom energy simulation schedules was provided by the College and based on room schedules from the 2017-2018 academic year. This schedule data consisted of existing science, technology, engineering, and mathematics (STEM) rooms elsewhere on campus. The occupancy profiles seen in the figures below reflect Monday through Friday and Saturday occupancy while the space is considered unoccupied on Sunday and Holidays. They were created through detailed analysis of each room's utilization based on the number of room reservations for that category at a certain time slot divided by the overall number of rooms of that category.

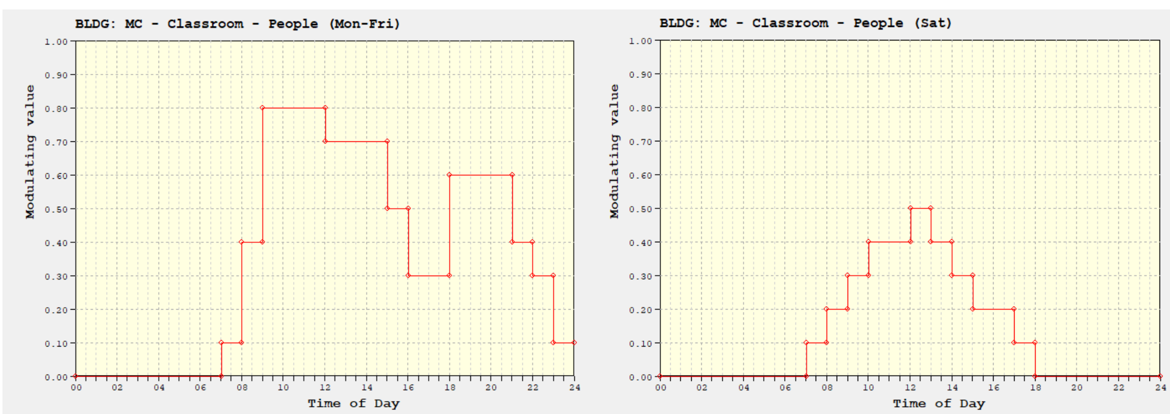


Figure 1 – Based on previous year's scheduling data, weekday classroom occupancy peaks at approximately 80% around 10 AM while Saturday occupancy peaks at 50%. The peaks of weekday day and evening classes are reflected in the occupancy profile.

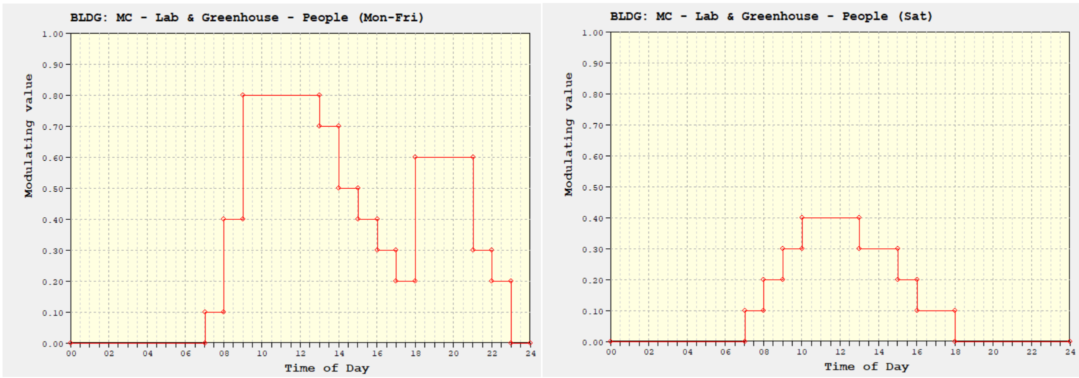


Figure 2 - Lab occupancy peaks at approximately 80% during the week and at 40% on Saturday.

The academic support category includes faculty office space and the Math and Science Learning Center. These spaces operate on a Monday through Friday schedule. The academic support operational schedule is provided below. Peak occupancy is lower than the class schedules to account for diversity in use of office space as all faculty office spaces likely will not be simultaneously occupied. Although most of the academic support space follows a standard 40-hour workweek, extended evening hours at low occupancy were included to account for miscellaneous faculty and student activities.

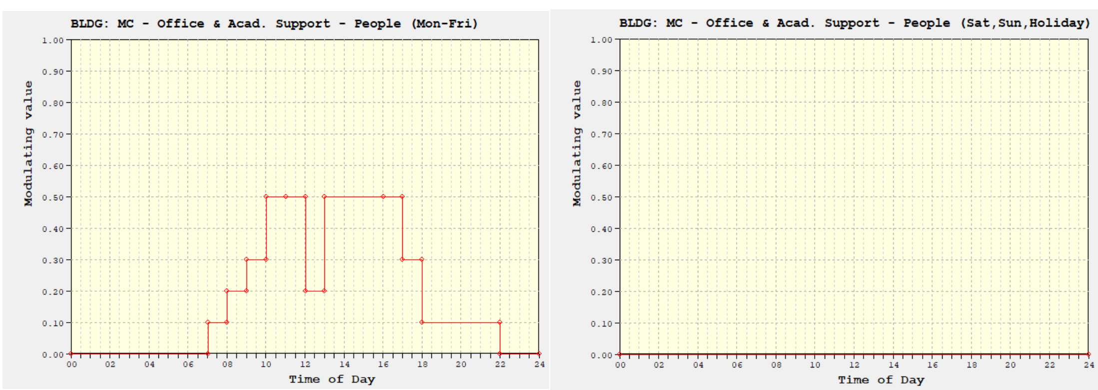


Figure 3 – Illustrates the occupancy profiles for the academic support space. The profiles follow a typical "office" profile with occupancy reductions at the traditional lunch time of 12 PM and no occupancy on Saturday, Sunday, or Holidays.

The planetarium hosts classes as well as special events is expected to be occupied Monday through Saturday and unoccupied on Sunday and Holidays. The assumed occupancy profiles are illustrated below.

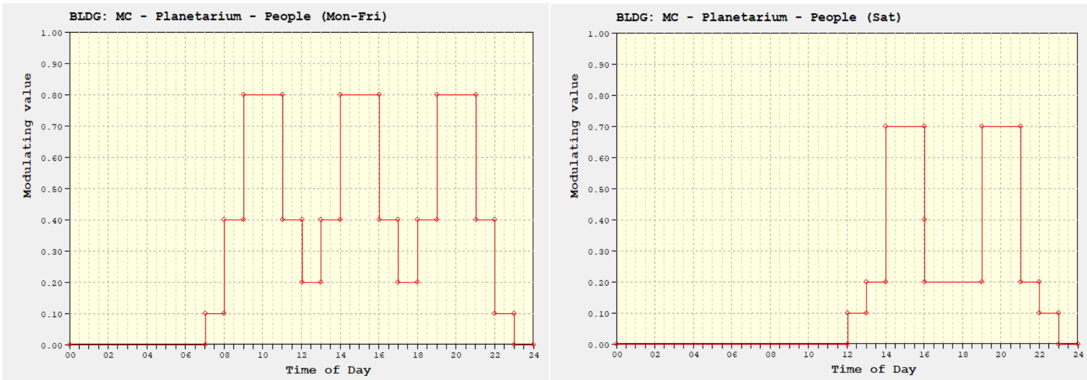


Figure 4 – As shown in the peaks of the occupancy profile, the planetarium is expected to have three events during a typical weekday and two events on the typical Saturday.

D. Building Envelope Characteristics

The building envelope will be designed to meet the prescriptive requirements of ASHRAE 90.1-2013 for building in Climate Zone 4A.

1. Roof: The roof assembly will target R-30 (continuous). The roof will be two-ply, modified bituminous roofing system with white, high albedo, granules on the top exposed surface, over cover board, 6" polyisocyanurate board insulation board insulation, and a vapor barrier on the roof deck.

2. Exterior Walls: The exterior wall assembly will target R-9.5 (continuous). The assembly will include 4" brick rainscreen, 3" mineral wool cavity insulation, non-permeable air barrier, 8" reinforced lightweight CMU, interior metal studs and gypsum board. An option is being evaluated (architecturally) to use terra cotta in lieu of brick for the rainscreen material.

3. Glazing Systems:

    a. Curtain wall systems will target U-0.42, and will include thermally broken, extruded aluminum framing, fluoropolymer coating finish, with high performance low-E insulated glazing units.

    b. Punched window openings will target U-0.5, with high performance low-E insulated glazing.

E. Electrical Systems

1. Lighting Design: The lighting system will be designed to meet ASHRAE 90.1 – 2013 and IECC – 2015, while following IESNA standards. Specialty lighting will be provided in the planetarium, greenhouse, building entries, math and science learning center, STEM concourses, STEM forum, digital theater and pre-function, and innovation hub. The lighting design in non-specialty areas will use a mixture of recessed, suspended, and surface mounted LED lighting fixtures. Lighting systems in lab, learning and office spaces will be designed to function consistently across similar space types for ease of operation. Installed lighting power density will target 0.75 W/sf building wide.

Laboratories and office areas will use 1x4, 2x2, and 2x4 recessed troffer LED type fixtures for ambient illumination. Lab, learning, and office fixtures will be located to achieve uniformity at the work plane while supporting a flexible furniture layout. Downlights and linear lighting will be designed as needed to highlight space features and supplement the ambient lighting. Certain laboratory spaces may require task lighting at work benches and along presentation walls. In the stairwells, surface mounted LED fixtures will Illuminate stairwells to 10 foot-candles minimum. Exterior LED fixtures will provide for the building site. College standard LED pole type fixtures will be utilized for the parking and path areas. Building mounted fixtures will be integrated into the building façade at entries. Handrail illumination will be provided to meet code along exterior stairs. LED marker lights will be recessed into the vertical face of the outdoor learning seating. Utility rooms and similar areas will use standard industrial strip LED fixtures.

2. Lighting Controls: The lighting control system will be designed to meet ASHRAE 90.1 – 2013 and IECC – 2015. Additionally, LEED v4 will influence control strategies. The lighting control system supports exterior lighting, spaces requiring dimming, and back of house. The planetarium is expected to be controlled by an audio visual (AV) system.

Table 4 – Lighting Controls by Space Type

Space Type	**RCPT Control**	**Local Control**	**Manual On**	**Partial Auto On**	**Bilevel**	**Daylight**	**Partial Off**	**Full Off**	**Schedule**
Office Private	X	X	X		D	X		X	
Office Shared	X	X		X	D	X		X	
Class/Learning	X	X		X	D	X		X	
Lab		X		X	D	X		X	
Support Lab		X		X	S	X		X	
Support Storage		X	X		S	X		X	
Support Equip		X	X			X			
Restroom		X				X		X	
Stair					D	X	X		TBD
Circulation		X				X	X	X	
Planetarium		X	TBD	TBD	D	X		TBD	TBD
Greenhouse		X	TBD	TBD	D	TBD			

3. Exterior lighting is controlled by relays connected to the Building Automation System (BAS). The BAS provides scheduling capabilities to reduce exterior lighting consumption between 12:00 AM and 6:00 AM and will connect to a roof mounted photocell for fixture control in response to daylight. Fixtures in areas requiring dimming control will be controlled by stand-alone room control modules. Controllers connect photocells, occupancy sensors, and user keypads via LMRJ cables. The controller contains contacts for line voltage branch circuiting to each control zone. The room controllers connect to the BAS for demand response capabilities and status monitoring. Back of house areas such as storage and equipment rooms will control lights via line voltage switches and occupancy sensors where required. Areas utilizing room controllers will utilize relay devices to tie the occupancy sensors for VAV control. The following table indicates control intent by space. “D” indicates dimming and “S” indicates switching methods to achieve bilevel requirements. The information populated combines ASHRAE 90.1 – 2013 requirements and the preferred control strategy by Montgomery College.

4. Night lighting will be provided in restrooms, labs, and circulation areas to energize select light fixtures 24/7. Dual-technology vacancy sensors will be utilized in all spaces requiring full shutoff. Dual-technology occupancy sensors will be utilized in areas requiring full shutoff and partial automatic on. The sensors will utilize an external relay to signal VAV’s. Stairwells will utilize occupancy sensors to energize fixtures to 100% output upon detecting occupancy, and dim lighting fixtures to 50% output upon detecting vacancy for 20 minutes. Photocells will be provided to dim lighting fixtures with installed wattages exceeding 150W within the primary and secondary zone. The photocell will dim the primary and secondary daylight zones in response to daylight within the space. Dimming will be provided in conference rooms and other a/v-intensive spaces.

5. Plug load control is required in offices and classrooms. Plug load will tie to the lighting control system occupancy/vacancy sensor within the space. Upon detecting vacancy for 20 minutes, half of the receptacles within the space will de-energize. Upon detecting occupancy, the de-energized receptacles will be energized until vacancy is detected.

6. The proposed building includes 50 kW photovoltaic system over 3,360 sf of roof area that is expected to produce approximately 73,000 kWh annually from NREL software-based calculation. The system cost is $201,600 and the annual value is $6,661, thus the payback for this system is approximately 30 years.

F. HVAC Systems

Refer to the Schematic Design narrative, Chapter 7 – Mechanical for full details on the design conditions associated with the system and equipment selection for the Math and Science Building.

