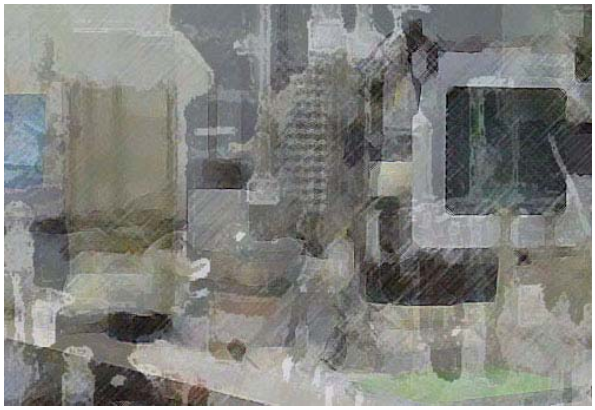
PROJECT DEFINITION

BINGHAM ENTREPRENEURSHIP AND ENERGY RESEARCH CENTER

UINTAH BASIN CAMPUS—UTAH STATE UNIVERSITY



OCTOBER 16, 2008 — FINAL

BINGHAM ENTREPRENEURSHIP AND ENERGY RESEARCH CENTER

UTAH STATE UNIVERSITY – VERNAL CAMPUS

Prepared by Harris & Associates - Salt Lake City

The following individuals have reviewed and approved this program.

Division of Facilities Construction and Management, State of Utah — Date: 10/20/08

Utah State University — Date: 10/14/08

BINGHAM ENTREPRENEURSHIP AND ENERGY RESEARCH CENTER

UTAH STATE UNIVERSITY – VERNAL CAMPUS

Prepared by Harris & Associates - Salt Lake City

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Executive Summary

The Bingham Entrepreneurship and Energy Research Center will be constructed on the new Utah State University Uintah Regional Campus in Vernal, Utah. This 59,278 gross square foot facility will house research and teaching space for entrepreneurial business development, scientific laboratories, a wide range of classroom spaces and faculty office/research space. Utah entrepreneur and businessman Marc Bingham and his wife, Debbie, donated $15 million to fund this new facility, the largest private gift in USU's history. The facility will feature state of the art research, computing and teaching spaces in a two-story brick, stone and glass building. Design will begin in mid-fall of 2008 with construction starting in the spring of 2009 and concluding in February of 2011.

Spaces in the new facility include: 28,000 square feet of research and teaching labs for Biology, Chemistry and Geology; 8,181 square feet of research and teaching labs for Natural Resources; 3,253 square feet for an Entrepreneurship Center; 2,336 square feet of computer support space; and over 15,000 square feet of general support space. Total project cost for the new facility will be approximately $17,700,000.

This new facility will serve the fast growing community of Vernal and help with economic development of eastern Utah's vast oil and gas resources. The Bingham Entrepreneurship and Energy Research Center will provide the local business community with business research support and open seminar spaces. The facility will also provide the scientific research and education community with laboratory support spaces and advanced training in Biology, Chemistry, Geology and Natural Resources. The facility will offer an open learning environment and resource center for Eastern Utah.

EXISTING SITE — VERNAL, UTAH (LOOKING SOUTH)

Introduction

This study is a facility program for the new Bingham Entrepreneurship and Energy Research Center in Vernal, Utah. The work product was contracted by Utah State University with Harris & Associates Salt Lake City office. The new facility includes regular and tiered classrooms; a tiered lecture hall; wet and dry teaching and research labs for biology, geology, and chemistry; research and instrument labs; cold room and herbarium; stock and prep areas; large and small equipment storage; garage and receiving dock; electronics shop; seminar hall; research center; small business development center and Entrepreneurship Center; reference and resource area; open computer labs, data center, Utah Education Network Hub, and seminar presentation rooms; registration; break room and conference rooms; faculty, tech and grad offices, as well as an office suite for the Dean of the Uintah Basin Campus. This project will built as a LEED "Silver" facility.

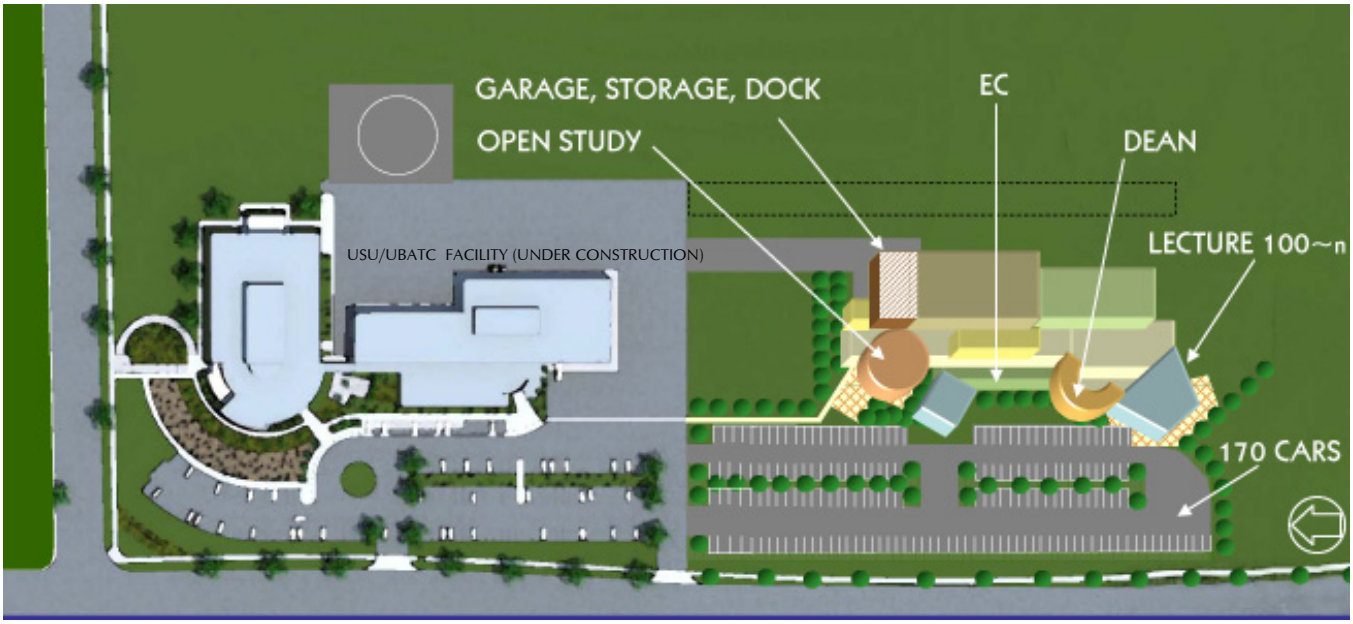
The facility will be a two-story steel structure with a brick and stone exterior finish. Total gross square footage of the new facility will be approximately 59,000 square feet. The first floor will feature public spaces for general classrooms, teaching labs, the small business development center, the Entrepreneurship Center, and a large 100-seat lecture hall. The second floor will be research labs and faculty offices.

This will be the second facility to be built on the new Uintah Basin Campus for Utah State University in Vernal, Utah. The project will be managed by the State Division of Facility Construction and Management and built using a "Design Build" delivery system with a project completion date of February of 2011. This project is funded entirely with donor contributions; total project cost will be approximately $17,700,000.

UTAH STATE UNIVERSITY UINTAH BASIN CAMPUS MASTER PLAN (BUILDING NO.2 IS THE BINGHAM BLDG.)

Project History

Utah entrepreneur and businessman Marc Bingham and his wife, Debbie, donated $15 million to Utah State University's Uintah Basin campus to fund the construction of an Entrepreneurship and Energy Research Center. To date, this gift has been the largest private gift in USU's history. The building is slated to become a state-of-the-art, high-tech educational facility to train students in business, entrepreneurship, accounting, engineering, water management, natural resources, environmental policy, and other programs. The design and programming phase of the project began in the winter of 2007 and was completed in October 2008.

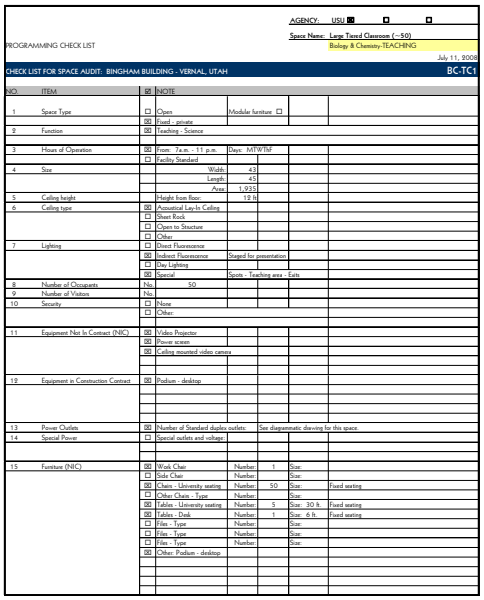


PRELIMINARY SITE PLAN

Study Methodology

The process for establishment of this work product consisted of two distinct studies. The first study was an assessment of the existing USU facility in Vernal on Highway 40. This first study was conducted in the fall of 2007 and involved meetings with representatives of Utah State University's Uintah Basin Campus to gain general understanding of the needs and requirements for expanding to a new facility, and it also included an analysis of the existing facility on Highway 40. The second study began in January of 2008 and was completed in October of 2008. This study involved faculty and administrators at USU's Logan Campus. Several meetings where held to discuss the overall concepts for a research and educational facility in Vernal, and also to learn the requirements for space, cost, schedule, as well as to gain general guidance and understanding of the scope of work.

The work was further developed by meeting with department heads of each agency slated to occupy the facility in order to obtain a greater comprehension of their needs and special requirements. After this information was gathered, a draft program of spaces, space diagrams, massing studies, and affinity diagrams were developed. This draft was presented to Utah State University for review. The components of the study were carefully analyzed and changes made to meet the needs of each agency. All parties involved in the review and resulting changes agreed to the final work product.



AGENCY: USU ☒ ☐ ☐

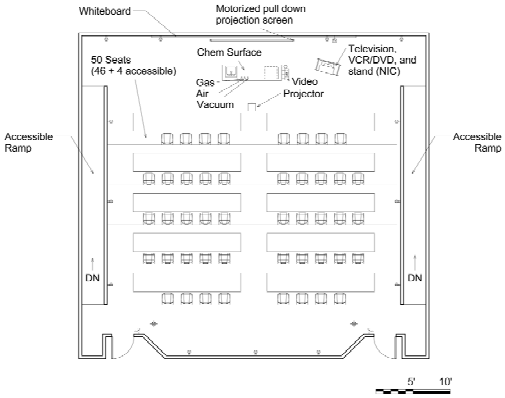
PROGRAMMING CHECK LIST

Space Name: Large Tiered Classroom (~50)
Biology & Chemistry-TEACHING

July 11, 2008

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — BC-TC1

NO.	ITEM	☒	NOTE				
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Teaching - Science				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWTHF			
		☐	Facility Standard				
4	Size		Width	45			
			Length	45			
			Area	1,935			
5	Ceiling height		Height from floor:	12 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence	Stayed for presentation			
		☐	Day Lighting				
		☒	Special	Spots - Teaching area - Exits			
8	Number of Occupants	No.	50				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
12	Equipment in Construction Contract	☒	Podium - desktop				
13	Power Outlets	☒	Number of Standard duplex outlets:	See diagrammatic drawing for this space.			
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Chairs - University seating	Number:	50	Size:	Fixed seating
		☐	Other Chairs - Type:	Number:		Size:	
		☒	Tables - University seating	Number:	5	Size: 30 ft.	Fixed seating
		☒	Tables - Desk	Number:	1	Size: 6 ft.	Fixed seating
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Podium - desktop				



SAMPLE PROGRAM PAGES

Document Organization

This document is organized as a guide to developing a new Entrepreneurship and Energy Research Center. The study is organized into two major sections: the Facility Program and an Appendices Section. Guidelines and character of the facility and site are discussed in the Facility Program Section and in backup information such as geotechnical reports, surveys, equipment lists, schedules, and DFCM and USU design criteria.

Within the Facility Program Section are seven subsections that describe the criteria for the new facility. Subsection 4.00 contains an overview about Vernal, Utah; information about the Uintah Basin Campus Master Plan; and criteria for the Site Plan of the new facility. Subsection 5.00 contains a space matrix and lists of all spaces required for the new facility. Subsection 6.00 contains detail diagram and space criteria for each space. Subsection 7.00 contains specific design criteria for the project.

Appendix A contains Site Surveys, Appendix B contains a Geotechnical Report, Appendix C contains an Equipment List, Appendix D contains DFCM's and USU's Design Guides and Criteria, Appendix E contains Technical Requirements, Appendix F contains a proposed project schedule, and Appendix G contains the diagrammatic images used for the programmed individual spaces.

4.10 Vernal Overview

The first explorers came through Vernal around 1776 leaving no major settlements, but in 1825 a fur trader named William H. Ashley arrived. He would become the namesake for Ashley Valley where Vernal is located. The Uintah Basin area was set aside by President Lincoln in 1861 as the Uintah Indian Reservation and the first significant settlement in Ashley Valley occurred in 1873. The Vernal area was referred to by early settlers as "the bench" and described as a barren cactus plain. It was the David Johnston family in 1878 who began cultivating this rugged terrain into a hardy settlement and by 1879 many settlers began joining them. When the people first established a post office, the U.S. Postal Service officially named the city Vernal, but it had been known as Jericho, Hatchtown, and Ashley Center until then. Vernal became incorporated in 1897, 15 years after it was officially established as a City in 1884.

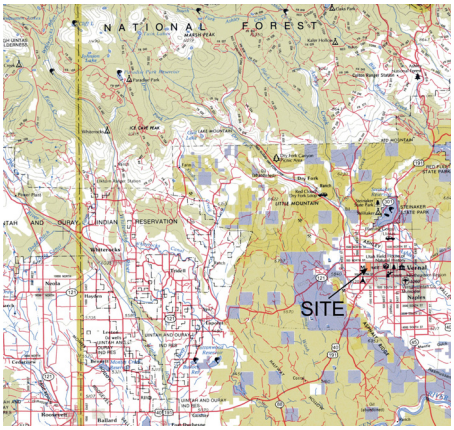
Located in Uintah County in Eastern Utah about 175 miles from Salt Lake City, Vernal is currently most famous for its successes in the oil industry and the discovery of a major site for dinosaur fossils. Adding to Vernal's colorful history is the documented presence of historic outlaws such as the notorious Butch Cassidy and the Wild Bunch who bought supplies from the general store during the early 1900's. Points of attraction for visitors include the Utah Field House of Natural History and Dinosaur Gardens; close proximity to the Dinosaur National Monument; Navajo petroglyphs in nearby Dry Fork Canyon; rodeos; and nature recreation throughout Ashley National Forest, Flaming Gorge, and the Uintah Mountains.

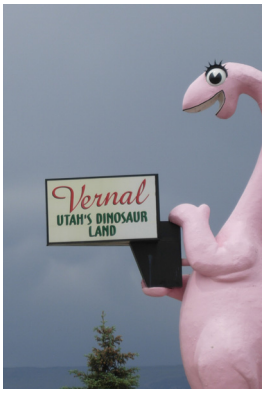
The Uintah Basin is a physiographic section of the larger Colorado Plateaus province, which in turn is part of the larger Intermountain Plateaus physiographic division. It is also a geologic structural basin in eastern Utah, east of the Wasatch Mountains and south of the Uintah Mountains.

The Uintah Basin is fed by creeks and rivers flowing south from the Uintah Mountains. Many of the principal rivers (Strawberry River, Currant Creek, Rock Creek, Lake Fork River, and Uintah River) flow into the Duchesne River which feeds the Green River—a tributary of the Colorado River. The confluence of the Green and Colorado rivers is located in Canyonlands National Park. The Uintah Mountains comprise one of the borders of the Uintah Basin (though outside of the Basin's boundary) and are the only major mountain ranges in the United States oriented from east to west, rather than north to south. They contain the highest point in Utah: Kings Peak, with a summit 13,528 feet above sea level. Vernal is located at 42°27′17″N 109°32′17″ W at an elevation of 5,328 feet. The time zone is MST, the zip code is 84078 – 84079 and the 2007 estimated population is 8,163.

Vernal City is currently experience rapid growth in the development of natural resources, specifically in natural gas and oil production. Additionally, there are extensive oil shale and tar sand deposits near Vernal that will most likely begin development in the next 10 years as energy costs and demands increase. All this growth, and potential for growth, has impacted the local community resulting in labor shortages, increased cost for lodging, and transportation. Construction demands have also increased dramatically resulting in an increase of 10 to 15% for product and labor as compared to the Wasatch Front.

Over the next 10 years, Vernal and the surrounding communities will be challenged to meet these new economic growth pressures while trying to maintain much of the character and charm of their lifestyle and cities. Local infrastructure for roads and utilities will need to be updated and expanded; support systems such as hospitals, hotels, restaurants, retail services, education, and law enforcements will also need to grow and expand. The new Bingham Building will provide a much needed resource to help establish an education resource for local business, technology expansion, and community development.





Master Plan

The Bingham Research Center will be located on the new Utah State University Campus in Vernal, Utah. The Campus site is a 138-acre site donated by Bob Williams, a local businessman and entrepreneur who has lived his entire life in Vernal. Currently, the site is used for agriculture but the community has begun to develop the infrastructure and road systems that will support the new Campus. A master plan study was completed in the spring of 2006 in a series of community and University planning workshops. The new campus will feature academic space for both Utah State University and the Uintah Basin Applied Technology Center. The first facility on this new campus (item no.1 shown above) is currently under construction and is scheduled to be completed in July of 2009. This facility will include teaching space for computer technology, science, nursing, food service, long distance learning, diesel mechanics, welding, building trades, and petroleum technology. The Bingham Research Building (item no.2) will be located south of the Technology Center.

Utilities:

The City of Vernal is currently completing road designs for 2000 West and the Main Street Extension. Construction of these new roads is scheduled to begin in the spring of 2009 with completion by the fall of 2009. Currently all utilities (telephone, data, sewer, water, gas) are located in 500 North. The City has indicated that 2000 West will contain all the utilities listed above. This will need to be verified with Vernal City prior to the design and construction of the new Bingham Building. All power is overhead from power lines located along 500 North. There currently is no storm drainage system in Vernal City. Storm drainage from site run-off, hard surfaces, and roofs will be retained on the Master Plan (see item no.6) for controlled release back into the soil.

Soil Conditions:

The soil on the Master Plan is highly saturated with a ground water that is located between 4′-0″ and 7′-0″ below grade in most locations on the Master Plan. This water table condition is largely man-made from

agricultural irrigation north of the campus. Water runs south through the campus and eventually is drained into the canal on the east edge of the campus. Storm run-off is not allowed into this canal and must be retained on site and allowed to percolate back into the soil. Eventually the ground water is collected by an existing subsurface drain field that drains into the canal at the southeast corner of the campus. The campus is currently used for agriculture production of alfalfa. Beneath the topsoil is a medium stiff, silty-clay layer that extends 3 to 5 feet below the surface. Below this first layer is a sandy-clay layer that extends 8 to 15 feet below the surface to a medium-stiff clay layer that is 1 to 2 feet thick. The clay layers all rest on a cobble layer which is at about 14 feet below the surface and extends to at least 25 feet below the surface. The soil materials above the cobble layer will not support foundation loads and will require soil improvement.

Design Criteria:

New facilities added to the campus will match the existing technology building in massing, construction materials, and landscaping design. Building heights should not exceed two stories, except for major focal point facilities which can be four stories. Building will be constructed of masonry veneers, architectural metal panels or stone veneers. Finished exterior materials not allowed on the campus include: stucco, cast concrete, concrete masonry units, tilt-up concrete, metal buildings, or exposed wood products. Masonry will be Ironstone color Emperor brick; metal panels will be similar to Metecon-Morin "S-16" shape in natural aluminum finish; stone will be similar to Arriscraft Cambridge, rocked or dressed finish, in "range" colors; glass will be similar to Solexia Green in natural aluminum frames; building trim and site furniture will be in natural aluminum finishes. Building signage will be directly applied to building exterior as natural aluminum metal letters or letters applied to low (4'-0" high max) concrete, stone or masonry monument-type signs in landscaped areas. Signage can be illuminate by indirect light systems.

