UNIFIED STATE LABORATORIES

MODULE 2

JANUARY 22, 2013

THE UNIFIED LAB GROUP

a collaboration of VCBO Architecture, SmithGroup, and Big-D Construction

Table of Contents

Introduction 1.1

- Project description
- Departmental organization

Executive Summary 2.1

Module 2 Directives 3.1

- Program accommodations
- Site considerations and concepts
- Architectural narrative
- Structural narrative
- Mechanical narrative
- Electrical narrative
- High performance buildings

Code Analysis 4.1

Program 5.1

- Program summary
- Module 1
- Module 2

Economics & Labor 6.1

- Schedule
- Cost estimate

Site design 7.1

Module 2 Design 8.1

Project Description

Building Summary by Use

Module 1

Department of Health
Microbiology
Chemistry
Laboratory Improvement
Management Services
Administration
Forensic Toxicology
Training Labs
Shared Spaces

Module 2

Department of Agriculture and Food
Office of the Medical Examiner
Department of Public Safety Forensic Laboratory
Remaining Shared Spaces

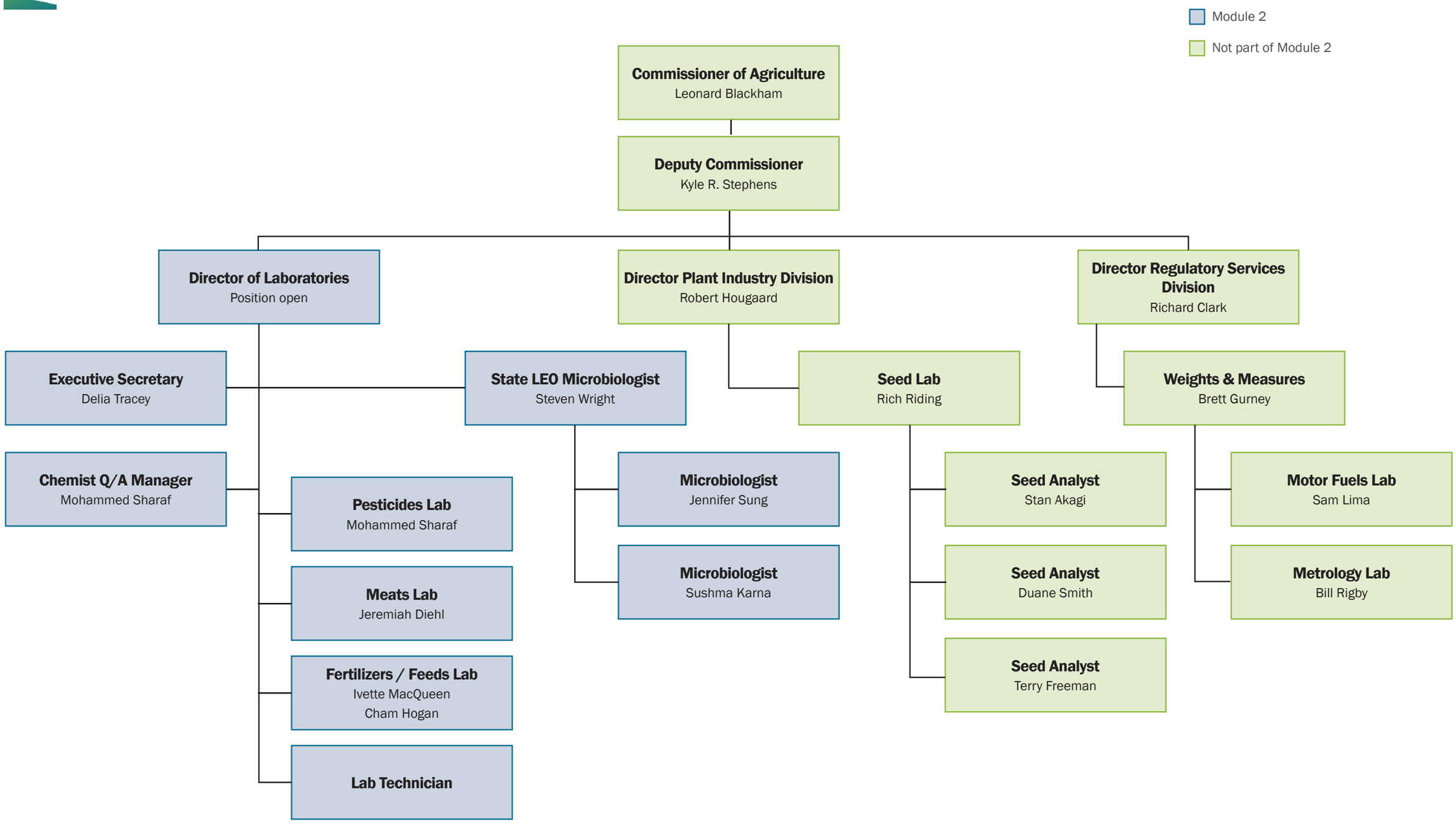
The purpose of this document is to report on the status of efforts made toward the complete realization of the Unified State Laboratories Campus. When the original program was completed in late 2006, three separate buildings were proposed, and it was decided to proceed with construction in three phases, one for each Module, pursuant to subsequent funding cycles.

At the outset of design efforts begun for Module 1, it was understood that program verification and concept design for the first phase could not proceed prior to the development of a complete Campus Masterplan. Therefore it became necessary to envision the site as a total package and develop concept proposals for all three buildings which placed an emphasis on integration, collaboration and shared resources. More on the development of the Campus Masterplan is detailed under the Architectural Narrative, which can be found later in this document.

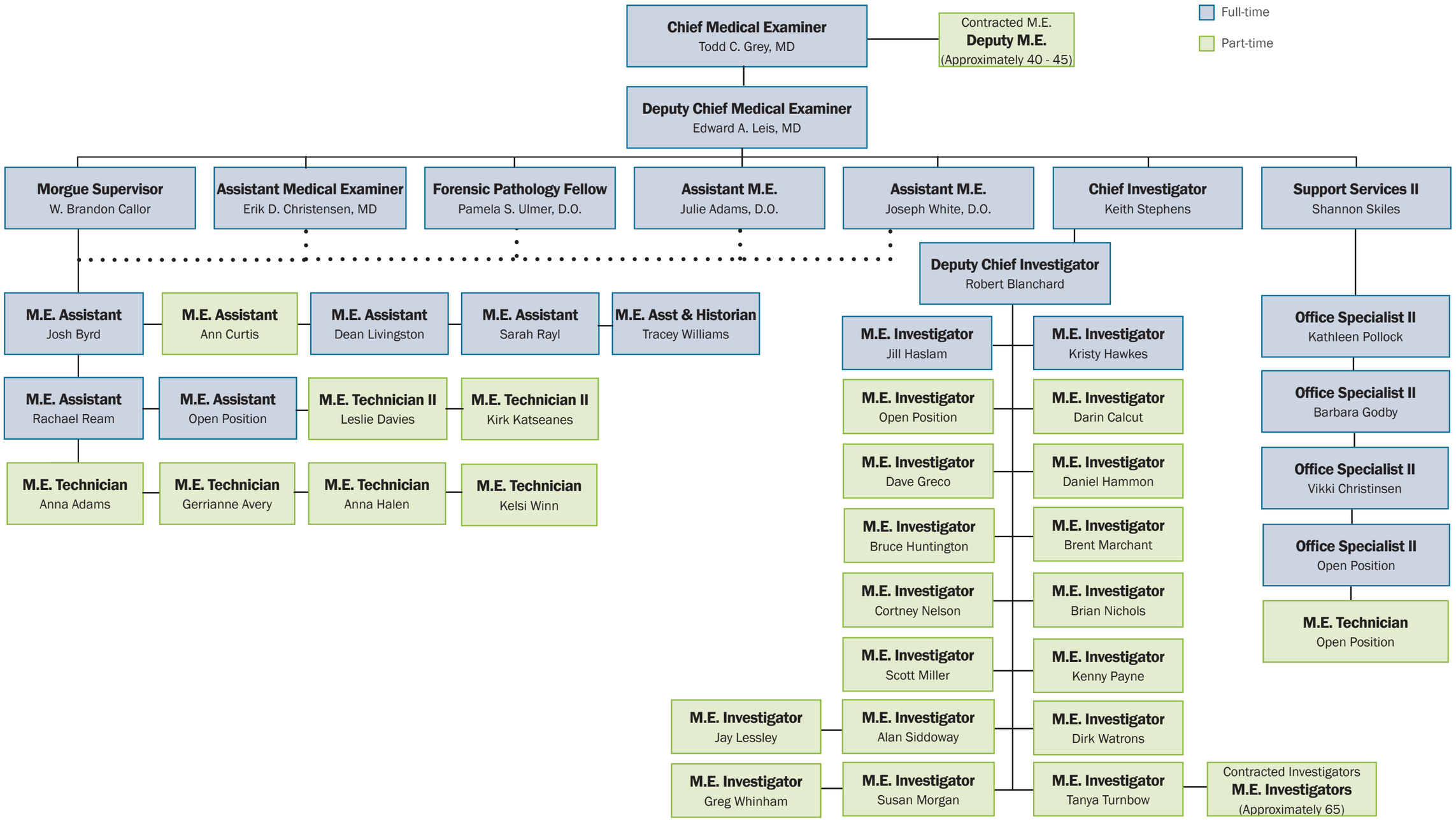
During the Spring of 2010, discussions between the four lab departments and DFCM resulted in an updated and more realistic master plan to consolidate Modules 2 and 3 into one building, while disaggregating several components from the Department of Agriculture's program to separate off-site facilities.

It was determined that Metrology, Motor Fuels, and the Seed Entomology labs, which were all heavier duty labs and not necessarily compatible with the consolidated lab functions, would be removed from this site to make room in Module 2 for the Crime Lab. The remaining offices for the Bureau of Lab Improvement which could not be originally accommodated in Module 1, and had been planned for inclusion into Module 2, had meanwhile found a home in vacated space in Module 1.

The design proposal for consolidating Modules 2 and 3 in this document is based on the original program completed in 2006, but completely reworked and updated during the summer of 2010 - and verified and further updated in January 2013. VCBO/SmithGroup toured the existing facilities, conducted in depth interviews with lab directors and pertinent lab personnel, and revisited building efficiency factors and shared lab spaces. In the end, a workable consensus program was developed with a subsequent design concept. What has emerged from this collaborative analysis is a fully integrated, efficient, state of the art science complex, and one which will well serve the State of Utah for many decades to come.


Module 2
Not part of Module 2
Commissioner of Agriculture
Leonard Blackham
Deputy Commissioner
Kyle R. Stephens
Director of Laboratories
Position open
Director Plant Industry Division
Robert Hougaard
Director Regulatory Services Division
Richard Clark
Executive Secretary
Delia Tracey
State LEO Microbiologist
Steven Wright
Seed Lab
Rich Riding
Weights & Measures
Brett Gurney
Chemist Q/A Manager
Mohammed Sharaf
Pesticides Lab
Mohammed Sharaf
Meats Lab
Jeremiah Diehl
Fertilizers / Feeds Lab
Ivette MacQueen
Cham Hogan
Lab Technician
Microbiologist
Jennifer Sung
Microbiologist
Sushma Karna
Seed Analyst
Stan Akagi
Seed Analyst
Duane Smith
Seed Analyst
Terry Freeman
Motor Fuels Lab
Sam Lima
Metrology Lab
Bill Rigby

Office of the Medical Examiner



Forensic Scientist Quality Manager
Karen Elliott

Forensic Lab Manager
Trinette Mullineaux
Murray PD

Forensic Lab Manager
Deborah Herrera-Parkin
Cottonwood PD

Laboratory Director
Jay Henry
Firearms Technical Leader

Support Services Coordinator II
Georgia Difrancesco

Chief Forensic Scientist
Pilar Shortsleeve

Forensic Scientist Manager
Any Pacejka
Latent Prints / Impressions

Senior Forensic Scientist
Elisa Macken Farmer
Technical Leader Latent Prints

Senior Forensic Scientist
Trent Grady
Technical Leader Impressions

Forensic Scientist II
Kelcee Ventura Vail

Forensic Scientist II
Bonnie Stewart

Forensic Specialist
Bonnie Wilder Holden
Evidence/AFIS

Forensic Scientist Manager
Chad Grundy
Biology
Technical Leader Serology

Senior Forensic Scientist
Suzanne Miles

Senior Forensic Scientist
Michele Marfori
Technical Leader DNA

Senior Forensic Scientist
Rebekah Hull Kay

Senior Forensic Scientist
Mandi Erwin Van Buren

Forensic Scientist I
Darren Bowles

Forensic Scientist I
Heather Larsen

Forensic Scientist I
Treasa Chopp

Senior Forensic Scientist
Lou Smith

Forensic Scientist I
Justin Masin

Forensic Scientist Manager
Todd VanBuren
CODIS
Technical Leader Crime Scene

Senior Forensic Scientist
Ryan Barney

Forensic Specialist
Tonya Fischer

Forensic Scientist Manager
Jennifer McNair
Chemistry/Trace
Technical Leader Chemistry / Paint

Senior Forensic Scientist
Mike Hepworth

Senior Forensic Scientist
Bryan Holden
Technical Leader Fibers

Forensic Scientist I
Amberlee Neibaur

Forensic Scientist II
Mike Saunders

Forensic Scientist I
Kelly Whittle

Forensic Scientist Manager
Bo Smith
Northern / Southern Lab

Senior Forensic Scientist
Justin Bechaver
Northern Laboratory

Senior Forensic Scientist
John Gerlits
Southern Laboratory

Forensic Scientist II
Terry Lamoreaux
Southern Laboratory

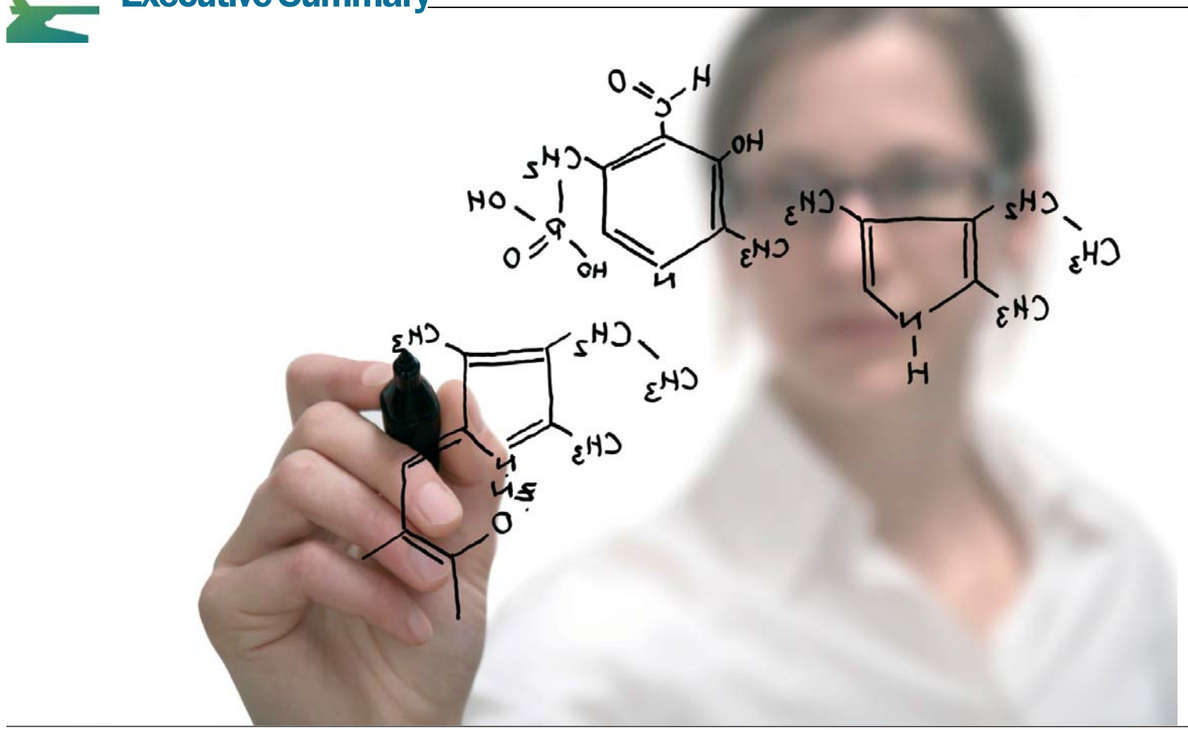
Forensic Scientist II
Jennifer Gelston
Northern Laboratory

Forensic Scientist II
Brent Horn
Volunteer

Forensic Scientist Manager
Scott McDaniel
Crime Scene / Evidence

Forensic Specialist
Michelle Harward
Evidence

Forensic Specialist
Alexis Nelson
Evidence



Overview of Module 2

Module 2 on the Unified State Laboratories Campus will replace the existing overcrowded and outdated labs at the Department of Agriculture. The new Module 2 facility will include modern safety and engineering features currently lacking at the existing lab such as biological safety cabinets, externally exhausted fume hoods, negative air pressure lab spaces, and flexible open sample processing areas designed for updated equipment and instrumentation needs and dedicated Biosafety facilities. The existing Bacteriology Lab that tests dairy products is extremely undersized and outdated. Module 2 will provide space for modern testing equipment that is greatly needed.