The main components of the HVAC system include the following:

1. Primary chilled water pumps (25 HP) shall provide chilled water capacity from the campus loop through the local chiller plant. Basis of design is B&G, model 1510.
2. Secondary chilled water pumps (15 HP) distribute capacity from the main loop (campus or chiller source) to the building. Basis of design is B&G, model 1510.
3. Primary heating hot water pumps (10 HP) provide heating hot water capacity from the campus loop through the local chiller plant. Basis of design is B&G, model 1510
4. Secondary heating hot water pumps (10 HP) distribute capacity from the main loop (campus or boiler source) to the building. Basis of design is B&G, model 1510.
5. (2) Two water-cooled, centrifugal chillers sized for 350 Tons each, with an NPLV of 0.66 kW/Ton.
    a. (2) Two induced draft, cross-flow cooling towers.
    b. (2) Two condenser water pumps (75 HP).
6. The Laboratory areas will be served by an 80,000 CFM dedicated outside air (DOAS) unit. The unit will be outdoor, custom, variable volume with 4” thick injected foam walls, chilled water coil, hot water preheat coil, energy recovery coil and supply fan array (4 fans).
    a. This unit will include an energy recovery coil section (pumped glycol) to pre-condition outdoor air using energy from the laboratory exhaust air system.
7. The Classroom and Office areas will be served by a 60,000 CFM custom, outdoor, variable volume recirculating unit. Construction will be similar to the standard for the DOAS unit. The unit will have supply and return fan arrays given the recirculating duty.
8. The Planetarium area of the building will be served by a dedicated 10,000 CFM indoor, modular recirculating air-handling unit.
9. The Laboratory areas will be fully ducted to a central laboratory exhaust system consisting of (3) three high plume dilution, mixed flow exhaust fans on a common skid. The exhaust fan array will be designed for 70,000 CFM, with N+1 fans, such that during normal operation each fan will operate at 67% of the rated airflow capacity.
    a. This unit will include an inlet plenum that will house an energy recovery coil (sensible only).

The design of the HVAC systems is intended to include, at a minimum, the following energy saving strategies:

1. All AHUs have 47 deg F supply air temperature with maximum 13 deg F supply air temperature reset.
2. Office / Classroom AHU has demand controlled ventilation (DCV) in spaces greater than 500 sf.
3. Office / Classroom AHU has air side economizer.
4. Laboratory AHU has night time airflow setback to ensure the higher of the 50% of the design ACH or 42% of the design space exhaust (fume hood and point exhaust) is the controlling function.
5. Laboratory AHU has a 50% efficient sensible energy recovery system for outside air pre-conditioning.
6. All pumps capable of variable speed operation.
7. All AHUs have fan arrays with individual VFD per fan.
8. Cooling tower fans have VFDs.
9. Chillers are proposed to be 6.6 COP.
10. Boilers are proposed to be 94% efficient.

G. Domestic Hot Water Systems

The domestic hot water system consists of the following energy consuming equipment:

1. A skid-mounted, duplex booster pump system designed at 65% - 65%. The pumping system will include a VFD.
2. Central, gas-fired domestic water heaters, each with 50% of the system total capacity. Heaters will be condensing design.
3. Laboratory Services:
    a. Central, gas-fired industrial water heater, each with 50% of the system total capacity. Heaters will be condensing design.
        1) The design team evaluated several options for domestic water heating, including central storage, local instantaneous and point-of-use strategies. Based on the increased hot water demand of the building's laboratory space, it was determined that a central gas-fired system would be most applicable.
    b. A central compressed air system in multi-compressor, air-cooled arrangement.
    c. A central vacuum pump system, using quadplex, oil lubricated, claw vacuum package with air-cooled vacuum pumps.
    d. A central laboratory water treatment system (reverse osmosis) consisting of water softener, pre-filter, RO membrane, RO storage tank and booster pump assembly.

At this stage in the design process, the domestic water systems have not been included in the modeling process. As more information becomes available in the DD phase, these services will be incorporated. Note, the requested Energy Budget is higher than the proposed design EUI to allow for the addition of domestic water and elevator systems.

H. Energy-Using Miscellaneous and Process Equipment

The Math and Science Building has a significant amount of teaching space types that require plug load densities above those typical provided for in office or classroom design. Laboratory countertop equipment, laboratory exhaust demands, and computer lab spaces are among the contributors to the nearly 36% of the building energy consumption that is associated with plug loads. Laboratory (fume hood) exhaust is required to operate continuously (24/7) and will include controls to turn down the quantity of exhaust air at each device during unoccupied hours (when not in use).

As the building design progresses, the Energy Analyst and the Mechanical Engineer on the project team will continue to refine the individual space plug loads, understanding that reductions in this category will contribute directly to lowering the overall project Energy Budget (kBtu /sf-yr).

II. BASELINE BUILDING OVERVIEW

Refer to the input data for the energy model included in Appendix E2 for a complete summary of the Baseline and Proposed modeling assumptions (in ASHRAE 90.1-2010 Appendix G format).

A. Thermal Envelope Variations

The baseline was modeled with building envelope components that meet the prescriptive minimum requirements of ASHRAE 90.1-2010. No shading elements from the proposed building design were modeled. The glazing window to wall ratio was limited to 40% of the total above ground wall area and applied uniformly to each façade orientation. Thermal values associated with the baseline building envelope are provided in Table 5 below.

Table 5 – Building Envelope Properties

Envelope Component	Baseline Assembly U-Value	Baseline SHGC	Proposed Assembly U-Value	Proposed SHGC
Roofs	U-0.048		U-0.032	
Walls, Above Grade	U-0.064		U-0.104	
Walls, Below Grade	C-1.14		C-0.119	
Slab on Grade Floors	F-0.73		F-0.520	
Opaque Doors	U-0.7		U-0.5	

Glazing - Curtainwall	U-0.50	SHGC-0.40	U-0.42	SHGC-0.40
Glazing - All Other	U-0.55	SHGC-0.40	U-0.42	SHGC-0.40
Glazing - Entrance Door	U-0.85	SHGC-0.40	U-0.77	SHGC-0.40

B. HVAC System Variations

The Baseline HVAC system is determined by ASHRAE 90.1-2010 Appendix G based on the size of the building and the fuel types used in the building. For a building that is 5 floors or less and 25,000 sf to 150,000 sf the HVAC system is determined to be System 5 – Packaged VAV with Reheat, however, since the proposed building design is utilizing the campus chilled water and heating hot water plant, the baseline System 7 – VAV with Reheat is used in place of System 5. The baseline HVAC system is modeled in accordance with the requirements of ASHRAE 90.1-2010 Appendix G.

C. Lighting Design Variations

The lighting power density for the baseline is limited based on the lighting power density allowance per the space-by-space method, as summarized below.

Table 6 – Lighting Power Densities

Space Type	Baseline LPD W/sf	Proposed LPD W/sf
Audience/ Seating area - Motion picture theater	1.14	0.91
Classroom/ Lecture/ Training	1.24	0.99
Conference/ Meeting/ Multipurpose	1.23	0.98
Corridor/ Transition	0.66	0.53
Electrical/ Mechanical	0.95	0.76
Laboratory - Classrooms	1.28	1.02
Lobby	0.9	0.72
Lounge/ Recreation	0.73	0.58
Office - Enclosed	1.11	0.89
Office - Open plan	0.98	0.78
Restrooms	0.98	0.78
Stairway	0.69	0.55
Storage	0.63	0.50

III. ANALYSIS SUMMARY AND RECOMMENDATIONS

A. Energy Model

The analysis was conducted using Integrated Environmental Solutions Virtual Environment (IESVE), Version 2017.4.0.0. This software platform allows for the physical modeling of the building, allowing a better understanding of building geometry, space adjacencies and building shading (both self-shading and window shade design). The final proposed building energy modeling geometry is pictured below.

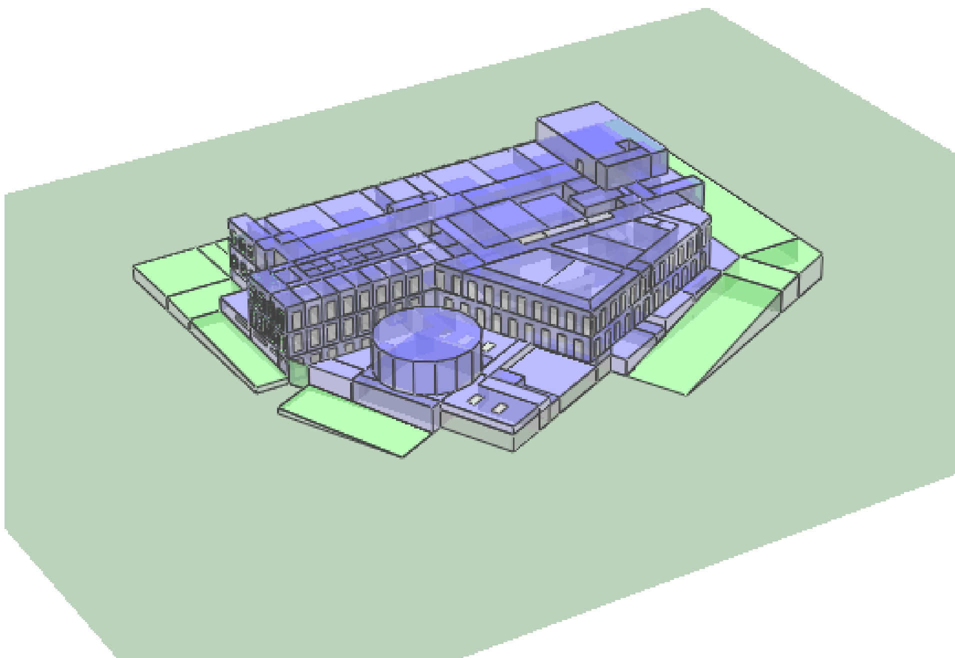


Figure 5 – 3D view from SE of Building. Planetarium is modeled as the cylinder on the bottom of the image. The green prisms modeled adjacent to the building where used to model the site's varying grade. The SE corner of the building is completely above grade, while the NW side is below grade.

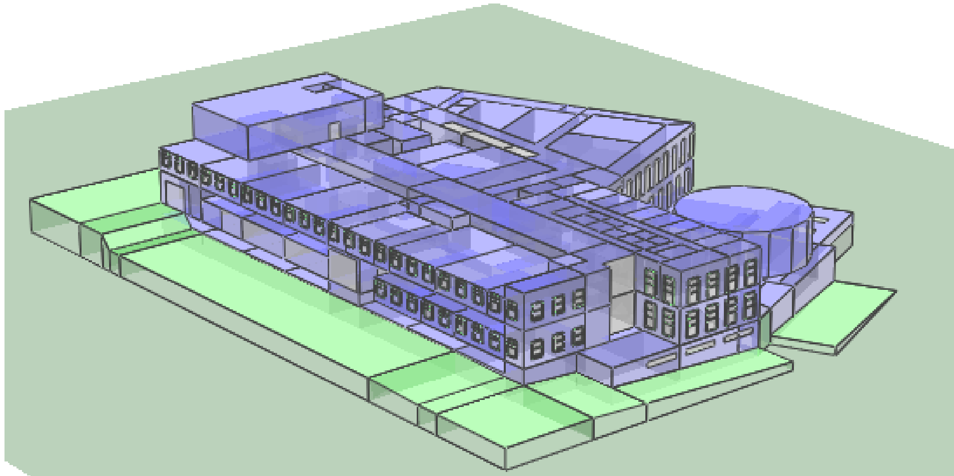


Figure 6 – View from SW of building.

B. Energy Analysis Summary

The energy analysis was performed following the Performance Rating Method (PRM) from Appendix G of ASHRAE Standard 90.1-2010. The PRM is intended for rating the energy efficiency of building designs that exceed the requirements of the standard and is the required procedure to assess energy cost savings performance for the LEED Energy and Atmosphere credits that are being pursued. The performance of the proposed building design is summarized below in Table 7.

Table 7 – Annual Energy Comparison

	Baseline Building (System 7)	**Proposed Building (VAV)**
Annual Energy Cost *($/yr)*	$788,465	$602,813
Energy Cost Savings	N/A	23.55%
Annual Energy Consumption *(kBtu/yr)*	39,262,029	27,216,987
Energy Consumption Reduction	N/A	30.68%
Energy Use Intensity *(kBtu/sf-yr)*	303.7	210.6

Figure 7 illustrates the annual energy cost by end use for both the proposed and baseline buildings. The figure shows that reductions in cooling and heating are the main sources of energy cost savings. Optimized lighting and air distribution (fan) strategies show savings potential.

Figure 8 provides a graphical representation of the energy consumption per component of the proposed design, as compared with the overall building energy consumption. This graphic indicates that receptacles (plug load) are the largest overall energy component of the proposed design, with cooling, heating and fan energy the next largest area of impact.