Landscape materials will be selected from the following matrix of plant material:

Landscape Schedule
USU Vernal Campus Master Plan

Botanical Name	Common Name	Height	Spread	Color	Photo Ref
Trees					
Ginkgo Biloba "Princeton Sentry"	Columnar Ginkgo	40-50 ft.	20-30 ft.	Green	A
Malus "Spring Snow"	Spring Snow Fruitless Crabapple	20-25 ft.	15-20 ft.	Green/white flowers	B
Nyssa Sylvatica	Sour Gum	30-50 ft.	20-30 ft.	Greenish white/Red fall	C
Robinia Pseudoacacia "Purple Robe"	Purple Robe Locust	30-50 ft.	20-35 ft.	Dark blue-green	D
Zelkova Serrata "Green Vase"	Sawleaf Zelkova	60-80 ft.	50-75 ft.	Dk green/orange,red fall	E
Shrub Areas					
Calamagrostis Acutiflora	Karl Foerster	3-4 ft.	2-3 ft.	Green/wheat	F
Coreopsis Verticillata "Moonbeam"	Threadleaf Coreopsis	1-2 ft.	2-3 ft.	Pale/bright yellow	G
Cornus Sericea "Isanti"	Isanti Redosier Dogwood	6-8 ft.	8-10 ft.	Red bark/white flowers	H
Festuca Glauca	Blue Fescue	6-12 in.	6-12 ft.	Blue-gray	I
Hemerocallis Mixed Various	Daylily Mix	20-30 in.	18-24 in.	Rose-pink,br.yellow,pch	J
Pennisetum Alopecuroides	Fountain Grass	2-4 ft.	2-4 ft.	Br.green/yellow-purp cyl	K
Pinus Mugo "Mops"	Mops Mugo Pine	3-5 ft.	3-4 ft.	Med-drk green needles	L
Ribes Alpinum	Alpine Currant	3-6 ft.	3-6 ft.	Drk leaves/brightred fruit	M
Rubeckia Fulgida "Goldsturm"	Goldsturm Black-Eyed Susan	18-24 in.	2 ft.	Golden-orange/blk eyed	N
Salvia "May Night"	May Night Sage	18 in.	18 in.	Green/purple bloom	O
Viburnum Opulus "Compactum"	Compact European Cranberrybush	2-3 ft.	2-4 ft.	Green/burgandy fall	P
Ground Covers					
Euonymus Coloratus	Purple Wintercreeper	6-12 in.	12-24 in.	Evergreen/purplish fall	Q
Sedum Spurium "Dragon's Blood"	Two Row Stone Crop	4-6 in.	15 in.	Leaves green & red	R
Turf Hydroseed	Drought Tolerant Fescue Blend	Mow to 1-1.5 in.	Full	Dark green turf	S

TREES

A. Columnar Ginkgo

B. Spring Snow Fruitless Crabapple

C. Sour Gum

D. Purple Robe Locust

E. Sawleaf Zelkova

SHRUBS

F. Karl Foerster

G. Threadleaf Coreopsis

H. Isanti Redosier Dogwood

I. Blue Fescue

J. Daylily Mix

SHRUBS

K. Fountain Grass

L. Mops Mugo Pine

M. Alpine Currant

N. Goldsturm Black-Eyed Susan

O. May Night Sage

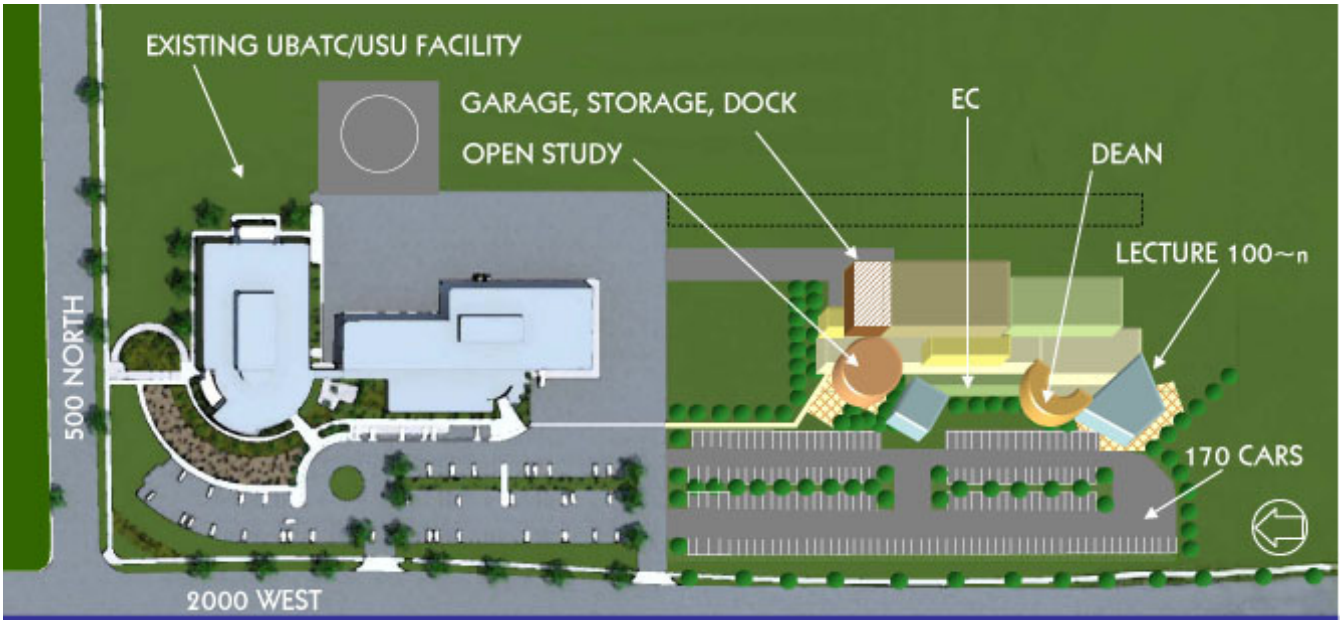
P. Compact European Cranberrybush

GROUND COVERS

Q. Purple Wintercreeper

R. Two Row Stone Crop

S. Drought Tolerant Fescue Blend



PRELIMINARY SITE PLAN

Site Considerations

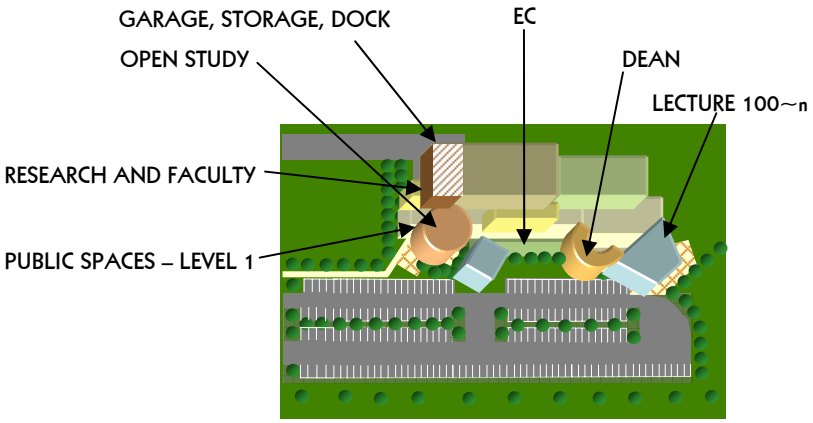
The site will be organized as indicated on the diagram above. Facility function placement along with critical site components are listed in this diagram. Site design element includes the following items:

The 170-car parking lots will utilize the existing curb cut on 2000 West for the UBATC/USU facility; no new curb cuts will be required for the new facility. Provide a service entrance on the east side of the site to the Garage, Storage, and Dock area. This access will be from the existing UBATC/USU Facility parking area. Outside plaza areas will be developed north of the Open Study space and also south of the Large Lecture space. Both of these spaces will feature outside gathering areas, shade and protection from the weather, and curb side drop-off. The main "front door" will be adjacent to the Open Study Space.

There is currently no storm drain system in Vernal City, therefore roof and hard surface site drainage will need to be retained on the campus to allow for a controlled release of storm water via soil percolation. A new storm drain system will be installed under a separate contract to move storm drain water from the UBATC/USU facility and the new Bingham Facility to a retainage pond as indicated on the master plan. This storm drain system will be constructed during the winter of 2008-2009 and will replace the open retention pond currently used for the existing UBATC/USU facility. Please refer to Section 4.11 Master Plan for Landscape criteria.

Affinities and Stacking Criteria

The affinity and stacking criteria of this facility is driven by site access and layout. Public and student access determine that teaching and open seminar spaces be located on the first level, distributed as indicated in the diagram. The large Lecture Hall will be easily access as a community space from the south end of the site. Open study, the Dean's suite and the Entrepreneurship Center will be located of the main entry on the northwest corner of the facility. The Garage, Storage and Dock will be located on the northeast corner of the facility to allow easy access for service from the existing USU-UBATC facility. All Research and Faculty offices will be located on the second floor. Generally, Lab spaces can be grouped around Storage, Lab support, and Equipment room to improve efficiencies and access. See the following pages for detail Affinities and Stacking Diagrams.



PRELIMINARY SITE PLAN

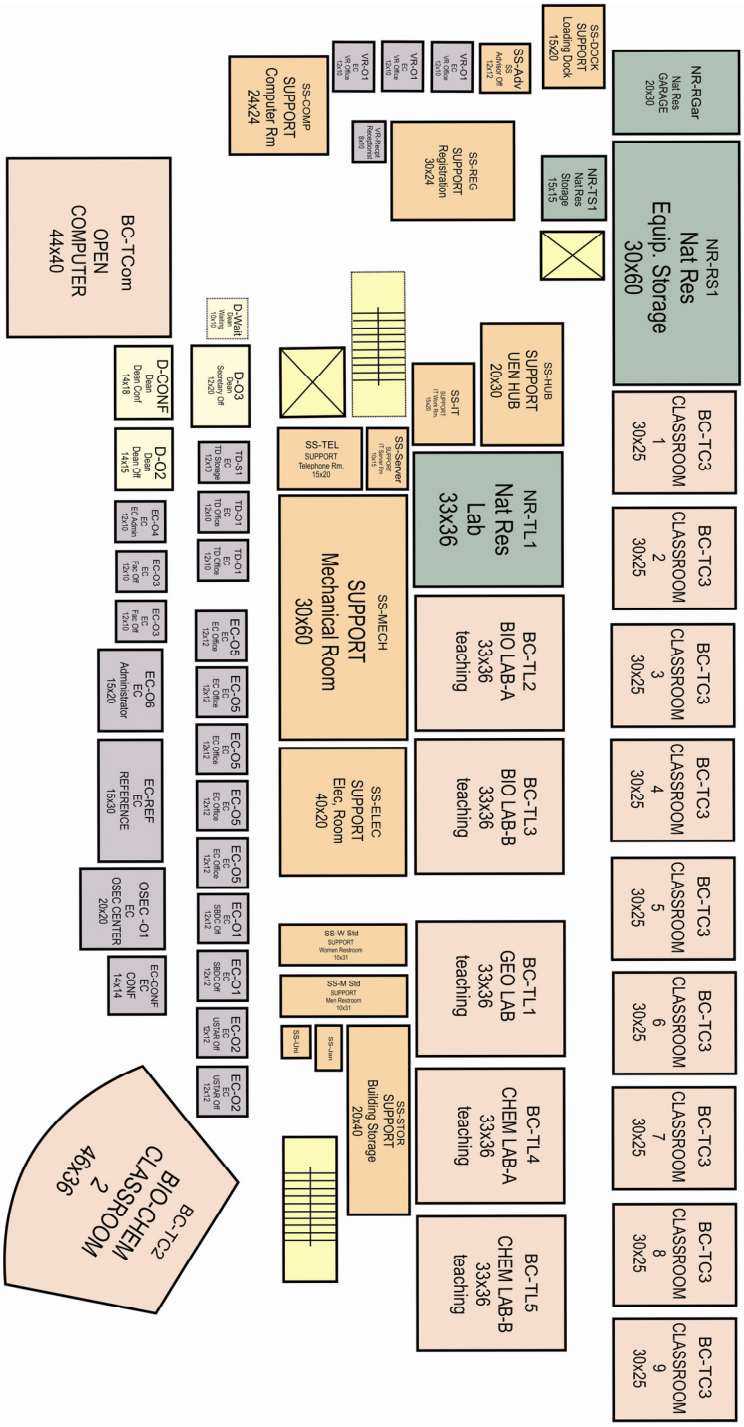
PROJECT DEFINITION - SPACE LIST - SUMMARY v19

USU Uintah Basin Regional Campus

Bingham Entrepreneurship and Energy Research Center

Thursday, October 16, 2008

CATEGORY	Total FTE	Total GSF	Notes
TEACHING- Biology, Chemistry, Physics	5	20,133	
RESEARCH- Biology, Chemistry, Physics	9	8,800	
OFFICES- Biology, Chemistry, Physics	1	2,784	
TEACHING- Natural Resources	1	1,766	
RESEARCH-Natural Resources	2	4,815	
OFFICES - Natural Resources	0	1,600	
ENTREPRENEURSHIP CENTER	5	3,253	
DEAN'S SPACE	2	933	
SUPPORT SPACE	0	15,195	
Totals:	25	59,278	



Level One

Bingham Building Affinities & Stacking diagrams

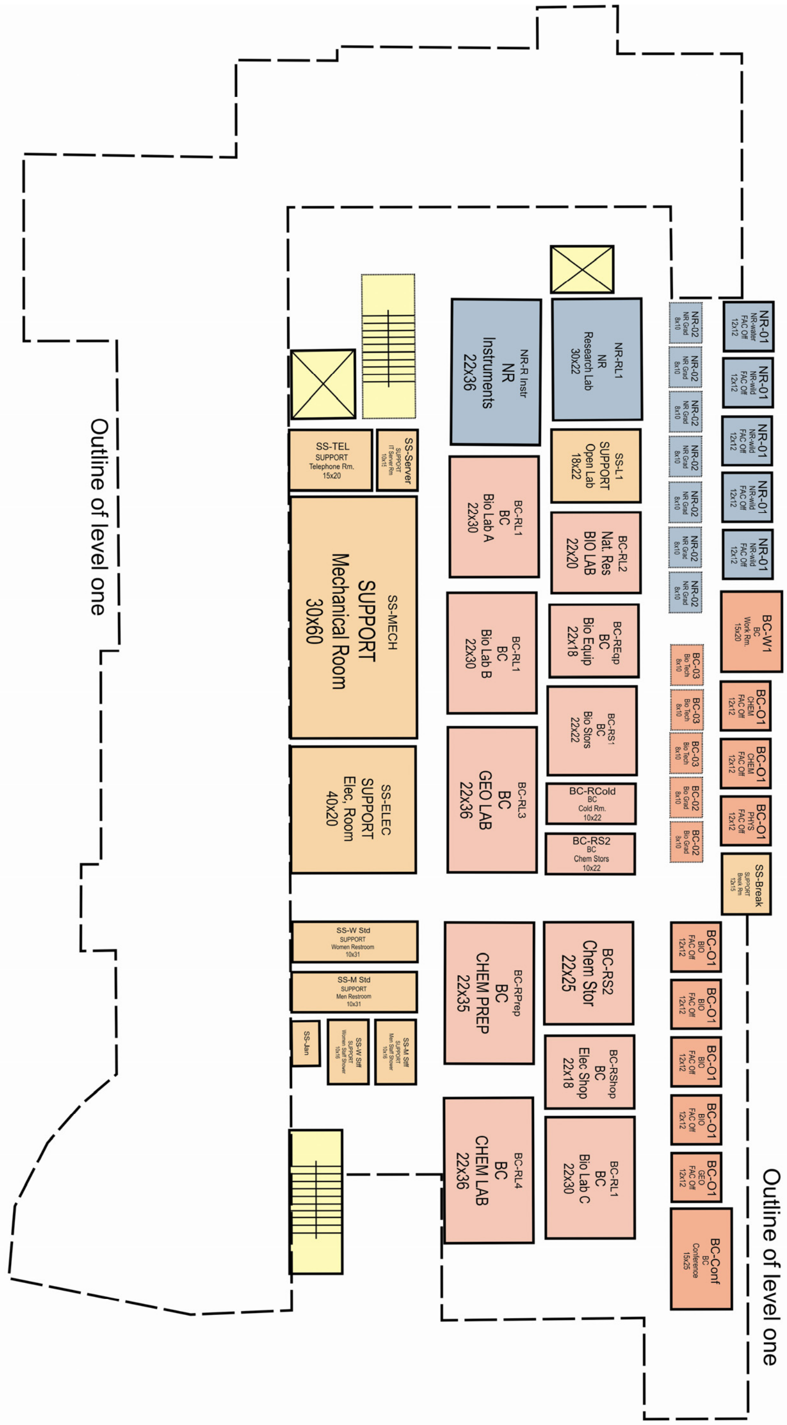
USU - Vernal Campus

Note: this drawing is diagramatic only and is not intended to represent an actual architectural floor plan.

Graphic Scale

0 25 50

10.16.08



Level Two

Bingham Building Affinities & Stacking diagrams

USU - Vernal Campus

Note: this drawing is diagramatic only and is not intended to represent an actual architectural floor plan.

Graphic Scale
0 25 50

10.16.08

PROJECT DEFINITION - SPACE LIST DETAILS v19

USU Uintah Basin Regional Campus
Bingham Entrepreneurship and Energy Research Center

Spaces for: Biology & Chemistry (also Physics courses req'd for Biology B.S.) — Section 6.10

CATEGORY	REF	TYPE	FTE	USES	SPACE DESCRIPTION	W	L	NSF	No.Spaces	Total	Factor	GSF	NOTES
TEACHING													
	BC-TC2	Classrooms		*shared w/ all sciences	Tiered, Lecture Hall (n~100)	46	36	1,656	1	1,656	1.25	2,070	Also for community talks, annual research meeting, large concurrent-enrollment classes
	BC-TC3	Classrooms		*shared w/ all sciences	Small (n~20), Classrooms	30	25	750	9	6,750	1.25	8,438	
	BC-TCom	Open Computer		*shared w/ all sciences	Student computer use/study (n~40)	44	40	1,760	1	1,760	1.25	2,200	Dedicated access to course & research software, USU library, open computer use lab
	BC-TL1	Geo Lab	1	Geology	Dry Lab (n~24)	33	36	1,188	1	1,188	1.25	1,485	Also for seminars
	BC-TL2	Bio Lab	1	Biology, Physics, Wildland Res.	Wet labs (n~24)	33	36	1,188	1	1,188	1.25	1,485	Wildland Res. will possibly need to schedule into one of these labs
	BC-TL3	Bio Lab	1	Biology	Wet lab (n~20)	33	36	1,188	1	1,188	1.25	1,485	
	BC-TL4	Chem Lab	1	Chemistry - Intro	Wet lab (n~20)	33	36	1,188	1	1,188	1.25	1,485	Intro Lab.
	BC-TL5	Chem Lab	1	Organic Chemistry	Wet lab (n~20)	33	36	1,188	1	1,188	1.25	1,485	Organic Chemistry
		Total FTE	5	SUBTOTAL TEACHING- BIOLOGY,CHEMISTRY, PHYSICS								20,133	
RESEARCH													
	BC-RL1	Bio Lab	3	Biology	Wet, adjacent to instrumentation & Biol. stock room	22	30	660	3	1,980	1.25	2,475	1 lab per 1 Biol. faculty
	BC-RL2	Bio Lab	1	Biology, Natural Resources	Herbarium	22	20	440	1	440	1.25	550	Herbarium will house exclusive Uintah Basin flora; needs to be adjacent to curator/tech office
	BC-RS1	Bio Stors		Biology storage	Store/Stock room & prep area	22	22	484	1	484	1.25	605	Support for both teaching & research; space for autoclave, water treatment (?)
	BC-REqp	Bio Equip		Biology Equipment room	Shared equipment	22	18	396	1	396	1.25	495	Lg. centrifuges, incubators (?), dig. quant. & imaging equip., PCR, fridges (?), -70 freezer, UV-Vis Spec, etc.
	BC-RL3	Geo Lab	1	Geology	Wet Lab	22	36	792	1	792	1.25	990	Lab for Geology faculty
	BC-RS2	Chem Stors		Large Chem Equip room	Instrument Rooms: large	22	25	550	1	550	1.25	688	Will house specific equip. (laser, NMR, Mass Spec, etc.); must be on ground floor
	BC-RS2	Chem Stors		Small Chem Equip room	Instrument Rooms: Small	10	22	220	1	220	1.25	275	
	BC-RL4	Chem Lab	1	Chemistry	Wet: rated fume hoods; separate desk space	22	36	792	1	792	1.25	990	1 lab per Chem. Faculty
	BC-RPrep	Chem Prep	1	Chemistry	Store/Stock room & prep area	22	35	770	1	770	1.25	963	Support for both teaching & research
	BC-RCold	Cold Room	1	*shared w/ all sciences	Cold room	22	10	220	1	220	1.25	275	
	BC-RShop	Elec Shop	1	Chemistry, Physics, Biology	Electronics shop	22	18	396	1	396	1.25	495	Support for instrumentation
		Total FTE	9	SUBTOTAL RESEARCH- BIOLOGY,CHEMISTRY, PHYSICS								8,800	
OFFICES													
	BC-O1	Fac. Office		Biology		12	12	144	4	576	1.25	720	1 per Biol. Faculty
	BC-O1	Fac. Office		Biology, Physics, Chem		12	12	144	2	288	1.25	360	1 per adjunct faculty
	BC-O2	Grad Office		Biology - Graduate Students		10	8	80	1	80	1.25	100	Grad. std./post. doc.
	BC-O3	Tech Office		Biology		10	8	80	1	80	1.25	100	Lab coordinator
	BC-O3	Tech Office		Biology		10	8	80	1	80	1.25	100	Lab tech, herbarium curator
	BC-O1	Fac. Office		Geology		12	12	144	1	144	1.25	180	Lab coordinator
	BC-O3	Tech Office	1	Chemistry		10	8	80	1	80	1.25	100	Lab tech, electronics tech.
	BC-O2	Grad Office		Chemistry		10	8	80	1	80	1.25	100	1 per chem. Faulty
	BC-O1	Fac. Office		Chemistry		12	12	144	1	144	1.25	180	Grad. std./post. doc.
	BC-W1	Work Room		*shared w/ all sciences	Photocopying, document prep., mailing, etc.	15	20	300	1	300	1.25	375	
	BC-Conf	Conf Room		*shared w/ all sciences	Meeting / conference room (n~20)	15	25	375	1	375	1.25	469	
		Total FTE	1	SUBTOTAL OFFICES- BIOLOGY,CHEMISTRY, PHYSICS								2,784	

Spaces for: Natural Resources (Wildland Resources and Watershed Science — Section 6.11

CATEGORY	REF	TYPE	FTE	USES	SPACE DESCRIPTION	W	L	NSF	No.Spaces	Total	Factor	GSF	NOTES
TEACHING													
	NR-TS1	Storage		Wildland Res.	Specimen storage	15	15	225	1	225	1.25	281	Adjacent to Wildland Res. classrooms
	NR-TL1	Lab	1	Watershed	Wet lab / classroom (n~20)	33	36	1,188	1	1,188	1.25	1,485	
		Total FTE	1	SUBTOTAL TEACHING - NATURAL RESOURCES								1,766	
RESEARCH													
	NR-RGar	Garage		Wildland Res.	Garage	20	30	600	1	600	1.25	750	Store trucks (2) & their equip.
	NR-RS1	Equip Stor		Wildland Res., Watershed	Equipment storage	30	60	1,800	1	1,800	1.25	2,250	Storage space for ea. N.R. faculty; Rich's space needs to be XL
	NR-RL1	Lab	1	Watershed	Research lab	22	30	660	1	660	1.25	825	For Watershed faculty
	NR-RInstr	Instr.	1	Watershed	Instrument lab	22	36	792	1	792	1.25	990	for Watershed faculty
		Total FTE	2	SUBTOTAL RESEARCH - NATURAL RESOURCES								4,815	
OFFICES													
	NR-O1	Fac Office		Wildland Res.		12	12	144	4	576	1.25	720	1 per Wildland Res. Faculty
	NR-O1	Fac Office		Watershed		12	12	144	1	144	1.25	180	1 per Watershed faculty
	NR-O2	Grad Office		Wildland Res., Watershed		10	8	80	5	400	1.25	500	Grad. std. offices
	NR-O2	Grad Office		Wildland Res., Watershed		10	8	80	2	160	1.25	200	Post-doc. offices
		Total FTE	0	SUBTOTAL OFFICES - NATURAL RESOURCES								1,600	

Spaces for: Entrepreneurship Center (EC) — Section 6.12

CATEGORY	REF	TYPE	FTE	USES	SPACE DESCRIPTION	W	L	NSF	No.Spaces	Total	Factor	GSF	NOTES
RESEARCH/TECHNOLOGY TRANSFER													
	EC-O1	**SBDC Offices**		Small Bus. Devel. Offices	Office Spaces	12	12	144	2	288	1.25	360	Offices open to Agencies and local Companies
	EC-O2	**USTAR Office**		USTAR Office	Office Space	12	12	144	2	288	1.25	360	
	EC-O3	**Fac Offices**	2	EC Faculty	Office Spaces	12	10	120	2	240	1.25	300	
	EC-O4	**EC Admin**	1	EC Secretary	Office Spaces	12	10	120	1	120	1.25	150	
	EC-O5	**EC Office**	1	Visitor Offices - Engrepreneurship	Office Spaces	12	12	144	5	720	1.25	900	
	EC-O6	**EC Office**	1	Administrator Office	Office Space	15	20	300	1	300	1.25	375	
	EC-Conf	**EC Conference**		Seminar	Small (n~10), Conference	14	14	196	1	196	1.25	245	Seminar Spaces.
	EC-Ref	**EC Reference**		Library/Reference	Reference/Study Room	15	30	450	1	450	1.25	563	
	OSEC-O1	**Office**		OSEC Center	Open Office Space	20	20	400	1	400	1.25	500	Open Reference Center
	VR-O1	**Office**		Voc Rehab Office	Office Space	12	10	120	2	240	1.25	300	
	VR-Recpt	**Receptionist**		Voc Rehab Recptionist	Office Space	8	10	80	1	80	1.25	100	
	VR-S1	**Storage**		Voc Rehab Storage	Storage	12	10	120	1	120	1.25	150	
	TD-O1	**Office**		Trans Dist. Office	Office Space	12	10	120	2	240	1.25	300	
	TD-S1	**Storage**		Trans Dist. Storage	Storage	12	10	120	1	120	1.25	150	
		Total FTE	5	**SUBTOTAL - EC**								**3,253**	