The Office of the Medical Examiner (OME) will also be relocated to Module 2 in order to share common lab and support functions. Working closely with both Forensic Toxicology and the Crime Lab. Current space at the OME is poorly located to serve the entire State, especially in the case of a major emergency or catastrophe. Capacity for body delivery, storage and autopsy is insufficient and relies on dated equipment, mechanical systems, HVAC and lab space.

Module 2 will also replace the undersized and outdated Department of Public Safety Crime Laboratory housed in the Rampton Building, which has numerous deficiencies limiting the ability of the Department to accomplish its mission. Functions that will be performed at the new Crime lab include:

- Forensic chemistry - controlled substance analysis, clandestine drug lab analysis
- Forensic biology - stain identification, DNA, and CODIS data basing
- Impression evidence - latent prints, shoe and tire and AFIS data basing
- Crime scene investigation and reconstruction
- Firearms and toolmarks - ballistics, shooting scene reconstruction, serial number restoration
- Trace evidence - video/audio analysis, hair/fiber testing, paint, glass and fire debris analysis

Intelligent Planning Saves Money and Lives

Module 2 is important to the State of Utah's citizens and public servants. The need for these critical laboratory buildings is key to public safety and the ability of the laboratory users and State employees to function in their roles. These laboratories are important, especially as Utah's population continues to increase rapidly. In addition, the existing infrastructure and functional resources for the current labs are strained, putting the occupants at risk. The laboratory agencies are operating beyond capacity and are unable to keep pace with the increased demands for food safety and crime investigation, commensurate with the population growth.

Distinct from the laboratories' lack of infrastructure capacity issues are compelling operational life safety concerns which plague the existing laboratories, such as lack of adequate storage for biohazardous materials and insufficient space and equipment for modern agricultural and forensic procedures. In addition, there is a need for greater perimeter security for essential functions in these critical State buildings.

Utah is working to position itself as a regional technology leader, a strategy that is a competitive necessity as States increase their efforts to attract innovative, high-tech businesses and develop long-term economic assets. It is appropriate for Utah to support best-of-class technology, specifically public laboratory functions. This will serve to optimize position among peer States, enhance reputation as technologically progressive, and be proactive in allocation of funding resources.

Economies of Scale

Shared infrastructure for both Module 1 and 2 at the Unified State Lab makes economic sense. The new campus, planned for construction on State owned land in Taylorsville adjacent to the Rampton Building, has already been efficiently master-planned for both Modules. There is no need for a "do-over" or duplication of efforts. This comprehensive site planning has incorporated comments from stakeholders from all three entities, as well as the Department of Health, to economically accommodate their specific and unique requirements.

Site infrastructure supporting the future module is already in place including the utilities that are structured and stubbed out for Module 2. Site investigation is complete, including a site geotechnical report and a comprehensive fault study. Site drainage has already been constructed in anticipation of future Modules as well. A comprehensive parking analysis is complete and very little will need to be added. Deliveries and receiving provisions are understood and planned, as is expansion of site circulation. The full laboratory campus will facilitate a number of economies including:

- Consolidation of laboratory-specific utilities locations
- Containment of biowaste/biohazards on a single site
- Consolidation of deliveries, services, landscaping, etc.

Stakeholder buy-in has been achieved as part of the preliminary planning. The three Laboratory departments have participated in the programming and master planning process, along with input from the Department of Health in Module 1, and have provided the critical feedback that will allow the Unified State Laboratories Campus to be realized as efficiently and economically as possible. Some other less tangible, but none-the-less highly beneficial outcomes of this consolidation include the potential to maximize interpersonal communications. The consolidated campus will provide opportunities for heightened inter-departmental interactions that will allow for more efficient communications, collaboration opportunities, and most importantly, the cross-pollination of ideas. The interrelationship between the two modules is understood at a campus and departmental level. Functional adjacencies have already been determined, relative sizes are already established, and the incorporation of site amenities (sun, air, light) is already proven and successfully implemented in Module I.

Application of Lessons Learned Saves Money and Time

A great deal was learned during the planning, design, and construction of Module 1 that can be applied to Module 2. The best use of granular information of this nature is to apply it going forward while it is still fresh and relevant. The time lag between the initial program and the actual implementation of Module 1 required some adjustments that were ultimately more costly to the state than a timelier implementation would have been. At this point, the Unified State Laboratories Program verification and realignment has been completed. Net-to-gross ratios have been adjusted and are now in line with reality, functional spaces sizing has been corrected, and best of all, the highly efficient planning modules already established for labs and offices in Module 1 can be applied to Module 2.

Issues related to materials and construction offer additional efficiencies. For example, the refined and streamlined construction detailing worked out for Module 1 can apply to Module 2. In addition, material costs and availability are fully understood and in line with today's dollars. The exhaustive cost studies already completed for Module 1 are applicable to Module 2. Another area of construction efficiency worth considering is the integration of the State's High Performance Building Requirements. The HPBR items already included in Module 1 can be applied to Module 2, easily and cost-effectively.

Economic impacts

The timely implementation of large projects such as the Unified State Laboratories will support the creation of many jobs for an extended period of time across the employment spectrum of the State including such diverse fields as the Laboratories' users, State employees, contractors and their subcontractors and laborers, local manufacturing, and local design professionals, project managers and administrators.

Conversely, the delay of Module 2 will cost more money than it saves, over both the long and short term as the cost of materials and labor rises. The State's ability to deliver these key services may be seriously compromised as population increases and as new, unforeseen potential public safety issues emerge. There could be unneeded deaths/tragedies caused by delay. There could also be public outcry and questions arising over the State's justifications for delaying these critical infrastructure improvements.

Note: As published in the Utah State Building Board's Five Year Building Program prepared for the 2011 Legislative session, discrepancies may exist in the square footage and cost amounts. This summary takes its numbers from the original Program for the Unified State Laboratories, and finds that the efficiency factors need to be resolved and trued up. The State will likely find the adjusted figures provided herein more favorable to both cost and schedule than those previously published.

Program Accommodations

The Program Validation for Module 1 was conducted during August 2007 by VCBO Architecture/SmithGroup to verify assumptions and criteria generated in the original program, dated September 2006. Further verification and updates were conducted in January 2013.

Interviews were held with user groups representing each of the five Department of Health Laboratory bureaus designated for Module 1 to gather in-depth information about all of their required spaces and functional relationships. Several follow-up meetings were held to verify the compiled information and a detailed understanding of specific needs. The total square footage at the conclusion of this initial interview process was 108,000 gross square feet.

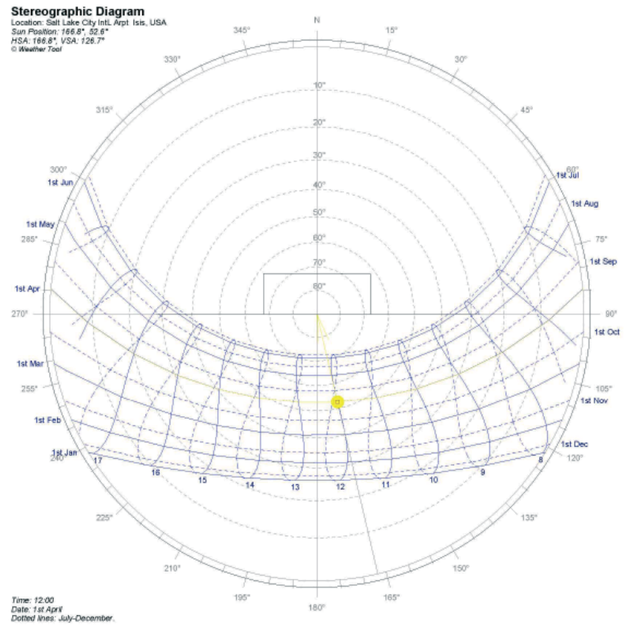
As directed by the Sate, reductions were presented by VCBO Architecture/SmithGroup and generally accepted by Director of Public Health Labs, Dr. Patrick Luedtke, with confirmation by his Bureau Directors. These reductions brought the total building area to 88,000 square feet. In an effort to continue to bring the numbers in line with State mandates and with the construction budget, additional meetings were conducted to consider specific reductions to each Bureau. This furthered the design team's progress toward achieving the median goal of 74,300 square feet. This objective incorporated an aggressive efficiency factor of 65% and an optimistic cost estimate of $348 per square foot.

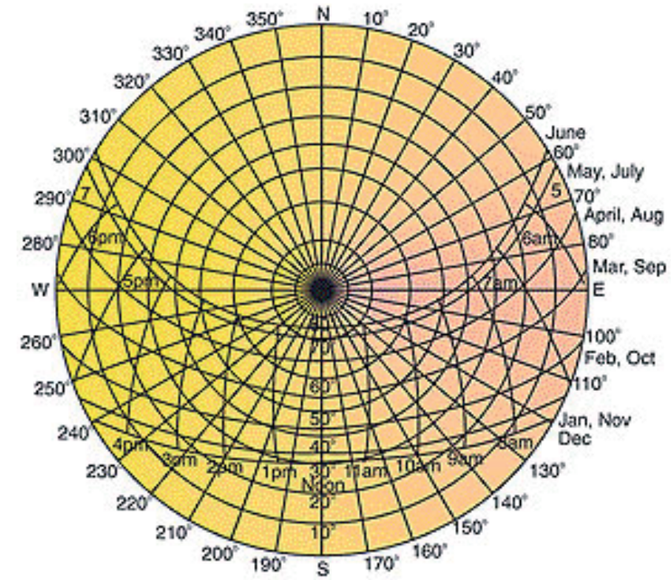
The Program Verification effort conducted by VCBO Architecture/Smith Group was intended at first to be a Program Validation of the original programming document dated September 2006. However, during initial discussion with DFCM and the State Health Department, two issues quickly became very clear. First, the original program budget of $298 per square foot was inadequate for this type of lab-intensive facility, and; second, the building efficiency factor (net/gross) of 80% used in the original program was naively optimistic and fundamentally flawed.

The Program Verification process facilitated the generation of the final workable program and gave the design team a solid foundation for Module 1. Much was learned during this process which is directly applicable to the program generated for Module 2. Net to gross ratios are now understood and adjustments can be made accordingly with the confidence of workability. Correct sizing of functional laboratory and office spaces has been achieved, and base assumptions can be directly applied to Module 2. Moreover, during the initial design phase of Module 1, highly efficient planning modules were developed which can also be directly applied to Module 2.

The entire Unified State Laboratories Campus, incorporating both Modules and their associated site functionality, was master-planned during the initial design phase prior to Module 1. Great efforts were made to program and design the site to facilitate interaction and share resources among the various campus buildings. Parking for Module 1 was kept to a minimum, and the decision was made to share future parking requirements with the adjacent Rampton Building by making use of the very large and under-utilized existing parking lot, thereby reducing the demand for additional parking construction.

Underground site utilities were also designed and constructed to accommodate the future Module.





Site Considerations and Concepts

Site Design Drivers

The site consists of about 15 acres and is located adjacent to the Rampton Building to the south, a facility for the Utah Department of Transportation. To the north is a large corporate facility for American Express. Interstate 215 defines the eastern edge of the site while 2700 West lines the western edge of the site.

Views

The site offers extraordinary and largely unobstructed views of the Wasatch Mountain Range, and this amenity was a primary site planning catalyst. Orienting interior office and laboratory space to provide mountain views and balancing those with the proper solar orientation are the primary drivers of Campus configuration and planning. The views to the east and southeast are the most prominent. As such, the office environments on each level are specifically oriented to the southeast, while the laboratories, facing north and south are also afforded significant views and daylighting.

Passive Solar Design

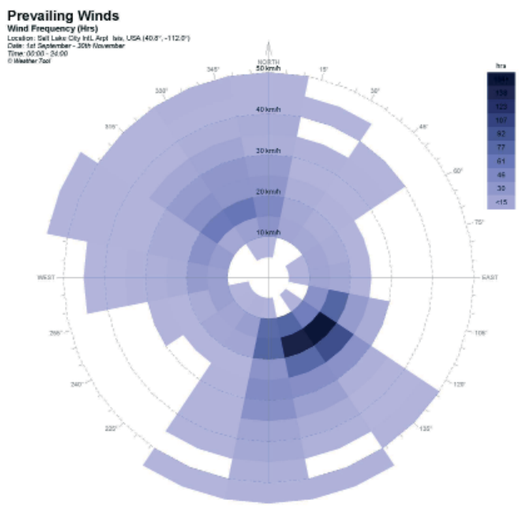
Campus and building planning concepts were also developed relative to passive solar design strategies. In both campus buildings the flexible laboratory modules face north and south. Ambient north light will flood the northern lab blocks and will not require active shading strategies. In all cases, southern light will be controlled with horizontal sun shading devices integrated into each building's south facade. The design team has also been studying the feasibility of integrating photo-voltaic panels into these sun shading devices, providing dual functionality. The harshest sun of all is the western afternoon sun. Recognizing this, the design for both buildings strategically turns its back to the west, thereby reducing solar gain and potentially overall operational costs long-term. Protection from the eastern morning sun will be balanced with a goal to preserve, to the greatest extent possible, the views to the east. This will be accomplished by utilizing large roof overhangs on the east of each building to create shade.

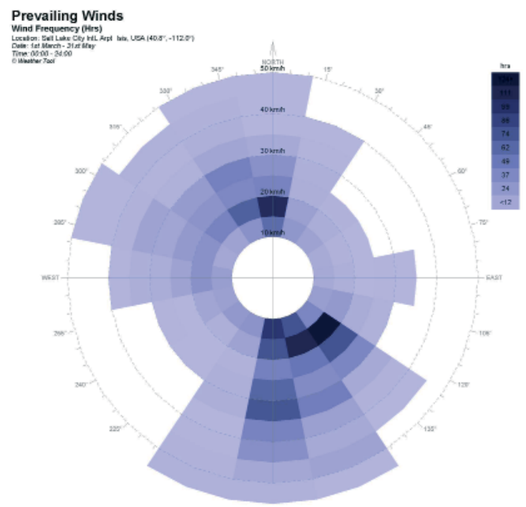
Parking and service

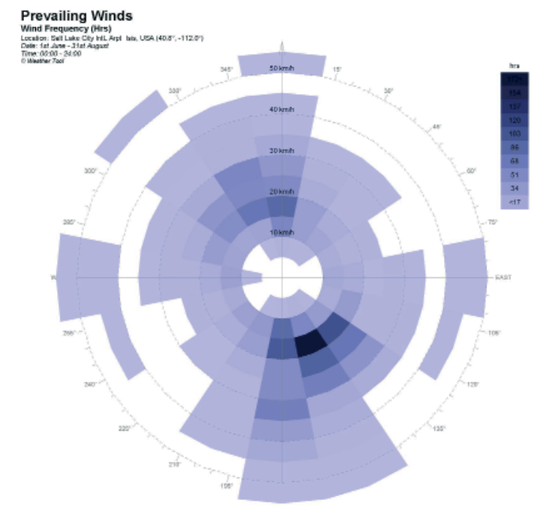
The campus is planned to extend the positive functional aspects of the existing site, while dealing with moderate topographical change and stringent security setback requirements. Service and delivery vehicles are planned to enter the site and approach all buildings from the north. This allows for the use of the existing curb cut to become a shared entry and direct the main public interface to the south of the site towards the main entry.

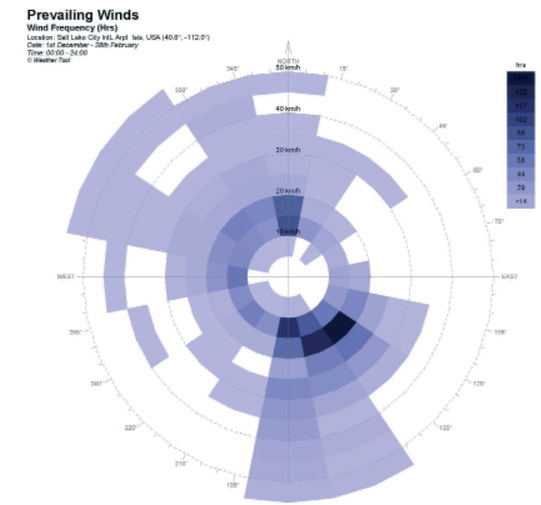
Service docks and yards, mechanical and electrical yards, waste/dumpster enclosures, and other "back of house" facility needs will generally be located on the north side of the site, out of sight from the main public entries on the south and east. Access to these service areas will also be more tightly controlled and regulated. This orientation also encourages sharing many of the similar service requirements of both modules.