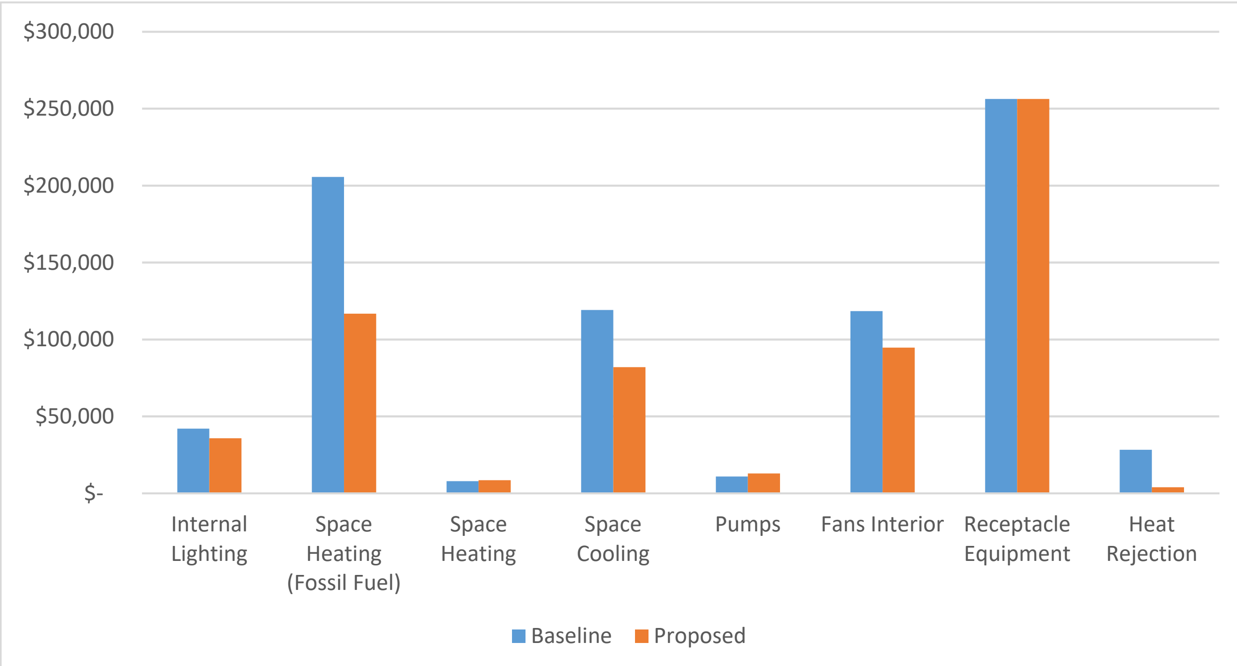


Figure 7 – Energy Cost Comparison between Baseline and Proposed Models.

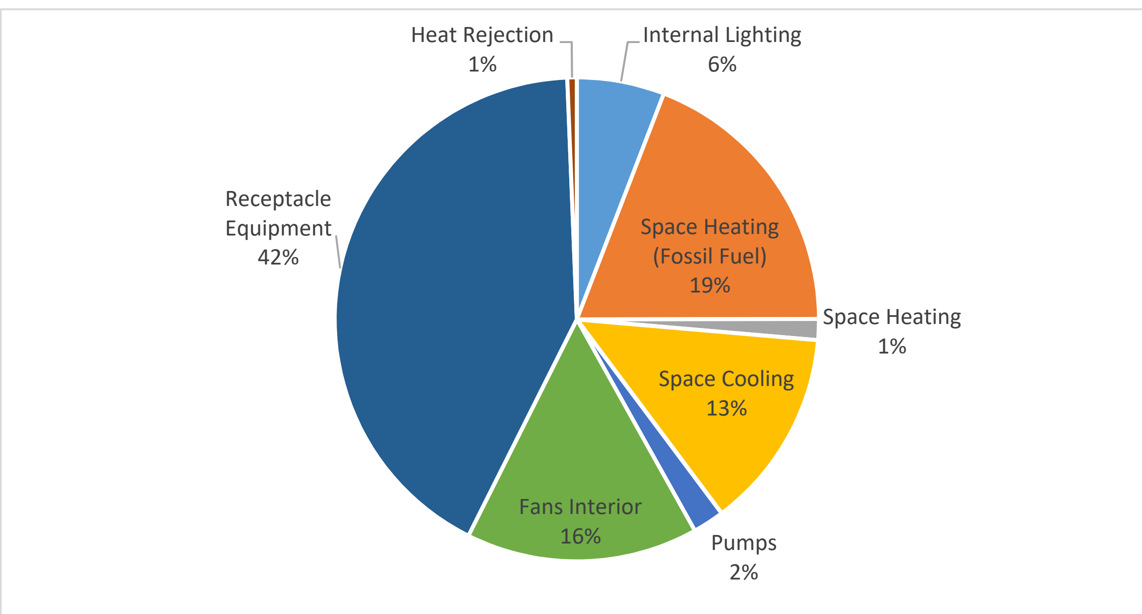


Figure 8 – Proposed Design Annual Energy Cost by End Use

1. Energy Targets / Compliance
   The Math and Science Building has several design goals in terms of energy performance based on the requirements of the College, County and State. While the focus of this energy analysis is to provide verification of compliance with the College energy requirement and Energy Budget, the exercise also provides the project team an opportunity to determine progress towards Energy Code compliance early in the design process.

   a. Montgomery College Resource Conservation and LEED Requirements
      The Montgomery College Design Standards require all new construction projects to pursue a minimum of LEED Silver under the v4 rating system for New Construction. Based on this requirement, the project must achieve a minimum of 5% improvement over an ASHRAE 90.1-2010 Appendix G baseline building model.

      The project currently meets the College requirement with 23.55% improvement over baseline (90.1-2010).

   b. Montgomery College Energy Budget
      The College assigns each new construction project with an Energy Budget, inclusive of all metered energy use planned for the facility. HVAC systems, lighting (building and grounds), elevators, motors, water heating and receptacle loads are assessed in comparison to the Energy Budget. The Energy Budget for this project was initially set at 40 kBtu/gsf-yr.

      The project does not currently meet the Energy Budget and has submitted a Request for Variance of Building Energy Budget to increase the project Energy Budget to 228 kBtu/gsf-yr. Refer to Appendix E1 for Request for Energy Budget Variance documentation, including a detailed analysis of the proposed Energy Budget target.

c. Energy Code (AHJ)
The project must comply with the most stringent of the requirements established by Montgomery County and the State of Maryland.

Montgomery County follows the 2015 International Energy Conservation Code and the 2012 International Green Construction Code (with MC amendments). The project team will pursue the 2012 IGCC alternative compliance path, requiring LEED Silver project certification (v4). In addition, it is required that the project achieve a minimum of 8 points under EAc1 – Energy and Atmosphere. This requires the project to estimate a minimum of 20% energy cost savings over an ASHRAE 90.1-2010 baseline (Appendix G).

The project currently meets the County requirement with 23.55% improvement of baseline (90.1-2010).

The State of Maryland also follows the 2015 International Energy Conservation Code; additionally, the State requires projects to comply with the High-Performance Green Building Program. As such, the project team will pursue compliance with the State Energy Code by pursuing the alternative compliance path. This includes certification to LEED Silver (v4) and a building energy performance 15% lower than an ASHRAE 90.1-2013 baseline (Appendix G).

The project team has not yet assessed the project based on an ASHRAE 90.1-2013 baseline. This will be completed prior to the Design Development deliverable to ensure the project is on track for compliance.

2. Energy Conservation Measures
The project team established an initial set of energy conservation measures for independent evaluation of potential energy savings. These are intended to be a starting point for discussion and will evolve as the project progresses. A detailed list of the ECMs that were evaluated can be found in the following sections for Thermal Envelope, Electrical Design and Mechanical Design and is summarized as Table 2 in the Executive Summary.

Note, several of the ECMs that were evaluated will be incorporated into the proposed model to ensure compliance with ASHRAE 90.1-2013 as required by local energy ordinances (county and state). These were included in the ECM analysis to provide a record of the modeling impact.

C. Recommendations, Strategies and Options

1. Recommendations for ECM implementation will be forthcoming with information from the SD cost estimate used to evaluate the ECMs in a life cycle cost analysis.

2. Space heating, space cooling, and interior fans are the largest regulated energy uses within the building and should be the primary focus of energy conservation in DD.

III. THERMAL ENVELOPE

A. Energy Conservation Measures: Full data for each of the ECMs is included in the summary (Table 1) included in the Executive Summary.

1. ECM # 1A: Increase roof insulation from R-20 to R-30 by increasing roof insulation from 4" to 6".
2. ECM # 1B: Increase roof insulation from R-20 to R-40 by increasing roof insulation from 4" to 8".
3. ECM # 2A: Increase wall insulation from R-9.5 to R-12.5 by increasing insulation from 2" to 2.5".
4. ECM #2B: Increase wall insulation from R-9.5 to R-15 by increasing insulation from 2" to 3".
5. ECM # 3: Provide below grade wall insulation at R-7.5 by providing 1.5" insulation.
6. ECM # 4: Provide insulation for slab on grade construction at R-15 by providing 3" insulation for 24".
7. ECM # 5A: Increase punched window glazing performance on the West and South façade from U-0.55 to U-0.5.
8. ECM # 5B: Increase punched window glazing performance on the West and South façade from U-0.55 to U-0.42.
9. ECM # 5C: Increase punched window glazing performance on the West and South façade from SHGC-0.4 to SHGC-0.36.
10. ECM # 6: Increase curtain wall system glazing performance from U-0.5 to U-0.42.
11. ECM # 7A: Increase punched window glazing performance on the West façade by applying a 50% frit pattern (to decrease solar gain).
12. ECM # 7B: Increase punched window glazing performance on the South façade by applying a 50% frit pattern (to decrease solar gain)
13. ECM # 8A: Increase curtain wall system glazing performance on the South façade by applying a 50% frit pattern (to decrease solar gain).
14. ECM #8B: Increase punched window glazing performance on the West and South façade by applying a 50% frit pattern (to decrease solar gain).
15. ECM # 9A: Provide horizontal shading design on punched windows on West façade (to decrease solar gain).

16. ECM # 9 B: Provide horizontal shading design on punched windows on South façade (to decrease solar gain).

IV. ELECTRICAL DESIGN

A. Energy Conservation Measures: Full data for each of the ECMs is included in the summary (Table 1) included in the Executive Summary.

1. ECM # 10: Provide 10% reduction in lighting power density (space-by-space method) from the ASHRAE 90.1-2010 prescriptive values.
2. ECM # 11: Provide 20% reduction in lighting power density (space-by-space method) from the ASHRAE 90.1-2010 prescriptive values.
3. ECM # 17: Provide 50 kW, roof-mounted, photovoltaic (PV) array.

V. HVAC SYSTEMS

A. Energy Conservation Measures: Full data for each of the ECMs is included in the summary (Table 1) included in the Executive Summary.

1. ECM # 12A: Increase supply leaving air temperature from 47F to 55F for AHU-1 (Laboratory DOAS unit).
2. ECM # 12B: Increase supply leaving air temperature from 47F to 55F for AHU-2 (Office / Classroom unit).
3. ECM # 13: Increase efficiency of exhaust air energy recovery (between laboratory exhaust and AHU-1) from 50% to 75% (sensible-only).
4. ECM # 14: Provide AHU-2 relief air (Class 1) as makeup air to AHU-1 to reduce amount of outside air conditioning required.
5. ECM # 15: Provide total energy recovery (wheel) for AHU-2 (office / classroom).
6. ECM # 16: Increase chiller efficiency to COP = 6.6 (0.53 kW/Ton).

VI. ENERGY ANALYSIS DETAIL

A. Input / Output Detail: The analysis was conducted using Integrated Environmental Solutions Virtual Environment (IESVE), Version 2017.4.0.0. The detailed results of this analysis are included in Appendix E2.

VII. LIFE-CYCLE-COST DETAIL

A. Analysis Details: The life cycle cost analysis will be performed using USDOE BLCC (Building Life Cycle Cost) tool, Version 5.3-18. The detailed results of this analysis will be included in Appendix E3 pending the results of the Schematic Design cost modeling.

B. While life-cycle-cost is an important factor in considering the implementation of an ECM, several other factors have been presented for review and discussion. Each of these factors will be updated pending the first cost analysis following the initial SD submission.

1. First Cost: Describes the added cost to the project construction budget to implement a particular strategy or improved equipment.
2. Energy Cost Savings: A calculated value using the baseline energy model and applying each individual ECM. The savings are calculated against the baseline (Appendix G, 90.1-2010) energy model.
3. Simple Payback: A calculated value that divides the energy cost savings into the first cost to determine the number of years to payback of the ECM.
4. Persistence: Provides a subjective input to the possible realization of the proposed energy savings. A high degree of persistence indicates a strategy that is very likely to see the calculated benefit. A low degree of persistence indicates a strategy that may be subject to user error, variations due weather conditions, occupancy conditions, etc. that may impact the ability of the project to realize the proposed savings.

Appendix E1

ENERGY BUDGET VARIANCE REQUEST

MONTGOMERY COLLEGE
Leggett Math and Science Building
MC Project #: FP16-077

Issued January 23, 2019
Schematic Design

REQUEST FOR VARIANCE OF BUILDING ENERGY BUDGET

Project Identification: Leggett Math and Science Building (MC Project #: FP16-077)

I hereby request that a variance be issued in the building energy budget for this project. The requested Building Energy Use Budget cannot be met, for reasons described in the attached narrative ("Supporting Documentation") and documented in the Schematic Energy Analysis report.