Spaces for: Dean of Campus — Section 6.13

CATEGORY	REF	TYPE	FTE	USES	SPACE DESCRIPTION	W	L	NSF	No.Spaces	Total	Factor	GSF	NOTES
DEAN													
	D-O2	**Deans-Office**	1	Dean's Office	Office	14	15	210	1	210	1.25	263	Dean's Office
	D-Conf	**Deans-Conf**		Conference	Conference Room (n~10)	14	14	196	1	196	1.25	245	Dean's Conference Room
	D-O3	**Deans Sec.**	1	Secretary	Office	12	20	240	1	240	1.25	300	Dean's Secretary/Work Area
	D-Wait	**Waiting area**		Dean's Waiting Area	Waiting	10	10	100	1	100	1.25	125	Dean's Waiting Area
		Total FTE	2	**SUBTOTAL - DEAN'S SPACE**								**933**	

Support Spaces (Common to all users) — Section 6.14

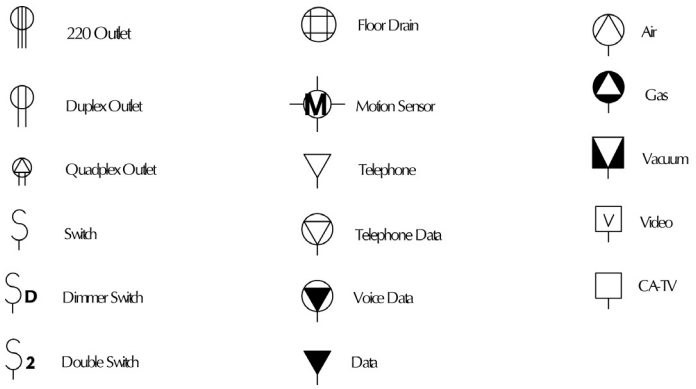
CATEGORY	REF	TYPE	FTE	USES	SPACE DESCRIPTION	W	L	NSF	No.Spaces	Total	Factor	GSF	NOTES
SUPPORT													
	SS-Mech	**Mech Equip**		Building HVAC systems	Building Space	60	30	1,800	2	3,600	1.25	4,500	
	SS-Elec	**Elect Room**		Building Elec. Systems	Building Space	40	20	800	2	1,600	1.25	2,000	
	SS-Tele	**Tele Com Rm**		Building Tele/Com Systems	Building Space	15	20	300	2	600	1.25	750	
	SS-Server	**IT File Server**		File Server Room	Server	10	15	150	2	300	1.25	375	Special Cooling/Power
	SS-Hub	**UEN Hub**		UEN Head end - Hub	UEN Hub	20	30	600	1	600	1.25	750	Special Cooling/Power
	SS-IT	**IT Work Rm**		IT Work Room	IT Work Room	15	20	300	1	300	1.25	375	
	SS-Stor	**Bldg Stor**		Building Storage Room	Storage	40	20	800	1	800	1.25	1,000	Storage Space for Building Supplies
	SS-Dock	**Dock/Rec.**		Loading Dock	Loading/Receiving	15	20	300	1	300	1.25	375	
	SS-Reg	**Registration**	5	Open Office-5 positions/Registration	Registration Open Office	24	30	720	1	720	1.25	900	
	SS-Adv	**Office**	1	Adviser's Office	Office	12	12	144	1	144	1.25	180	
	SS-L1	**Open Lab**		Small Open Work Lab	Wet Lab	22	18	396	1	396	1.25	495	Field Labs for open use
	SS-Com	**Computer Rm**		Open Computer Room	Open Computer Lab	24	24	576	1	576	1.25	720	
	SS-Lobby	**Lobby**		Entry/Commons	Lobby	20	20	400	1	400	1.25	500	
	SS-Break	**Break Areas**		Food/Eating Areas	Breakroom	12	15	180	1	180	1.25	225	
	SS-Janitor	**Custodial**		Janitor's supplies	Janitor's closet	5	8	40	2	80	1.25	100	
	SS-M Stff	**Men's**		Shower, Locker -Staff	Shower Room	10	16	160	1	160	1.25	200	LEED Points
	SS-W Stff	**Women's**		Shower, Locker -Staff	Shower Room	10	16	160	1	160	1.25	200	LEED Points
	SS-M Std	**Men's**		Restrooms	Restrooms- Students/Faculty	10	31	310	2	620	1.25	775	
	SS-W Std	**Women's**		Restrooms	Restrooms- Students/Faculty	10	31	310	2	620	1.25	775	
	SS-Unisex	**Unisex Restrooom**		Restrooms- Unisex	Restrooms- Unisex	7	8	56	1	56	1.25	70	
		Total FTE		**SUBTOTAL - SUPPORT SPACES**								**15,195**	

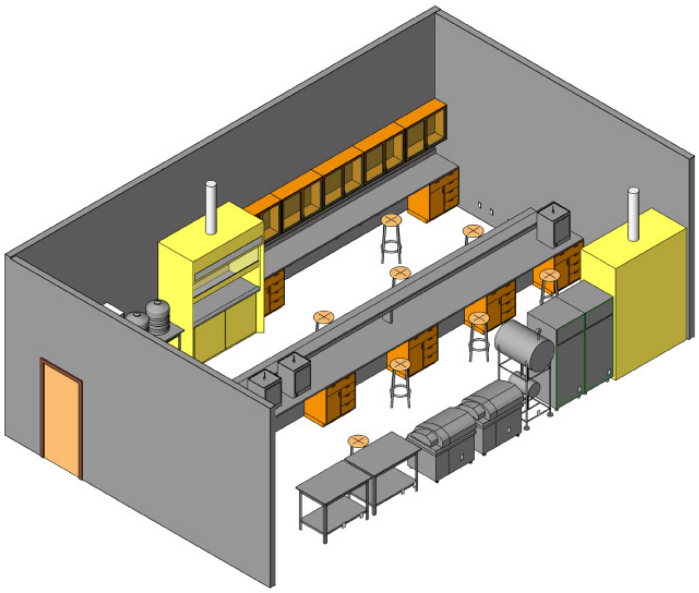
Individual Spaces

This section contains a detailed Programming Check List for every department designated in the building. Each department's space is documented with a 3-page criteria checklist, including a diagrammatic image. See key below.

The departments include:

6.10 Biology/Chemistry
6.11 Natural Resources
6.12 Entrepreneurship Center
6.13 Dean of Campus Space
6.14 Support Spaces





Biology & Chemistry

Individual space lists for each room designated.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Tiered Lecture Hall (~100)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TC2

NO.	ITEM	☑	NOTE				46'x36' - 1,656 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Seminar - Teaching - Presentations				
3	Hours of Operation	☒	From: 7a.m. - 12 p.m.	Days: M - Sat.			
		☐	Facility Standard				
4	Size		Width:	46			
			Length:	36			
			Area:	1,656			
5	Ceiling height		Height from floor:	Varies			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☒	Other	Wood accents			
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence	Staged lighting for presentation: Setup to dim front of room separate from the back of room.			
		☐	Day Lighting				
		☒	Special	Spots at stage			
8	Number of Occupants	No.	100				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Ceiling mounted video camera				
12	Equipment in Construction Contract	☒	Lab Equipment				
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs-Tablet w/arm	Number:	100	Size:	Typical tablet chairs. Fixed seating in contract.
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other - Stool	Number:	1	Size:	NIC

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Tiered Lecture Hall (~100)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TC2

NO.	ITEM	☑	NOTE				46'x36' - 1,656 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☐	Rubber				
		☒	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	2			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				
	<Provide conduit & power>	☒	Built-In Video Projector (NIC)				
	<Provide conduit & power>	☒	Projector Screen	Power: ☒	Manual: ☐	8 x12	See diagrammatic drawing for this space.
		☒	White Boards: Size:	8 x12	Number:	1	See diagrammatic drawing for this space.
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☒	Special: Voice amplification/speakers. Control room acoustics for speaking use.				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

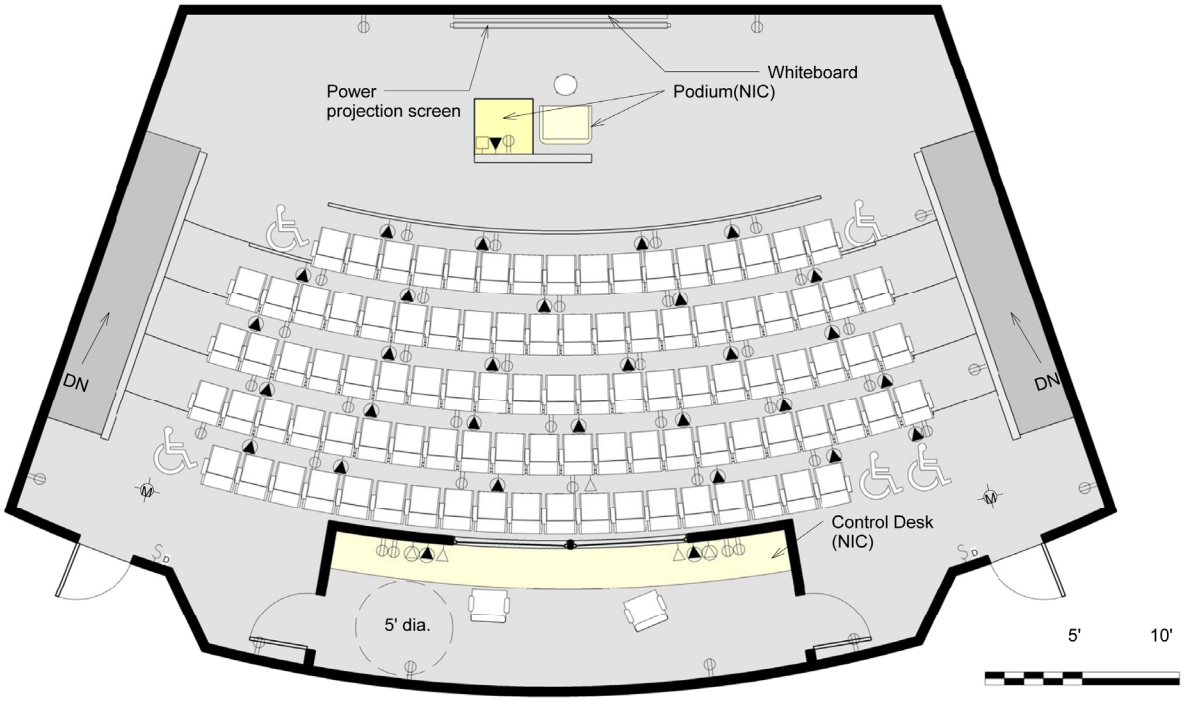
Space Name: Tiered Lecture Hall (~100)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TC2

NO.	ITEM	☑	NOTE	46'x36' - 1,656 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
The configuration and length & width orientation should not be construed as rigid.

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Small Classroom (~20) (9)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TC3

NO.	ITEM	☑	NOTE				(Nine spaces) 30'x25' - 750 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Teaching				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	30			
			Length:	25			
			Area:	750			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence	Staged lighting.			
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	15-20				
9	Number of Visitors	No.					
10	Security	☒	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
		☒	Television / DVD				
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	22	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Desk
		☒	Tables - Type	Number:	6	Size:	8 ft.
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Podium	Number:	1	Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Small Classroom (~20) (9)
Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

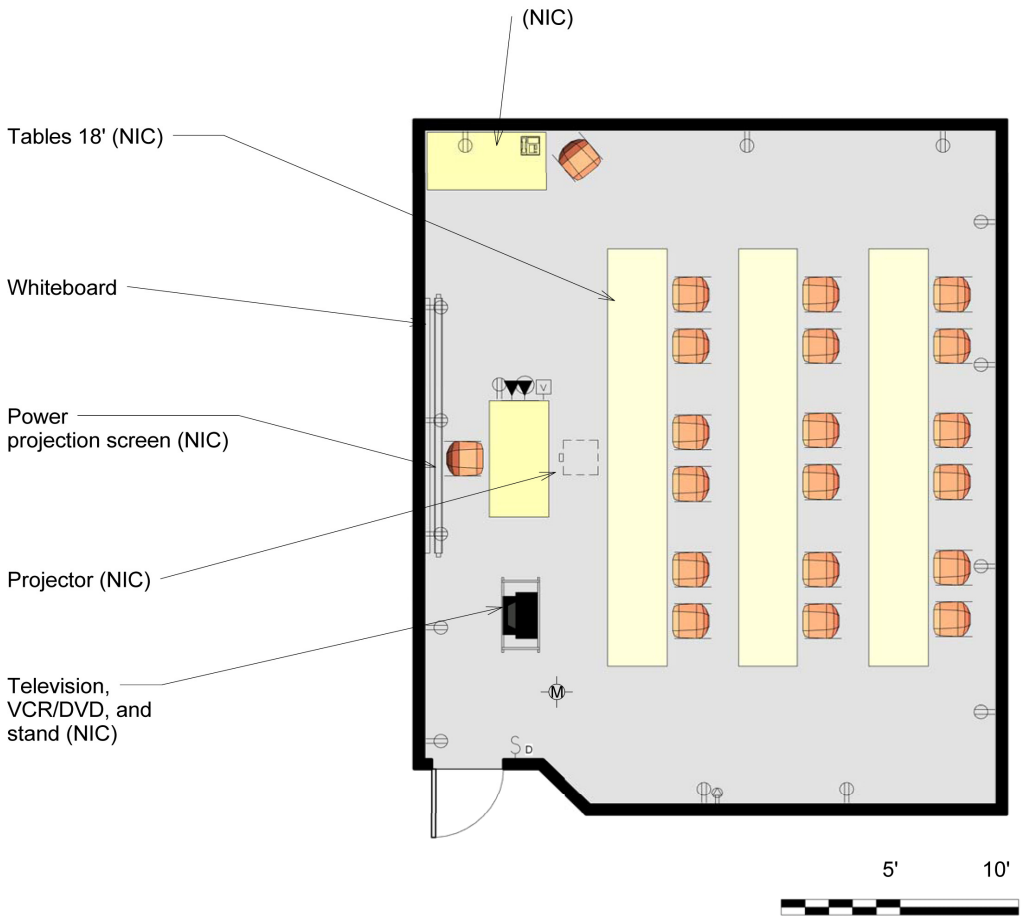
BC-TC3

NO.	ITEM	☑	NOTE				(Nine spaces) 30'x25' - 750 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power and screen.
		☒	White Boards: Size:	6x12	Number:	1	IN CONTRACT.
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TC3

NO.	ITEM	☑	NOTE	(Nine spaces) 30'x25' - 750 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Open Computer (~30+)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TCom

NO.	ITEM	☑	NOTE				44'x40' - 1,760 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Teaching				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	44			
			Length:	40			
			Area:	1,760			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	40				
9	Number of Visitors	No.					
10	Security	☒	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
		☒	Television / DVD				
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	1	Size:	Drafting type stool w/back
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	30	Size:	30" x 54"
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Podium	Number:	1	Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Open Computer (~30+)

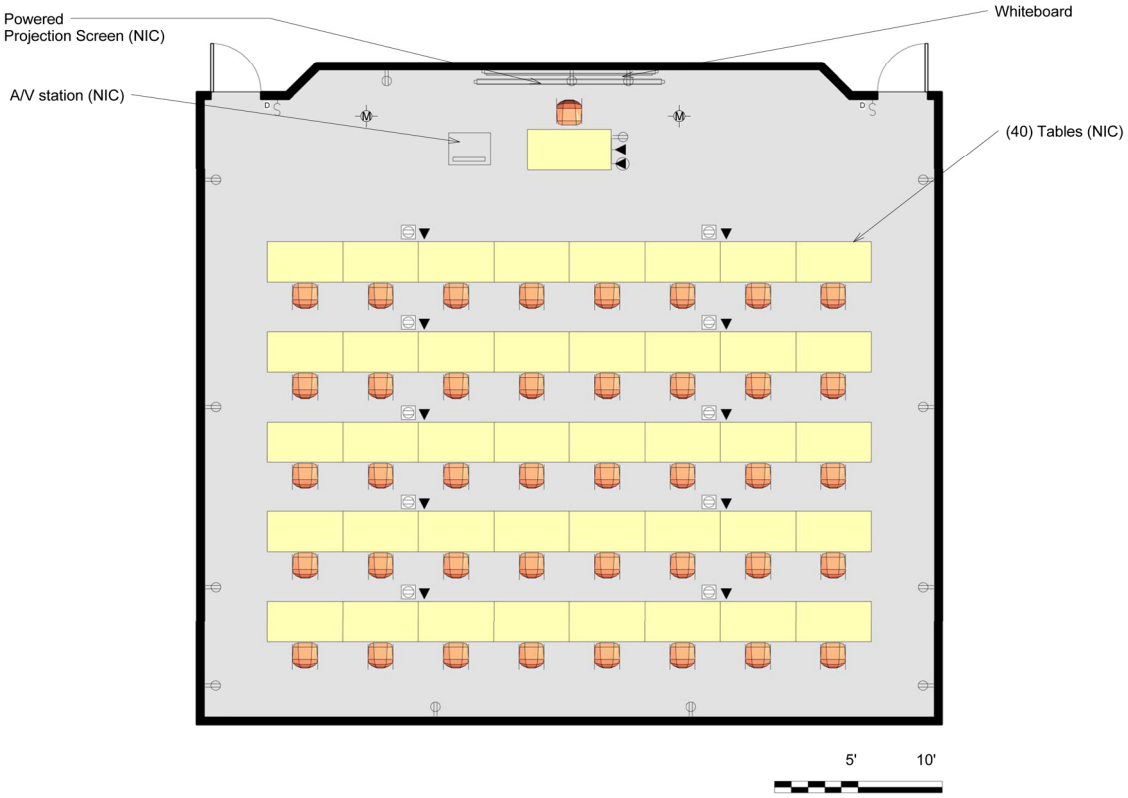
Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TCom

NO.	ITEM	☑	NOTE				44'x40' - 1,760 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

NO.	ITEM	☑	NOTE	44'x40' - 1,760 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
The configuration and length & width orientation should not be construed as rigid.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Geology Dry Lab (~24)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL1

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Teaching Lab - Geology Dry Lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	33			
			Length:	36			
			Area:	1,188			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	24				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	32	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Geology Dry Lab (~24)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL1

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hood	1			
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

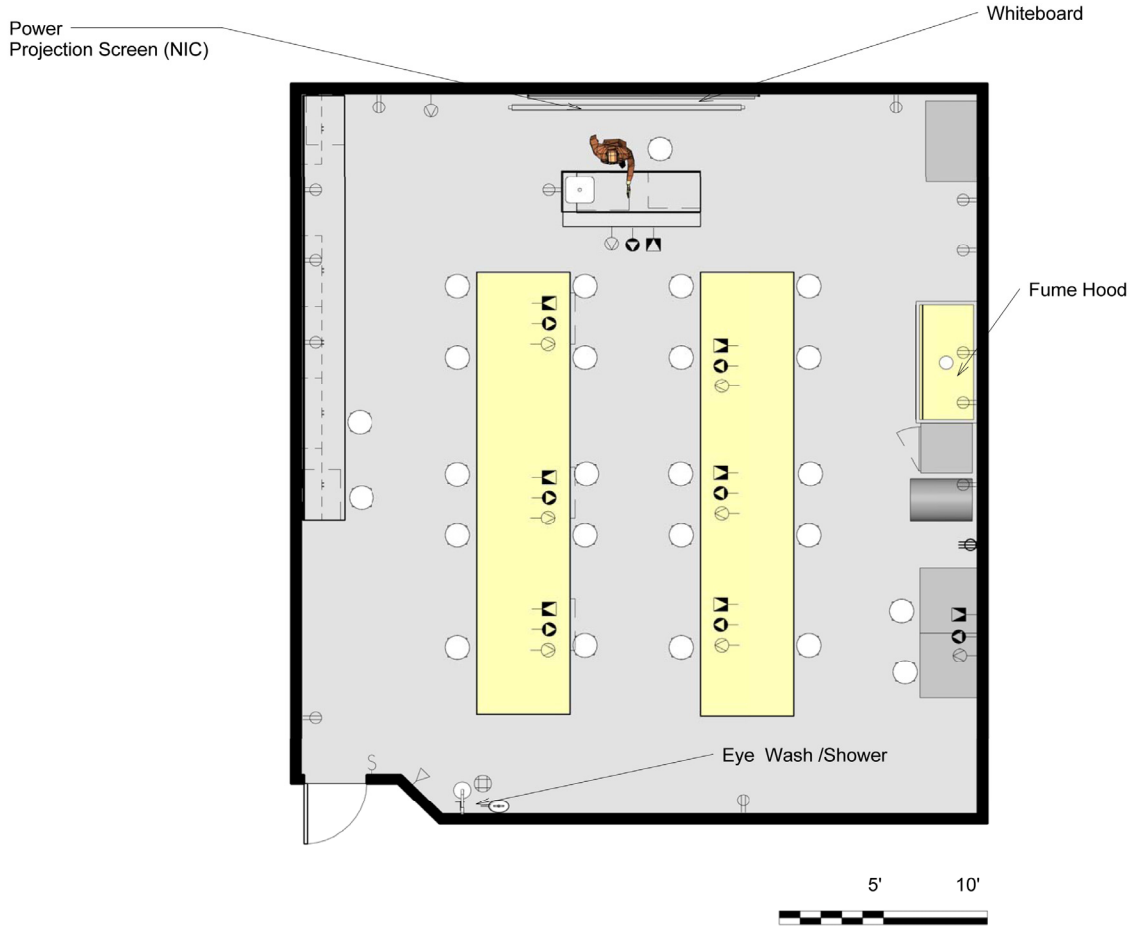
Space Name: Geology Dry Lab (~24)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL1

NO.	ITEM	☑	NOTE	33'x36' - 1,188 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Wet Lab (~24)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL2

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Bio Teaching Lab - Wet Lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	33			
			Length:	36			
			Area:	1,188			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	24				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	32	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Wet Lab (~24)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL2

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hood	1			
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