Department of Defense security guidelines have significantly impacted the campus design with regards to setbacks. These provisions mandate that no vehicles may be allowed within 85 feet of Module 1. Additionally, a 150 foot setback is required from the property line to the building envelope.









Prevailing Winds

The design team studied the prevailing winds on the site, which predominantly blow from the southeast. A primary campus driver is to capture these breezes at certain times of the year and provide natural ventilation for the interior office spaces, via the integration of operable windows into building facades.

Fault and Soils Studies

A major geologic fault was brought to the attention of the team during design. It crosses the site from north to south and forced Module 1 to be relocated 200' to the east, late in Design Development. It also forces additional seismic resistance to be designed into the structure of all modules. The best method of respecting these additional constraints on structural design has already been developed for Module 1 and will be applied accordingly to Module 2.

Soil borings and analyses have already been completed and can be readily amended for Module 2. Moreover, the structural design of footings and foundation has already taken into account the impact of the soils report on their engineering.

Architectural Narrative

Campus Masterplan

In developing consensus regarding the planned growth of the campus, the design team tested a multitude of broad-brush masterplan concepts. The Steering Committee agreed upon a scheme that organizes the two Modules around a centralized shared courtyard. The masterplan also provides for a single common entry that serves both buildings on the campus at full build out.

The central courtyard is envisioned as an 'Oasis' space for staff that provides shade as well as outdoor shared common space for the entire campus. This courtyard is also envisioned to become part of an over arching unified identity for the campus, its staff and it mission. Currently, the departments and agencies that will occupy the site are scattered in a variety of locations with multiple levels of duplication between infrastructure, equipment and functionality. The masterplan for the campus will not only create a legible identity for these critical state agencies, but will reduce these duplications and operational costs and increase overall efficiency and collaboration.

Planning and Stacking Goals

The planning of the building and site is one of the most critical aspects of creating a successful, functional project. The design team applied a number of important principles and goals to both the planning of the site and to the planning of the all interior research and office spaces. These principles have yielded a highly functional stacking and zoning concept which will provide users of both buildings with a high quality work environment.

Floor Plate Efficiency

Working with a 'modular' laboratory planning strategy, maintains a flexible facility while accommodating specific requirements for all spaces. With an eye to budget as a primary driver of the project, the design team developed a series of highly compact and efficient floor plans. In an effort to keep building circulation to a minimum, all laboratories are organized around a single double loaded corridor that connects laboratory and office functions.

Workflow Efficiency

Each building is planned to take into consideration the wide variety of processes that occur within the facility and to maximize the efficiency and movement of people, materials and samples.

Maximize Daylight and Views

Reducing operational costs by reducing lighting loads is a critical aspect of each design. Creating views and maintaining a connection to the outdoor environment is critical to staff productivity and morale. It was a primary goal of the design team to provide daylight and views to a maximum of all interior workspaces.

Connectivity

Promoting a sense of community for the campus is a key element of the site planning objectives. Additionally, creating an equal sense of community on the interior, and providing for multiple levels of connectivity is an important design objective. By centrally locating common areas such as the break rooms, conferencing areas and 'huddle' spaces, users are more likely to run into their counterparts, stop and talk and exchange ideas and experiences. At the ground level, the seminar room, the main cafeteria, and the training spaces all face the shared courtyard. This will foster a sense of connectivity in the future between building occupants. Vertical connectivity is also important. The design provides for spacious and well lit stairs that promotes their use. A high volume space at the main lobby provides visual connectivity between the floors and gives each of the bureaus a visibility from the 'front door.'

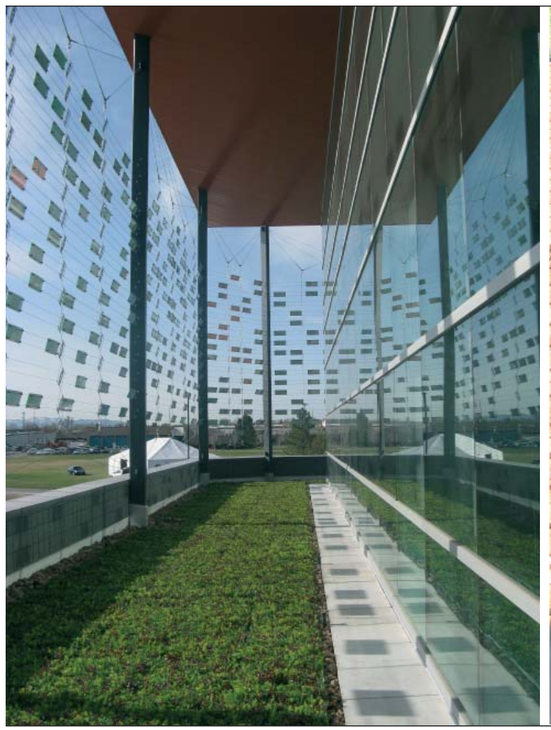
Exterior Material Palette

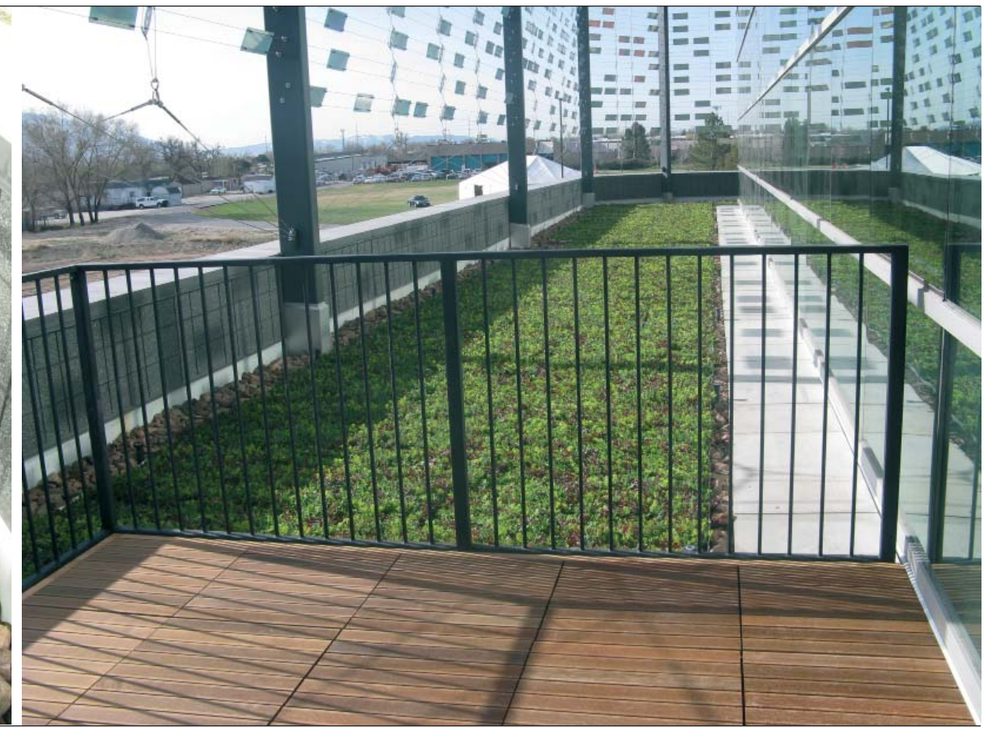
The material palette is conceived to support the quality and identity appropriate for a State facility of this stature and to address the need for durable and low maintenance materials long term. Not only is it critical to invest up front on materials that are durable and aesthetically appropriate, it is paramount that the exterior materials provide the State with a low to no maintenance exterior skin to prevent the need for replacement and repair to reduce operational costs.

The exterior material palette is designed to be simple but also elegant and reflective of the mission of the three Departments in creating an 'excellent workplace.' The palette is comprised of three basic materials:

1. Integral color ground-faced CMU
2. Exterior metal panel system
3. Insulated high performance glazing w/ aluminum storefront and curtainwall systems

In addition to this basic palette, the design includes important aluminum and steel shading elements that will preserve goals of daylighting and views while providing adequate protection from the sun. These shading elements are critical to reducing overall HVAC loading on the mechanical systems and will reduce energy consumption and operational costs over the life of the building.





Sustainable Strategies

Form Follows Function and Sustainable

The design of the facility is a specific reflection of the internal functions. It is also based on a good number of important sustainable strategies.

As previously mentioned, the design team proposes the use of photo-voltaic panels to both shade the façade from the southern sun, while also creating and storing energy for the facility. The team has explored partnerships with the local utility provider and other vendors to implement the cost/benefit of this strategy.

The Office Component is clearly represented as a distinct element of the building form. A distinctly recognizable public entry welcomes visitors and staff to an open volume lobby space that provides transparency into the office environments above. This is important for the range of training and outreach functions that the facility will provide.

The office environment is oriented to provide a large 'picture window' to the mountain views to the east and to address the common courtyard. Additionally, shared conference rooms and balconies all create light-filled common spaces that will engage the courtyard below and create a relationship with the future buildings surrounding the courtyard.

Daylighting

As part of the State of Utah High Performance Building Rating System, the project will strive for a minimum of four points in the Daylighting category.

Natural Ventilation

The main entry is designed as a large 'Breeze Scoop' that will capture the prevailing breezes and provide natural ventilation for the offices. Strategic placement of operable windows and transoms at interior office spaces will allow for breezes to enter the building from the southeast and to 'wash' thru the open office environment and exit at the north. This concept will be refined in subsequent phases.

Making Shade and Shading Facades

As previously mentioned, shading facades with glazing is critical. The development and detailing of the shade elements that are incorporated into the east, south and west facades have already been studied and will be refined in subsequent phases.

Additionally, the site design will work towards reducing the impacts of potential 'Heat Island' effect. Open space will be shaded to the greatest extent possible. Creating shade in the courtyard space through the landscape design will be important in creating a comfortable environment in the summer months.

Green Roof

There are a number of roof areas that are directly visible from the office environments. To improve the views from these offices, and to reduce additional potential for 'Heat Island' effect, economical Green Roofs are proposed. The Green Roof application occurs over the ground level common space that protrudes out from the volume of the upper office floors along the east edge of the building and over the Central plan space at the northeast corner of the building. Specifications and detailing of the Green Roofs have already been developed and will be implemented as appropriate in subsequent phases.

Structural Narrative

Basic Design

Each building is a 2-3 story steel structure with a large penthouse. The floor to floor elevation is typically 16'. In order to promote a flexible laboratory environment, the floors will been designed to meet strict vibration criteria. In all laboratory locations vibration is held at or below 4,000 micro inches per second. This performance is further assured by conducting the analysis with a walking speed of 75 steps/min (as compared to a standard 50 steps/min) throughout the laboratory and circulation areas. The office blocks will been designed to typical Class-A standards.

Ground Floor

The ground floor of each structure will be slab-on-grade, designed to satisfy the characteristics of the geotechnical report for the given site. The typical slab on grade will be 5" thick with #4 at 18" each way. A few spaces within given laboratories may have loads as high as 4,000 pounds per square foot which will require significantly more structural support. Slabs in these areas will be 12 to 16 inches thick, with two layers of reinforcing of #6 bars at 12" on center each way. Because of the substantial construction required, these loading criteria will be confirmed and the location of specific loads determined.

Each foundation system will be comprised of a conventional system of continuous and spot concrete footings at all columns. The footings will be designed based on an allowable soil bearing pressure of 3000 psf per the Geotechnical Study.

Steel Floor Framing

The general framing system of each building will consist of steel wide-flange composite beams supporting a 3" steel deck. The typical deck span will be 10' +/- to maximize the deck's efficiency and economy. Girders will typically span 30' +/- in the laboratories to increase space flexibility. The typical slab will be 3 1/2" of normal weight concrete over metal deck to support lab loads as well as help dampen vibrations. Beams will have minimal camber, and where camber is used it will be limited to 75% of the DL deflection. Nominal reinforcing will be provided directly over the grid line beams to assist in crack mitigation.

Steel Roof Framing

Roof framing for each building will be accomplished with a combination of open-web steel joists and steel wide-flange beams. At roof top mechanical areas, composite wide-flange steel beams will be used with concrete over 3" metal deck. This will simplify any fireproofing requirements and provide a clean surface from which to suspend HVAC loads. Accommodations for concrete housekeeping pads will be provided below mechanical equipment.

Wall Systems

None of the interior or exterior wall systems will be used to support gravity or lateral loads. They will instead be designed to support those required loads specified in the code with reference to wind, etc. Exterior panels will be supported from the structure. A few interior walls may be masonry, for security and durability reasons. These walls will be supported by thickened slab footings.

Steel Moment Frames

Moment frames will be placed typically around the perimeter of the building. The use of moment frames minimizes the impact on architectural characteristics and maximizes the flexibility between laboratory modules. The moment frames consist of wide-flange beams and columns. An option to consider would be to explore the use of braced frames. Braced frames consist of where wide-flange beams and columns with tube braces. Braced frames require close coordination and can possibly limit future space planning.

Codes and Standards

The minimum codes and standards that apply to the design of new buildings include current editions of the following:

International Building Code (Current Edition)

American Institute of Steel Construction (AISC) with Commentary

ACI 318 Building Code Requirements for Reinforced Concrete

American Iron and Steel Institute (AISI) specifications for the Design of Cold Formed Steel Structural Members

American Welding Society ANSI/AWS D1.1 Structural Welding codes

Steel Joist Institute (SJI) for Joists and Girders

Steel Deck Institute (SDI)

Mechanical Narrative

General

The Unified Laboratory Project will include all Mechanical systems and components including the following:

Utilities

Domestic water service connection

Fire service connection

Sanitary sewer connection

Storm drainage connection

Natural gas connection

HVAC & Plumbing

Laboratory waste water neutralization system

Pure water generation system

Lab vacuum system

Lab air system

Acid waste piping system

Lab gas piping system

Building compressed air system

VAV Air Handling and air distribution systems

VAV Manifolded Lab exhaust system

Dedicated exhaust systems

Exhaust energy heat recovery

Three stage evaporative cooling systems

Chilled water systems

Condenser water and heat rejection systems

Hot water heating systems

VAV & constant volume terminal units

Computer room and other specialized space conditioning systems

Building DDC energy management system

The following sound criteria will be used for the design of mechanical systems:

Open Offices:	NC35
Laboratories:	NC35
Private Offices	NC30
Conference Rooms	NC30

Design Parameters

The following Design Standards, including those listed in the SFO, will apply to all Modules:

ANSI Standards

ARS Facilities Design Standards

ASHRAE Handbooks

ASHRAE 90.1-1999

Industrial Ventilation Manual of Recommended Practice

International Building Code

International Plumbing Code

International Mechanical Code

International Fire Code

International Fuel Gas Code

NFPA Standards

SMACNA Duct Design, Third edition,

SMACNA HVAC Duct Construction Standards, Metal and Flexible,

Design Temperatures

The following design temperatures and conditions will be used to design systems and select equipment for all Modules:

	Winter	Summer
Outdoors	0°F db	96°F db/62°F wb (ASHRAE 0.4%)
Indoors	72°F db +2°F 10-30% RH	72°F db + 2°F 30-50% RH Evaporative Cooling 66°F wb/85°F db (ASHRAE 0.4%)

Interior heat loads will be determined during each building specific design phase. Generally, the systems will be designed on the following where specific information is not available:

Lighting:	1.5 watts / s.f.
Equipment, laboratories:	12 watts / s.f.
Equipment offices:	3.0 watts / s.f.

Ventilation for occupants will be 20 cfm per person except where ASHRAE Standard 62 has a greater requirement. Restroom ventilation will be in accordance with the International Mechanical Code with a minimum of 2 cfm exhaust per square foot of area. Fume hood face velocities, in general, will be designed at 100 fpm at 18" sash opening.

Temperature Control Zoning

Exterior zones:	500 occupancy sf. max
Interior open office zones:	2,000 occupancy sf. max
Walled offices:	Maximum of three offices with the same exposure and internal loads (people and equipment)
Meeting/Conference Rooms:	Separate zones
Print/Special Use Rooms:	Separate zones
Laboratories:	Separate Zones
Computer/Telecomm Server Rooms:	Dedicated equipment

HVAC Systems

Central Plant

Heating water will be supplied from two natural gas-fired, hot water boilers, each sized for 67% of the building load. Two steam boilers shall be installed to provide the steam process load for glass wash and sterilization requirements as needed for each building. Chilled water shall be supplied from two hermetic electric motor driven centrifugal chillers, each sized for 50% of the load. An indoor condenser water sump will be provided. Variable flow pumping shall be used for chilled water and building heating hot water. Two counter flow cooling towers will be used to reject building heat. All wetted surfaces of the towers will either be stainless steel or plastic. The plant will also house the fire alarm riser, domestic water pressure reducing station, domestic water heaters, RO equipment, and lab compressed air and vacuum systems.