Building Energy Use Budget:	40	kBtu / gsf-yr
Calculated Building Energy Use:	228	kBtu / gsf-yr

STATE OF MARYLAND
JOHN R. HARRIMAN
34764
PROFESSIONAL ENGINEER

1/23/19

John Harriman, PE

Registered Professional Engineer

Date: 1/23/2019

SMITHGROUP

REQUEST FOR VARIANCE OF BUILDING ENERGY BUDGET

Supporting Documentation

The proposed Building Energy Budget for the Leggett Math and Science Building is 228 kBTU/gsf-yr (site). This value was selected after creating a building energy range from references including the 2003 Commercial Building Energy Consumption Survey (CBECS), the International Institute for Sustainable Laboratories (I2SL) Labs21 database, and the baseline and proposed building as modeled in Integrated Environmental Solutions Virtual Environment (IESVE) per LEED v4 (ASHRAE 90.1-2010 Appendix G).

CBECS data is from a national survey conducted by U.S. Department of Energy's Energy Information Administration. Building Energy Use Intensity (EUI) from CBECS data is summarized in Energy Star Portfolio Manager's March 2016 Technical Reference, "U.S. National Median Reference Values for All Portfolio Manager Property Types". EUIs from CBECS for pertinent categories are listed in the table below while the EUI of the Germantown Child Care Building Energy Budget is from the Montgomery College Energy Design Guidelines:

Table 1 – Comparison of CBECS data and Montgomery College assigned Building Energy Budget

Building Category	**Site EUI (kBtu/gsf-yr)**
Education - College/University	130.7
Office	67.3
DOE Office Building (Medium)	45
Montgomery College Building Energy Budget	40

This data shows that the Building Energy Budget provided by the College is more aligned with an Energy Budget for an office building, than a math and science building.

The approximate program breakdown of the Math and Science building is shown in the table below. The category "Teaching Lab" includes all spaces requiring 100% outside air.

Table 2 – Math and Science Building program breakdown showing nearly 1/3 of program is Teaching Lab.

Building Program	**Gross Building Area (%)**
Academic / Non-Lab	69%
Teaching Lab	31%

Due to the program of the building being nearly 1/3 Teaching Lab, the Labs21 database, whose dataset is based exclusively on lab buildings, was used as a reference for the proposed Building Energy Budget. The Labs21 database was filtered to only include measured data of Teaching Labs of all lab types and occupancy hours in Climate Zone 4A with a lab area ratio (i.e. ratio of lab area to gross building area) between 20% and 40%. The result included 14 Teaching Labs with site EUIs based on data from 2007 to 2014. The Labs21 median and mean EUI from this data are summarized in the table below.

Table 3 – Summary of Labs21 Results after filtering for Climate Zone, Lab Function, and Lab Area Ratio.

Source	Number of Labs	Median Site EUI (kBtu/gsf-yr)	Average Site EUI (kBtu/gsf-yr)	Standard Deviation (kBtu/gsf-yr)
Labs21 Database	14	260	308	138

The building was modeled in IESVE 2017 per ASHRAE 90.1-2010 Appendix G requirements. For additional detail on the baseline and proposed models, see the SD Energy Analysis Report. The following table summarizes the range of values for the proposed Building Energy Budget. The estimated building energy range based on benchmark data is from 211 to 308 kBtuh/gsf-yr.

Table 4 – List of EUIs that make up the building energy range for this building type. The proposed Building Energy Budget is bolded below.

Building Energy Reference	Site EUI (kBtu/gsf-yr)
Proposed Building (IESVE 2017)	211
30% Below Baseline (90.1-2010)	213
Leggett Math and Science Building Target	**228**
20% Below Baseline (90.1-2010)	243
Labs21 Teaching Labs - Median	260
10% Below 90.1-2010 Baseline (90.1-2010)	274
Baseline (90.1-2010)	304
Labs21 Teaching Labs - Average	308

The proposed Building Energy Budget is 228 (kBtuh/gsf-yr), which is 25% below the ASHRAE 90.1-2010 baseline. This value is within the lower standard deviation from the mean of the Labs21 data for teaching labs with similar lab ratios in the same climate zone. Also, it is in line with the Montgomery County energy code alternative compliance path that requires 8 points under the LEED v4 Energy and Atmosphere category which equates to 20% reduction from baseline.

A building energy model is best suited as a relative analysis tool for comparison of alternatives and does not fully capture the intricacies of reality that would be required for accurately predicting metered energy. Therefore, the IESVE energy model should not be the sole basis for the Building Energy Budget and the proposed Building Energy Budget is ~10% higher than the proposed building modeled in IESVE 2017.

Appendix E2

ENERGY ANALYSIS DETAIL

2018-Proposed v2.mit

[General info](#) [Space summary](#) [Advisory messages](#) [Proposed vs baseline](#)
[Energy type summary](#) [On site renewables](#) [Exceptional calc measure](#) [Report](#)

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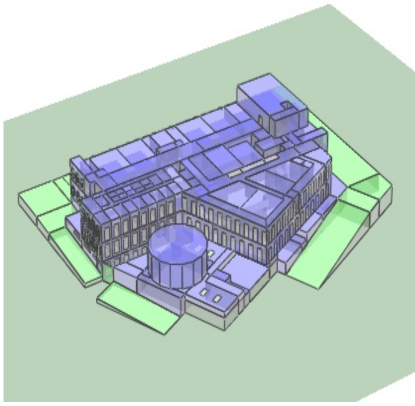
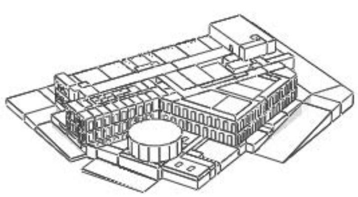
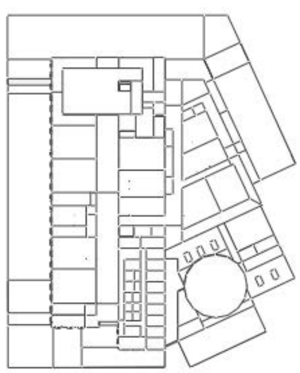
1.1 General information



Building Form



Building Plan



Responsible individual:

Company name:

Simulation program:

Integrated Environmental Solutions Virtual Environment version	2018

Energy Code:

ASHRAE 90.1 - 2010 Appendix G

Model data:

Project file	2018-Proposed v2.mit
Model floor area[1]	129260.20 ft2
Building floor area[2]	129260.19 ft2
Building volume[3]	2161556.25 ft3
Number of conditioned spaces	278
No of floors	7

Heating calculation data:

Principal heating source	Electricity
Results file	
Calculated	

Cooling calculation data:

Principal cooling source	Electricity
Results file	
Calculated	

Design weather:

Source	ASHRAE design weather database
Weather location	Washington/National , DC
Weather file	USA_VA_Arlington-Ronald.Reagan.Washington.Natl.AP.724050_TMY3

Climate zone:

ASHRAE 90.1	4A
Koeppen-Geiger	Cfa

Construction:

New construction %	100
Existing construction %	0

This report produces output in accordance with the LEED NC 2009 Submittal Template, 2010 - option 1: Performance Rating Method

The Virtual Environment software has al the capabilities described in G2 Simulation General Requirements in Appendix G of ASHRAE 90.1 - 2010

The baseline building and proposed building in this project's energy simulatic runs use the assumptions and modelling methodology described in Appendix G o ASHRAE 90.1 - 2010

The report outputs that sequence with th following 90.1 sections:

1.1 - General info
1.2 - Space Summary
1.3 - Advisory messages
1.4 - Comparison of proposed design versus baseline design energy model inputs
1.5 - Energy type summary
1.6 - On site renewable energy (if applicable)
1.7 - Exceptional calculation measure summary (if applicable)
1.8 - Performance rating method compliance report

1. 'Model floor area' is the total floor area of all spaces in the building regardless o whether they are conditioned

2. 'Building floor area' is the total area of all spaces for which 'Include in building floor area' is ticked in 'Space Data' (usec for loads metrics in this report)

3. 'Building volume' is the total volume o all spaces for which 'Include in building floor area' is ticked in 'Space Data'

1.2 - Space Summary

Table 1.2 Space Summary

Building Use (Occupancy type)	Conditioned Area ft^2	Un-conditioned Area ft^2	Total Area ft^2
A-Z	**Hi/Lo**	**Hi/Lo**	**Hi/Lo**
SPACE: Audience/ Seating area - Motion picture theater	3,100	0	3100
SPACE: Classroom/ Lecture/ Training - Multipurpose (custom)	9,814	0	9814
SPACE: Conference/ Meeting/ Multipurpose	6,013	0	6013
SPACE: Corridor/ Transition	31,757	0	31757
SPACE: Electrical/ Mechanical	6,007	0	6007
SPACE: Electrical/ Mechanical - Telecom (custom)	991	0	991
SPACE: Elevator - Equipment	32,666	0	32666
SPACE: Elevators - Equipment	136	0	136
SPACE: Laboratory - Classrooms	3,906	0	3906
SPACE: Laboratory - Classrooms - Computer Lab (custom)	5,447	0	5447
SPACE: Laboratory - Classrooms - Greenhouse (custom)	1,680	0	1680
SPACE: Laboratory - Classrooms - Lab Support (custom)	6,156	0	6156
SPACE: Laboratory - Classrooms - Wet Lab (custom)	31,508	0	31508
SPACE: Lobby	2,505	0	2505
SPACE: Lounge/ Recreation	2,998	0	2998
SPACE: Office - Enclosed	8,660	0	8660
SPACE: Office - Open plan	329	0	329
SPACE: Restrooms	3,476	0	3476
SPACE: Stairway	3,253	0	3253
SPACE: Stairway - Vestibule (custom)	523	0	523
SPACE: Storage	2,127	0	2127
Totals	163,051.8	0.0	163,051.8

1.3 - Advisory Messages

Table 1.3 - Advisory messages

Advisory Messages	Proposed Building	Baseline Building	Difference
Number of hours heating loads not met:	96.0	39.0	57.0
Number of hours cooling loads not met:	112.0	59.0	53.0
Number of warning messages:	0	0	0.0
Number of error messages:	0	0	0.0
Number of defaults overridden	0	0	0.0

1.4 - Comparison of Proposed versus Baseline Design

Table 1.4 - Proposed vs Baseline Const.

Model Input parameter Construction	Proposed		Baseline	
	Description	Input U value / % (area weighted)	Description	Input U value / % (area weighted)
Exterior wall construction	CZ4 Ext Wall (Non-Res) - Steel Framed; R-13.0 + 7.5 c.i; U=0.064 (0.363)	0.06	CZ4 Ext Wall (Non-Res) - Steel Framed; R-13.0 + 7.5 c.i; U=0.064 (0.363)	0.06
Exterior wall construction	CZ4 Ext Wall (Non-Res) - Mass Wall; R-9.5 c.i; U=0.104 (0.591)	0.10	CZ4 Ext Wall (Non-Res) - Steel Framed; R-13.0 + 7.5 c.i; U=0.064 (0.363)	0.06
Roof construction	ECM 1a: Roofs with Insulation Entirely Above Deck Insulation Entirely Above Deck (R-30 Ins.)	0.03	CZ4 Roof (Non-Res) - Ins Above Deck; R-20; U=0.048 (0.273)	0.05
Roof construction			CZ4 Roof (Non-Res) - Ins Above Deck; R-20; U=0.048 (0.273)	0.05
Floor/slab construction	ECM 4: Ground contact floor: U=F (0.52)	0.02	CZ4 Ground contact floor: U=F(0.73) *Floor perim. (1089.72ft)/Floor area(50742ft^2)	0.03
Floor/slab construction	Ground Floor - Interior	0.00	CZ4 Floor (Non-Res) - Steel Joist; R-30.0; U=0.038 (0.218)	0.04
Floor/slab construction			Ground Floor - Interior	0.00
Floor/slab construction			CZ4 Ground contact floor: U=F(0.73) *Floor perim. (1089.72ft)/Floor area(50742ft^2)	0.03
Floor/slab construction			CZ4 Floor (Non-Res) - Steel Joist; R-30.0; U=0.038 (0.218)	0.04
Floor/slab construction			Ground Floor - Interior	0.00
Window to gross wall ratio	Overall	16%	Overall	22%
Window to gross wall ratio	North / South / East / West	19 / 12 / 20 / 13%	North / South / East / West	23 / 18 / 26 / 20%
Window to gross wall ratio			Overall	22%
Window to gross wall ratio			North / South / East / West	23 / 18 / 26 / 20%
Fenestration U-Value (North)	ECM 6/8a/b: Curtain wall w/frit U=0.42; SHGC=0.284	0.42	CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.50
Fenestration U-Value (North)	ECM 5a: Punched openings U=0.50; SHGC=0.40	0.50	CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.55
Fenestration U-Value (North)			CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.50
Fenestration U-Value (North)			CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.55
Fenestration U-Value (non - North)	ECM 5a: Punched openings U=0.50; SHGC=0.40	0.50	CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.50
Fenestration U-Value (non - North)	ECM 6/8a/b: Curtain wall w/frit U=0.42; SHGC=0.284	0.42	CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.55
Fenestration U-Value (non - North)			CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.50
Fenestration U-Value (non - North)			CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.55
Fenestration SHGC - North	ECM 6/8a/b: Curtain wall w/frit U=0.42; SHGC=0.284	0.30	CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.42
Fenestration SHGC - North	ECM 5a: Punched openings U=0.50; SHGC=0.40	0.42	CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.42