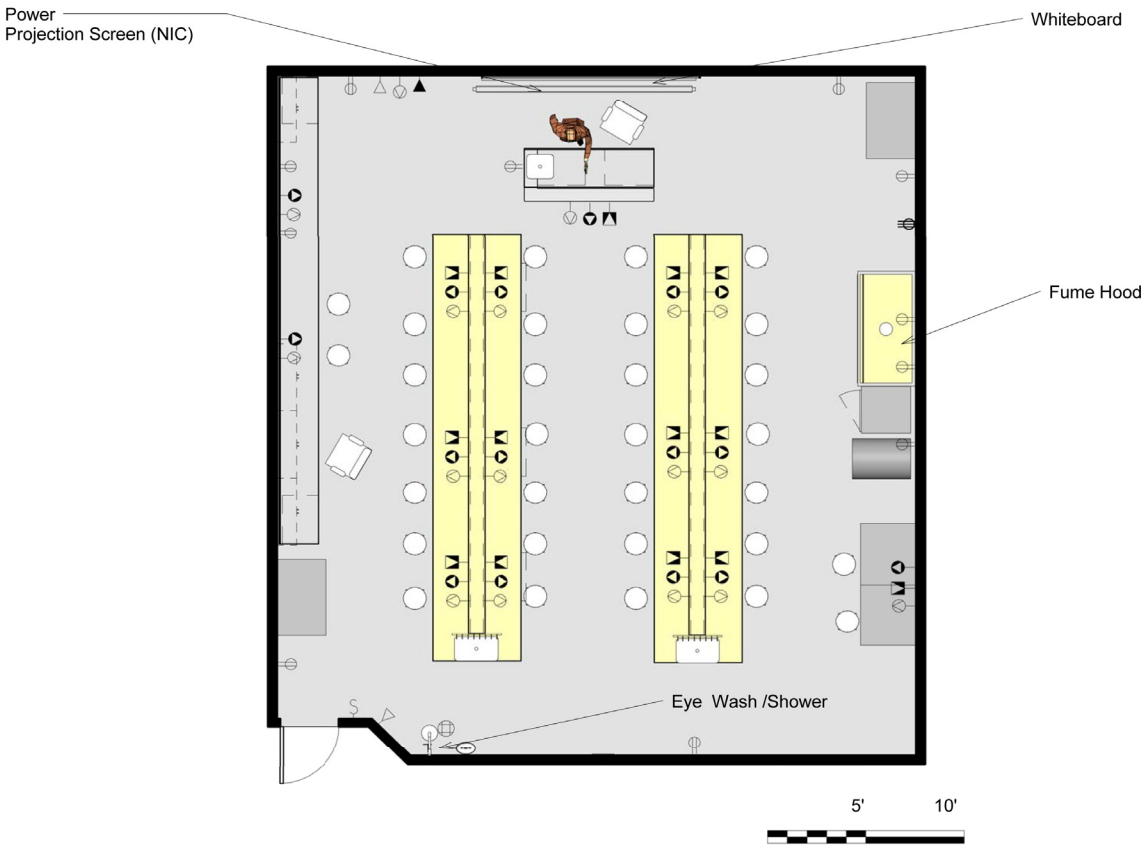
Space Name: Biology Wet Lab (~24)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL2

NO.	ITEM	☑	NOTE	33'x36' - 1,188 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Wet Lab (~20)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL3

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Bio Teaching Lab - Wet Lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	33			
			Length:	36			
			Area:	1,188			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	24				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	22	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Wet Lab (~20)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

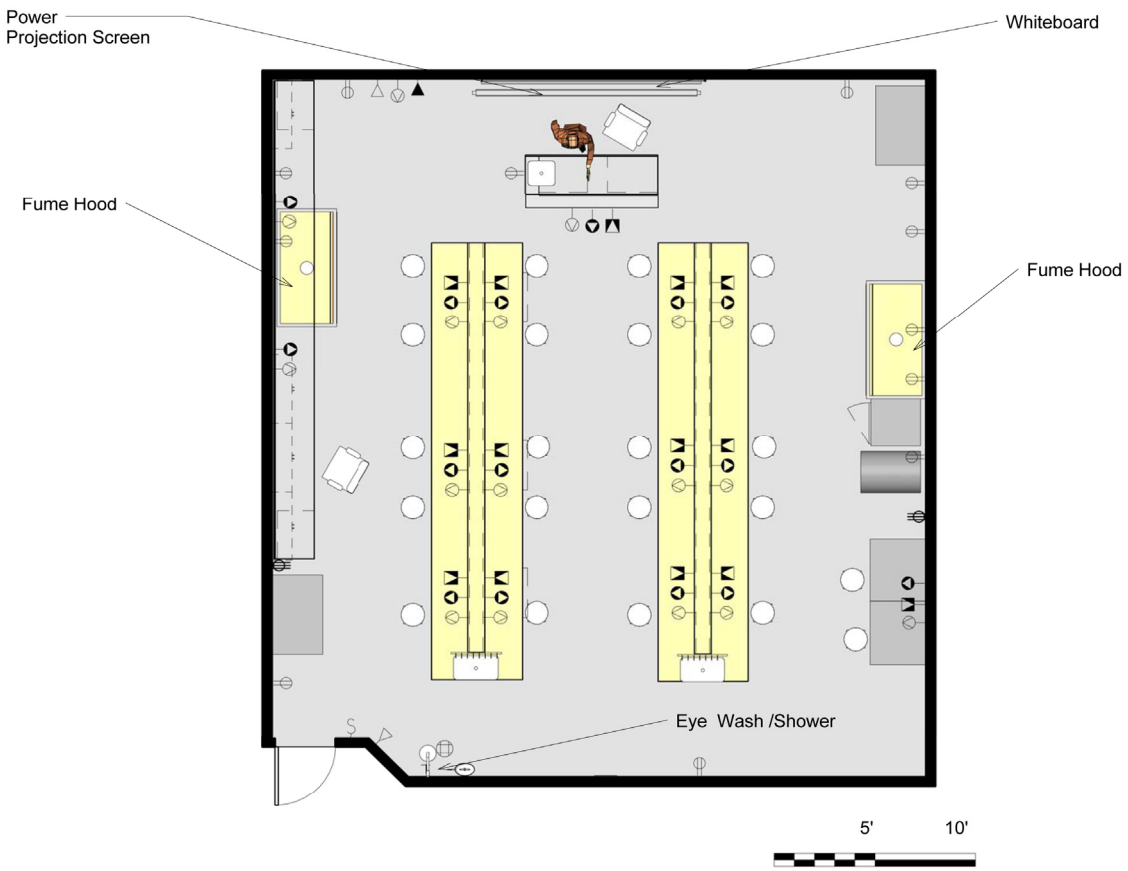
BC-TL3

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hoods	2			1 Pecloric Acid Fume Hood
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL3

NO.	ITEM	☑	NOTE	33'x36' - 1,188 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Wet Lab (~20)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL4

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Chemistry - Intro Teaching Lab - Wet Lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	33			
			Length:	36			
			Area:	1,188			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	16				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	22	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Wet Lab (~20)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL4

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hoods	2			1 Pecloric Acid Fume Hood
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

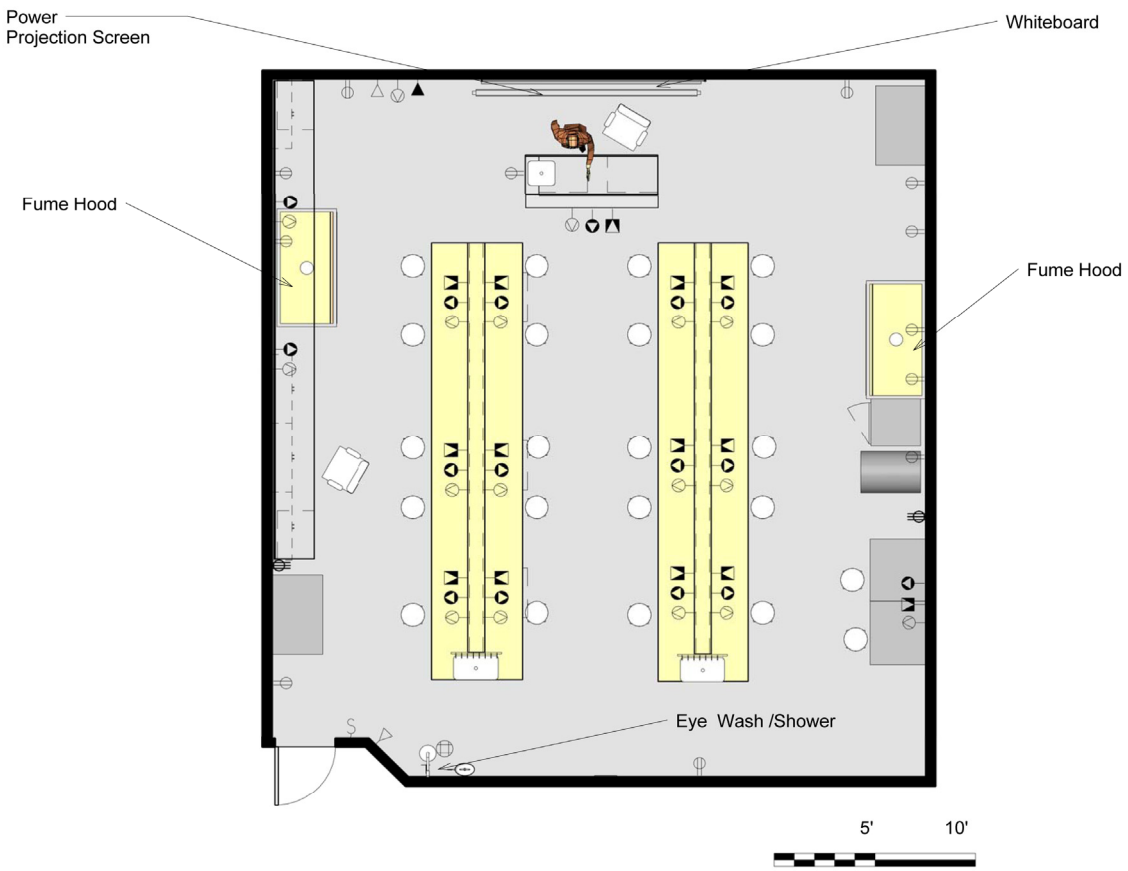
Space Name: Chemistry Wet Lab (~20)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL4

NO.	ITEM	☑	NOTE	33'x36' - 1,188 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Organic Chemistry Wet Lab (~20)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL5

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Organic Chemistry - Teaching Lab - Wet Lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	33			
			Length:	36			
			Area:	1,188			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	16				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	22	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Organic Chemistry Wet Lab (~20)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL5

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hoods	2			1 Pecloric Acid Fume Hood
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

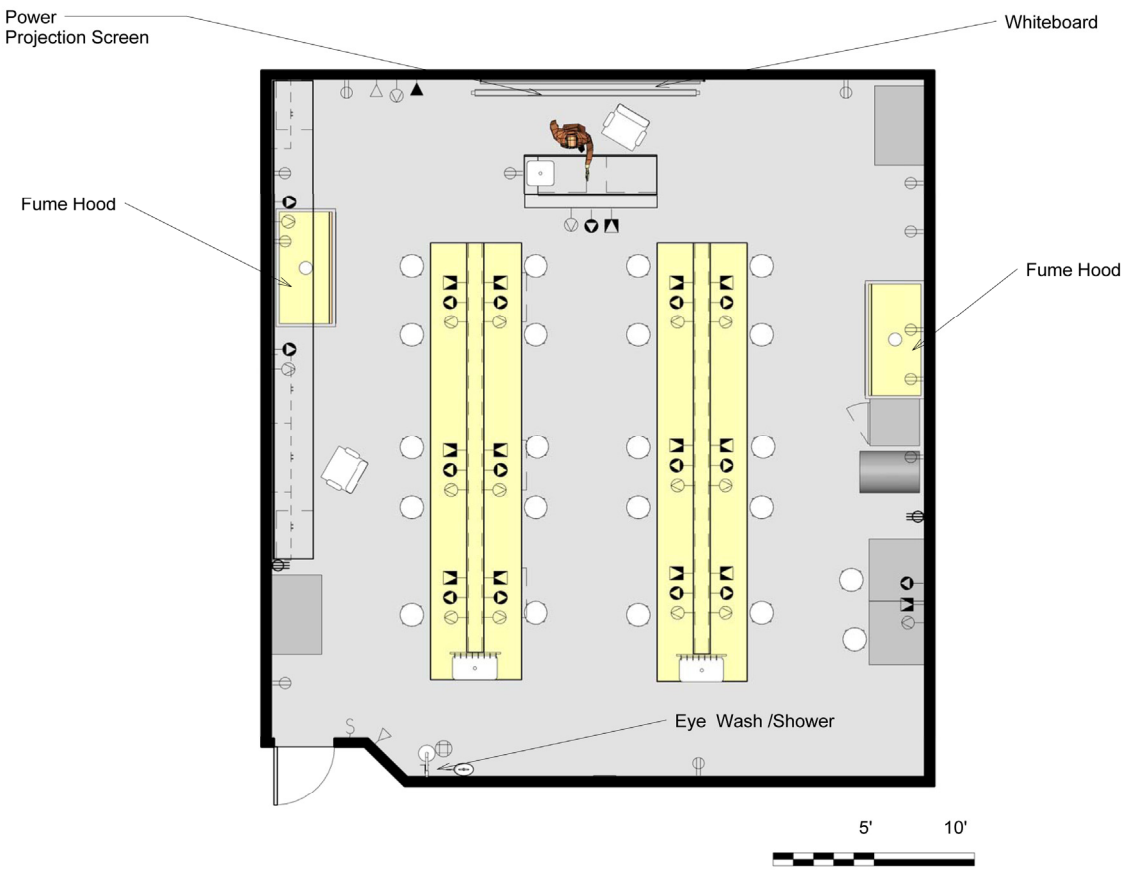
Space Name: Organic Chemistry Wet Lab (~20)

Biology & Chemistry-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-TL5

NO.	ITEM	☑	NOTE	33'x36' - 1,188 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Wet Lab (3)

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL1

NO.	ITEM	☑	NOTE				(Three labs) 22'x30' - 660 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Bio Research Lab - Wet Lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	30			
			Area:	660			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	12-14				
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	12	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Wet Lab (3)

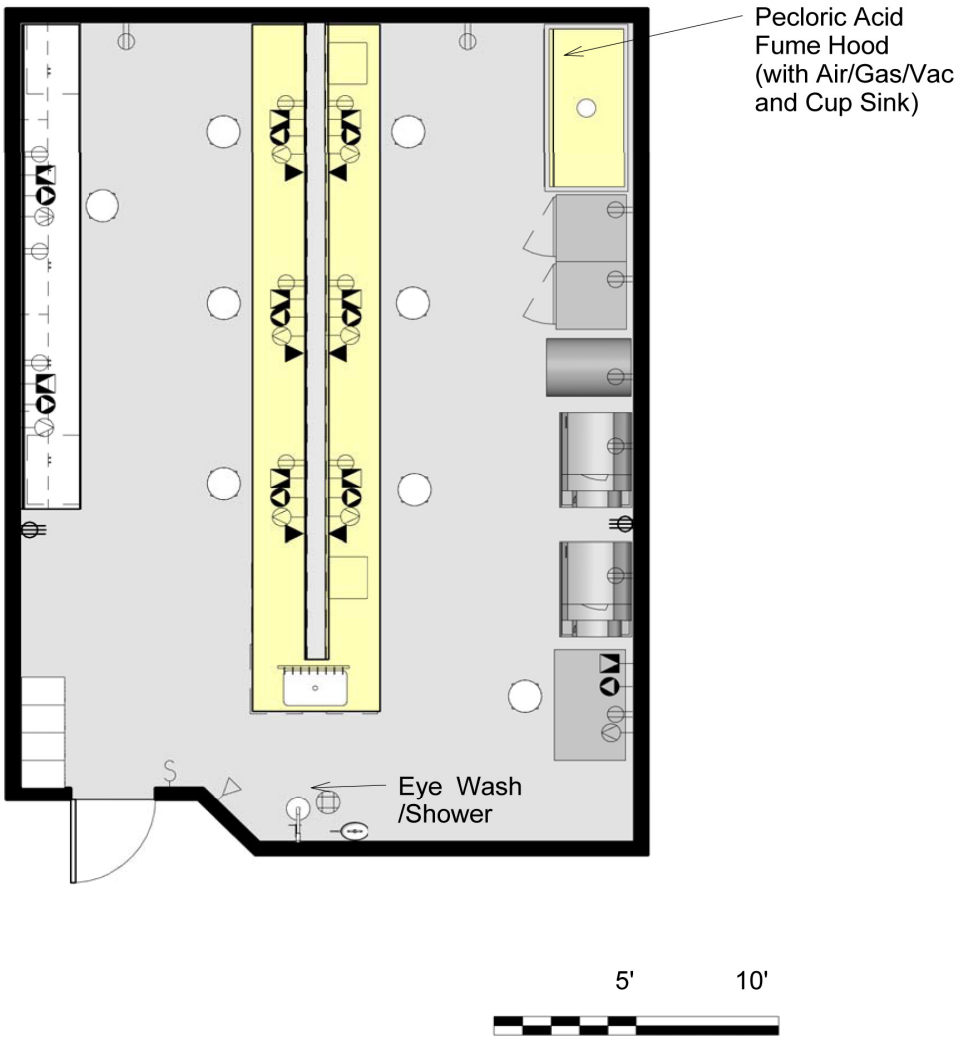
Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL1

NO.	ITEM	☑	NOTE				(Three labs) 22'x30' - 660 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Built-In Video Projector (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hood	1			1 Pecloric Acid Fume Hood
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

NO.	ITEM	☑	NOTE	(Three labs) 22'x30' - 660 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Lab Herbarium

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL2

NO.	ITEM	☑	NOTE				22'x20' - 440 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Research growth				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	20			
			Area:	440			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☒	Day Lighting				
		☒	Special: Balanced natural light fixtures				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	6	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Lab Herbarium

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL2

NO.	ITEM	☑	NOTE				22'x20' - 440 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☐					
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

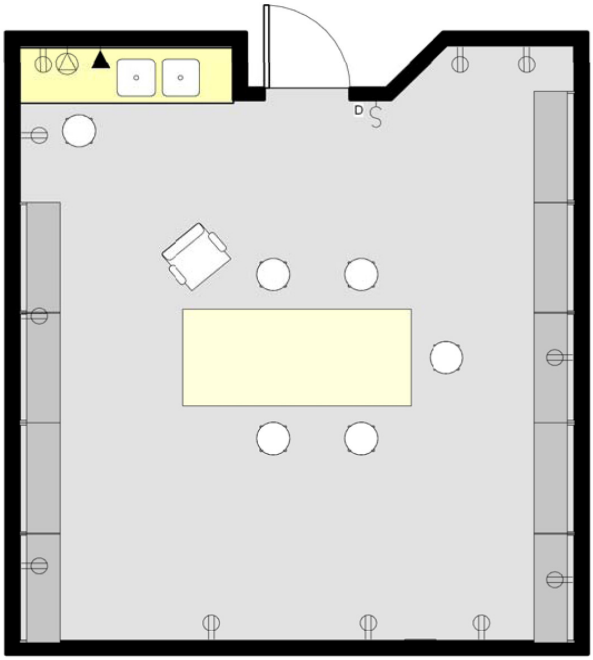
Space Name: Biology Lab Herbarium

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL2

NO.	ITEM	☑	NOTE	22'x20' - 440 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Store/Stock Room & Prep Area

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RS1

NO.	ITEM	☑	NOTE				22'x22' - 484 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Storage + Stockroom + Prep Ares for Biology				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	22			
			Area:	484			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	2	Size: 6ft.	Work table
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other:	Number:		Size: 6ft.	Metal cabinet - NIC

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Store/Stock Room & Prep Area

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RS1

NO.	ITEM	☑	NOTE				22'x22' - 484 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

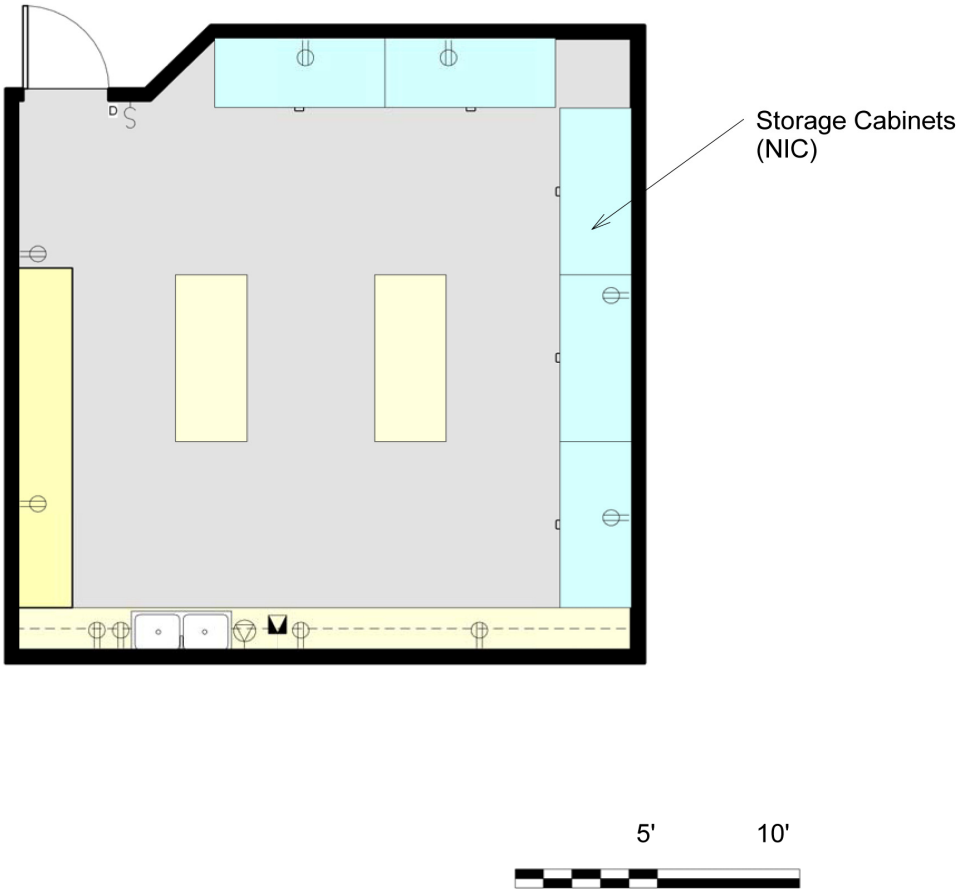
Space Name: Biology Store/Stock Room & Prep Area

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RS1

NO.	ITEM	☑	NOTE	22'x22' - 484 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Equipment

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-REqp

NO.	ITEM	☑	NOTE				22'x18' - 396 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Storage for shared Biology equipment				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	18			
			Area:	396			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Biology Equipment
Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-REqp

NO.	ITEM	☑	NOTE				22'x18' - 396 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