The Central Plant for Module 1 has been designed such that the building may be expanded and future boilers, chillers, cooling towers, and other mechanical equipment may be added to accommodate Module 2.

Air Handlers

The supply air handlers will be custom manufactured with mixed flow or plenum fans, chilled water cooling coils, air washers with bypass dampers, indirect precooling coils, glycol solution pre-heating coils, pre- filters, final filters, outside air intake dampers, return dampers. The air handlers shall be double wall construction with 4-inch thick walls. The internal liner upstream of the air washer section will be perforated galvanized metal. Downstream of the air washer, the liner will be solid galvanized steel.

Three stage evaporative cooling will be utilized to provide cooling for both the office and lab spaces in each building. The first stage of cooling will be the air washer. The second stage of cooling will be the cooling tower by using the pre-cool coils. The final stage be provide by the chiller. With this arrangement, the chiller will only need to operate for a few weeks each year. The air washer can be used to add humidity during the winter months. The air handler serving each office block will be a recirculation design with economizer controls for up to 100 % outdoor air when the outdoor conditions are favorable. A minimum outside air damper with air flow measurement station and controls shall be provided to assure minimum ventilation rates are being provided. During the cooling season, the air handler will utilize 100% outside air so that the three stage evaporative cooling approach can be utilized.

Two air handlers will serve each building's laboratory spaces. Each unit will be sized at 60% to provide some redundancy if one unit is down for maintenance. These units will be connected into a common plenum and use 100% outdoor air at all ambient condition. Three stage cooling with a run-around hydronic heat recovery will be provided.

Air Distribution

Air will be distributed to spaces through insulation-wrapped, medium-pressure duct systems to the inlet of variable air volume (VAV) terminal units with insulation-lined, low-pressure distribution duct on the outlet side leading to ceiling-mounted air diffusers. In the lab areas, diffusers shall be displacement type to limit air velocities near the hoods to 50 FPM. A Ceiling return air plenum will be used in the offices spaces. All air supplied to the lab spaces will be exhausted.

Laboratory Exhaust

The laboratory fume hoods will need to be variable volume type. The exhaust from each hood will be controlled by a Phoenix variable volume exhaust valve. The Phoenix control system will maintain constant 100 FPM face velocity with any sash opening from closed to 18 inches open. Variable volume Phoenix valves will also be used to control the exhaust rate in the labs. Phoenix supply air valves with reheat coils will also be used. The general exhaust valve will be controlled in conjunction with the supply valve and hood valve to maintain lab temperature and room pressurization. An alarm system will be provided at each hood and will be connected to the Building Automation System. These hoods will be connected to a manifolded exhaust duct system. The laboratory hood exhaust fans shall be constructed from steel with an acid resistant baked phenolic coating on all surfaces. Two fans will be provided, each sized at 60% to provide some redundancy in the event of failure for either fan. Each fan will be installed inside an exterior air handling unit housing with a heat recovery coil and upstream filters. A VFD will be used to control the fan speed to maintain the required exhaust manifold pressure. An auxiliary intake damper at the fan will be provided to maintain stack velocities. The heat recovery coils will have acid resistant baked phenolic coating on all parts exposed to the exhaust air stream. Dampers will be provide to isolate each fan and system component to allow service while the remaining components are operational. The inside and outside of the stack shall also be coated.

Computer Rooms

Two Liebert computer room air units with air cooled condensers will be used to cool the Computer Rooms. Each unit will have humidification, air filtration, and smoke detection.

Perimeter Radiation

All exterior offices and labs will be provided with perimeter ceiling radiation panels. Control for these panels will be zoned to terminal box zones.

Controls

Direct Digital Control (DDC) system with graphics will be provided. There will be a front-end PC located in each building manager's office for central monitoring and control. All air-handling units, chillers, cooling towers, boilers, pumps and all VAV and FPVAV terminal units will have DDC controls, and will be tied to the central monitoring and control computer. Any miscellaneous heating or cooling equipment will have self-contained controls. This system will provide control and monitoring for all key system components including the future VAV terminal units. Capacity for a 25 percent expansion of control/monitoring points will be provided.

Plumbing Systems

Domestic Hot and Cold Water

Each domestic hot and cold water system will be connected to non-laboratory plumbing fixtures only., with the exception that all eye washes and emergency showers will be connected to the domestic cold water and domestic hot water and tempered to 80°F.

Domestic hot water will be generated from gas fired water heaters. Design hot water temperature will be maintained through a water recirculating system.

Industrial Water Systems

Industrial water systems will be connected to the domestic water system through an approved reduced pressure type backflow preventer. The industrial water system will be connected to all fixtures and equipment required in laboratories. Vacuum breakers will be provided on water source connection outside of each fume hood.

Industrial hot water for laboratory fixtures and equipment will be supplied from gas fired water heaters. Hot water temperature will be maintained through a water recirculating system.

Soft Water

Commercial-type duplex water softeners will be provided to soften the domestic and industrial hot water only. The softeners will be designed on minimum salt

dosage of 6 lbs salts per cubic foot of resin which will reduce salt consumption by 40%.

Pure Water System

For each building, a reverse Osmosis (RO) deionized system will be provided complete with storage tanks, re-pressure pumps, and DI tanks. It will be located in the main mechanical room. The DI water will be circulate throughout each building to the various laboratory locations and back from the laboratories to the RO storage tanks. Recirculation will be provided to prevent pure water quality degradation due to water standing in the piping system. Point of use polishers such as Deionizers and Distillers will be provided at locations where a higher quality of water is required.

Laboratory Compressed Air

Compressed air will be supplied from rotary screw air compressors and storage tanks. Air receiver, filters, air dryers and pressure regulators will be provided. Air piped to the laboratory areas will be of instrument quality. Compressed air will be provided at 100 psig at shafts with a regulator to reduce at each floor down to 15 psi. All air to laboratories shall be instrument grade, generated in compressors, filtered to remove hydrocarbons and particles and dried.

Laboratory Vacuum System

A rotary vane vacuum pump system complete with receiver will be provided for each building. Vacuum will be provided at 15” HG minimum to the outlets in laboratories and support areas.

Sanitary Sewer and Waste System

A complete sanitary waste and vent system will be provided in accordance with IPC throughout each building. This system will be connected to the sewer main.

Laboratory Waste System

A complete acid resistant laboratory waste and vent system will be installed throughout the building. A neutralization tank and monitoring system will be provided.

Electrical Narrative

Codes and Standards

Codes which are applicable to the design of the electrical systems are listed below. Design for each building will comply with each of the latest adopted publications.

ASHRAE 90.1 Energy Code

DFCM, Division of Facilities Construction and Management, Design Criteria

EIA/TIA, Electronics Industries Association/Telecommunications Industry Association

IBC, International Building Code

IESNA, Illuminating Engineering Society of North America

NFPA, National Fire Protection Association (applicable sections including but not limited to):

NFPA 70, National Electrical Code

NFPA 72, National Fire Alarm Code

UL, Underwriter=s Laboratories

Utah State Fire Marshal Laws, Rules and Regulations

Electrical Design Objective

The electrical systems design will concentrate on the following objectives: energy efficiency, compliance with all applicable codes and standards, fulfillment of the electrical functional requirements of the project, allowing for future expansion and provide systems that will be easily maintainable.

Electrical Site Utility Systems

The serving electrical utility company is Rocky Mountain Power (RMP). Service to the site is underground. The routing of the utility primary and pad mounted transformer was be coordinated with RMP during the design development phase of the project. Primary conduit and trenching was provided under this contract. Metering enclosure, secondary conduit, conductors, trenching and concrete transformer pads were provided under this contract. Meter, totalizing equipment, primary feeder conductors and pad mounted transformer was provided by RMP.

The site telecommunications infrastructure includes conduits to the existing Rampton Building and conduits run to the property line for service from additional telecommunications service providers. Four 4” conduits are provided from the MDF to an existing manhole at the Rampton Building, and four 4” conduits are provided to the property line.

Normal Power Distribution

Power will be distributed throughout each facility from a 277/480V -3Ph-4W service entrance. The estimated service size for this building (Phase 1 only) is 2,500 amps. However, a switchboard with 4,000 amp capacity will be provided so that it may feed future phases. Service conductors for this phase will be provided, with spare conduits for additional conductors in the future. The main 277/480V service switchboard and the main 120/208V distribution switchboard will be draw-out style gear. In general lighting, HVAC equipment, miscellaneous motors and heating loads will be served at 277/480V. General purpose receptacles and lab equipment will be served from 120/208V-3Ph-4W panelboards via dry type transformers. Transformers will be NEMA TP1 compliant.

In addition to the utility meter, sub-metering will be provided at the main service and at each 120/208V distribution board. This will be a valuable information

source for future work to determine if distribution points have sufficient capacity for modifications that will require more load capacity. Metering shall be digital type with demand and energy functions. Where practical, interfacing the meters with the building management system will be considered.

Distribution panels and power panels will be circuit breaker-type and will be sized to accommodate the actual load as well as a projected additional 25% spare capacity, unless noted otherwise. Lighting and power panels will be commercial-type with bolt-on circuit breakers. In general, Molded-case breakers will be used. Each panel will have a hinged door with a master-keyed flush tumbler latch. Selected panels will also have hinged trim to allow entire front cover to swing open for easy maintenance. In general, over current protection devices will be selectively coordinated with supply side over current protective devices. Circuit breakers will be fully rated except that series rated devices may be considered/limited to branch breakers and an upstream main within the same panel or switchboard. Bussing will be aluminum or copper. Distribution and branch panels will be located in stacked electrical closets. Branch panels serving specific labs will be located recessed in the walls of the lab space.

Transformers will be provided to convert 480-volt power to 208Y/120 volts for receptacle, and equipment needs. Transformers will be standard high efficiency, NEMA STP TP1 dry-type rated for 115° C rise. Windings will be copper or aluminum. K-rated transformers will be utilized in areas where loads predominately consist of "non-linear" loads. Transformers rated 75 kVA or smaller may be wall or floor-mounted. Transformers rated 112.5 kVA or greater will be floor-mounted. Transformers will be located to keep maximum feeder length from the transformer to the 120-volt panels from exceeding 200 feet in order to keep the neutral to ground voltage differential at workstations and equipment within acceptable limits.

Transient voltage surge suppression (TVSS) and "noise" protection will be provided at service equipment and on the load side of each step-down transformer in the facility. TVSS units may be integral to the panelboard or switchboard, or individually mounted "stand-alone" units. However, if individual units are used, they shall be placed immediately adjacent to the panelboard or switchboard to minimize the effects of increasing clamping voltages due to excessive lead lengths.

Wiring devices will be 20-ampere minimum, and color as selected. In general, device plates will be hi-impact nylon. Stainless-steel plates will be used in selected areas. Receptacles will be provided in accordance with the program requirements. Each office shall have at a minimum a single duplex receptacle on each wall, coordinated with office furniture locations. Corridor receptacles shall be placed every forty feet on center. Restrooms shall each have a single GFCI receptacle. Storage rooms shall have at a minimum a single duplex receptacle placed near the door. Lab counter tops shall have at a minimum a duplex receptacle mounted within wireway every twelve inches, alternating between normal power and standby power throughout the length of the wireway with a maximum of three receptacles per circuit.

Each lab shall be served by a dedicated panel with an isolated ground bus for both normal power and standby power and shall be sized to accommodate the actual load as well as a projected additional 25% spare capacity.

Disconnect switches will be heavy-duty type. Exterior switches will be rain-tight. Disconnect switches for packaged HVAC equipment will be fusible.

HVAC equipment will be controlled by VFD's, individual motor starters and motor starters mounted in motor control centers as determined by the mechanical division. VFD's shall include factory-mounted harmonic filtering within the enclosure to limit the total input current harmonic distortion to 15% or less. Each magnetic motor starter will include a hand-off-auto (H-O-A) switch, auxiliary contacts, a control power transformer, and a motor running pilot light. Each starter will have a minimum inrush rating of 140% of that for a standard motor to meet the NEC requirement for use with energy efficient motors.

For groups of 3 or more motors, motor control centers will be provided. Motor control centers may be provided for each major mechanical space. Motor control centers will be Class 1, Type B with motor circuit protectors. Bussing will be copper. Components will be rated for AIC. Starters will incorporate the features described above.

Refer to the program equipment summary and space plan sheets for equipment requiring electrical rough-in and connections. All equipment and furniture identified in the program documents, whether it is furnished in this contract or a separate contract, shall be provided with power and raceway rough-in for complete operation. Coordinate furniture connections with furniture systems suppliers.

Branch circuits shall be loaded to no more than 80% of what is allowed by NFPA 70. Where outlets are intended for a specific piece of equipment, the load of the outlet shall be based on the equipment nameplate. Otherwise, allow no more than 6 convenience outlets per circuit or 3 outlets per circuit serving workstation computer terminals and lab equipment. Outlets with dedicated branch circuits (one outlet per circuit) are required for vending machines, copy machines, break room counters, A/V cabinets, lab equipment and other locations likely to have equipment requiring dedicated circuits. Each branch circuit homerun shall have no more than 3 circuits per raceway. All 120V branch circuits shall be provided with an oversized neutral.

The electrical power distribution system will be grounded in accordance with the NEC. The ground bus at the main service equipment will be connected to the water service, a concrete-encased electrode, building perimeter ground ring, and building steel. The grounding system will be installed in strict accordance with NEC article 250. All transformers will have the neutral of the derived system bonded to building steel, the nearest metal water pipe, and the transformer case. An insulated equipment grounding conductor will be installed with feeders and branch circuits. Metal raceways, boxes, equipment, receptacles, and light fixtures will be bonded to the equipment grounding system. Provide a grounding riser system throughout the telecommunications closets, with grounding bus bars mounted accessible in each closet. All grounding systems shall be bonded together per NEC requirements.

All conductors shall be copper. Conductors for branch circuits shall be minimum size of # 12 and sized to prevent voltage drop exceeding 3% at the farthest load. The total voltage drop on both feeders and branch circuits shall not exceed 5%. When calculating the voltage drop, the load shall be assumed to be 80% of the ampacity of the branch circuit and feeder conductors. Insulation will be THWN or XHHW rated for 90° C; however, design will be based on 75° C ratings. Four-wire feeders, where neutral is considered a current-carrying conductor, will have an additional 80% derating. All conductors, including neutrals and grounding conductors, will be color-coded.

All wiring will be in raceways, minimum ¾"C for power and minimum 1" C for communications. Rigid galvanized steel (RGS) conduit or intermediate metal conduit (IMC) will be used for exposed exterior work where subject to damage. Type MC or AC cable is strictly prohibited. A cable tray system will be provided such that station cable raceways do not extend more than 50= max to cable tray. Conduits shall stub all the way to the cable tray. Include pull strings in all empty conduits. Include raceway for all audio/visual and technology systems whether furnished as part of the construction contract or furnished by the Owner.

Special Considerations for BSL3 Areas: All conduit shall be threaded rigid metal and boxes shall be cast metal type. Cover plates shall be gasketed and sealed. Conduits shall be internally sealed and caulked at each box once wires are installed. Conduits passing through wall shall be sealed and caulked around the outside.

A fault current and coordination study shall be performed by a licensed electrical engineer to indicate available fault current at all points in the 15 kV and Building distribution systems. New equipment will be adequately rated for the amount of available fault current. System coordination shall be studied, and fuses or breakers selected to ensure minimum system outage due to overloads or fault currents. Breakers with adjustable long time, short time, instantaneous and/or ground fault settings shall be set at levels for optimum system coordination.

Emergency Power Distribution

For Phase 1, an outdoor diesel-driven generator will be provided to accommodate emergency power for egress and exit lighting. It will also include standby power for selected areas and equipment as directed by the owner to include but not limited to: computer systems, telephone equipment, selected refrigeration equipment, selected lab equipment and any other items directed by owner. Automatic transfer switches shall be provided for Legally Required Standby and Optional Standby loads.

The alternate source for the emergency system will initially consist of one diesel

engine genset estimated at 750 kW, 277/480V-3ph-4W. The generator will be located outside in a WP enclosure with a critical silencer. The fuel tank will be skid-mounted, dual-wall in accordance with EPA guidelines and sized for a capacity of 24 hours of fuel consumption at 100% load.

Provisions for future phases will be made by allowing outdoor space for additional generators. Paralleling switchgear will be provided in the first phase with bus sized for the anticipated stand-by power needs of the full build out. The switchgear will be planned to accommodate a total of 3 generators.