Model Input parameter Construction	Proposed		Baseline	
	Description	Input U value / % (area weighted)	Description	Input U value / % (area weighted)
Fenestration SHGC - North			CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.42
Fenestration SHGC - North			CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.42
Fenestration SHGC - non - North	ECM 5a: Punched openings U=0.50; SHGC=0.40	0.42	CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.42
Fenestration SHGC - non - North	ECM 6/8a/b: Curtain wall w/frit U=0.42; SHGC=0.284	0.30	CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.42
Fenestration SHGC - non - North			CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.42
Fenestration SHGC - non - North			CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.42
Fenestration visual light transmittance (N)	ECM 6/8a/b: Curtain wall w/frit U=0.42; SHGC=0.284	0.76	CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.76
Fenestration visual light transmittance (N)	ECM 5a: Punched openings U=0.50; SHGC=0.40	0.76	CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.76
Fenestration visual light transmittance (N)			CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.76
Fenestration visual light transmittance (N)			CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.76
Fenestration visual light transmittance	ECM 5a: Punched openings U=0.50; SHGC=0.40	0.76	CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.76
Fenestration visual light transmittance	ECM 6/8a/b: Curtain wall w/frit U=0.42; SHGC=0.284	0.76	CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.76
Fenestration visual light transmittance			CZ4 Window (Non-Res)Metal framing (curtainwall/store) U=0.50; SHGC=0.40	0.76
Fenestration visual light transmittance			CZ4 Window (Non-Res) - Metal framing (all other) U=0.55 (3.12); SHGC=0.40	0.76
Shading devices				

Table 1.4 - Proposed vs Baseline MEP

Model Input parameter MEP	Proposed		Baseline	
	Description	Input (area weighted)	Description	Input (area weighted)
Other Lighting Controls				
Interior lighting power density	Total power density ($Btu/h•ft^2$)	3.44	Total power density ($Btu/h•ft^2$)	3.44
Interior lighting power density			Total power density ($Btu/h•ft^2$)	3.44
Day lighting controls	Radiance simulation	No	Radiance simulation	Yes
Day lighting controls			Radiance simulation	Yes
Exterior lighting power	Total power consumption (kBtu/h)	0.00	Total power consumption (kBtu/h)	0.00
Exterior lighting power			Total power consumption (kBtu/h)	0.00
Process lighting	Total power density ($Btu/h•ft^2$)	0.00	Total power density ($Btu/h•ft^2$)	0.00
Process lighting			Total power density ($Btu/h•ft^2$)	0.00
Receptacle equipment	Total power density ($Btu/h•ft^2$)	18.85	Total power density ($Btu/h•ft^2$)	18.85
Receptacle equipment			Total power density ($Btu/h•ft^2$)	18.85
Elevators/escalators	Total power consumption (kBtu/h)	0.00	Total power consumption (kBtu/h)	0.00
Elevators/escalators			Total power consumption (kBtu/h)	0.00
Refridgeration equipment	Total power density ($Btu/h•ft^2$)	0.00	Total power density ($Btu/h•ft^2$)	0.00
Refridgeration equipment			Total power density ($Btu/h•ft^2$)	0.00
Cooking equipment	Total power density ($Btu/h•ft^2$)	0.00	Total power density ($Btu/h•ft^2$)	0.00
Cooking equipment			Total power density ($Btu/h•ft^2$)	0.00
Data processing/centre equipment	Total power density ($Btu/h•ft^2$)	0.00	Total power density ($Btu/h•ft^2$)	0.00
Data processing/centre equipment			Total power density ($Btu/h•ft^2$)	0.00

Table 1.4 - Proposed vs Baseline HVAC

Model Input parameter HVAC	Proposed		Baseline	
	Description	Performance SCop / SSEER Cfm / SFP / kW	Description	Performance SCop / SSEER Cfm / SFP / kW
Primary HVAC system				
Other HVAC system				
Fan supply power				
Fan power				
Economiser control				
Demand control ventilation				
Unitary equip cooling efficiency				
Unitary equip heating efficiency				
Chiller				
Chilled water loop and pump				
Boiler				
Hot water loop and pump				
Cooling tower				
Condenser water loop and pump				

1.5 - Energy Type Summary

Table 1.5 - Energy type summary

Energy Type Proposed / baseline design	Utility rate description	Units of Energy	Units of demand
Electricity	Flat rate	kBtu	MBH
Gas	Flat rate	kBtu	MBH
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

1.6 - On Site Renewable Energy

Table 1.6 - On site Renewables

Renewable Source	Back up Energy Type	Annual Energy Generated (kBtu)	Rated Capacity (MBH)	Renewable Energy Cost ($)
Photovoltaic Panels	Electricity	0.00	0.00	0.00
Wind Power	Electricity	0.00	0.00	0.00
Combined Heat and Power (electricity)	Electricity	0.00	0.00	0.00
Solar Water Heating	Electricity	0.00	0.00	0.00

1.7 - Exceptional Calculation Measures

The Energy Analysis does not include exceptional calculation method (s)

ASHRAE 90.1 - 2010, G2.5

1.8.1 Baseline Performance

Table 1.8.1 - Baseline Performance - PRM

End Use	Process	Baseline Design Energy Type	Units of Annual Energy & peak demand	Baseline 0 rotation	Baseline 90 rotation	Baseline 180 rotation	Baseline 270 rotation	Baseline Solution
Combined Heat and Power (heat)	No	Gas	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Combined Heat and Power (heat)Demand	No	Gas	Demand MBH	0.00	0.00	0.00	0.00	0.00
Internal Lighting	No	Electricity	Energy use kBtu	1,334,287.38	0.00	0.00	0.00	1,334,287.38
Internal LightingDemand	No	Electricity	Demand MBH	354.49	0.00	0.00	0.00	354.49
Exterior Lighting	No	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Exterior LightingDemand	No	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Space Heating (Fossil Fuel)	No	Gas	Energy use kBtu	20,761,928.00	0.00	0.00	0.00	20,761,928.00
Space Heating (Fossil Fuel) Demand	No	Gas	Demand MBH	7,451.64	0.00	0.00	0.00	7,451.64
Space Heating	No	Electricity	Energy use kBtu	248,460.66	0.00	0.00	0.00	248,460.66
Space HeatingDemand	No	Electricity	Demand MBH	228.27	0.00	0.00	0.00	228.27
Space Cooling	No	Electricity	Energy use kBtu	3,780,045.25	0.00	0.00	0.00	3,780,045.25
Space CoolingDemand	No	Electricity	Demand MBH	2,007.81	0.00	0.00	0.00	2,007.81
Pumps	No	Electricity	Energy use kBtu	344,193.84	0.00	0.00	0.00	344,193.84
PumpsDemand	No	Electricity	Demand MBH	169.40	0.00	0.00	0.00	169.40
Fans Process	No	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Fans ProcessDemand	No	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Fans Interior	No	Electricity	Energy use kBtu	3,758,492.50	0.00	0.00	0.00	3,758,492.50
Fans InteriorDemand	No	Electricity	Demand MBH	635.65	0.00	0.00	0.00	635.65
Fans Parking Garage	No	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Fans Parking GarageDemand	No	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Service Water Heating (Fossil Fuel)	No	Gas	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Service Water Heating (Fossil Fuel)Demand	No	Gas	Demand MBH	0.00	0.00	0.00	0.00	0.00
Service Water Heating	No	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Service Water HeatingDemand	No	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Receptacle Equipment	Yes	Electricity	Energy use kBtu	8,135,894.50	0.00	0.00	0.00	8,135,894.50
Receptacle EquipmentDemand	Yes	Electricity	Demand MBH	2,070.86	0.00	0.00	0.00	2,070.86
Interior Lighting Process	Yes	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Interior Lighting ProcessDemand	Yes	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Refrigeration	Yes	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
RefrigerationDemand	Yes	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Data Centre Equipment	Yes	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Data Centre EquipmentDemand	Yes	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Cooking (Fossil Fuel)	Yes	Gas	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Cooking (Fossil Fuel)Demand	Yes	Gas	Demand MBH	0.00	0.00	0.00	0.00	0.00
Cooking	Yes	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
CookingDemand	Yes	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Elevators Escalators	Yes	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Elevators EscalatorsDemand	Yes	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Heat Rejection	No	Electricity	Energy use kBtu	898,726.50	0.00	0.00	0.00	898,726.50
Heat RejectionDemand	No	Electricity	Demand MBH	322.66	0.00	0.00	0.00	322.66
Humidification	No	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
HumidificationDemand	No	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Humidification (Fossil Fuel)	No	Gas	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Humidification (Fossil Fuel) Demand	No	Gas	Demand MBH	0.00	0.00	0.00	0.00	0.00
Other Processes	Yes	Electricity	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Other ProcessesDemand	Yes	Electricity	Demand MBH	0.00	0.00	0.00	0.00	0.00
Other Processes (Fossil Fuel)	No	Gas	Energy use kBtu	0.00	0.00	0.00	0.00	0.00
Other Processes (Fossil Fuel) Demand	No	Gas	Demand MBH	0.00	0.00	0.00	0.00	0.00
Total Annual Energy Use kBtu/year				39,262,028.63	0.00	0.00	0.00	**39,262,028.63**
Total Process Energy kBtu/year								**8,135,894.50**

1.8.1 (b) Baseline Energy Costs

Table 1.8.1 (b) - Baseline Energy Costs

Energy Type	Baseline 0 rotation ($)	Baseline 90 rotation ($)	Baseline 180 rotation ($)	Baseline 270 rotation ($)	Baseline Building Performance ($)
Electricity	743,334.99	0.00	0.00	0.00	743,334.99
Gas	236,686.02	0.00	0.00	0.00	236,686.02
Oil	0.00	0.00	0.00	0.00	0.00
Coal	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
-	0.00	0.00	0.00	0.00	0.00
Total Baseline Costs:	980,021.01	0.00	0.00	0.00	**980,021.01**

1.8.2 Performance Rating Table - PRM Compliance

Table 1.8.2 - Performance Rating

End Use	Process	Proposed Design Energy Type	Proposed Design Units	Proposed Building Results	Baseline Design Units	Baseline Building Results	Percent Savings %
Combined Heat and Power (heat)	No	Gas	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Combined Heat and Power (heat)	No	Gas	Demand MBH	0.00	Demand MBH	0.00	0.0
Internal Lighting	No	Electricity	Energy use kBtu	1,135,194.50	Energy use kBtu	1,334,287.38	14.9
Internal Lighting	No	Electricity	Demand MBH	304.45	Demand MBH	354.49	14.1
Exterior Lighting	No	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Exterior Lighting	No	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Space Heating (Fossil Fuel)	No	Gas	Energy use kBtu	11,789,032.00	Energy use kBtu	20,761,928.00	43.2
Space Heating (Fossil Fuel)	No	Gas	Demand MBH	4,882.22	Demand MBH	7,451.64	34.5
Space Heating	No	Electricity	Energy use kBtu	270,000.31	Energy use kBtu	248,460.66	-8.7
Space Heating	No	Electricity	Demand MBH	206.42	Demand MBH	228.27	9.6
Space Cooling	No	Electricity	Energy use kBtu	2,601,820.75	Energy use kBtu	3,780,045.25	31.2
Space Cooling	No	Electricity	Demand MBH	2,009.01	Demand MBH	2,007.81	-0.1
Pumps	No	Electricity	Energy use kBtu	406,648.00	Energy use kBtu	344,193.84	-18.1
Pumps	No	Electricity	Demand MBH	191.02	Demand MBH	169.40	-12.8
Fans Process	No	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Fans Process	No	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Fans Interior	No	Electricity	Energy use kBtu	3,004,540.75	Energy use kBtu	3,758,492.50	20.1
Fans Interior	No	Electricity	Demand MBH	544.87	Demand MBH	635.65	14.3
Fans Parking Garage	No	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Fans Parking Garage	No	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Service Water Heating (Fossil Fuel)	No	Gas	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Service Water Heating (Fossil Fuel)	No	Gas	Demand MBH	0.00	Demand MBH	0.00	0.0
Service Water Heating	No	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Service Water Heating	No	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Receptacle Equipment	Yes	Electricity	Energy use kBtu	8,135,894.50	Energy use kBtu	8,135,894.50	0.0
Receptacle Equipment	Yes	Electricity	Demand MBH	2,070.86	Demand MBH	2,070.86	0.0
Interior Lighting Process	Yes	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Interior Lighting Process	Yes	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Refrigeration	Yes	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Refrigeration	Yes	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Data Centre Equipment	Yes	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Data Centre Equipment	Yes	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Cooking (Fossil Fuel)	Yes	Gas	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Cooking (Fossil Fuel)	Yes	Gas	Demand MBH	0.00	Demand MBH	0.00	0.0
Cooking	Yes	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Cooking	Yes	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Elevators Escalators	Yes	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Elevators Escalators	Yes	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Heat Rejection	No	Electricity	Energy use kBtu	122,736.38	Energy use kBtu	898,726.50	86.3
Heat Rejection	No	Electricity	Demand MBH	205.36	Demand MBH	322.66	36.4
Humidification	No	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Humidification	No	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Humidification (Fossil Fuel)	No	Gas	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Humidification (Fossil Fuel)	No	Gas	Demand MBH	0.00	Demand MBH	0.00	0.0
Other Processes	Yes	Electricity	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Other Processes	Yes	Electricity	Demand MBH	0.00	Demand MBH	0.00	0.0
Other Processes (Fossil Fuel)	No	Gas	Energy use kBtu	0.00	Energy use kBtu	0.00	0.0
Other Processes (Fossil Fuel)	No	Gas	Demand MBH	0.00	Demand MBH	0.00	0.0
Total Annual Energy Use kBtu/year				27,465,867.20		39,262,028.63	**30.0**
Total Process Energy kBtu/year				8,135,894.50		8,135,894.50	**0.0**