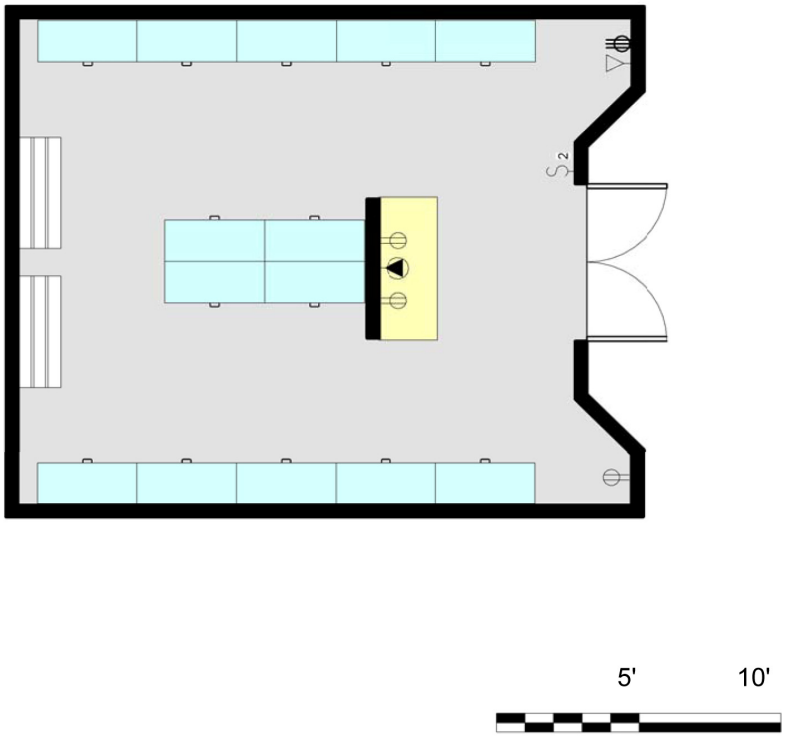
Space Name: Biology Equipment

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-REqp

NO.	ITEM	☑	NOTE	22'x18' - 396 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Geology Wet Lab

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL3

NO.	ITEM	☑	NOTE				22'x36' - 792 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Geo Research Lab - Wet Lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	36			
			Area:	792			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	24				
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	18	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Geology Wet Lab

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

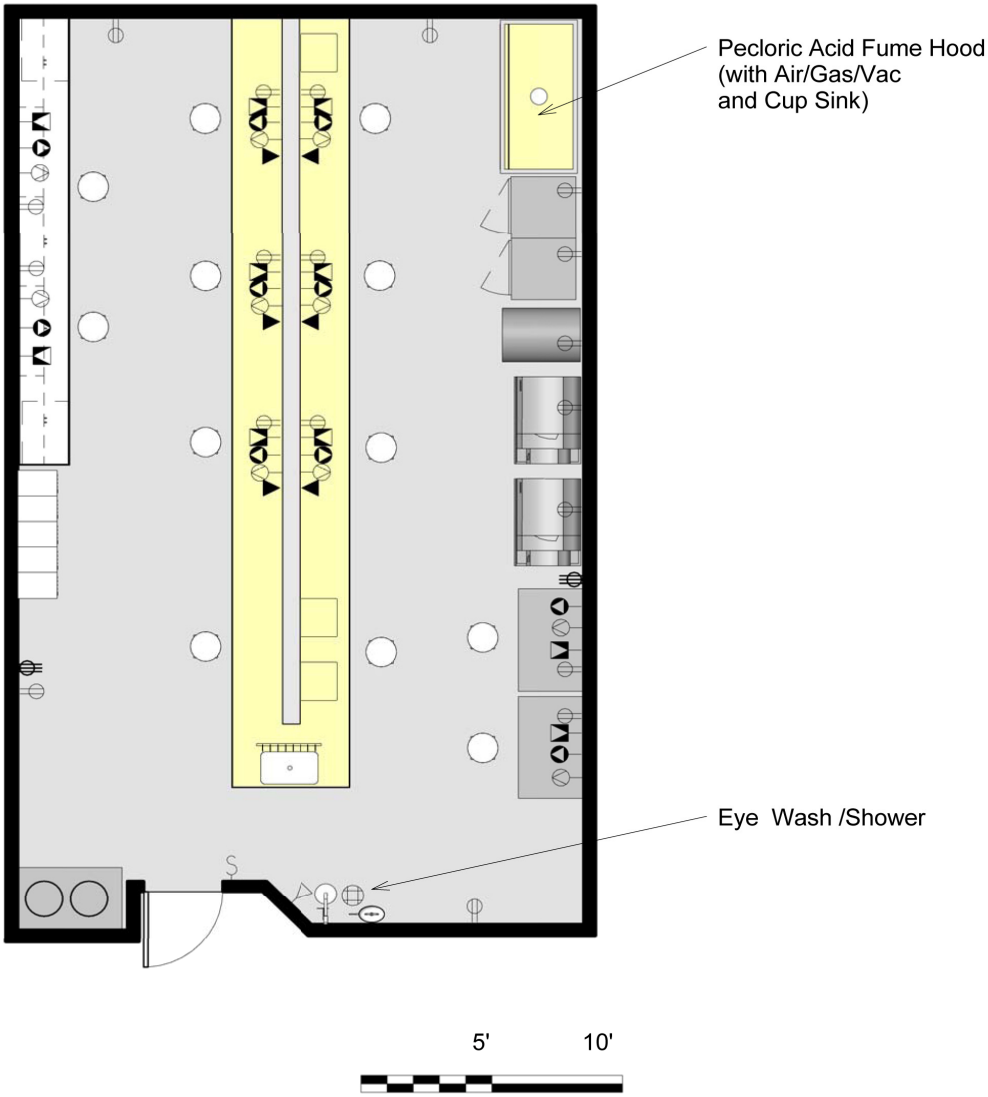
BC-RL3

NO.	ITEM	☑	NOTE				22'x36' - 792 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Built-In Video Projector (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hood	1			1 Pecloric Acid Fume Hood
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL3

NO.	ITEM	☑	NOTE	22'x36' - 792 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Storage - Instrument Room, Large

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RS2

NO.	ITEM	☑	NOTE				22'x25' - 550 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Storage + Instrument Room for Chemistry				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	25			
			Area:	550			
5	Ceiling height		Height from floor:	9 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Storage - Instrument Room, Large

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RS2

NO.	ITEM	☑	NOTE				22'x25' - 550 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

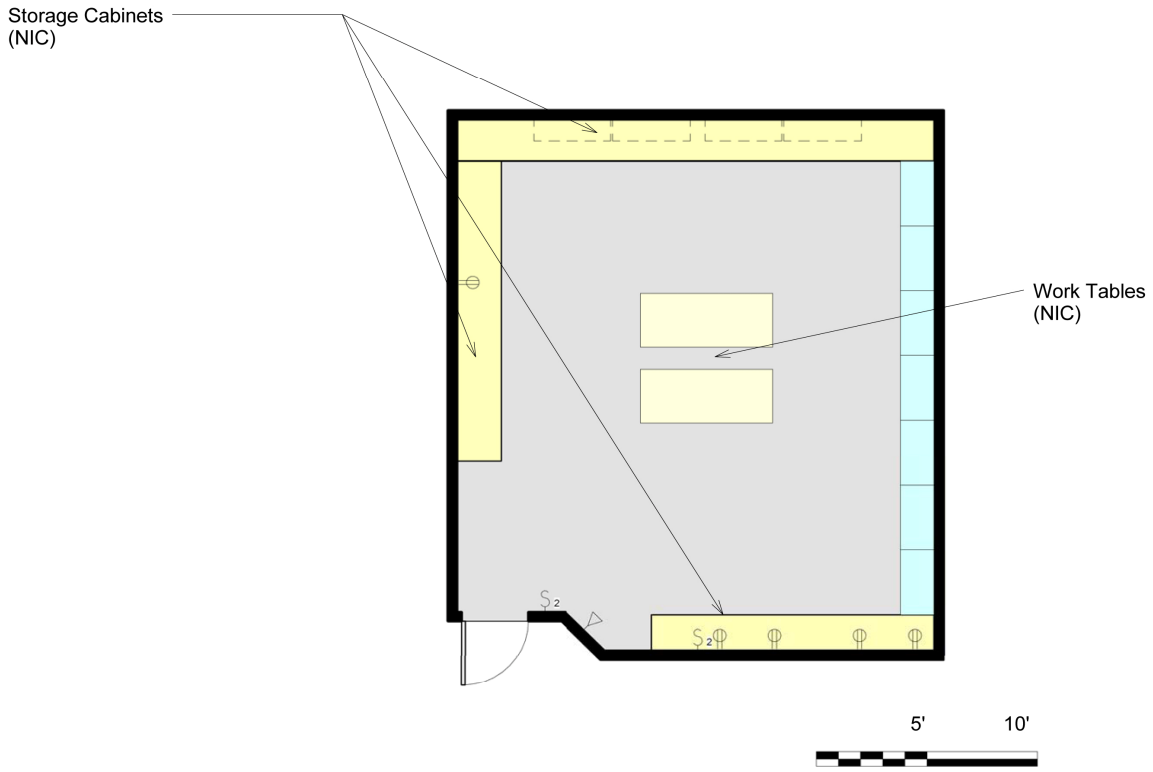
Space Name: Chemistry Storage - Instrument Room, Large

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RS2

NO.	ITEM	☑	NOTE	22'x25' - 550 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Storage - Instrument Room, Small

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RS2

NO.	ITEM	☑	NOTE				10'x22' - 220 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Storage + Instrument Room for Chemistry				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	10			
			Length:	22			
			Area:	220			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Storage - Instrument Room, Small

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RS2

NO.	ITEM	☑	NOTE				10'x22' - 220 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

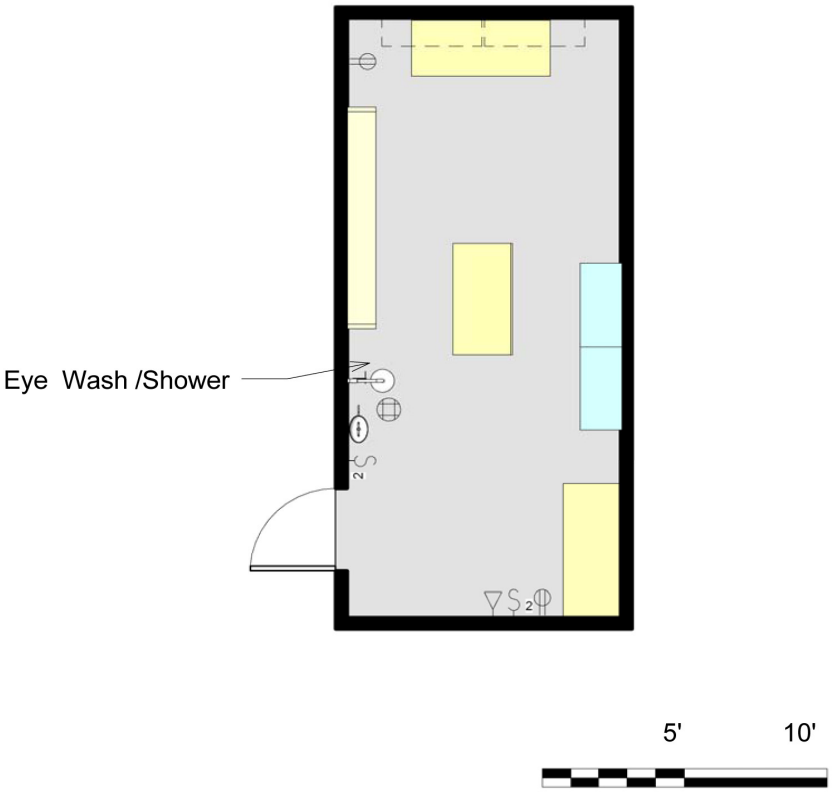
AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Storage - Instrument Room, Small

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH **BC-RS2**

NO.	ITEM	☑	NOTE	10'x22' - 220 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Wet Lab

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL4

NO.	ITEM	☑	NOTE				22'x36' - 792 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Chemistry Research Lab - Wet; rated fume hoods				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	36			
			Area:	792			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	16				
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	18	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Wet Lab

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

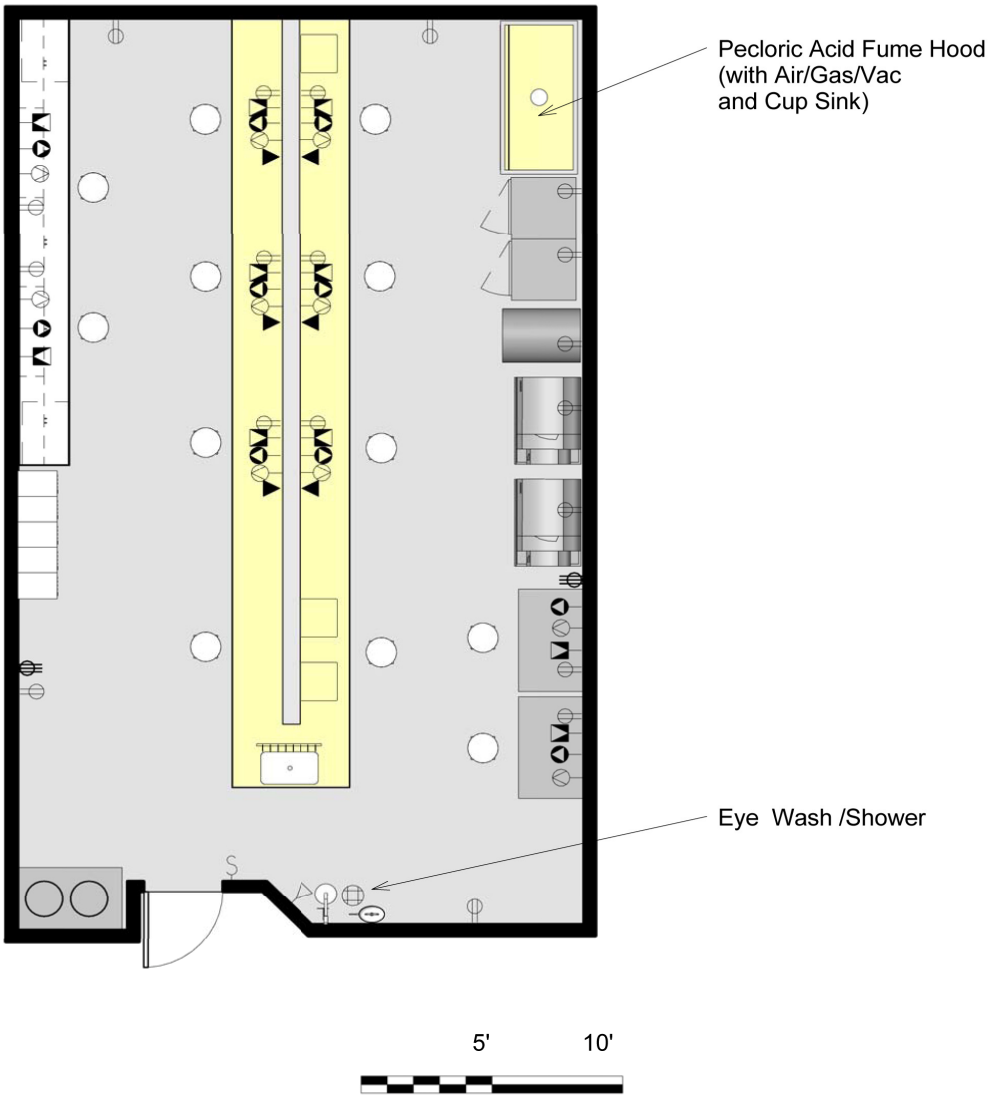
BC-RL4

NO.	ITEM	☑	NOTE				22'x36' - 792 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Built-In Video Projector (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hoods				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RL4

NO.	ITEM	☑	NOTE	22'x36' - 792 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Prep

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RPrep

NO.	ITEM	☑	NOTE				22'x35' - 770 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Storage + Stockroom + Prep Ares for Chemistry				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	35			
			Area:	770			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Chemistry Prep

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

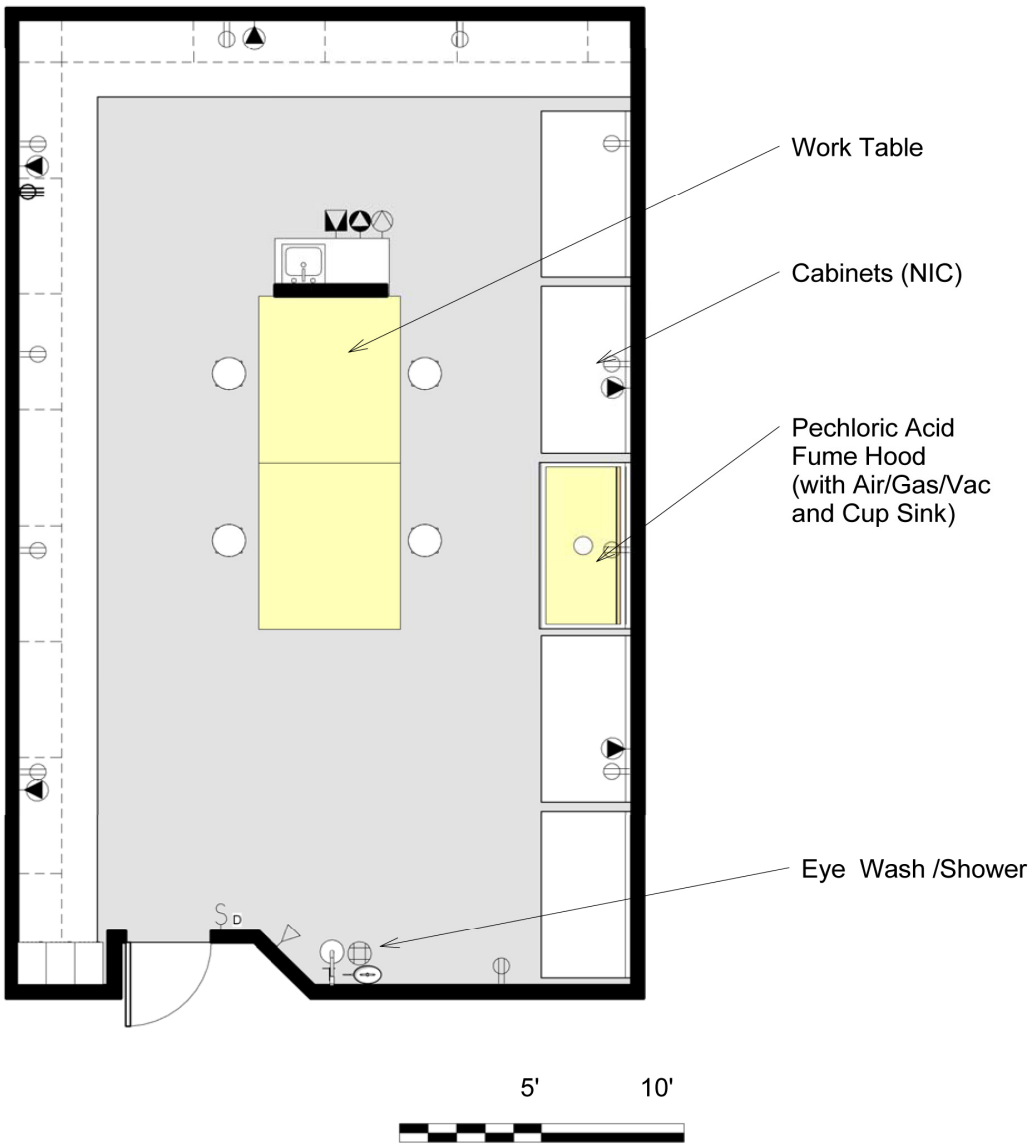
BC-RPrep

NO.	ITEM	☑	NOTE				22'x35' - 770 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hood	1			1 Pecloric Acid Fume Hood
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RPrep

NO.	ITEM	☑	NOTE	22'x35' - 770 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Cold Room

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RCold

NO.	ITEM	☑	NOTE				22'x10' - 220 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Cold room - Shared with all Sciences: Cold storage				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	10			
			Area:	220			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☒	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Pre-fab Cold Storage Room by Owner. Coordinate power & special HVAC with Owner.				
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☒	Special outlets and voltage: Coordinate with Owner				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Cold Room

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

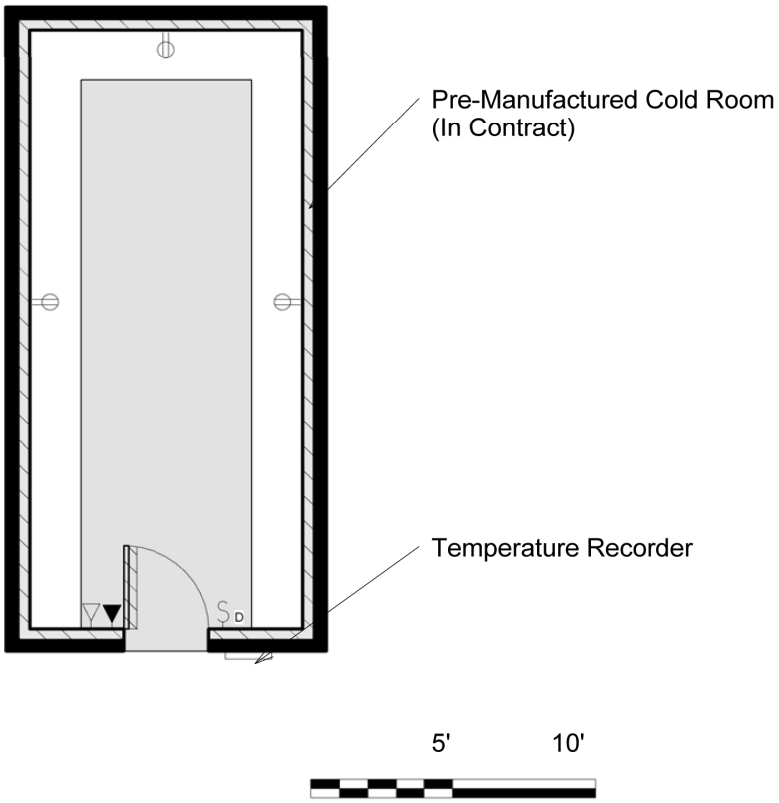
BC-RCold

NO.	ITEM	☑	NOTE				22'x10' - 220 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☐	Rubber				
		☐	Wood				
		☐	Tile				
		☒	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	1			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☐	Standard				
		☒	Special Temperature Range:	COORDINATE ALL WITH OWNER			
		☒	Special Humidity Range:	COORDINATE ALL WITH OWNER			
		☒	Special Operating Times:	For hours & days of operation: COORDINATE ALL WITH OWNER			
		☒	**Pre-fab Cold Storage Room by Owner. Coordinate power & special HVAC with Owner.**				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RCold

NO.	ITEM	☑	NOTE	22'x10' - 220 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Electronics Shop

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — BC-RShop

NO.	ITEM	☑	NOTE				22'x18' - 396 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Electronics shop - Chemistry, Physics, and Biology				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	18			
			Area:	396			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	4-6				
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☒	Special outlets and voltage: Coordinate with Owner				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	4	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Electronics Shop