The emergency systems will be designed in accordance with the NEC. The emergency system will be divided into at least two branches: Life Safety Branch with integral battery back up as well as both Legally Required Standby and Optional Standby branches both on generator back up. A third branch is proposed for lower priority loads that can be added to the generator system when capacity is available, and shed when capacity is not available.

In general, emergency loads will be served from the emergency branches indicated in the following paragraphs:

The Life Safety Branch will consist of loads including egress lighting and exit signs, Fire Alarm, Security, IT, and automatic doors required for egress. All of these systems will also be provided with an integral battery system as required when generator power is not available.

The Legally Required Standby Branch will serve the loads that when power is interrupted could create hazards or hamper rescue or fire-fighting operations.

The Optional Standby Branch will serve additional owner requested systems and equipment desired to be on generator back up. Lab counter tops shall have at a minimum a duplex receptacle mounted within wireway every twelve inches, alternating between normal power and standby power throughout the length of the wireway with a maximum of three receptacles per circuit. Wiring devices on emergency circuits will be red in color. Coverplates will be engraved with the with ¼" white letters to read, "EMERGENCY".

Each lab shall be served by a dedicated panel with an isolated ground bus for both normal power and standby power and shall be sized to accommodate the actual load as well as a projected additional 25% spare capacity.

Uninterruptible Power Supplies, where needed, are assumed to be provided by the Owner or end users for a particular space or piece of equipment.

Lighting

Energy efficient luminaires will be provided throughout the facility. Closed and open office and like areas will be provided with high efficient, low glare fixtures. Lab areas will be provided with pendant mounted direct/indirect lighting fixtures.

Storage and unfinished areas will be provided with 2' x 4' standard lensed troffers or industrial type fixtures.

Specialty luminaires will be provided as necessary in areas such as lobbies, entries and conference rooms.

Display lighting will be provided for special artifact areas.

Lighting will be controlled via a low-voltage networked lighting control system. In general, occupancy sensors will be used throughout. Perimeter lighting in day lit areas will be controlled by photo sensors.

All required egress and exit lighting will be connected to the emergency generator. LED exit signs will be used for exit signage.

The lighting system design will consider occupant needs, visual tasks to be performed, the desired appearance of the respective space, infection control and energy/economic constraints. The lighting design will consider the Recommended Practices of the IES North America and energy codes.

Design illumination levels as noted in the program will be used for the basis of design for interior illumination levels. Lighting fixture selection will consider visual comfort, appearance and energy efficient lamp and ballast sources.

Energy efficient luminaires will be provided throughout the majority of the facility. In general, T8 and T5 fluorescent lamp sources with electronic low THD ballasts will be used.

Adjustable dimmed downlights will be used in rooms where additional light function is required.

Lighting in non-occupied spaces will be controlled via occupancy sensors where applicable. Separate controls will be provided for day-lit areas. Photocell control with dimming ballasts will be considered for perimeter areas where substantial day-lighting is available. As a minimum, bi-level switching will be utilized for local control. All other lighting will be controlled via local switching.

HID pole mounted site lighting fixtures (maximum of 30') and building mounted luminaires at entrances and other appropriate locations along the building will be selected with attention given to dark sky sensitivity. Bollards may be added along the circulation path if required. Any areas/features that require high lighting will utilize metal halide directional fixtures. Exterior lighting will be photocell/time clock controlled.

Lightning Protection

A complete concealed lightning protection system will be provided. The system will have master label approval. Down conductors will be run in raceways concealed in the building structure. Detailed installation drawings will be provided by the system supplier.

Fire Alarm System

The facility will be provided with an intelligent microprocessor-based, addressable fire alarm system complete with addressable control relays. The system will have sensitivity monitoring and adjustment of all smoke detectors.

Addressable manual stations will be provided at each exit from the building and no more than 200 feet from any part of the building. Smoke detectors will be provided for elevator capture, HVAC system control, paths of egress, and other areas required by code.

Audible/visual evacuation signals will be visible in the evacuation path. Signals will be located no more than 15 feet from exit doors and no more than 80 feet on center in corridors. Signals will also be installed in toilets and common use areas. An additional signal will be located on the exterior of the building.

Audible evacuation signals will be horns. Visual signals will be strobes meeting ADA requirements. Small rooms will be equipped with mini strobes. Signals will be combined audible/visual assemblies, unless otherwise indicated.

HVAC systems will be provided with duct detectors as required by code. Relays will be provided to shut down each air handling unit in response to an alarm generated by its associated detector. Smoke dampers will be wired to dedicated 120-volt circuits from emergency panels. Circuits will be controlled by the fire alarm panel so damper close upon smoke detection at the serving air handling unit or in the space served.

Fire sprinkler system will be monitored for flow and valve position. The fire pump controller will be monitored for power availability, pump run status, and trouble conditions. All fire alarm wiring will be installed in raceways.

A stand alone digital fire alarm system with early warning capabilities will be provided to include the following:

Fire alarm control panel, annunciator, booster panels, heat detectors in elevator machine room, pit, and top of shafts,

Complete corridor smoke detector coverage, Smoke detectors at top of stair wells, Smoke detectors in high risk areas such as electrical rooms, IT rooms and computer rooms, Smoke detectors for elevator recall, Duct smoke detectors in air handling equipment over 2000CFM, Manual pull station at all exits and where required by code, Connection to fire protection sprinkler water flow alarm and tamper switches, Complete audio/visual coverage per NFPA-72 via ceiling mounted devices, Connection to central monitoring agency.

Security System

A door entry control system and CCTV monitoring is planned. Card readers, door control, door monitoring, motion detection, cameras and other required security equipment will be provided at the following locations: selected exterior doors, Main Staff Entrance as well as locations directed by the owner and per the program. A Closed Circuit TV System will be provided for monitoring of selected areas and doors. Cameras will include motion detection activation feature.

Voice/Data and Communications System

The voice/data cabling and equipment will be designed and installed under the direction of the DFCM IT department. The responsibility of the electrical division will be to provide an empty raceway system for the installation of cabling by others.

Stacked telecommunications closets will be provided to serve each floor of the building. Coordinate equipment layout and wall space with DFCM. Closets are located such that when cabling is routed through the raceway system provided, the distance will not exceed 290 feet to the furthest outlet. Provide a minimum of four 4" conduits from the MDF to the stacked IDF locations and four 4" sleeves between floors. If possible, stack the MDF below the IDF's. Provide both normal and emergency circuits to each IDF, 3 each, with one fourplex per circuit. Twenty-four hour HVAC is required in each closet and shall be supplied with emergency power.

Horizontal Distribution

Provide a cable tray distribution network throughout each floor and into the IDF closets. Extend the cable tray around inside of the IDF closet to allow cables to be routed within the room. Consider ease of access to the tray system when the building is in full operation. Limit cable tray routing to be above corridors, common and similar areas. Where ceilings are exposed or inaccessible, then provide a bridge of equivalent conduit connecting the cable trays in the accessible ceiling areas. Do not load the cable tray and raceway system to more than 50% of what is allowed by cable fill requirements of NFPA 70.

Voice/Data Drops

Each voice/data outlet location shall consist of a 4" square box with mud ring and one 1@ conduit stubbed to the nearest cable tray. Locations will be coordinated with the users during design. As a minimum, provide one voice/data drop for each workstation, fax machine, copy machine, desk, computer terminal and lab bench. Where wireless networks are being considered, still allow sufficient empty raceways for future hardwired connections should the wireless system have insufficient bandwidth for evolving applications.

Program Deviations

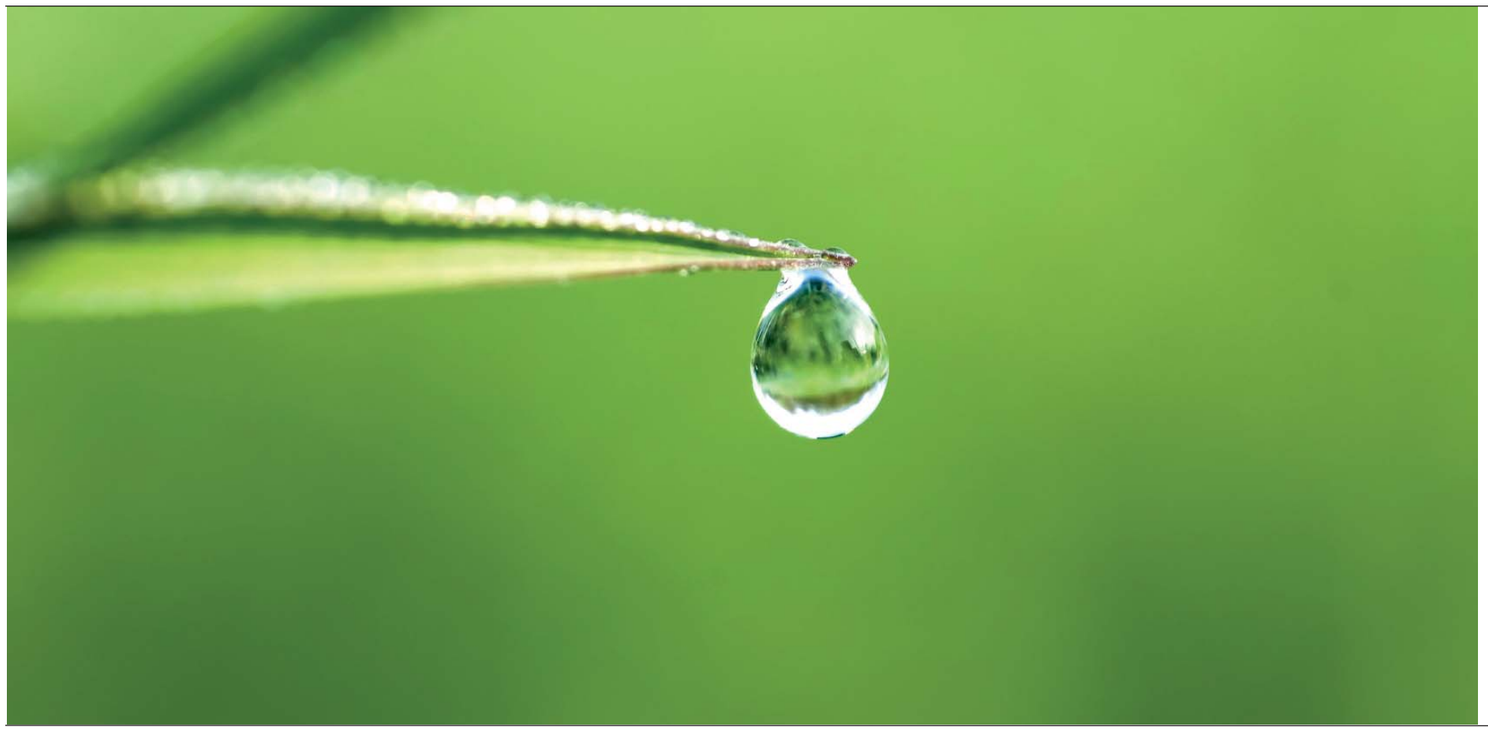
The following items are required by program but are not included in the schematic scope of work at this time. They have been discussed with the design team and not included due to feasibility, availability or cost:

Dual Utility Service

Program requires two separate utility services. Only one is provided at this time.

Dual Service Transformers with Main-Tie-Main Service Switchboard

Only one transformer with a single main breaker is provided at this time.



High Performance Buildings

All Modules on the Unified State Laboratory Campus are required to comply with the State of Utah High Performance Building Rating System (HPBRS). The high performance building rating system requires the project to be LEED Certified at the Silver level. A summary of credits currently being considered for module 2 is outlined below. The LEED checklist, in addition to the Innovation In Design Narrative, is a comprehensive summary of the sustainable design features which will be incorporated into the Unified State Laboratories Campus.

Key Sustainable Features Narrative

In addition to the LEED Reference Guide and requirements, the Labs 21 Design Guidelines will be followed to ensure efficiency within the laboratory areas. The following sustainable features will be integrated into the building and site design.

Site Features

1. Parking will be shared with Module 1 and the Rampton facility. Where parking is added, stalls for car-pool and low emitting, fuel efficient vehicles will be reserved.
2. Showers and changing facilities as well as secure bicycle storage will be provided for building occupants.
3. Full cut-off exterior light fixtures will be specified to minimize light pollution.
4. The site will be designed for use by and benefit to the users and community.

Water Efficiency

5. The evaporative cooling water will be re-used to help irrigate the landscape.
6. A closed loop processed water system will be provided.

Energy Efficiency

7. New fume hood technologies will be explored to reduce mechanical loads.
8. Separate air handlers will be used for lab areas and office areas to maximize efficiencies.
9. Laboratory equipment loads will be properly sized.

Materials and Resources

10. A recycling program will be implemented in the new facilities to encourage recycling.
11. Materials with recycled content will be used throughout the new facilities.
12. Materials that are regionally extracted and manufactured will be used.

Indoor Air Quality

13. An enclosed exterior smoking area will be provided to ensure there is no smoking near the building.

Education Program

14. Signage will be developed to inform site users of the project's sustainable design features.

LEED 2009 for New Construction and Major Renovation

Project Checklist

Unified State Labs Module 2

31-Aug-10

Sustainable Sites — Possible Points: 26

Y	N	?			
17	1	8		**Sustainable Sites**	Possible Points: 26
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
	1		Credit 3	Brownfield Redevelopment	1
		6	Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
		1	Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
1			Credit 8	Light Pollution Reduction	1

Water Efficiency — Possible Points: 10

5	0	1		**Water Efficiency**	Possible Points: 10
Y			Prereq 1	Water Use Reduction—20% Reduction	
2			Credit 1	Water Efficient Landscaping	2 to 4
				X Reduce by 50%	2
				No Potable Water Use or Irrigation	4
			Credit 2	Innovative Wastewater Technologies	2
3		1	Credit 3	Water Use Reduction	2 to 4
				Reduce by 30%	2
				X Reduce by 35%	3
				Reduce by 40%	4

Energy and Atmosphere — Possible Points: 35

14	0	6		**Energy and Atmosphere**	Possible Points: 35
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
10			Credit 1	Optimize Energy Performance	1 to 19
				Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
				Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
				Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
				Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
				Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
				Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
				Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
				Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
				Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
				X Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
				Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
				Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
				Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
				Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
				Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
				Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
				Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
				Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
				Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
		1	Credit 2	On-Site Renewable Energy	1 to 7
				X 1% Renewable Energy	1
				3% Renewable Energy	2
				5% Renewable Energy	3
				7% Renewable Energy	4
				9% Renewable Energy	5
				11% Renewable Energy	6
				13% Renewable Energy	7
2			Credit 3	Enhanced Commissioning	2
2			Credit 4	Enhanced Refrigerant Management	2
		3	Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2

6	8	2	**Materials and Resources**		Possible Points:	**14**
Y			Prereq 1	Storage and Collection of Recyclables		
	3		Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof		1 to 3
				Reuse 55%		1
				Reuse 75%		2
				Reuse 95%		3
	3		Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements		1
2			Credit 2	Construction Waste Management		1 to 2
				50% Recycled or Salvaged		1
				X 75% Recycled or Salvaged		2
	2		Credit 3	Materials Reuse		1 to 2
				Reuse 5%		1
				Reuse 10%		2
2			Credit 4	Recycled Content		1 to 2
				10% of Content		1
				X 20% of Content		2
2			Credit 5	Regional Materials		1 to 2
				10% of Materials		1
				X 20% of Materials		2
		1	Credit 6	Rapidly Renewable Materials		1
		1	Credit 7	Certified Wood		1

11	0	4	**Indoor Environmental Quality**		Possible Points:	**15**
Y			Prereq 1	Minimum Indoor Air Quality Performance		
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control		
1			Credit 1	Outdoor Air Delivery Monitoring		1
1			Credit 2	Increased Ventilation		1
1			Credit 3.1	Construction IAQ Management Plan—During Construction		1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy		1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants		1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings		1
		1	Credit 4.3	Low-Emitting Materials—Flooring Systems		1
		1	Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products		1
1			Credit 5	Indoor Chemical and Pollutant Source Control		1
1			Credit 6.1	Controllability of Systems—Lighting		1
1			Credit 6.2	Controllability of Systems—Thermal Comfort		1
1			Credit 7.1	Thermal Comfort—Design		1
1			Credit 7.2	Thermal Comfort—Verification		1
		1	Credit 8.1	Daylight and Views—Daylight		1
		1	Credit 8.2	Daylight and Views—Views		1

4	0	2	**Innovation and Design Process**		Possible Points:	**6**
1			Credit 1.1	Innovation in Design: Building Education Program		1
1			Credit 1.2	Innovation in Design: Enhanced laboratory commissioning		1
1			Credit 1.3	Innovation in Design: Slow mercury lighting		1
		1	Credit 1.4	Innovation in Design: Specific Title		1
		1	Credit 1.5	Innovation in Design: Specific Title		1
1			Credit 2	LEED Accredited Professional		1

0	0	1	**Regional Priority Credits**		Possible Points:	**4**
			Credit 1.1	Regional Priority: SSc4.1		1
		1	Credit 1.2	Regional Priority: EQc1 - 36%		1
			Credit 1.3	Regional Priority: IEQc8.1		1
			Credit 1.4	Regional Priority: Specific Credit		1

57	9	24	**Total**		Possible Points:	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

Code Analysis

Governing Codes

Building Code	IBC 2009
Mechanical Code	IMC 2009
Electrical Code	NEC 2009
Fire Code	IFC 2009

Occupancy Type

B Business

S-1 Storage

H Hazardous (Within Control Areas - Section 414.2 and in accordance with table 414.2.2)

A-3 Assembly (Accessory Occupancy)

Non-separated occupancies

B, S-1 and A-3 occupancies

Occupancy Separation

Code required fire resistance rating between control areas. Each floor is currently considered a control area.