1.8.2 (b) Energy Cost & Consumption by energy Type - PRM Compliance

Table 1.8.2 (b) - Energy Cost

Energy Type	Units	Proposed Design		Baseline Design		Percent Savings	
		Energy Use	Cost ($)	Energy Use	Cost ($)	Energy Use	Cost
Electricity	kBtu	15,676,835.20	629,896.04	18,500,100.63	743,334.99	15.26	15.26
Gas	kBtu	11,789,032.00	134,394.98	20,761,928.00	236,686.02	43.22	43.22
Subtotal (Model Outputs):		27,465,867.20	764,291.02	39,262,028.63	980,021.01	30.04	22.01

On site Renewable Energy	Energy Generated (kBtu)	Renewable Energy Cost ($)	Narrative
Photovoltaic Panels	0.00	0.00	Generated from source
Wind Power	0.00	0.00	Generated from source
Combined Heat and Power (electricity)	0.00	0.00	Generated from source
Solar Water Heating	0.00	0.00	Generated from source

Exceptional Calculations	Energy Savings	Cost Savings	Narrative

Summary	Units	Proposed Design		Baseline Design		Percent Savings	
		Energy use	Cost ($)	Energy use	Cost ($)	Energy use	Cost
Total	kBtu	27,465,867.20	764,291.02	39,262,028.63	980,021.01	30.04	22.01

Percent Savings	
Energy use	Cost
30.04	22.01

Appendix E3

LIFE-CYCLE-COST DETAIL

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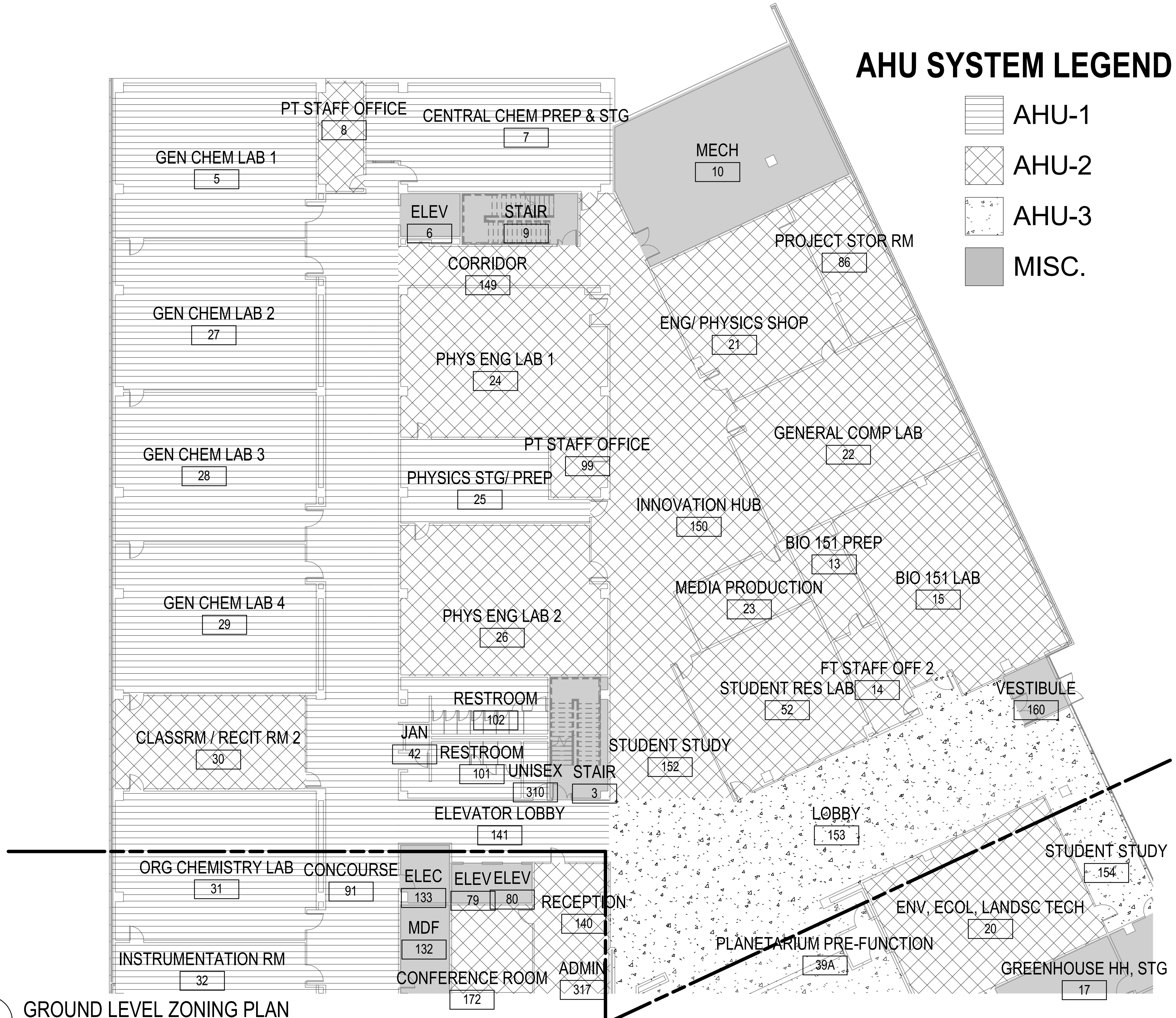
Appendix E4

BUILDING FLOOR PLANS



1 GROUND LEVEL ZONING PLAN
SCALE: 3/64" = 1'-0"

Plot Date: 1/22/2019 7:55:23 PM

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SKETCH

HVAC SYSTEM ZONING PLAN - GROUND LEVEL PLAN A
SKETCH TITLE

SD Energy Analysis Report
ISSUED WITH

N/A
DRAWING REFERENCE

3/64" = 1'-0"
SCALE

01/22/19
DATE

Project Name
PROJECT NAME

Project Number
PROJECT NUMBER

MSK8.1A
SKETCH NUMBER

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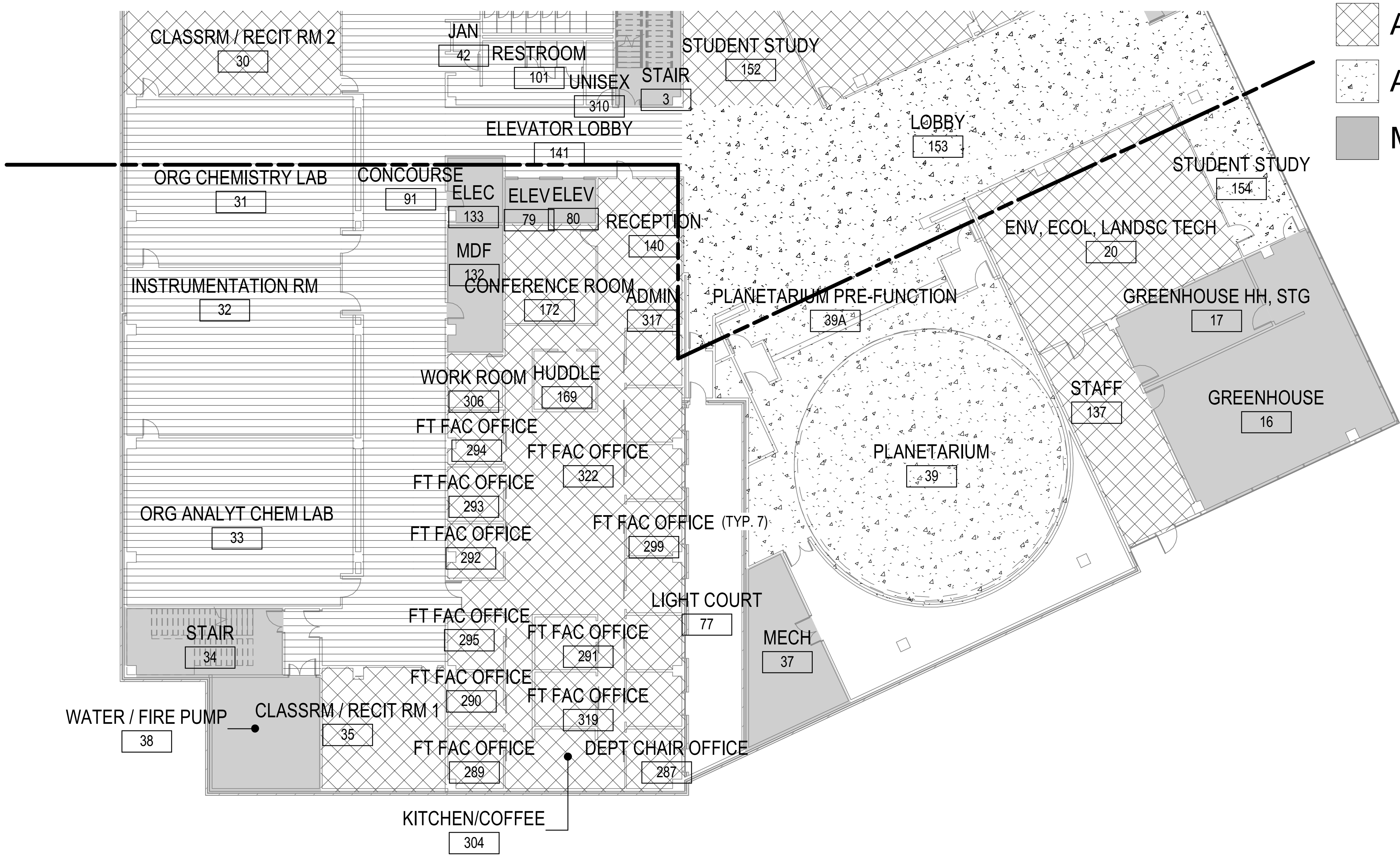
AHU SYSTEM LEGEND

- AHU-1
- AHU-2
- AHU-3
- MISC.



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SCALE: 3/64" = 1'-0"

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SKETCH TITLE

SD Energy Analysis Report
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N/A
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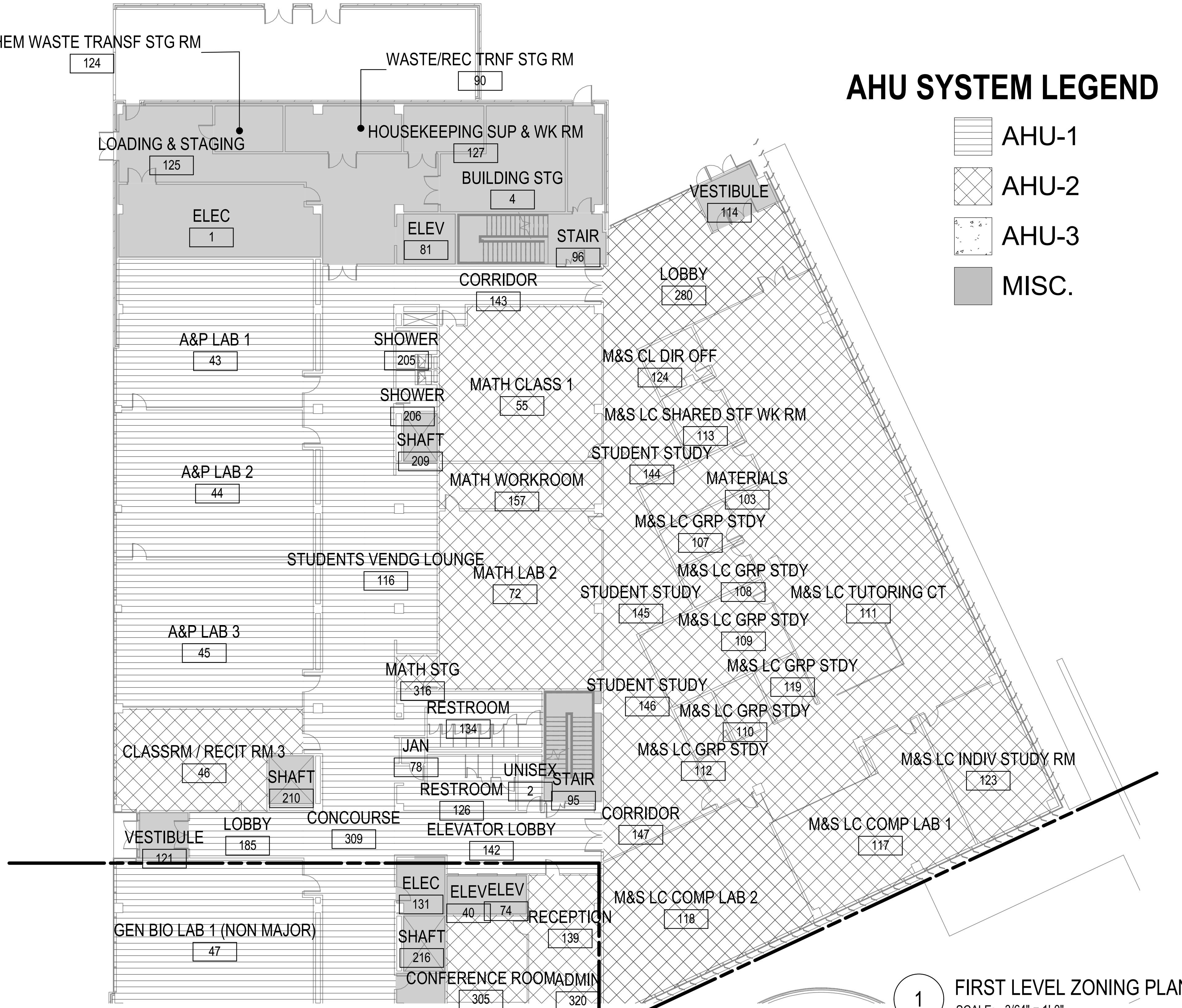
3/64" = 1'-0"
SCALE