Biology & Chemistry-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

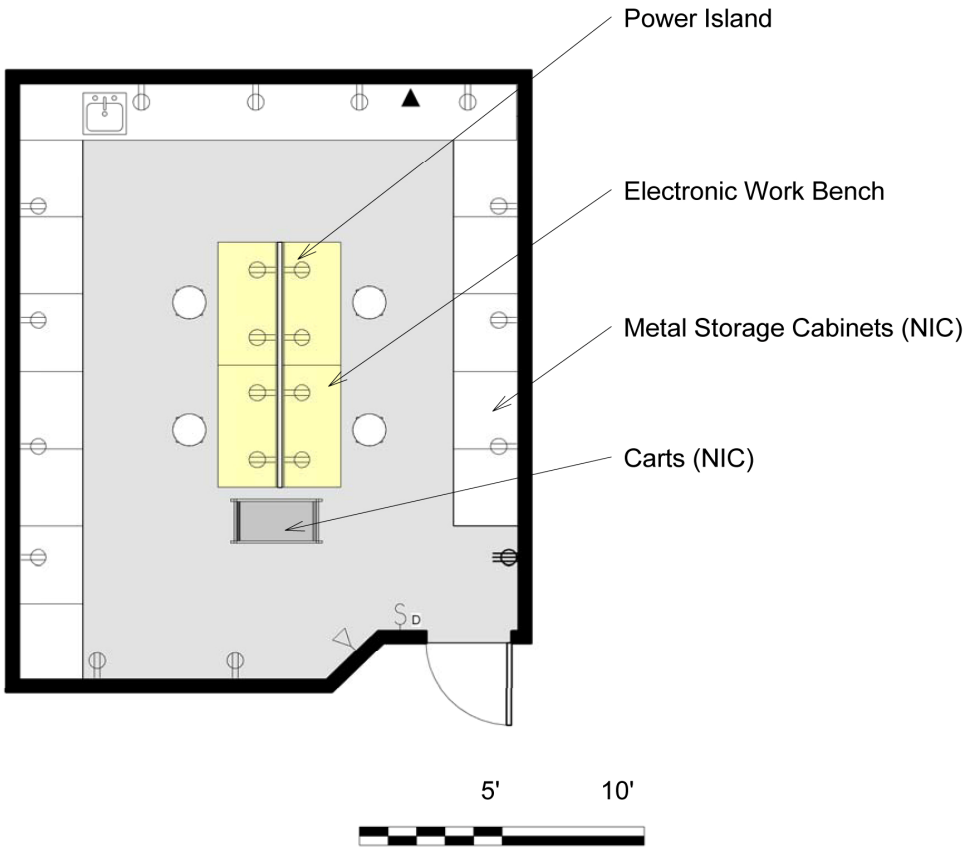
BC-RShop

NO.	ITEM	☑	NOTE				22'x18' - 396 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	1			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☐	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-RShop

NO.	ITEM	☑	NOTE	22'x18' - 396 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Faculty Office (8)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-O1

NO.	ITEM	☑	NOTE				(Eight offices) 12'x12' - 144 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Faculty offices for B & C staff				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	12			
			Area:	144			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐	None				
		☒	Other: Locked door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	2	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Faculty Office (8)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-O1

NO.	ITEM	☑	NOTE				(Eight offices) 12'x12' - 144 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only
		☒	Number of Handset:	1	NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☒	White Boards: Size:	3x4 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

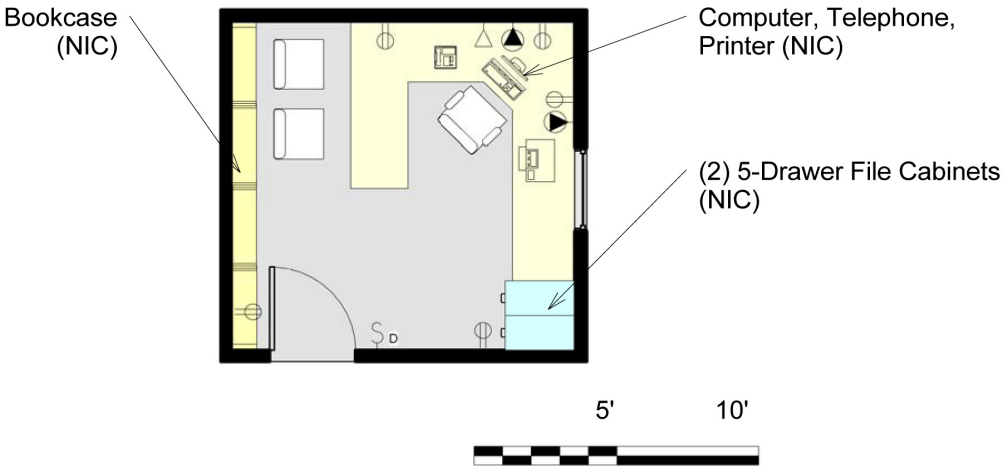
Space Name: Faculty Office (8)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-O1

NO.	ITEM	☑	NOTE	(Eight offices) 12'x12' - 144 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Graduate Office (2)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-O2

NO.	ITEM	☑	NOTE				(Two offices) 10'x8' - 80 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Grad offices for B & C				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	10			
			Length:	8			
			Area:	80			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☒	Day Lighting - windows				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	1				
10	Security	☐	None				
		☒	Other: Locked door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	1	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	1	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Graduate Office (2)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-O2

NO.	ITEM	☑	NOTE				(Two offices) 10'x8' - 80 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☒	White Boards: Size:	3x4 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

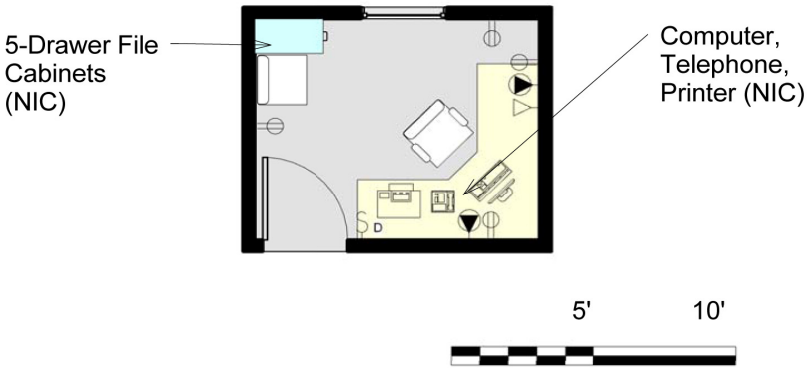
Space Name: Graduate Office (2)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-O2

NO.	ITEM	☑	NOTE	(Two offices) 10'x8' - 80 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Tech Office (3)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-O3

NO.	ITEM	☑	NOTE				(Three offices)10'x8' - 80 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Grad offices for B & C				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	10			
			Length:	8			
			Area:	80			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☒	Day Lighting - windows				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	1				
10	Security	☐	None				
		☒	Other: Locked door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	1	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	1	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Tech Office (3)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-O3

NO.	ITEM	☑	NOTE				(Three offices)10'x8' - 80 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☒	White Boards: Size:	3x4 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

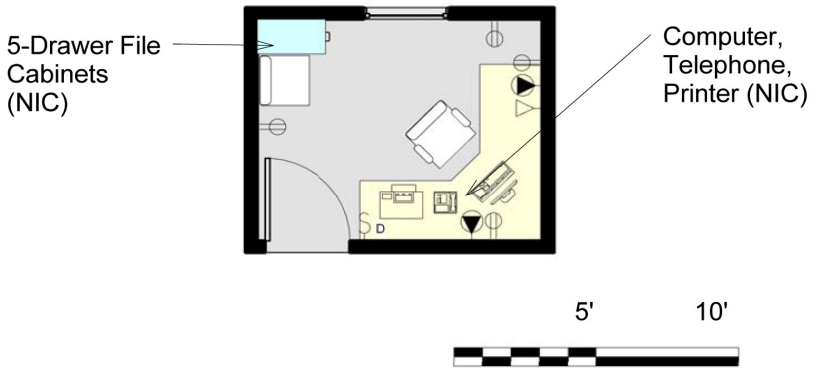
AGENCY: USU ☒ ☐ ☐

Space Name: Tech Office (3)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH BC-O3

NO.	ITEM	☑	NOTE	(Three offices)10'x8' - 80 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Work Room

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — BC-W1

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Photocopying, document preparation, mailing, etc.				
			Stores office supplies + paper				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	15			
			Length:	20			
			Area:	300			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Copier machine				
		☒	Fax machine				
		☒	Scanners				
		☒	Shredder / Recycle garbage cans				
12	Equipment in Construction Contract	☒	Millwork for cabinets				
13	Power Outlets	☒	Number of Standard duplex outlets: Apprx. 8 duplex outlets along each wall; some at countertop height and on walls.				
14	Special Power	☒	Copiers (2) - designaged 20 amp breaker				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Work Room

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — BC-W1

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Built-in cabinets, countertops:				
		☒	Type: Wall cabinets		Length:		
		☒	Type: Countertops		Length:		
		☒	Type: Shelves		Length:		
		☒	Type: Island work surface		Length:		
		☒	Shelving access from both sides of island.				
19	Telephone	☒	Number of Outlets:	2			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: 3 = 4-plex: 1 voice; 2 data				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

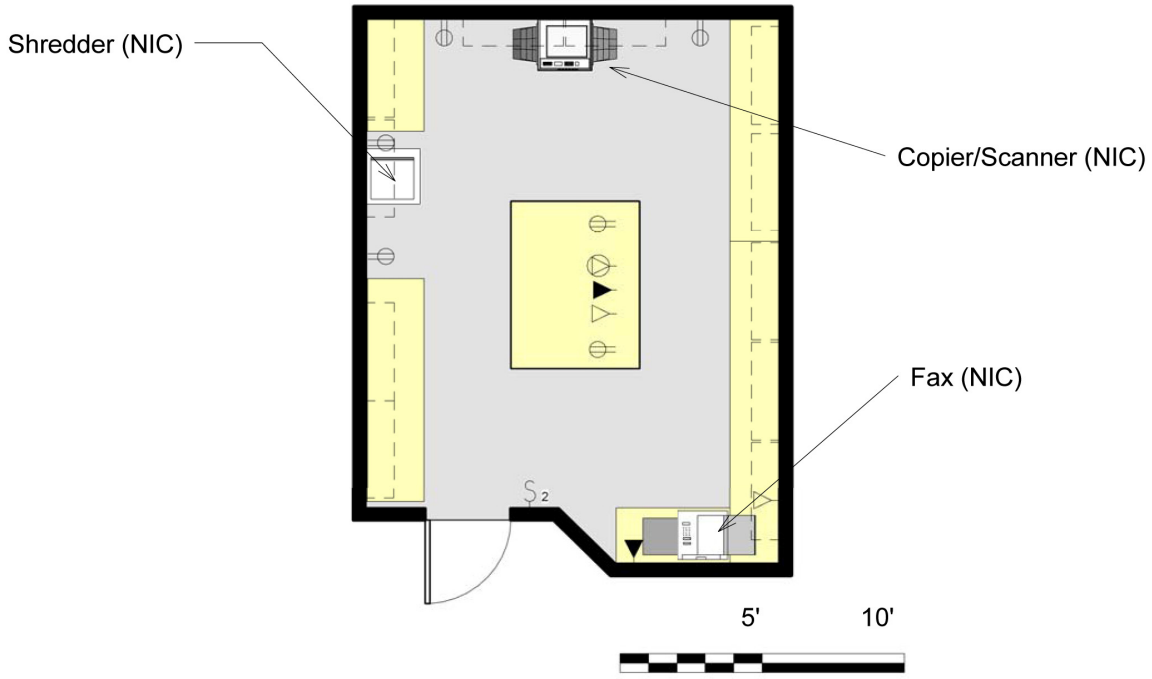
Space Name: Work Room

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-W1

NO.	ITEM	☑	NOTE	15'x20' - 300 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Conference Room (n~20)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-Conf

NO.	ITEM	☑	NOTE				15'x25' - 375 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Meeting / conference room				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	15			
			Length:	25			
			Area:	375			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				Staged for presentations.
		☐	Day Lighting				
		☒	Special				Down light spot.
8	Number of Occupants	No.	20				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Special pendant light				
		☒	Ceiling mounted video camera				
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets: 8-duplex outlets spaced on each wall				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☒	Side Chair	Number:	20	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size: 12 ft. conference table	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Conference Room (n~20)

Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

BC-Conf

NO.	ITEM	☑	NOTE				15'x25' - 375 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Type: Wood base-wainscoting		Length:	3 ft.	
		☒	Type: Wood bookcase - built-in		Length:	25 ft.	
		☒	Type: Couffered ceiling-coved lighting		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	2			Conduit only.
		☒	Number of Handset:	2	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	Voice / Data jacks (3) in floor			
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

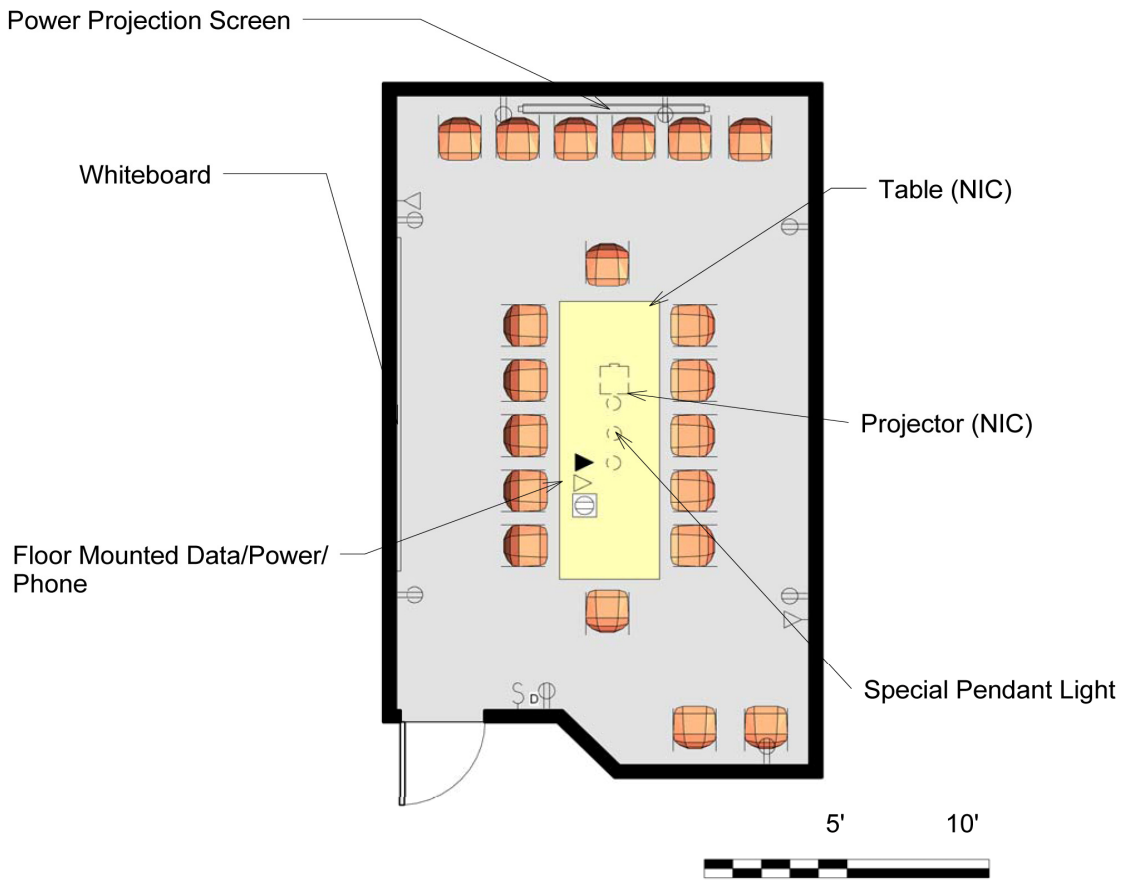
AGENCY: USU ☒ ☐ ☐

Space Name: Conference Room (n~20)

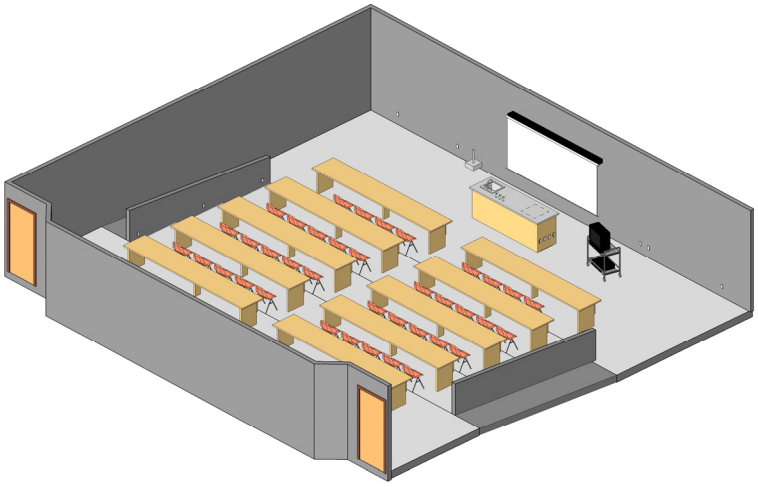
Biology & Chemistry-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH **BC-Conf**

NO.	ITEM	☑	NOTE	15'x25' - 375 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space. The configuration and length & width orientation should not be construed as rigid.



Natural Resources
Wildlife Resources and Watershed Sciences

Individual space lists for each room designated.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Storage

Natural Resources-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-TS1

NO.	ITEM	☑	NOTE				15'x15' - 225 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Specimen storage				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	15			
			Length:	15			
			Area:	225			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Other Chairs - Type	Number:	4	Size:	Stools
		☒	Tables - Type	Number:	1	Size: 4ft.	Work table
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other:	Number:	4	Size: 6ft.	Adjustable metal storage shelves

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Storage

Natural Resources-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-TS1

NO.	ITEM	☑	NOTE				15'x15' - 225 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	1			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power:☐	Manual:☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

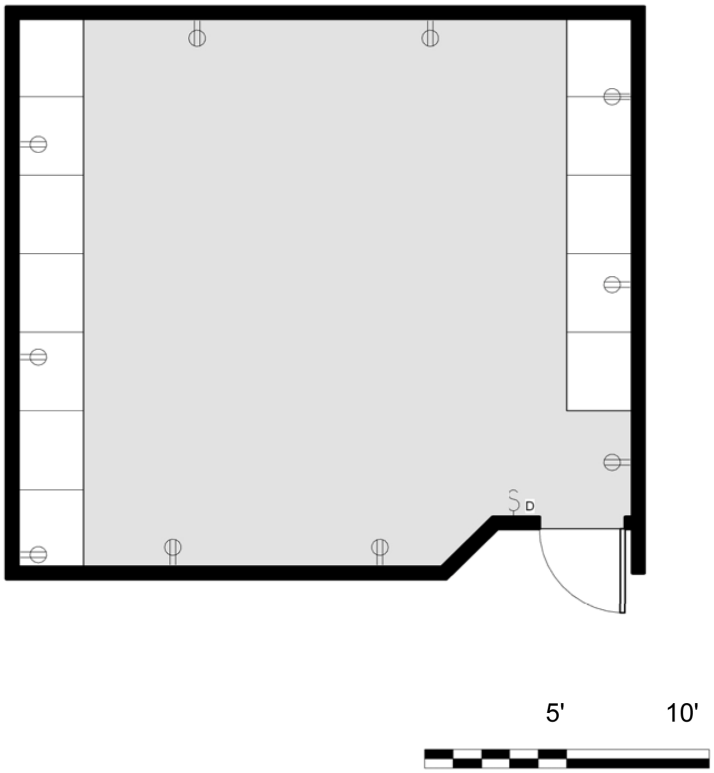
Space Name: Storage

Natural Resources-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-TS1

NO.	ITEM	☑	NOTE	15'x15' - 225 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Classroom - Wet Lab (n~20)

Natural Resources-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-TL1

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Teaching Wet Lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	33			
			Length:	36			
			Area:	1,188			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	24				
9	Number of Visitors	No.					
10	Security	☒	None				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	2	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	12	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Classroom - Wet Lab (n~20)

Natural Resources-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — NR-TL1

NO.	ITEM	☑	NOTE				33'x36' - 1,188 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hoods				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

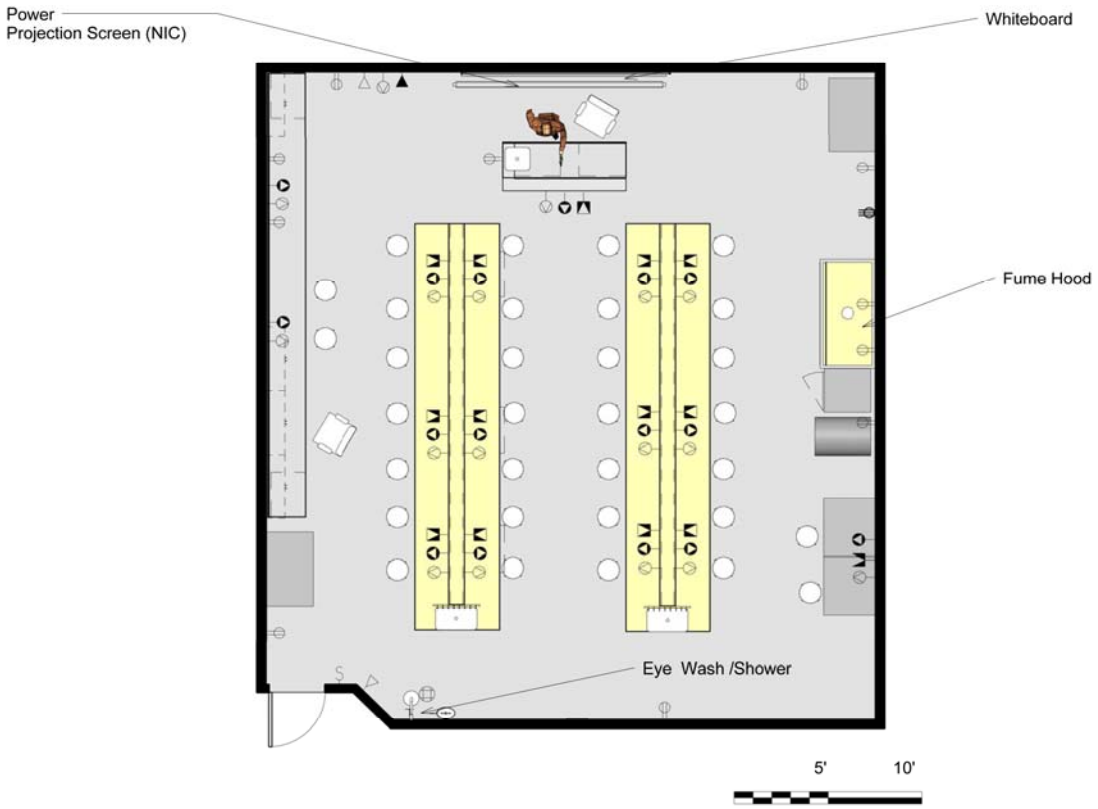
AGENCY: USU ☒ ☐ ☐

Space Name: Classroom - Wet Lab (n~20)

Natural Resources-TEACHING

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH NR-TL1

NO.	ITEM	☑	NOTE	33'x36' - 1,188 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Garage

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RGar

NO.	ITEM	☑	NOTE				20'x30' - 600 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Garage for vehicles, boats, various transportation				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	20			
			Length:	30			
			Area:	600			
5	Ceiling height		Height from floor:	Open		12'-0" CLEAR	
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☒	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Garage

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RGar

NO.	ITEM	☑	NOTE				20'x30' - 600 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	1			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