Separation between Hazardous occupancies and other occupancies to be determined.

Construction Type IIA

Allowable Height for type IIA Construction (Table 503)

Based on Occupancy group S-1, which is the most restrictive, non accessory occupancy.

4 levels

Allowable Area for type IIA Construction (Table 503)

Based on Occupancy group S-1, which is the most restrictive, non accessory occupancy.

26,000 SF per level

Area Modifications (Section 506)

Aa = At + (At x Lf) + (At x Ls)

Aa = 26,000 + (26,000 x .75) = 45,500 SF *(not including additional area from sprinkler system.)*

Actual Area (TBD)

Level 1	34,000 SF
Level 2	27,000 SF
Level 3	27,000 SF
Total	88,000 SF

Fire Resistance Rating for Building Elements (Table 601)

Structural Frame	0
Bearing Walls – Exterior	0
Bearing Walls – Interior	0
Non-Bearing Walls – Exterior (Table 602)	0
Non-Bearing Walls – Interior	0
Floor Construction	0
Roof Construction	0

e. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3, or an allowable height increase in accordance with section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.

Design Occupancy Load

Business	1Person / 100 SF
Assembly	1Person / 15 SF
Storage	1Person / 300 SF

Egress Width for Occupancy Served

7.95' Required 27' Provided

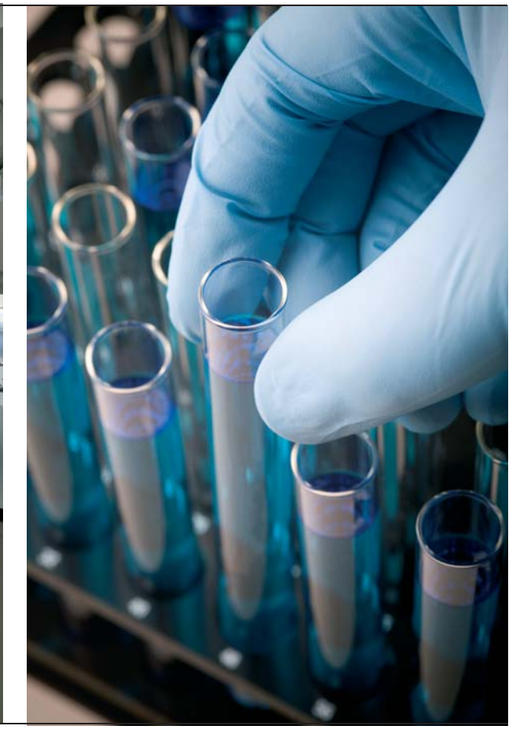
Exit Access

Number of Exits Required	3 per Story
Minimum length of exit access travel distance	250'
Common Path of Egress Travel	100'
Corridor Fire Resistance Rating	0
Dead Ends	50'

Plumbing Fixtures

Occupancy	Water Closets		Lavatories		Drinking Fountains
	Male	Female	Male	Female	
Business	1 per 25 for the first 50; 1 per 50 for the remainder exceeding 50		1 per 40 for the first 80; 1 per 50 for the remainder exceeding 80		1 per 100
Assembly	1 per 125	1 per 65	1 per 200		1 per 500
Storage	1 per 100		1 per 100		1 per 1,000

Program Summary



Module 1 *(Completed January 2010)*

Department of Health Laboratories

Administration	824
Bureau of Management Services	1,358
Bureau of Microbiology	13,455
Bureau of Laboratory Improvement	3,679
Unified Shared Areas	10,217
Bureau of Forensic Toxicology	5,064
Bureau of Chemical and Environmental Services	14,395
TOTAL NSF	**48,992**
Efficiency	**65%**
TOTAL GSF	**75,448**

Module 2

Shared Facilities	2,745

Department of Agriculture and Food

Administration	1,319
Metrology	0
Motor Fuels	0
Seed/Entomology Lab	0
Bacteriology	3,581
Chemistry	6,578
Lab Support	715
Subtotal	**12,193**

Office of the Medical Examiner

Laboratory Administration	3,894
Autopsy/Morgue	8,980
Investigative	1,259
Subtotal	**14,133**

Department of Public Safety Forensic Laboratory

Laboratory Administration	1,793
ID/Laboratory	3,436
Forensic Biology/Serology	6,464
CODIS	840
Chemistry Trace	4,491
Firearms/Toolmarks	3,641
QA/Safety/Evidence	2,087
Photo/Video	300
Crime Scene Response	1,900
Subtotal	**24,952**
TOTAL NSF	**54,023**
Efficiency	**60%**
TOTAL GSF	**89,678**

SPACE	AREA (SF)	QTY	NASF	NOTES
SHARED FACILITIES - Module 2				
Lobby	330	1	330	
Reception/Security	120	1	120	
Mailroom	80	1	80	
IT/DFCM Positions	160	1	160	
Centralized Gas Cylinder Room	80	1	80	
Pure Water	80	1	80	
Loading Dock/Supply/Receipt	400	1	400	
General Shared Laboratory	330	1	330	
Warehouse	1,000	1	1,000	
Workshop/Machine Shop	165	1	165	
Subtotal			**2,745**	
DEPARTMENT OF AGRICULTURE AND FOOD - Module 2				
Laboratory Administration				
Office and Support				
Lab Director	160	1	160	
Administrative Assistant	64	1	64	
Conference Room and Library	250	1	250	
Huddle Rooms	80	2	160	
Break Room/Coffee Station	220	1	220	
Records/Filing/Workroom/Archives	220	1	220	
Copy/Print/Scan/Fax/Supply	80	1	80	
Department Lobby	165	1	165	
Subtotal			**1,319**	

SPACE	AREA (SF)	QTY	NASF	NOTES
Metrology				
Subtotal			**0**	
Motor Fuels				
Subtotal			**0**	
Seed/Entomology Lab				
Subtotal			**0**	
Bacteriology				
Office And Support				
Supervisor	80	1	80	
Laboratorians	64	4	256	
Laboratory				
Dairy Plating - FDA	660	1	660	
Media Prep/Glass Wash/Sample Storage	660	1	660	
General Lab/Food Lab	660	1	660	
Instrument Room	440	1	440	
Microscope Area	165		165	
Pathogen Lab - State Lab/BSL2+ Testing	660	1	660	
Subtotal			**3,581**	

SPACE	AREA (SF)	QTY	NASF	NOTES
Chemistry				
Office and Support				
Supervisor	80	1	80	
Laboratorians	64	7	448	
Laboratory				
Microscopy	80	1	80	
Balance Area	80	1	80	
Pesticide Residue - Extract/Clem/Milk/GW	660	1	660	
Pesticide Residue - Instrument Lab	660	1	660	
Equipment/Furnace - Oven	165	1	165	
Equipment/Refrigerator	165	1	165	
Wet Chemistry - Feed & Fert/Meat/Food/Water	1440	1	1440	
Wet Chemistry - ICP-Mass Spec Room	165	1	165	
Wet Chemistry - Instrument Lab	165	1	165	
Volatile Analysis - Solids/Liquids	660	1	660	
Glasswash	165	1	165	
F&F Sample Storage	165	1	165	
Grinding	80	2	160	
Pesticide Formulation - Extraction	660	1	660	
Pesticide Formulation - Instrument Lab	660	1	660	
Subtotal			**6,578**	
Lab Support				
Laboratory				
Central Accessioning	330	1	330	
Refrigerated Sample Storage	110	1	110	
Lab Record Archive Storage	110	1	110	
Chemical Storage	165	1	165	
Subtotal			**715**	

SPACE	AREA (SF)	QTY	NASF	NOTES
OFFICE OF CHIEF MEDICAL EXAMINER - Module 2				
Laboratory Administration				
Office and Support				
Chief Medical Examiner	160	1	160	
Deputy Chief ME Office	145	1	145	
Forensic Pathologists	130	10	1,300	
Management Services Coordinator	100	1	100	
Resident Assistant & Medical Student Office	64	3	192	
Secretarial Staff	64	6	384	
Abstractor Work Area	64	2	128	
Conference Room and Training	250	1	250	
Family Grieving	110	1	110	
Huddle Rooms	80	3	240	
Breakroom	220	1	220	
Records Archiving/Filing	200	1	200	
Copy/Print/Scan/Fax/Supply	80	1	80	
Library/Research	165	1	165	
Department Lobby	220	1	220	
Subtotal			**3,894**	
Investigative				
Office and Support				
Chief Investigator's Office	145	1	145	
Deputy Chief Investigator's Office	100	1	100	
Investigator's Open Office Area	64	6	384	
Conference/Training Room		1		Shared with Module 1
Huddle Rooms	80	2	160	
Photographic Slide Storage Room	80	1	80	
Evidence Storage Long Term	180	1	180	
Field Apparel Closet	50	1	50	
Photographic Work Room/Area	80	1	80	
Copy/Print/Scan/Fax/Supply	80	1	80	
Subtotal			**1,259**	

SPACE	AREA (SF)	QTY	NASF	NOTES
Autopsy/Morgue				
Office and Support				
Supervisor's Office	80	1	80	
Autopsy Assistant Office	64	8	512	
Histologist Office	64	2	128	
Copy/Print/Scan/Fax/Supply	80	1	80	
Laboratory				
Transport Reception	660	1	660	
Covered Parking		2		Shaded Parking Only
Body Receiving - Release	220	1	220	
Body Receiving Data Recording	40	4	160	
Evidence Storage	30	1	30	
X-ray Radiology Room	550	1	550	
Special Procedures Autopsy	220	1	220	
Special Procedures Body Storage	165	1	165	
Anthropology/Isolation	250	1	250	
Body Cooler	1,500	1	1,500	
Body Freezer Long Term	165	1	165	
Refrigerated Tissue Storage	165	1	165	
Frozen Tissue Storage	165	1	165	
Biohazardous Waste Storage Refrigerator	100	1	100	
Tissue Recovery Room	220	1	220	
Tissue Recovery Staging/Scrub	80	1	80	
Tissue Recovery Storage Room	80	1	80	
Tissue Recovery Janitor	50	1	50	
Locker Rooms - Men	300	1	300	
Locker Rooms - Women	300	1	300	
Laundry Room	150	1	150	
Autopsy Store Room - Consumable	120	1	120	
Histology Lab	550	1	550	
General Autopsy	1,600	1	1,600	
Autopsy Janitor Closet	50	1	50	
Wet Tissue Storage	150	1	150	
Morgue Clerk After Hours Quarters	180	1	180	
Subtotal			**8,980**	

SPACE	AREA (SF)	QTY	NASF	NOTES
CRIME LABORATORY - Module 2 DEPARTMENT OF PUBLIC SAFETY				
Laboratory Administration				
Office and Support				
Director	160	1	160	
Deputy Director	145	1	145	
Manager	100	3	300	
Administrative Support	64	2	128	
Conference Room/Library	300	1	300	
Huddle Rooms	80	2	160	
Breakroom	220	1	220	
Filing Room	110	1	110	
Copy/Print/Scan/Fax/QA	80	1	80	
Public Relations Display	80	1	80	
Lobby/Waiting - Public Side	110	1	110	
Subtotal			**1,793**	
Identification/Impressions				
Office and Support				
Supervisor's Office	80	1	80	
Examiner Workstations/Office	64	9	576	
Copy/Print/Scan/Fax/Supply	80	1	80	
Laboratory				
Castings Storage	80	1	80	
Automated Fingerprint Identification System (AFIS)	220	1	220	
Latent Prints/Wet Bench/Exam Stations	1,250	1	1,250	
Bloodstain Patterning/Reconstruction	165	1	165	
Footware/Tire	165	1	165	
Chemical Processing Area	440	1	440	
Photography/Digital Imaging	220	1	220	
Chemical Storage Room	80	1	80	
Vestibule	80	1	80	
Subtotal			**3,436**	

SPACE	AREA (SF)	QTY	NASF	NOTES
Forensic Biology - Serology				
Office and Support				
Supervisor's Office	80	2	160	
Examiner's Workstation	64	16	1,024	
Copy/Print/Scan/Fax/Supply	80	1	80	
Records Storage	80	1	80	
Laboratory				
Trace Rooms	220	3	660	
Serology Room	990	1	990	
Freezer Room	110	1	110	
Walk-In Freezer	110	1	110	
Reagents Preparation Room	110	1	110	
DNA Extraction Area	1,660	1	1,660	
Pre-Amplification Room	330	1	330	
Amplification Equipment Area	330	1	330	
Electrophoresis Room	660	1	660	
Chemical Storage	80	1	80	
Vestibule	80	1	80	
Subtotal			**6,464**	
CODIS				
Office and Support				
Supervisor's Office	80	1	80	
Examiner's Workstation	64	3	192	
CODIS Technician	64	2	128	
Records Storage	330	1	330	
Laboratory				
Sample Accessions Area	110	1	110	
Subtotal			**840**	

SPACE	AREA (SF)	QTY	NASF	NOTES
Chemistry Trace				
Office and Support				
Supervisor's Office	80	1	80	
Examiner	64	9	576	
Library	100	1	100	
Copy/Print/Scan/Fax/Supply	80	1	80	
Records Storage	80	1	80	
Laboratory				
Central Chemistry Lab	1,440	1	1,440	
SEM Room	165	1	165	
Trace Room	165	2	330	
Specialized Instrumentation Room	1,320	1	1,320	
Chemical Storage	80	1	80	
Stockroom	80	1	80	
Cylinder Storage	80	1	80	
Vestibule	80	1	80	
Subtotal			**4,491**	
Firearms/Toolmarks				
Office and Support				
Supervisor's Office	80	1	80	
Examiner	64	4	256	
Copy/Print/Scan/Fax/Supply	80	1	80	
Records Storage	80	1	80	
Laboratory				
Firearms & Toolmarks Lab/Ammo Storage	660	1	660	
Gun Vault	440	1	440	
Workshop	220	1	220	
Indoor Range and Ammo Storage	1,250	1	1,250	
Bullet Recovery Tank	330	1	330	
Chemical Processing/Exam Lab	165	1	165	
Vestibule	80	1	80	
Subtotal			**3,641**	

SPACE	AREA (SF)	QTY	NASF	NOTES
QA/Safety/Evidence				
Office and Support				
Shared Office	64	3	192	
Case File Storage	220	1	220	
Laboratory				
Evidence Receiving/Lobby	110	1	110	
Case Consultation/Viewing	220	1	220	
Evidence Receiving/Admin	220	1	220	
Evidence Vault	660	1	660	
Specialty Storage	165	1	165	
Evidence Locker Area	220	1	220	
Freezer Storage	80	1	80	
Subtotal			**2,087**	
Photo/Video				
Office and Support				
Supervisor's Office	80	1	80	
Laboratory				
Forensic Video/Audio	220	1	220	
Subtotal			**300**	
Crime Scene Response				
Office and Support				
Planning and Debriefing	200	1	200	
Laboratory				
Vehicle Large Evidence Bays	450	2	900	
Covered Exterior Vehicle Bay		2		Shaded Only
Evidence Prep	110	1	110	
Equipment Storage	80	1	80	

SPACE	AREA (SF)	QTY	NASF	NOTES
Training Equipment Storage	80	1	80	
Locker Rooms/Showers	200	2	400	
Laundry Room	80	1	80	
Chemical Storage	50	1	50	
Subtotal			**1,900**	
Net Total			**54,023**	
Efficiency factor			1.66	
Subtotal Net x efficiency			**89,678**	

Space Summary	Original Program	Adjusted Program
Shared Facilities	3,820	2,745
Agriculture and Food	20,217	12,193
Chief Medical Examiner	15,484	14,133
Crime Laboratory	30,072	24,952
Total Net Square Feet (NSF)	**69,593**	**54,023**
Gross-up factor	1.54	1.66
Total Gross Square Feet (GSF)*	**107,173**	**89,678**
Efficiency	65%	60%