01/22/19
DATE

Project Name
PROJECT NAME

Project Number
PROJECT NUMBER

MSK8.1B
SKETCH NUMBER



1 FIRST LEVEL ZONING PLAN

SCALE: 3/64" = 1'-0"

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SKETCH TITLE

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SCALE

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PROJECT NAME

Project Number

PROJECT NUMBER

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SKETCH NUMBER

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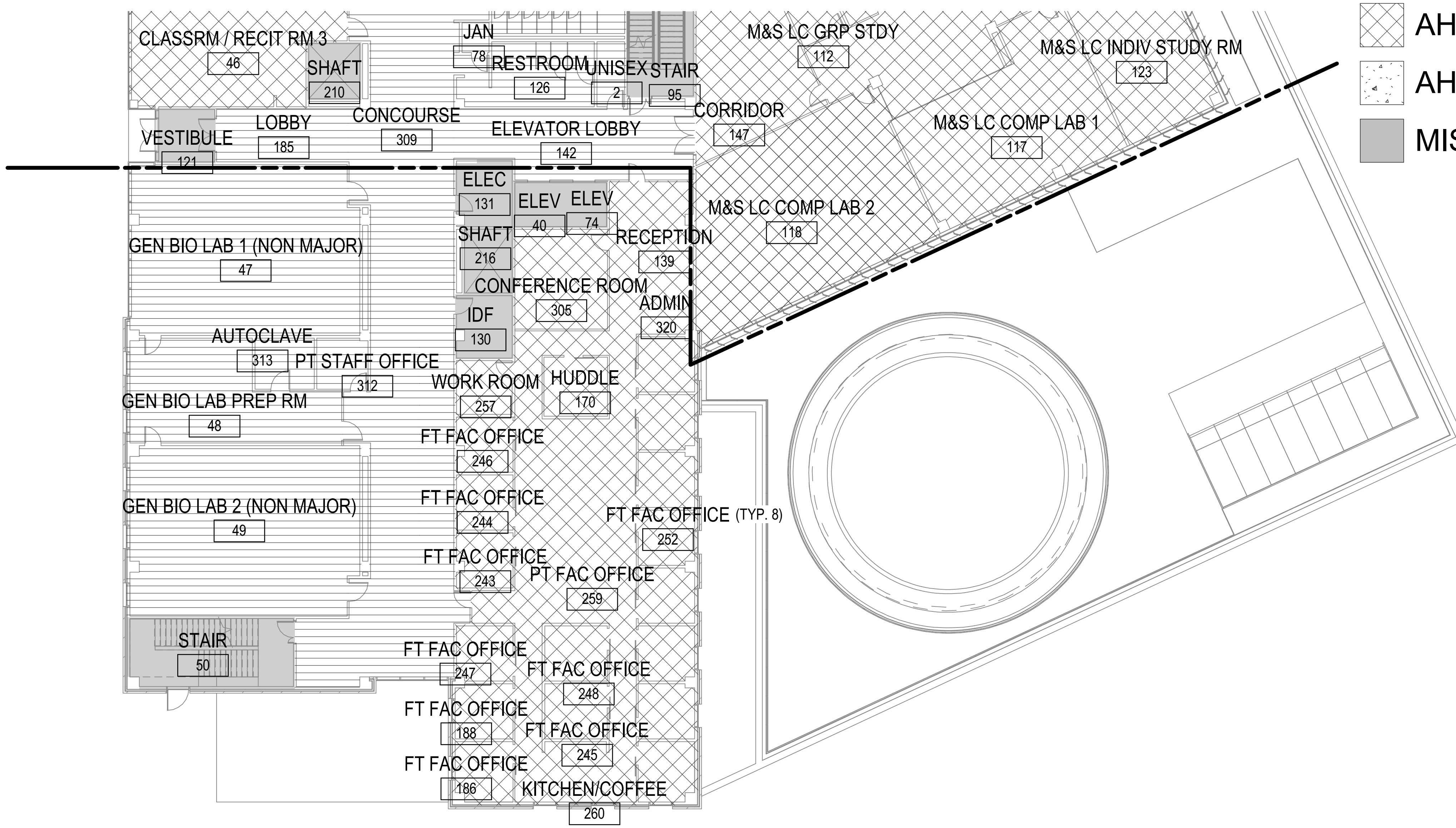
AHU SYSTEM LEGEND

- AHU-1
- AHU-2
- AHU-3
- MISC.



1 FIRST LEVEL ZONING PLAN
SCALE: 3/64" = 1'-0"

SKETCH

HVAC SYSTEM ZONING PLAN - FIRST LEVEL PLAN B
SKETCH TITLE

SD Energy Analysis Report
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DRAWING REFERENCE

3/64" = 1'-0"
SCALE

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DATE

Project Name
PROJECT NAME

Project Number
PROJECT NUMBER

MSK8.2B
SKETCH NUMBER

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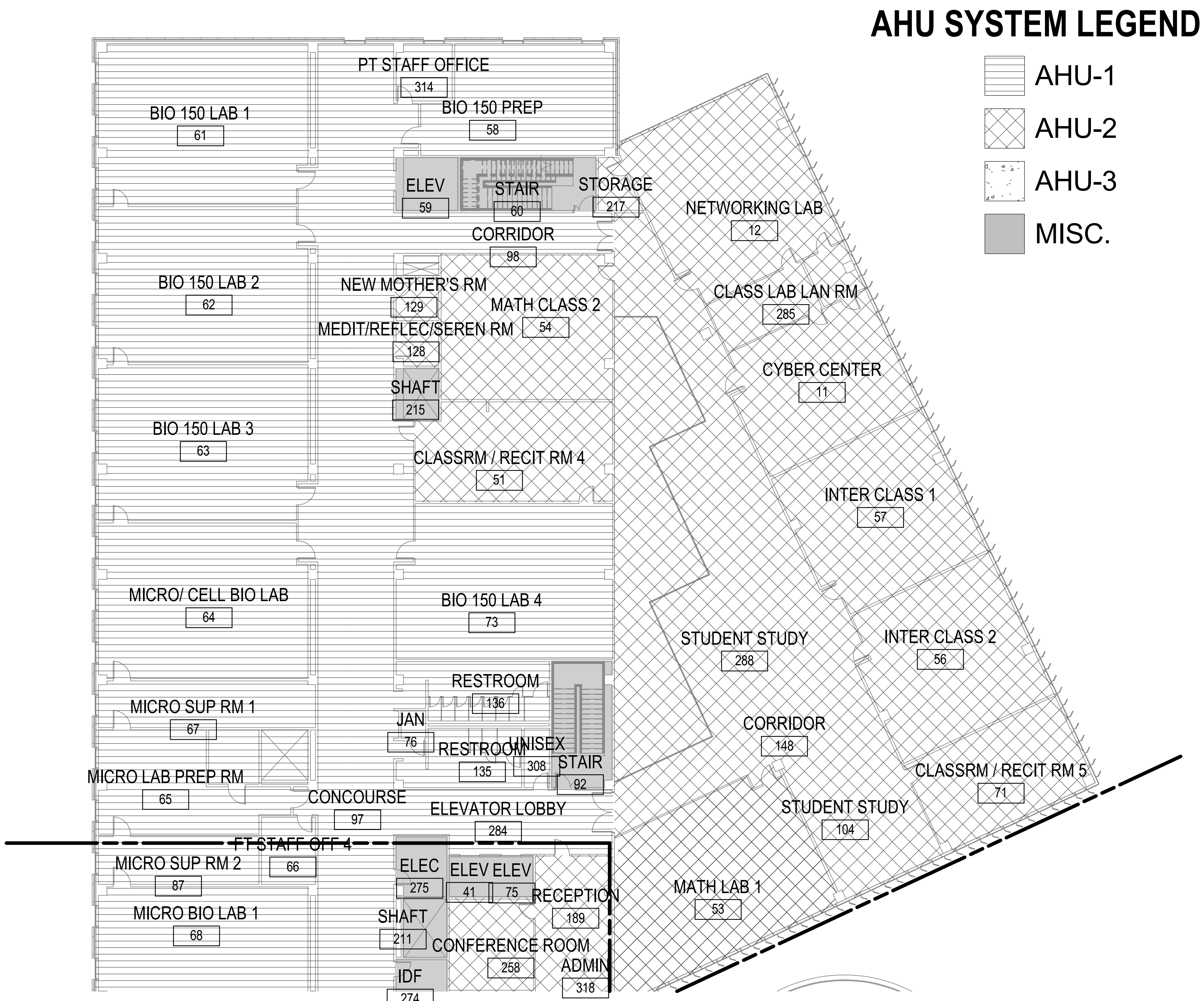

1 SECOND LEVEL ZONING PLAN

SCALE: 3/64" = 1'-0"

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SKETCH

HVAC SYSTEM ZONING PLAN - SECOND LEVEL PLAN A

SKETCH TITLE

SD Energy Analysis Report

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SCALE

01/22/19

DATE

Project Name

PROJECT NAME

Project Number

PROJECT NUMBER

MSK8.3A

SKETCH NUMBER

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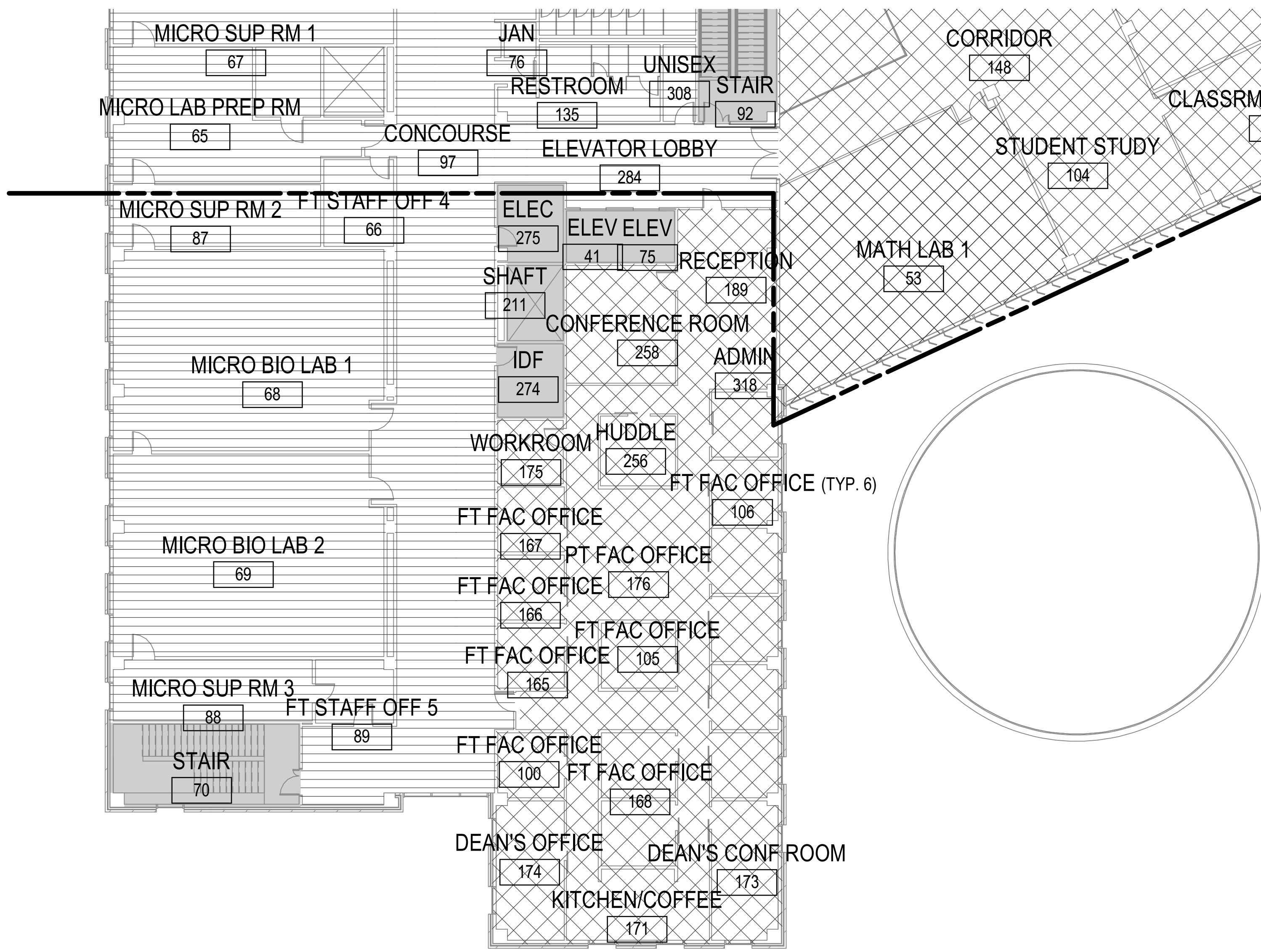
AHU SYSTEM LEGEND

- AHU-1
- AHU-2
- AHU-3
- MISC.