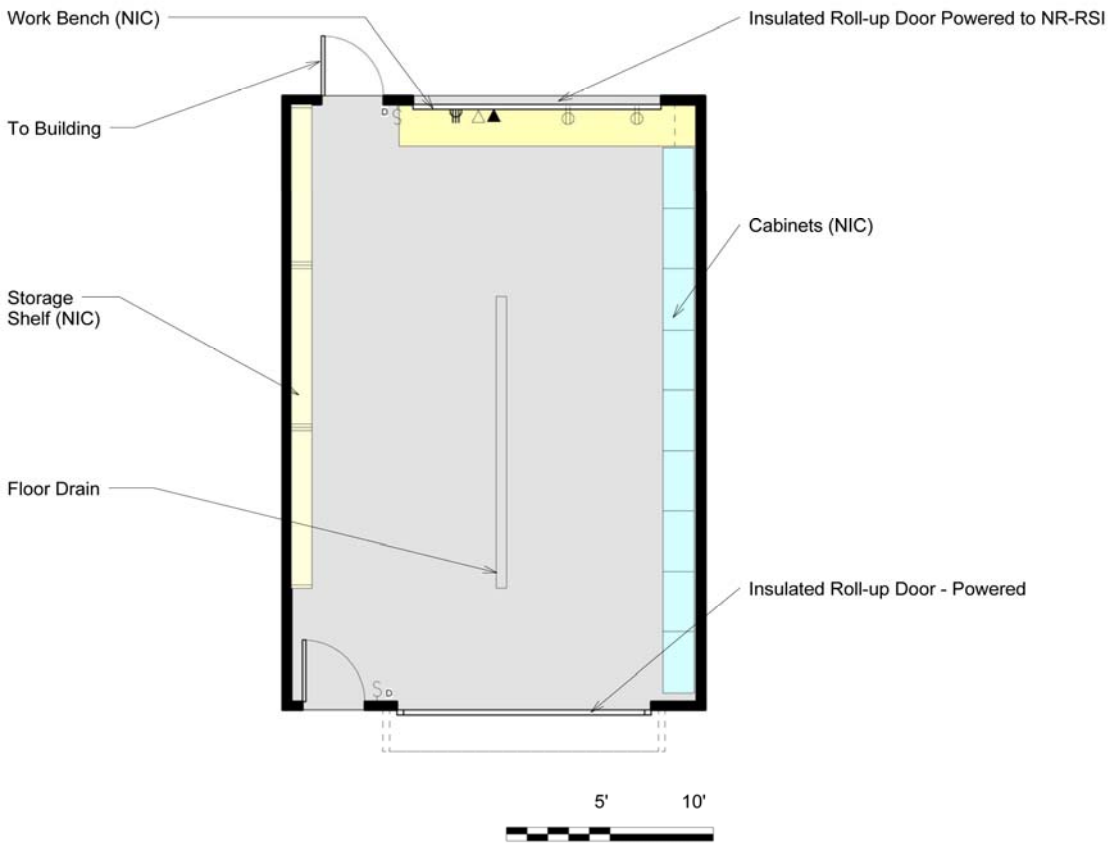
Space Name: Garage

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RGar

NO.	ITEM	☑	NOTE	20'x30' - 600 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Equipment Storage

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RS1

NO.	ITEM	☑	NOTE				30'x60' - 1,800 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Equipment storage				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	30			
			Length:	60			
			Area:	1,800			
5	Ceiling height		Height from floor:			12'-0" CLEAR	
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☒	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Storage cabinets				
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Work sink table				
		☒	Roll-up door to NR-RGar				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Equipment Storage

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH NR-RS1

NO.	ITEM	☑	NOTE				30'x60' - 1,800 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	1			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

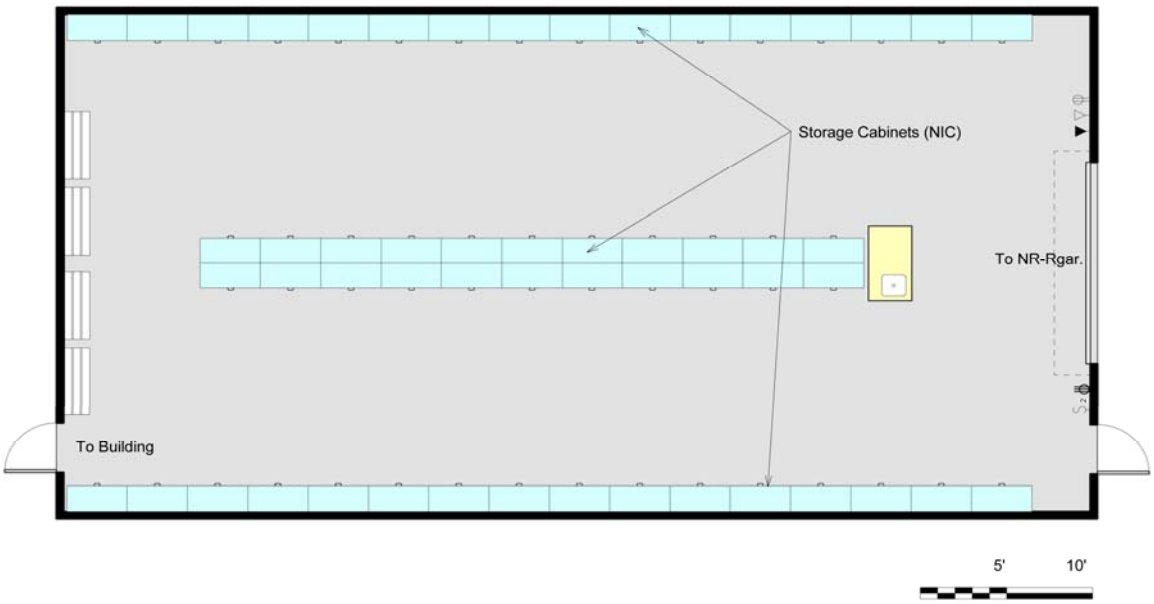
AGENCY: USU ☒ ☐ ☐

Space Name: Equipment Storage

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH NR-RS1

NO.	ITEM	☑	NOTE	30'x60' - 1,800 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Research Lab

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RL1

NO.	ITEM	☑	NOTE				22'x30' - 660 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Research lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	30			
			Area:	660			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	8				
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	8	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Research Lab

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RL1

NO.	ITEM	☑	NOTE				22'x30' - 660 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Built-In Video Projector (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hoods				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

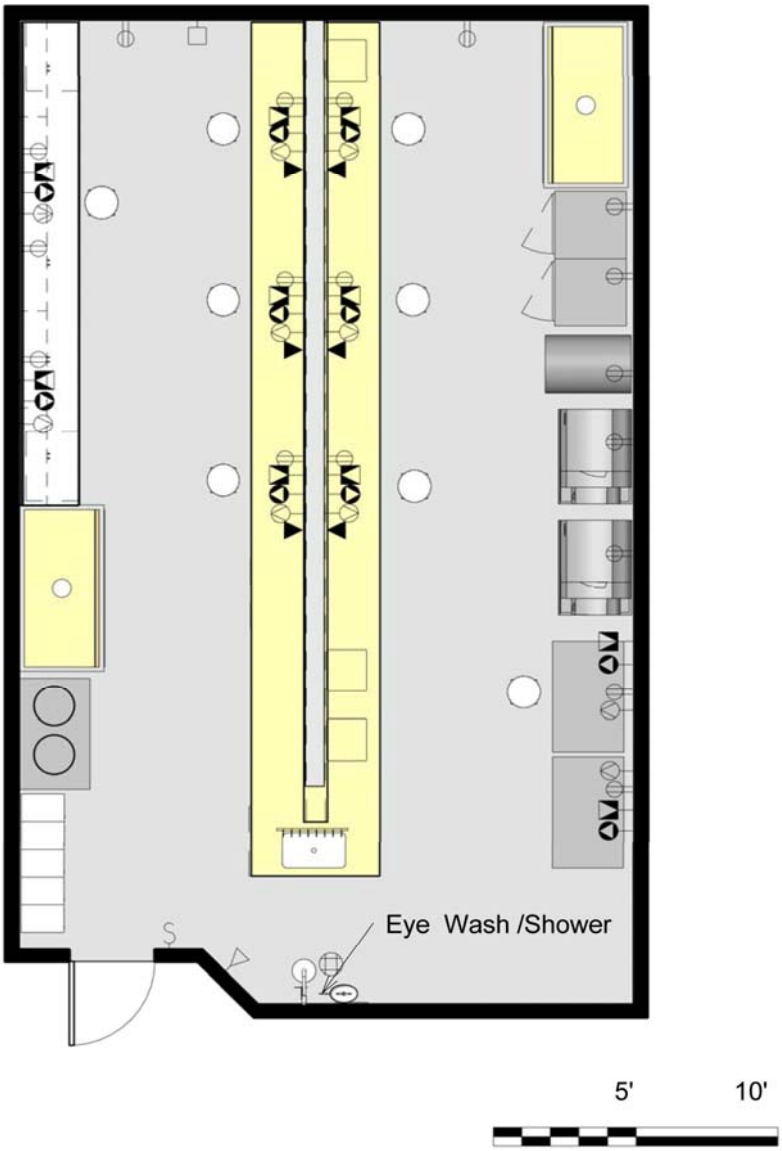
Space Name: Research Lab

Natural Resources-RESEARCH

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RL1

NO.	ITEM	☑	NOTE	22'x30' - 660 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Instrument Lab

Natural Resources-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RInstr

NO.	ITEM	☑	NOTE				22'x36' - 792 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Instrument lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	36			
			Area:	792			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		Floor power and data coordinate with Owner.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Cabinets				
		☒	Work bench				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Instrument Lab

Natural Resources-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-RInstr

NO.	ITEM	☑	NOTE				22'x36' - 792 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surfaces + shelving - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	Floor power and data coordinate with Owner.			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

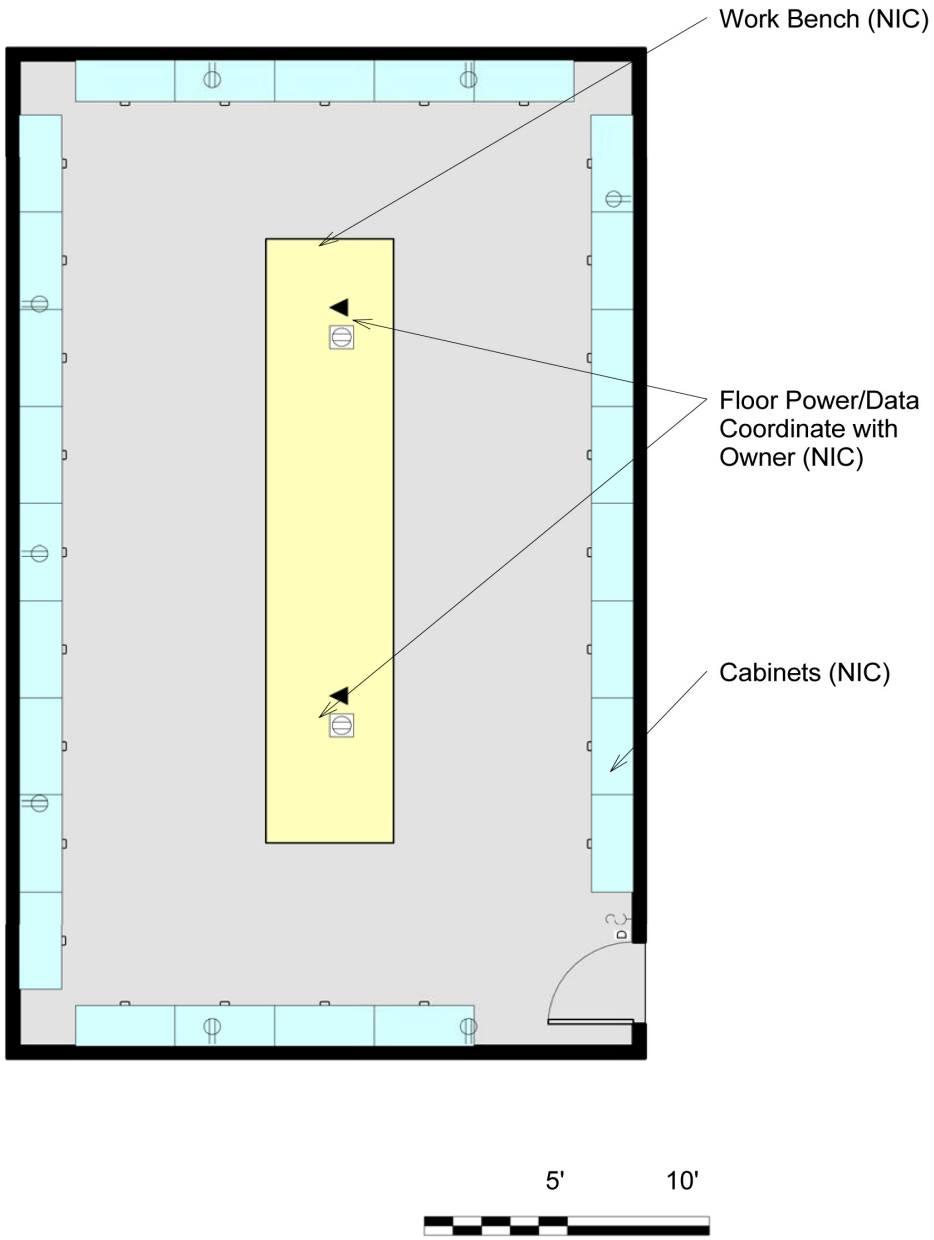
AGENCY: USU ☒ ☐ ☐

Space Name: Instrument Lab

Natural Resources-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH **NR-RInstr**

NO.	ITEM	☑	NOTE	22'x36' - 792 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Faculty Offices (5)

Natural Resources-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-O1

NO.	ITEM	☑	NOTE				(Five offices) 12'x12' - 144 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Faculty offices for Natural Resources staff				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	12			
			Area:	144			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐	None				
		☒	Other: Locked door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	2	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Faculty Offices (5)

Natural Resources-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-O1

NO.	ITEM	☑	NOTE				(Five offices) 12'x12' - 144 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☒	White Boards: Size:	3x4 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

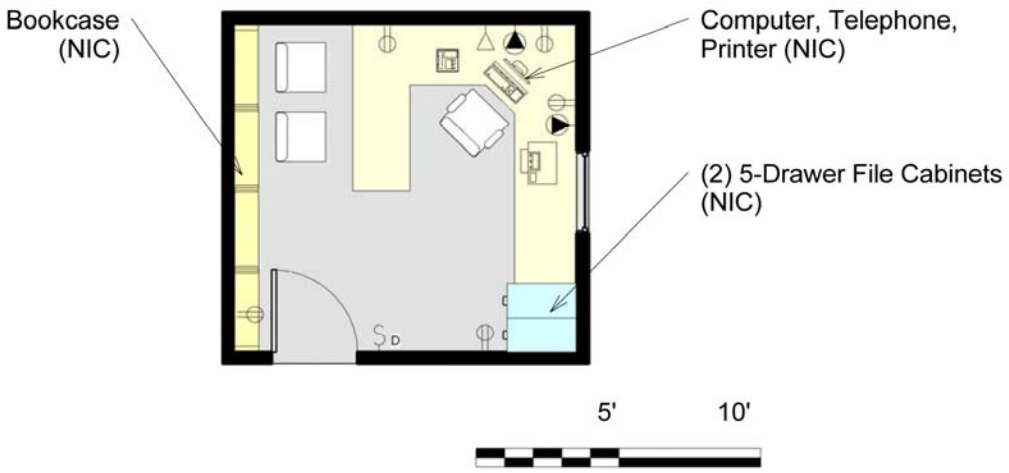
AGENCY: USU ☒ ☐ ☐

Space Name: Faculty Offices (5)

Natural Resources-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH NR-O1

NO.	ITEM	☑	NOTE	(Five offices) 12'x12' - 144 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Graduate Office (7)

Natural Resources-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-O2

NO.	ITEM	☑	NOTE				(Seven offices) 10'x8' - 80 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Grad offices for Natural Resources				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	10			
			Length:	8			
			Area:	80			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	1				
10	Security	☐	None				
		☒	Other: Locked door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	1	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	1	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Graduate Office (7)

Natural Resources-OFFICES

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

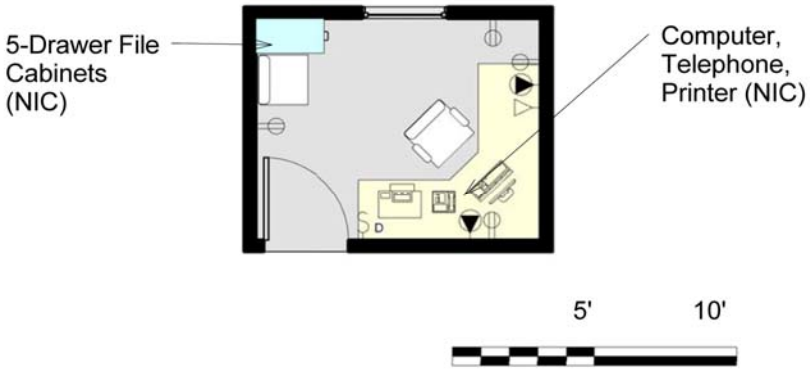
NR-O2

NO.	ITEM	☑	NOTE				(Seven offices) 10'x8' - 80 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☒	White Boards: Size:	3x4 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

NR-O2

NO.	ITEM	☑	NOTE	(Seven offices) 10'x8' - 80 SF
25				



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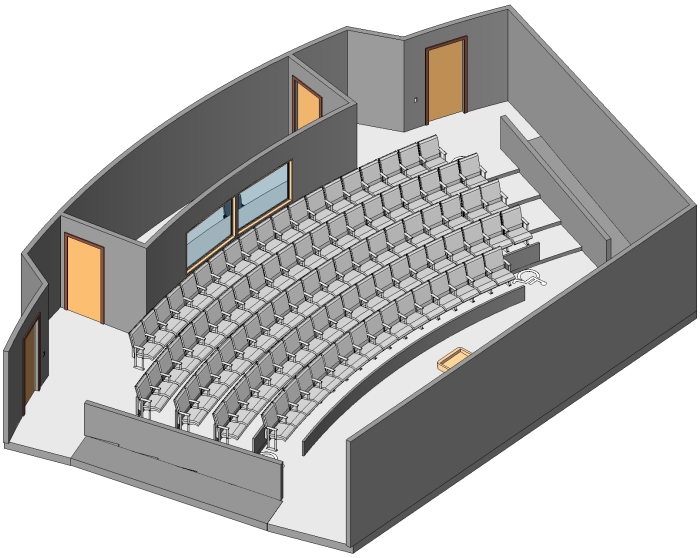


Entrepreneurship Center

Individual space lists for each room designated.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Small Business Development Center (SBDC)/Offices (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

ER-O1

NO.	ITEM	☑	NOTE				(Two offices) 12'x12' - 144 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Office spaces for SBDC (Small Business Development Center)				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	12			
			Area:	144			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☒	Day Lighting - windows				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	2	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Small Business Development Center (SBDC)/Offices (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

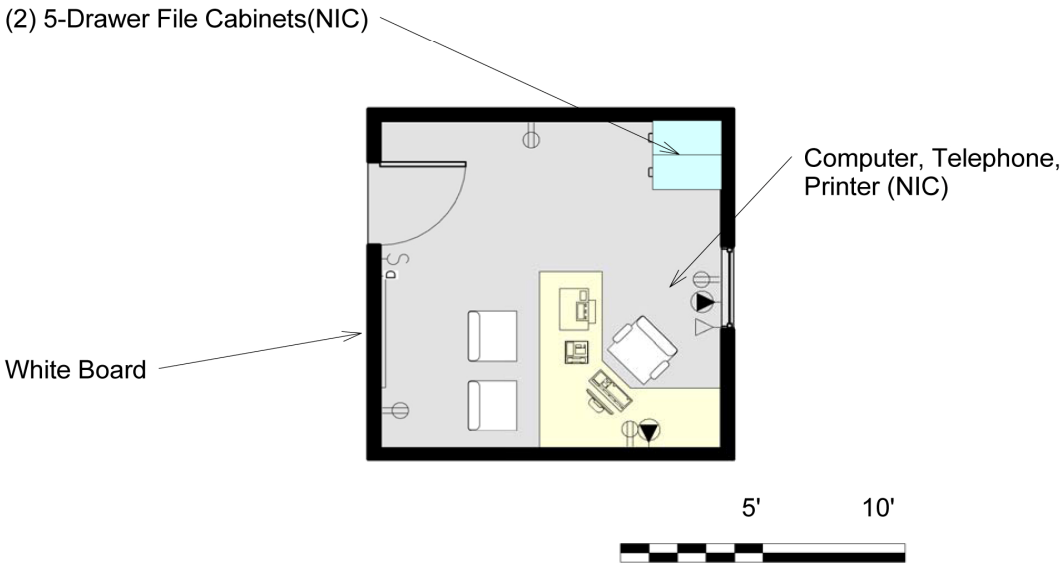
ER-O1

NO.	ITEM	☑	NOTE				(Two offices) 12'x12' - 144 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power:☐	Manual:☐		
		☒	White Boards: Size:	3x4 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

ER-O1

NO.	ITEM	☑	NOTE	(Two offices) 12'x12' - 144 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: USTAR Offices (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

ER-O2

NO.	ITEM	☑	NOTE				(Two offices) 12'x12' - 144 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Office spaces for USTAR				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	12			
			Area:	144			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☒	Day Lighting - windows				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	1				
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	1	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	1	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: USTAR Offices (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

ER-O2

NO.	ITEM	☑	NOTE				(Two offices) 12'x12' - 144 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☒	White Boards: Size:	3x4 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

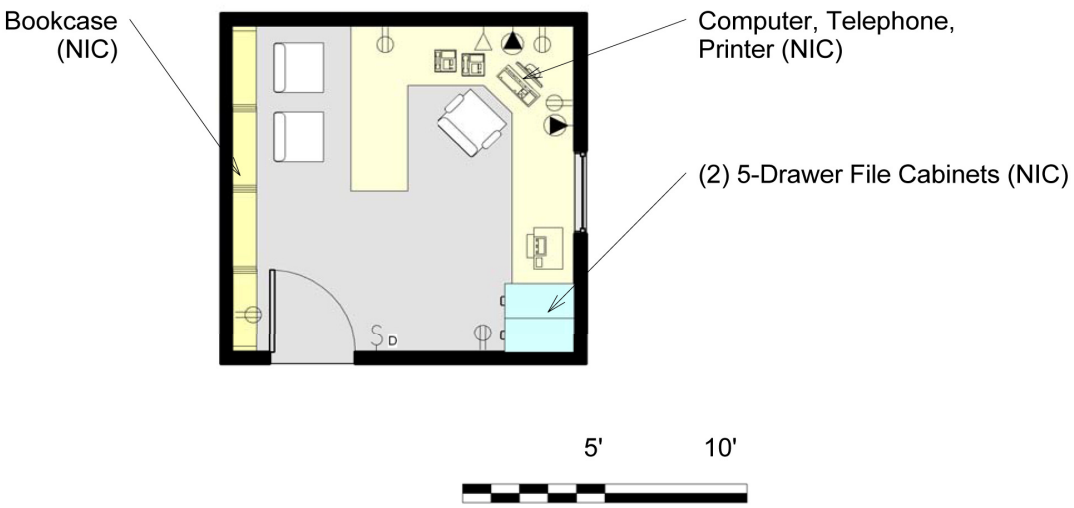
Space Name: USTAR Offices (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