** Isolated AHRF building omitted*

View of the Unified State Laboratories Campus site as seen from the north, showing Module 1 under construction

The following depicts Big-D Construction's observations and opinions regarding current trends in the local construction market. Since August 2008 there have been significant decreases in the cost of materials. For example:

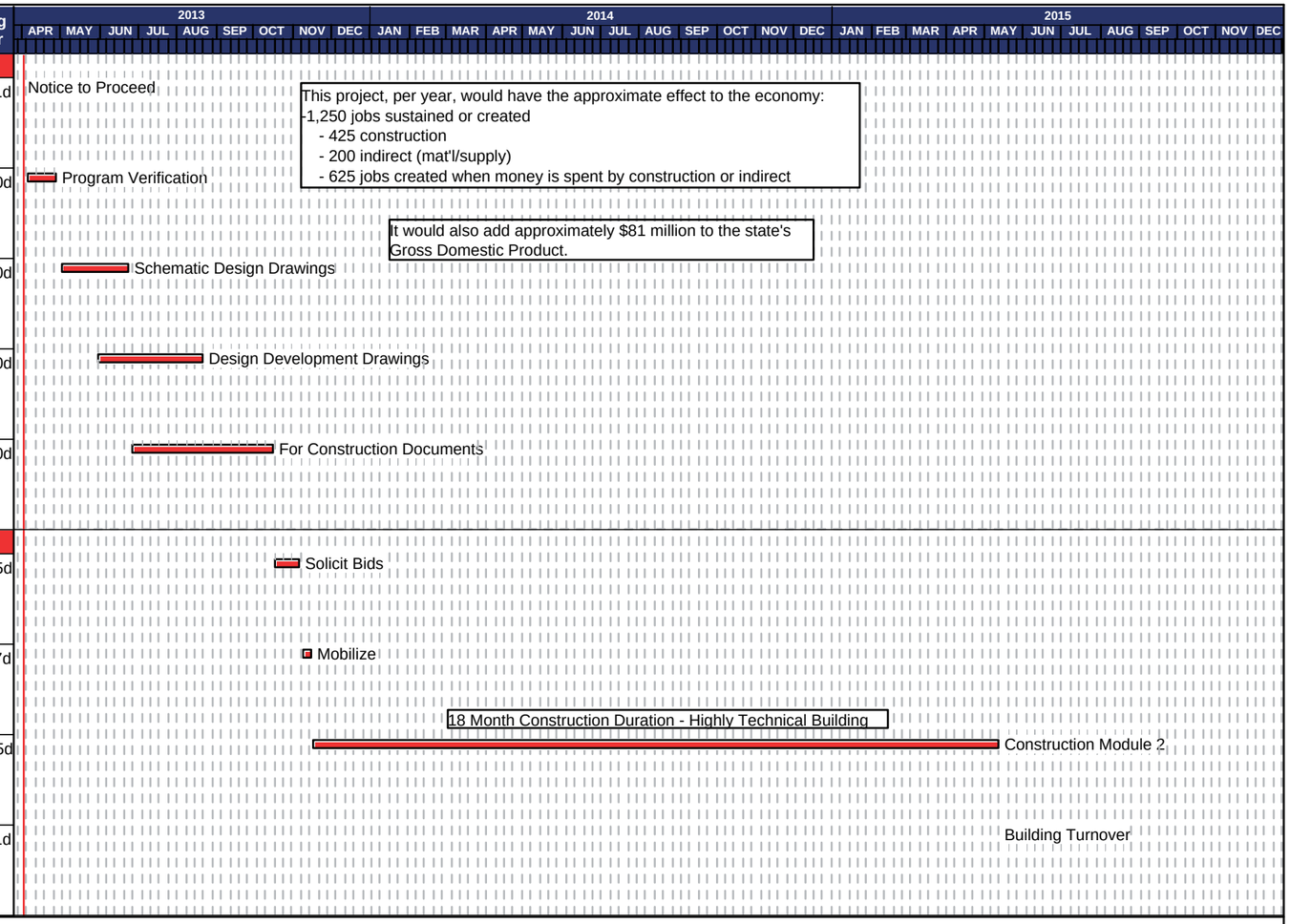
- Fabricated structural steel has decreased roughly 15-20%
- Reinforcing steel is down 25%
- Steel joists & decking are down approximately 20-25%
- Ready mix concrete materials are also down 15-20% depending on the mix design

Based on projects recently priced in comparison to 2008, this would hold true. Projects are coming in well under the estimate of costs. The phrase "construction is on sale" is often used and has proven to be appropriate nomenclature. It is safe to hypothesize that location construction costs have reduced in the 15-20% range as compared to even 12-18 months ago.

Right now is the time to build infrastructure in our state. The construction sector has been the hardest hit industry nationwide in the economic downturn and it has largest unemployment rate of any sector in this state. Construction of a technical building of this caliber will benefit the State, the community and our overall economy.

Proposed Schedule for Design and Construction of Module 2

Description	Orig Dur
Design Activities	
Notice to Proceed	1d
Program Verification	20d
Schematic Design Drawings	40d
Design Development Drawings	60d
For Construction Documents	80d
Construction	
Solicit Bids	15d
Mobilize	7d
Construction Module 2	385d
Building Turnover	1d



Big-D Construction Corp
Unified State Labs - Module 2

Pre-Program Estimate

Revision 01

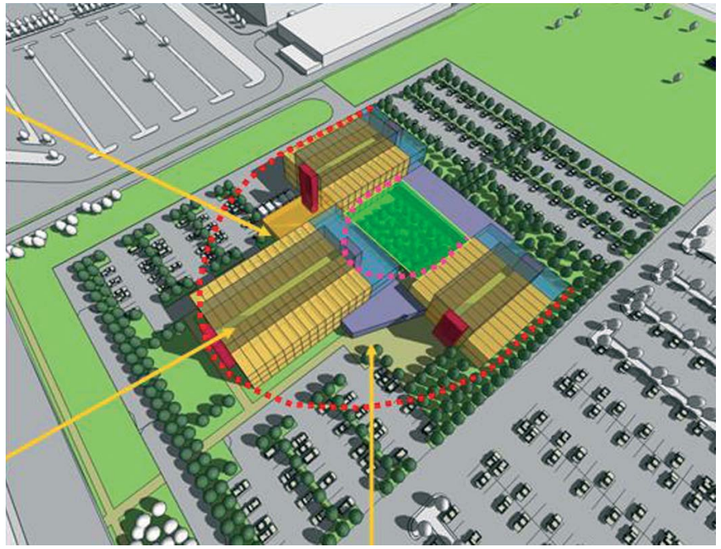
August 30, 2010

	System	Unified State Lab Module 2			SUBTOTAL
		System Quantity	System Cost/SF	Subtotal	
1	Demolition	225,000 sf	$ 0.25	$ 56,250	$ 56,250
2	Site Work	225,000 sf	$ 5.50	$ 1,237,500	$ 1,237,500
3	Foundations	30,000 sf	$ 14.00	$ 420,000	$ 420,000
4	Substructure	30,000 sf	$ 6.00	$ 180,000	$ 180,000
5	Superstructure	89,657 sf	$ 28.00	$ 2,510,396	$ 2,510,396
6	Exterior Closure	60,000 sf	$ 45.00	$ 2,700,000	$ 2,700,000
7	Roofing	30,000 sf	$ 7.00	$ 210,000	$ 210,000
8	Interior Construction	89,657 sf	$ 26.00	$ 2,331,082	$ 2,331,082
9	Conveying	89,657 sf	$ 2.00	$ 179,314	$ 179,314
10	Equipment	89,657 sf	$ 32.00	$ 2,869,024	$ 2,869,024
11	Fire Protection	89,657 sf	$ 2.40	$ 215,177	$ 215,177
12	Plumbing	89,657 sf	$ 12.00	$ 1,075,884	$ 1,075,884
13	Mechanical	89,657 sf	$ 74.00	$ 6,634,618	$ 6,634,618
14	Electrical	89,657 sf	$ 29.00	$ 2,600,053	$ 2,600,053
15	Staffing	89,657 sf	$ 7.25	$ 650,013	$ 650,013
16	Site Requirements	89,657 sf	$ 6.00	$ 537,942	$ 537,942
	Subtotal			**$ 24,407,253**	**$ 24,407,253**
0.60%	General Liability Insurance			$ 169,299	$ 169,299
	Building Permit & Plan Check (BY DFCM)			$ -	$ -
	Builders Risk Insurance (BY DFCM)			$ -	$ -
	Testing & Inspection (BY DFCM)			$ -	$ -
	Design Fees (BY DFCM)			$ -	$ -
	Subtotal Construction & Indirect			**$ 24,576,552**	**$ 24,576,552**
	Preconstruction Fee			$ 141,082	$ 141,082
0.10%	Warranty Reserve			$ 28,216	$ 28,216
5.00%	Cost Escalation through 2012			$ 1,410,824	$ 1,410,824
3.00%	Concpetual Contingency			$ 846,494	$ 846,494
0.80%	Performance & Payment Bond			$ 225,732	$ 225,732
3.50%	Contractor's Fee			$ 987,577	$ 987,577
	Construction Totals		**$314.72 /sf**	**$ 28,216,478**	**$ 28,216,478**

Updated January 2013: $318,00/sf $ 28,500,000

UNIFIED
STATE
LABORATORIES
PUBLIC
HEALTH

Campus Planning Concepts



Campus Identity

shared resources and infrastructure

interdepartmental collaboration

economies of scale

Courtyard Oasis

opportunities for informal collaboration

connection to the environment

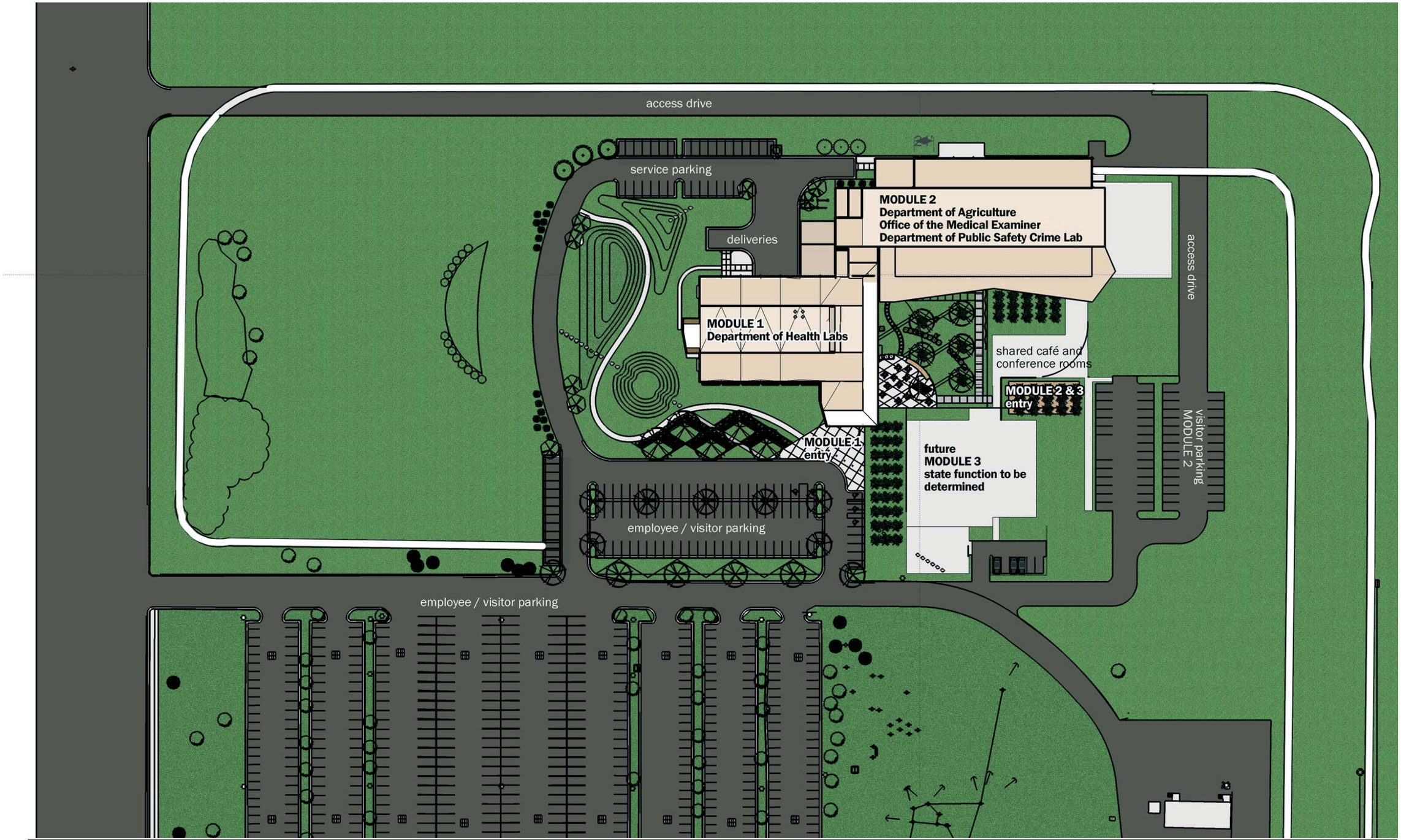
sense of community

Common Entries

building and departmental identity

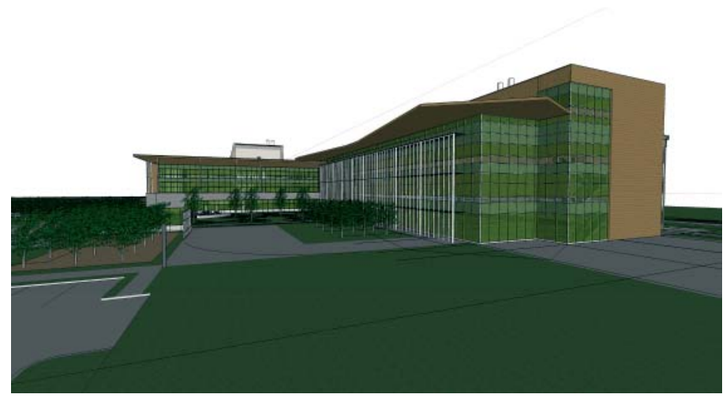
simplification of wayfinding

access and security control


access drive
service parking
deliveries
MODULE 2
Department of Agriculture
Office of the Medical Examiner
Department of Public Safety Crime Lab
MODULE 1
Department of Health Labs
shared café and
conference rooms
MODULE 2 & 3
entry
MODULE 1
entry
future
MODULE 3
state function to be
determined
access drive
visitor parking
MODULE 2
employee / visitor parking
employee / visitor parking