1 SECOND LEVEL ZONING PLAN
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SKETCH

HVAC SYSTEM ZONING PLAN - SECOND LEVEL PLAN B
SKETCH TITLE

SD Energy Analysis Report
ISSUED WITH

N/A
DRAWING REFERENCE

3/64" = 1'-0"
SCALE

01/22/19
DATE

Project Name
PROJECT NAME

Project Number
PROJECT NUMBER

MSK8.3B
SKETCH NUMBER

APPENDIX F

PLUMBING FIXTURE CALCULATIONS

Project # 12543 Montgomery College- Leggett B

Preliminary Occupant Load and Plumbing Fixtures

Ground Level	Total Area =				Toilet Factor		# of Toilets		# of Lavatories		# of Urinals		# of Drinking	
Occupant Load Classification	**tal Area (S**	**Occupant Load Factor**	**Occupant Load**	**# Men/Women**	**Men**	**Women**	**Men**	**Women**	**Factor**	**# Per Gender**	**Factor**	**Men**	**Factor**	**#**
Business	5,477	100	54.77	28	**25/50**	**25/50**	1.56	1.56	**40/80**	1.35	0.5	0.78	100	0.5477
Storage/Mechanical	5,572	100	55.72	28	100	100	0.28	0.28	100	0.28	0.5	0.14	1000	0.05572
		0	0	0	125	65	0	0	200	0	0.67	0	500	0
Classrooms	4,005	20	200.25	101	125	65	0.808	1.553846	200	0.505	0.67	0.54136	500	0.4005
Theater		**Fixed Seating**	150	75	125	65	0.6	1.153846	200	0.375	0.67	0.402	500	0.3
Laboratories	17,917	50	358.34	180	125	65	1.44	2.769231	200	0.9	0.67	0.9648	500	0.71668
Assembly (unconcentrated)	3,216	15	214.40	108	125	65	0.864	1.661538	200	0.54	0.67	0.57888	500	0.4288
Shafts														
		Total =	1034			**Total=**	6	9	**Total =**	4	**Total =**	**3**	**Total =**	3
				Total Men Toilets (Toilets - Urinals) =			**3**							

Level #	Occupant Load =	Exit Capacity =

Toilets: (#M/W)/25 for the first 50 and /50 every # after that where equation would be =2+(J9-50)/50

Lavatories: (#M/W)/40 for the first 80 and /80 every # after that where equation would be =2+(J9-80)/80

Project # 12543 Montgomery College- Leggett B

Preliminary Occupant Load and Plumbing Fixtures

Level 1	Total Area =				Toilet Factor		# of Toilets		# of Lavatories		# of Urinals		# of Drinking	
Occupant Load Classification	**tal Area (S**	**Occupant Load Factor**	**Occupant Load**	**# Men/Women**	**Men**	**Women**	**Men**	**Women**	**Factor**	**# Per Gender**	**Factor**	**Men**	**Factor**	**#**
Business	4,598	100	45.98	23	**25/50**	**25/50**	1.46	1.46	**40/80**	1.2875	0.5	0.73	100	0.4598
Storage/Mechanical	3,746	100	37.46	19	100	100	0.19	0.19	100	0.19	0.5	0.095	1000	0.03746
			0	0	125	65	0	0	200	0	0.67	0	500	0
Classroom	6,386	20	319.3	160	125	65	1.28	2.461538	200	0.8	0.67	0.8576	500	0.6386
Theater		**Fixed Seating**	0	0	125	65	0	0	200	0	0.67	0	500	0
Laboratories	5,232	50	104.64	53	125	65	0.424	0.815385	200	0.265	0.67	0.28408	500	0.20928
Assembly (unconcentrated)	6,334	15	422.27	212	125	65	1.696	3.261538	200	1.06	0.67	1.13632	500	0.844533
Shafts														
		Total =	930			**Total=**	6	9	**Total =**	4	**Total =**	**3**	**Total =**	3
				Total Men Toilets (Toilets - Urinals) =			**3**							

Level #	Occupant Load =	Exit Capacity =

Toilets: (#M/W)/25 for the first 50 and /50 every # after that where equation would be =2+(J9-50)/50

Lavatories: (#M/W)/40 for the first 80 and /80 every # after that where equation would be =2+(J9-80)/80

Project # 12543 Montgomery College- Leggett B

Preliminary Occupant Load and Plumbing Fixtures

Level 2	Total Area =				Toilet Factor		# of Toilets		# of Lavatories		# of Urinals		# of Drinking	
Occupant Load Classification	**tal Area ($**	**Occupant Load Factor**	**Occupant Load**	**# Men/Women**	**Men**	**Women**	**Men**	**Women**	**Factor**	**# Per Gender**	**Factor**	**Men**	**Factor**	**#**
Business	5,281	100	52.81	27	**25/50**	**25/50**	1.54	1.54	**40/80**	1.3375	0.5	0.77	100	0.5281
Storage/Mechanical	2,765	100	27.65	14	100	100	0.14	0.14	100	0.14	0.5	0.07	1000	0.02765
		0	0	0	125	65	0	0	200	0	0.67	0	500	0
Classroom	7,889	20	394.45	198	125	65	1.584	3.046154	200	0.99	0.67	1.06128	500	0.7889
Theater		**Fixed Seating**	0	0	125	65	0	0	200	0	0.67	0	500	0
Laboratories	6,638	50	132.76	67	125	65	0.536	1.030769	200	0.335	0.67	0.35912	500	0.26552
Assembly (unconcentrated)	2,661	15	177.4	89	125	65	0.712	1.369231	200	0.445	0.67	0.47704	500	0.3548
Shafts														
		Total =	786			**Total=**	5	8	**Total =**	4	**Total =**	**2**	**Total =**	2
				Total Men Toilets (Toilets - Urinals) =			**3**							

Level #	Occupant Load =	Exit Capacity =

Toilets: (#M/W)/25 for the first 50 and /50 every # after that where equation would be =2+(J9-50)/50

Lavatories: (#M/W)/40 for the first 80 and /80 every # after that where equation would be =2+(J9-80)/80

Project # 12543 Montgomery College- Leggett B

Preliminary Occupant Load and Plumbing Fixtures

Penthouse	Total Area =				Toilet Factor		# of Toilets		# of Lavatories		# of Urinals		# of Drinking	
Occupant Load Classification	**tal Area ($**	**Occupant Load Factor**	**Occupant Load**	**# Men/Women**	**Men**	**Women**	**Men**	**Women**	**Factor**	**# Per Gender**	**Factor**	**Men**	**Factor**	**#**
Business	300	100	0	0	**25/50**	**25/50**	1	1	**40/80**	1	0.5	0.5	100	0
Storage/Mechanical	2603	100	26.03	14	100	100	0.14	0.14	100	0.14	0.5	0.07	1000	0.02603
Exhibits/Mercantile		30	0	0	125	65	0	0	200	0	0.67	0	500	0
Classrooms		20	0	0	125	65	0	0	200	0	0.67	0	500	0
Theater		**Fixed Seating**	0	0	125	65	0	0	200	0	0.67	0	500	0
Laboratories		50	0	0	125	65	0	0	200	0	0.67	0	500	0
Assembly (concentrated)		15	0	0	125	65	0	0	200	0	0.67	0	500	0
Shafts														
		Total =	27			**Total=**	2	2	**Total =**	2	**Total =**	**0**	**Total =**	1
				Total Men Toilets (Toilets - Urinals) =			**2**							

Level #	Occupant Load =	Exit Capacity =

Toilets: (#M/W)/25 for the first 50 and /50 every # after that where equation would be =2+(J9-50)/50

Lavatories: (#M/W)/40 for the first 80 and /80 every # after that where equation would be =2+(J9-80)/80

APPENDIX G

GREEN BUILDING PROGRAM

INTRODUCTION AND VISION

The Montgomery College Catherine and Isiah Leggett Math and Science Building (MCMSB) on the Takoma Park/Silver Spring Campus has a goal to embrace sustainable design, and to achieve LEED certification under the US Green Building Council's Leadership in Energy and Environmental Design (LEED) for Building Design and Construction (BD&C), version 4.0 (v.4). The project has been registered with the USGBC. SmithGroup will serve as the LEED project Administrator. The project will be the first on the Takoma Park campus to pursue LEED Version 4. The MCMSB project has a minimum goal of reaching a LEED Silver rating, but LEED Gold or higher is desirable.

As a publicly funded project, the MCMSB must also follow the requirements of the 2017 Maryland High-Performance Green Building Program. Compliance requires that projects achieve LEED Silver at a minimum, but also to strive for a higher level of LEED Certification. Additionally, the following LEED credits must be implemented into the project:

- Light Pollution Reduction
- Outdoor water use reduction of 50% or more
- Regulated indoor water use reduction of 35% or more
- 15% improved energy costs over the minimum requirements of the IECC 2015 energy code
- 75% minimum diversion of construction waste
- Meet low-emitting materials requirements
- Complete Construction IAQ management during construction
- Provide metering and monitoring of energy and water use

The Sustainable Design Workshop was held on December 5, 2018 including broad participants from the College and the design team. By holding the workshop in the early concept phase, outcome from the workshop have informed the design during the schematic design. The purpose of this meeting was to establish a sustainable vision to guide the project design and to map out next steps towards pursuing holistic sustainable design strategies.

The outcomes of the workshop were incorporated in to the approach described within this plan. The structure of the LEED system is used within this report to organize the discussion and recommendations.

SCORECARD

A scorecard has been included in the following pages. Points marked with a "Yes" have been incorporated in the schematic design deliverable or are planned to be incorporated in the design. These credits would provide 59 points, enough to meet the target for LEED Silver Certification. In addition to those 59 points, there are 40 additional points that can be earned depending on the development of the design concept and the project budget.

Copies of the LEED scorecard, which summarize the points to be targeted, follows below.

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Y	?	N			
1			Credit	Integrative Process	**1**
7	**7**	**2**		**Location and Transportation**	**16**
		16	Credit c1	LEED for Neighborhood Development Location	16
1			Credit c2	Sensitive Land Protection	1
		2	Credit c3	High Priority Site	2
2	3		Credit c4	Surrounding Density and Diverse Uses	5
3	2		Credit c5	Access to Quality Transit	5
1			Credit c6	Bicycle Facilities	1
	1		Credit c7	Reduced Parking Footprint	1
	1		Credit c8	Green Vehicles	1
6	**4**	**0**		**Sustainable Sites**	**10**
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
	2		Credit	Site Development - Protect or Restore Habitat	2
1			Credit	Open Space	1
1	2		Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1
7	**4**	**0**		**Water Efficiency**	**11**
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2			Credit	Outdoor Water Use Reduction	2
4	2		Credit	Indoor Water Use Reduction	6
	2		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1
17	**14**	**2**		**Energy and Atmosphere**	**33**
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
3	3		Credit	Enhanced Commissioning	6
10	8		Credit	Optimize Energy Performance	18
1			Credit	Advanced Energy Metering	1

	2		Credit	Demand Response	2
	1	2	Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

5	**6**	**2**		**Materials and Resources**	**13**
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
	3	2	Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - EPD	2
1	1		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

10	**1**	**5**		**Indoor Environmental Quality**	**16**
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
2	1		Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
2			Credit	Interior Lighting	2
		3	Credit	Daylight	3
		1	Credit	Quality Views	1
		1	Credit	Acoustic Performance	1

3	**3**	**0**		**Innovation**	**6**
1			Credit	Green Education	1
1			Credit	Green Cleaning	1
	1		Credit	Innovation	1
	1		Credit	Innovation	1
	1		Credit	Innovation	1
1			Credit	LEED Accredited Professional	1

3	**1**	**0**		**Regional Priority**	**4**
1			Credit	Outdoor Water Use Reduction	1
1			Credit	Indoor Water Use Reduction Threshold 3	1
1			Credit	Optimize Energy Performance	1
	1		Credit	Protect and Restore Habitat	1

59	**40**	**11**	**TOTALS**	Possible Points:	**110**

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

APPENDIX H

SCHEMATIC DESIGN COST ESTIMATE

SCHEMATIC DESIGN COST ESTIMATE

ESTIMATE TO BE PROVIDED UNDER SEPARATE COVER.