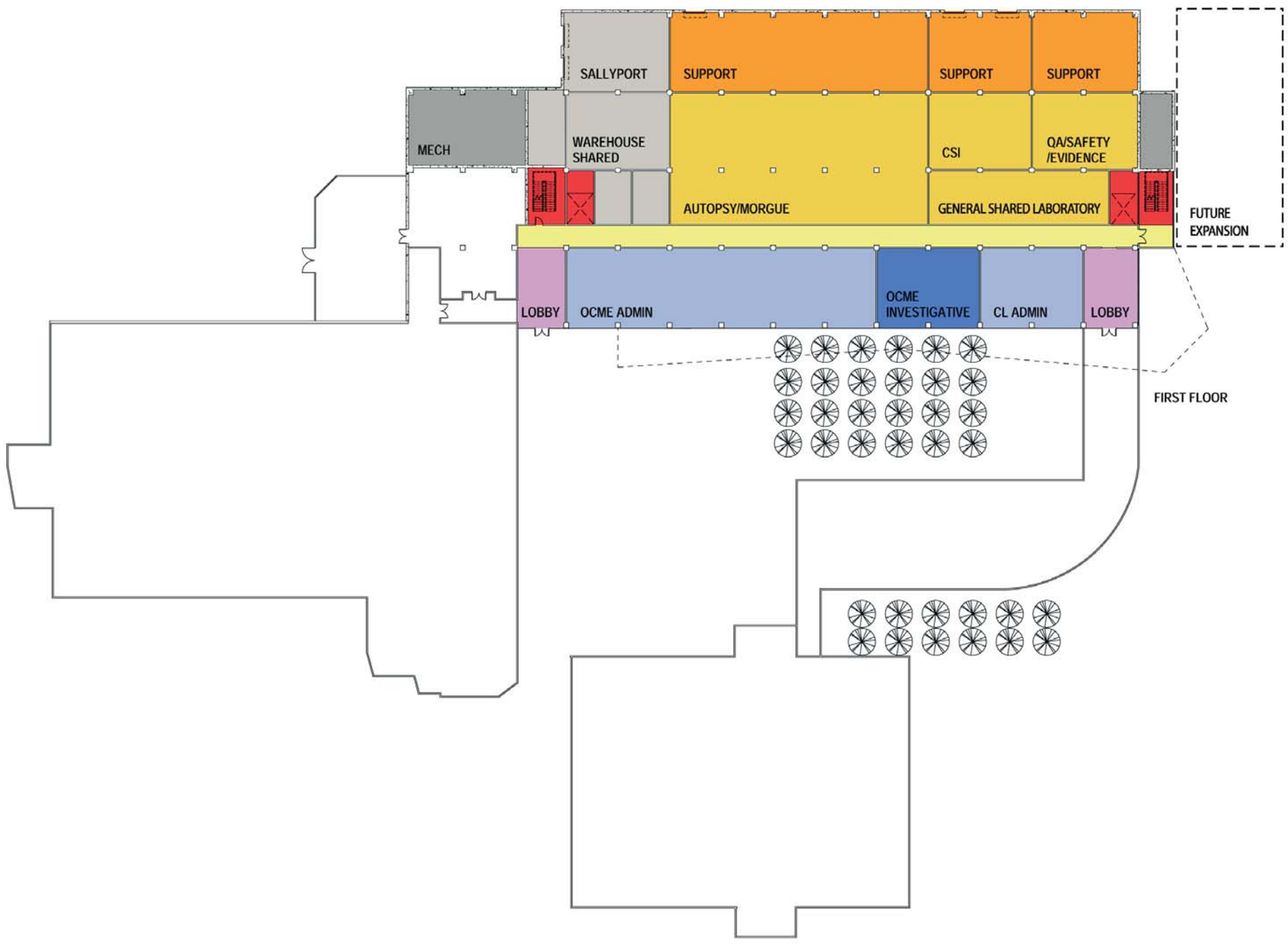
Shared Courtyard

View into courtyard from east



View into courtyard from east

View into courtyard from south



Module 2 • Level 1

Office of the Medical Examiner

Department of Public Safety Forensic Laboratory

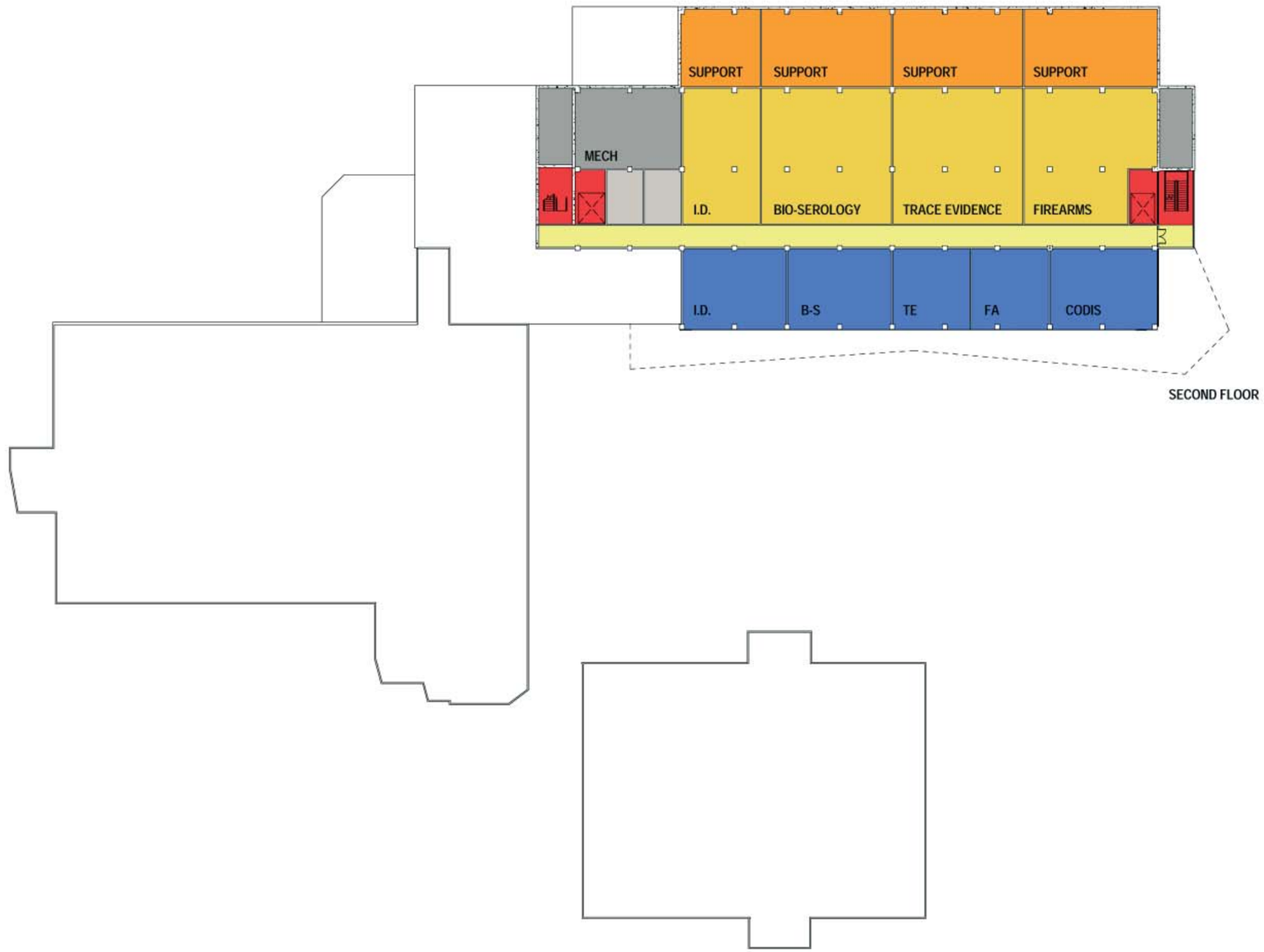
Shared Facilities

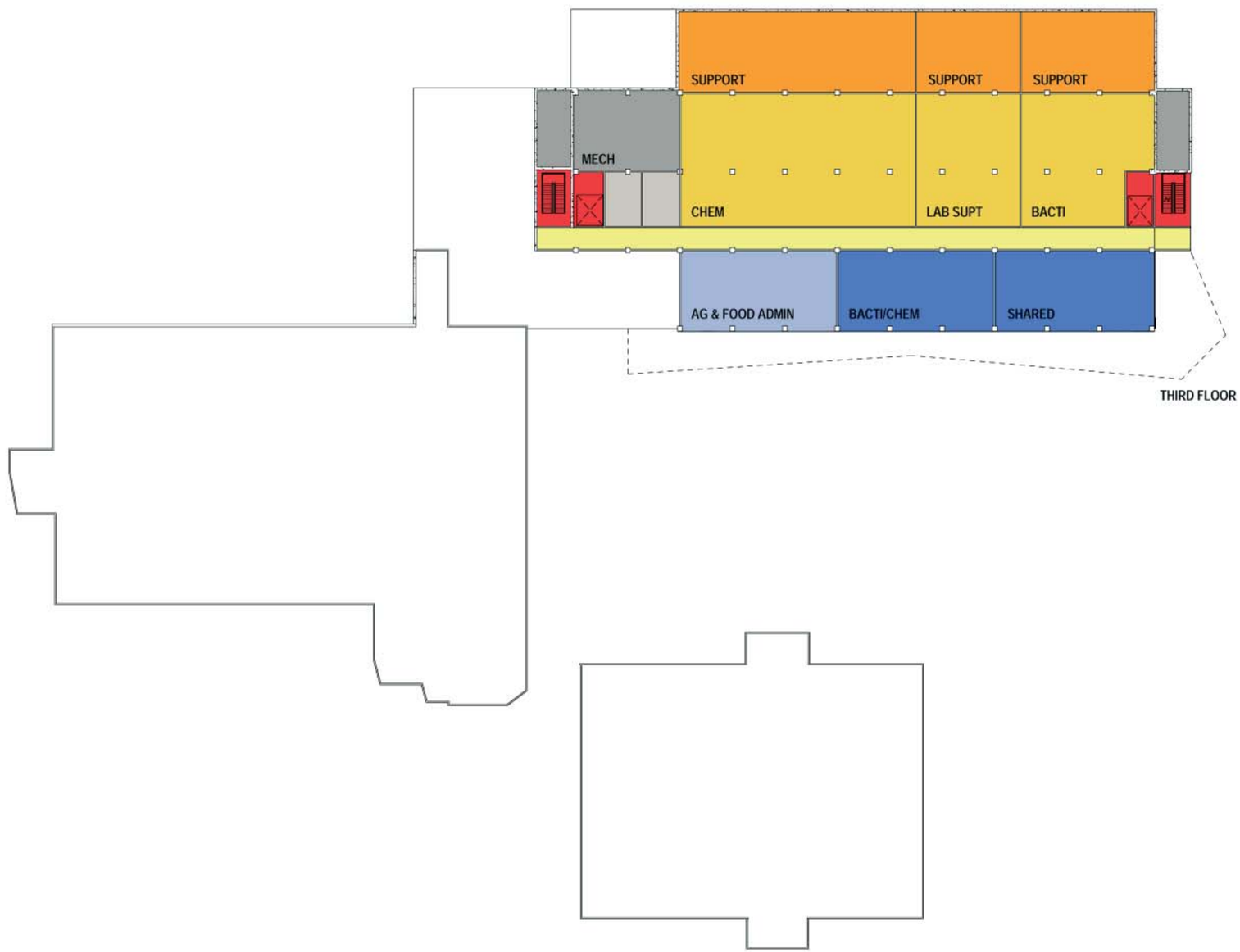
- laboratories
- offices
- administration
- horizontal circulation
- vertical circulation
- interaction space
- mechanical spaces
- building support / toilets

Module 2 • Level 2

Department of Public Safety Forensic Laboratory

- laboratories
- offices
- administration
- horizontal circulation
- vertical circulation
- interaction space
- mechanical spaces
- building support / toilets



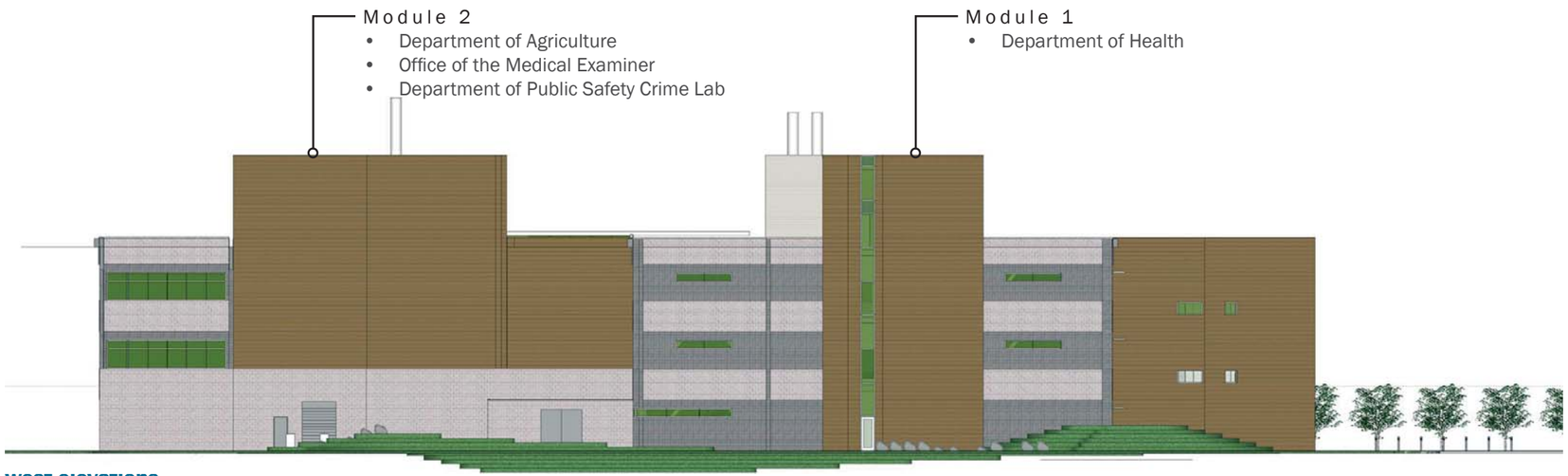


Module 2 • Level 3

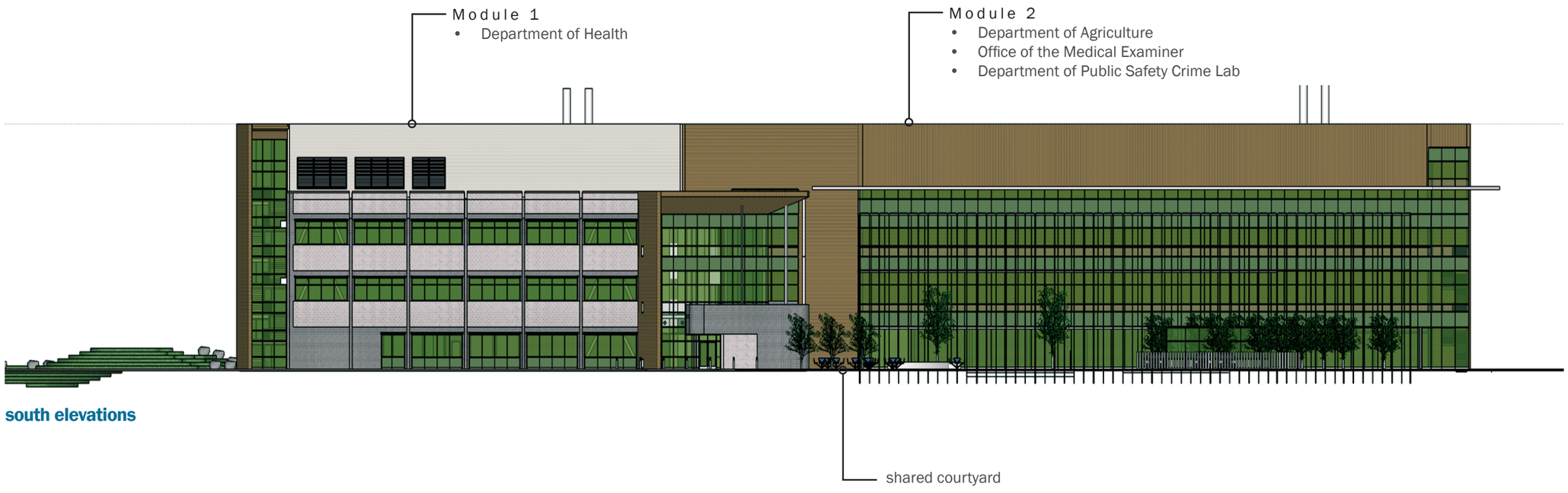
Department of Agriculture and Food

Shared Facilities

- laboratories
- offices
- administration
- horizontal circulation
- vertical circulation
- interaction space
- mechanical spaces
- building support / toilets

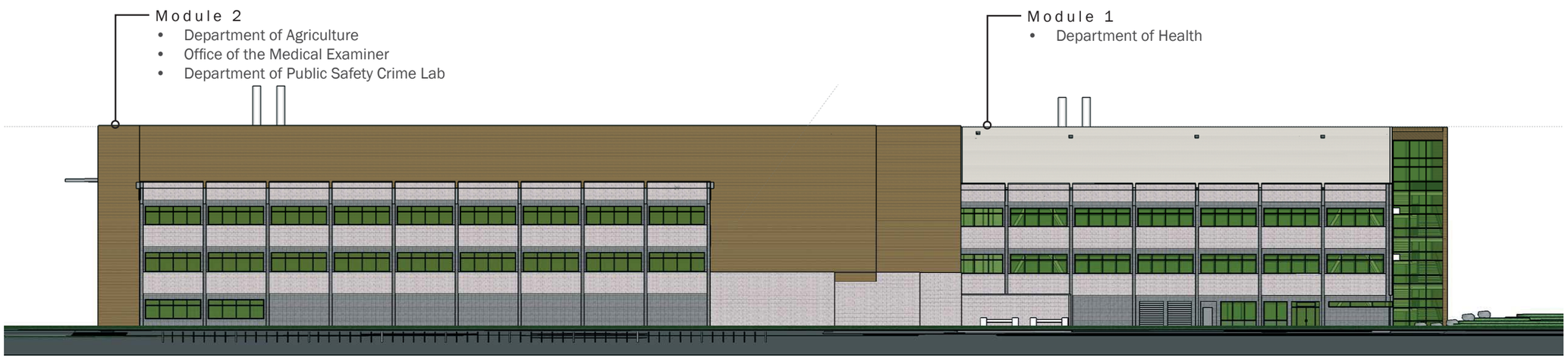


west elevations



south elevations

east elevations



north elevations