ER-O2

NO.	ITEM	☑	NOTE	(Two offices) 12'x12' - 144 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Faculty Office (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O3

NO.	ITEM	☑	NOTE				(Two offices) 12'x10' - 120 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Faculty offices for EC staff				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	10			
			Area:	120			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	2	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Faculty Office (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O3

NO.	ITEM	☑	NOTE				(Two offices) 12'x10' - 120 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

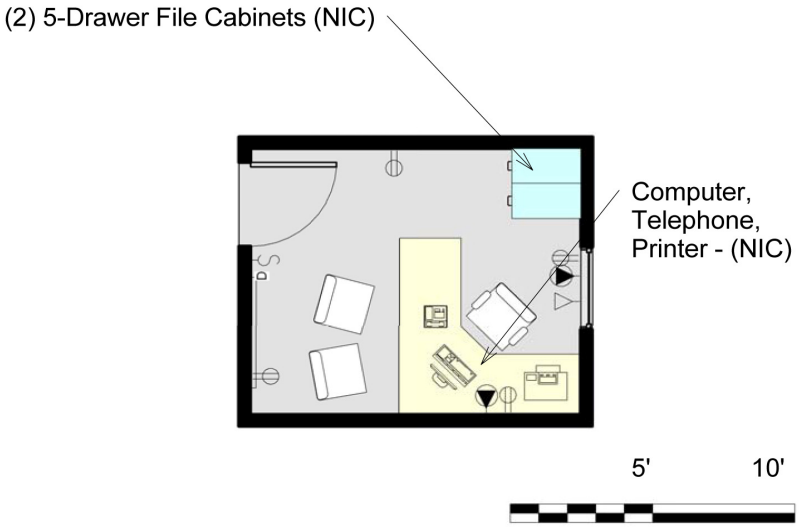
Space Name: Faculty Office (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O3

NO.	ITEM	☑	NOTE	(Two offices) 12'x10' - 120 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: EC Admin - EC Secretary (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O4

NO.	ITEM	☑	NOTE				(Two offices) 12'x10' - 120 SF
1	Space Type	☒	Open	Modular furniture ☒			
		☐	Fixed - private				
2	Function	☒	Admin office for EC Secretary				
3	Hours of Operation	☒	From: 7a.m. - 6 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	10			
			Area:	120			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	1				
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☐					
		☐					
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	1	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	1	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: EC Admin - EC Secretary (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O4

NO.	ITEM	☑	NOTE				(Two offices) 12'x10' - 120 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

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PROGRAMMING CHECK LIST

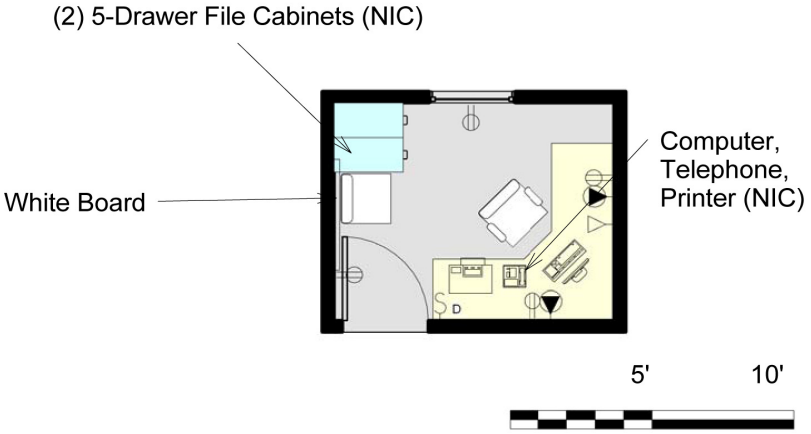
AGENCY: USU ☒ ☐ ☐

Space Name: EC Admin - EC Secretary (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH EC-O4

NO.	ITEM	☑	NOTE	(Two offices) 12'x10' - 120 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Visitor Offices (5)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O5

NO.	ITEM	☑	NOTE				(Five offices) 12'x12' - 144 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Visitor Offices - Entrepreneurship				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	12			
			Area:	144			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☒	Day Lighting - windows				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐	None				
		☒	Other: Locked door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	2	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☒	Other: Bookcase				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Visitor Offices (5)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O5

NO.	ITEM	☑	NOTE				(Five offices) 12'x12' - 144 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	3 - Voice/Data on 3 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

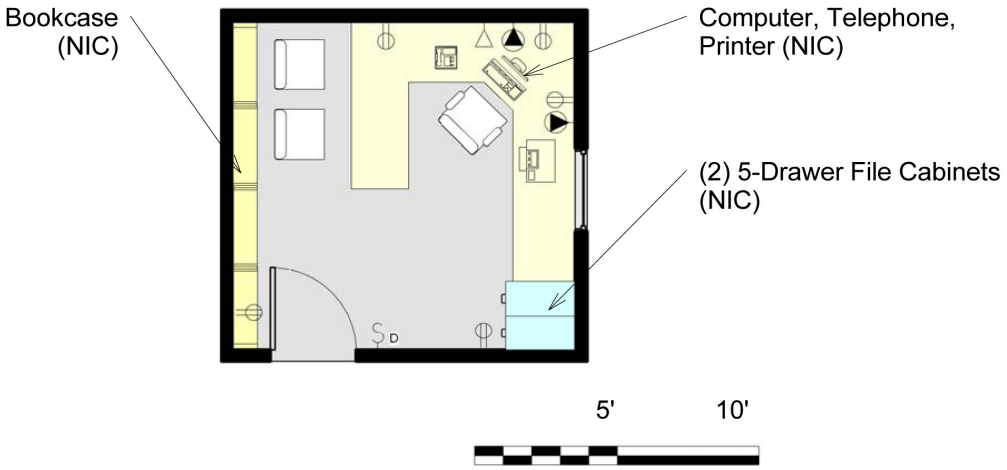
Space Name: Visitor Offices (5)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O5

NO.	ITEM	☑	NOTE	(Five offices) 12'x12' - 144 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Administrator Office

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O6

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Administrator's office				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	15			
			Length:	20			
			Area:	300			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	10				
9	Number of Visitors	No.					
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Telephone				
		☒	Other:		1		Television / DVD
12	Equipment in Construction Contract	☐					
		☐					
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	4	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size: 4ft.	
		☐	Tables - Type	Number:		Size:	Side table
		☒	Files - Type	Number:		Size:	Lateral files
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Bookcases	Number:		Size:	
		☒	Other: Work Desk	Number:	1	Size:	

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Administrator Office

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O6

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 4 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards:				
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

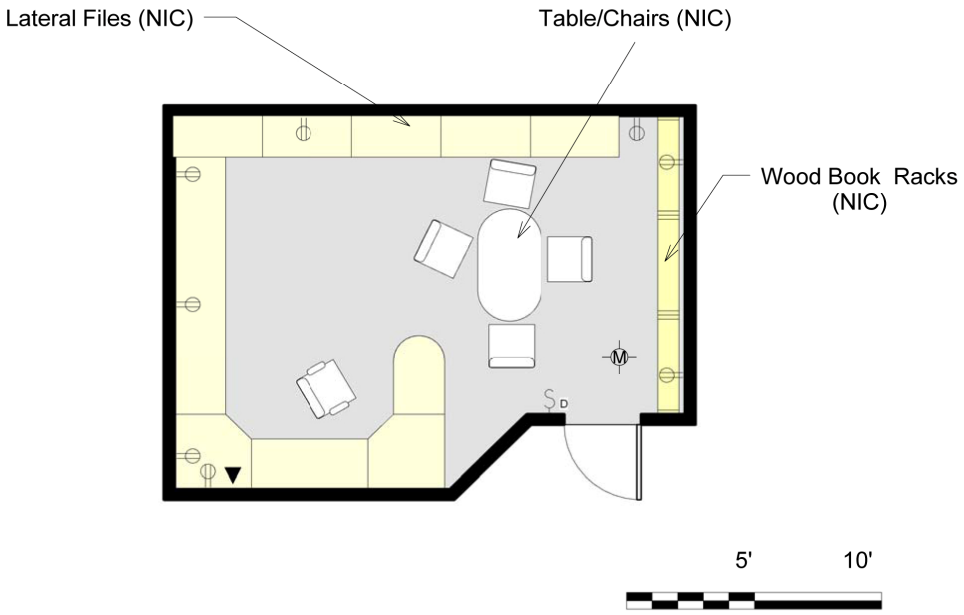
Space Name: Administrator Office

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-O6

NO.	ITEM	☑	NOTE	15'x20' - 300 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: EC Conference Room - Seminar Rm.

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-Conf

NO.	ITEM	☑	NOTE				14'x14' - 196 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Meeting / conference room				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	14			
			Length:	14			
			Area:	196			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☒	Other - Couffered ceiling				
7	Lighting	☐	Direct Fluorescence				
		☐	Indirect Fluorescence				Staged for presentations.
		☐	Day Lighting				
		☒	Special - Coved lighting				Down light spot.
8	Number of Occupants	No.	10				
9	Number of Visitors	No.					
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Ceiling mounted video camera				
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets: 6-duplex outlets spaced on each wall				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☒	Side Chair	Number:	10	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size: 10 ft. conference table	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: EC Conference Room - Seminar Rm.

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-Conf

NO.	ITEM	☑	NOTE				14'x14' - 196 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Type: Wood base-wainscoting		Length:	3 ft.	
		☒	Type: Wood bookcase - built-in		Length:	14 ft.	
		☒	Type: Couffered ceiling-coved lighting		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only. Telephone comp in floor.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	Voice / Data jacks (3) in floor			
		☐	Special Power:				
21	Audio Visual	☒	Ceiling mounted video camera (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Built-In Video Projector (NIC)				Provide conduit and power.
		☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				
			Wood accents				

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

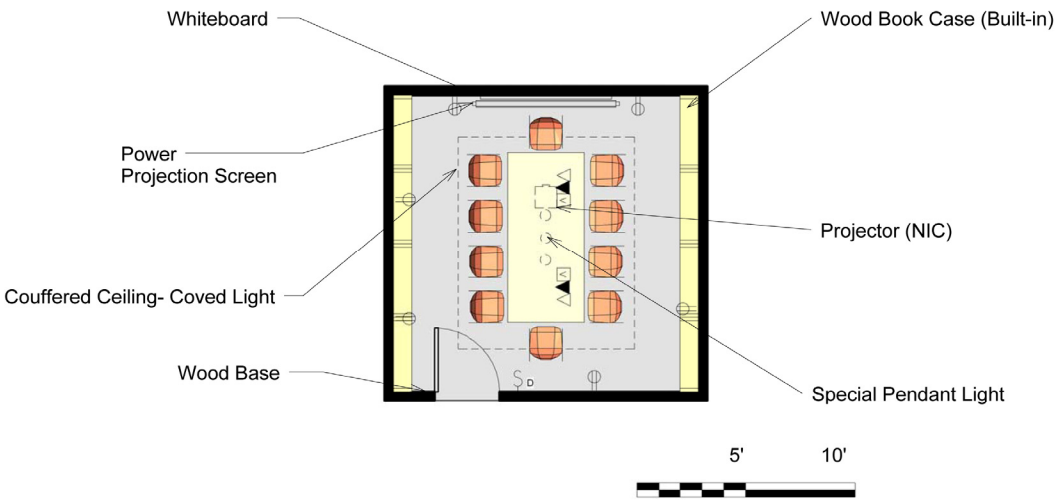
Space Name: EC Conference Room - Seminar Rm.

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-Conf

NO.	ITEM	☑	NOTE	14'x14' - 196 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: EC Reference

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-Ref

NO.	ITEM	☑	NOTE				15'x30' - 450 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Library / Reference room				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	15			
			Length:	30			
			Area:	450			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	10-12				
9	Number of Visitors	No.					
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets: 8; two duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☒	Side Chair	Number:	10	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	2	Size: 6 ft.	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Magazine racks	Number:	6	Size:	
		☒	Other: Lamp and tables	Number:	2ea	Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: EC Reference

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-Ref

NO.	ITEM	☑	NOTE				15'x30' - 450 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Type: Wood base-wainscoting		Length:	3 ft.	
		☒	Type: Wood bookcase - built-in		Length:	30 ft.	
		☒	Type: Couffered ceiling-coved lighting		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 4 walls + floor jacks at each table/station			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☒	White Boards: Size:	3x10 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				
			Wood Accents				
			Wall Coverings				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

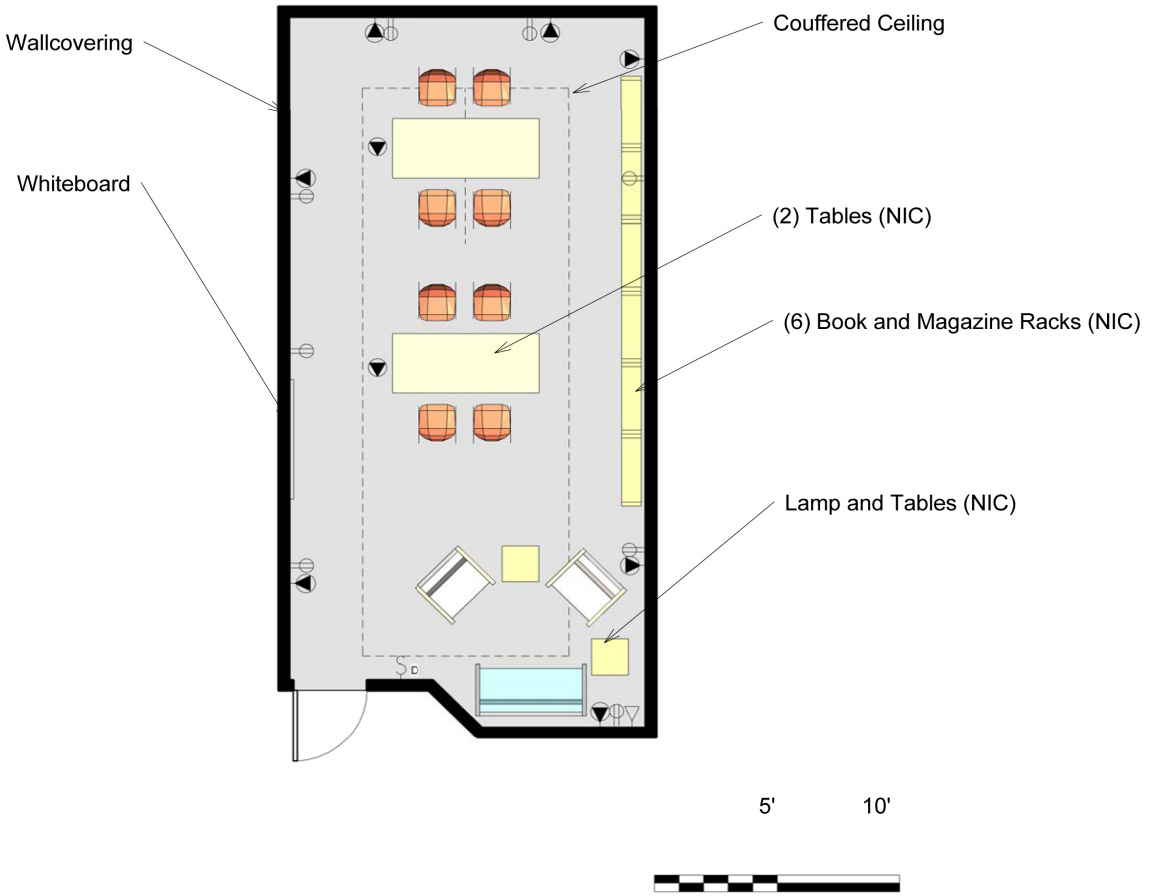
Space Name: EC Reference

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

EC-Ref

NO.	ITEM	☑	NOTE	15'x30' - 450 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Office - OSEC Center

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — OSEC-O1

NO.	ITEM	☑	NOTE				20'x20' - 400 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Open reference center				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	20			
			Length:	20			
			Area:	400			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1-10				
9	Number of Visitors	No.					
10	Security	☐					
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Telephone				
		☐					
12	Equipment in Construction Contract	☐	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 5; duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Work table	Number:	1	Size: 10 ft.	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Shelves	Number:	Surrounding room		

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Office - OSEC Center

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — OSEC-O1

NO.	ITEM	☑	NOTE				20'x20' - 400 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Type: Wood shelves		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1	See diagrammatic drawing for this space. Conduit only.		
		☒	Number of Handset:	1	NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	2			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☐					

Harris & Associates

PROGRAMMING CHECK LIST

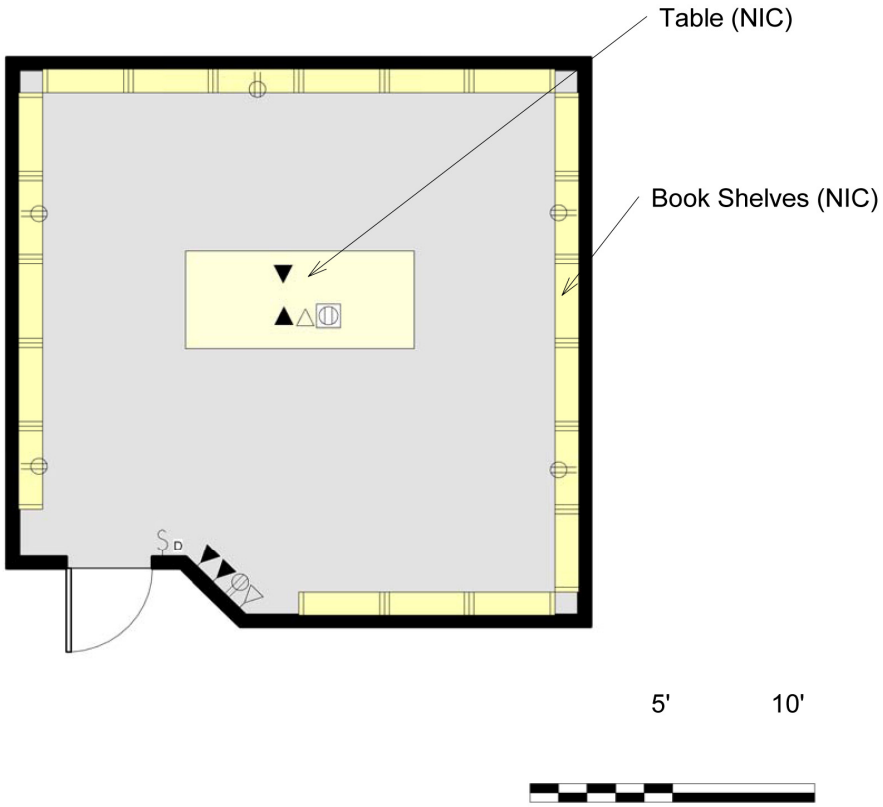
AGENCY: USU ☒ ☐ ☐

Space Name: Office - OSEC Center

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — OSEC-O1

NO.	ITEM	☑	NOTE	20'x20' - 400 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Office - Vocational Rehab Office (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH — VR-O1

NO.	ITEM	☑	NOTE				(Two offices) 12'x10' - 120 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Vocational Rehab Office				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	10			
			Area:	120			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐					
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	2	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Office - Vocational Rehab Office (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

VR-O1

NO.	ITEM	☑	NOTE				(Two offices) 12'x10' - 120 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

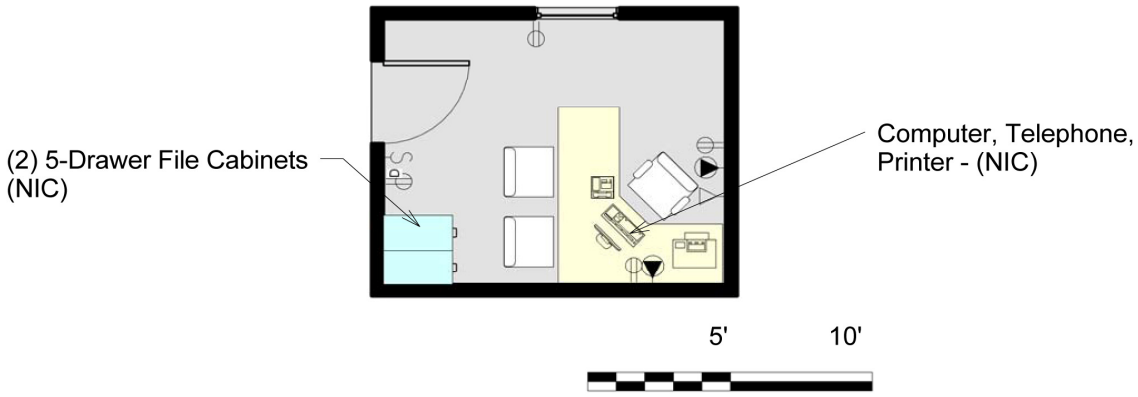
Space Name: Office - Vocational Rehab Office (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

VR-O1

NO.	ITEM	☑	NOTE	(Two offices) 12'x10' - 120 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Receptionist for Vocational Rehab

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

VR-Recpt

NO.	ITEM	☑	NOTE				8'x10' - 80 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Open reference center				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	8			
			Length:	10			
			Area:	80			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐					
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	1	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Receptionist for Vocational Rehab

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

VR-Recpt

NO.	ITEM	☑	NOTE				8'x10' - 80 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

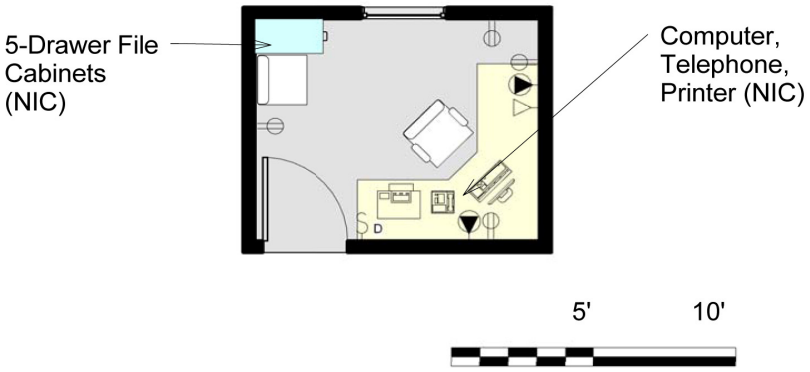
Space Name: Receptionist for Vocational Rehab

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

VR-Recpt

NO.	ITEM	☑	NOTE	8'x10' - 80 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Vocational Rehab Storage

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

VR-S1

NO.	ITEM	☑	NOTE				12'x10' - 120 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Vocational rehab storage				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	10			
			Area:	120			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		2		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Shelves	Number:	Surrounding room		Adjustable metal storage shelves

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Vocational Rehab Storage

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

VR-S1

NO.	ITEM	☑	NOTE				12'x10' - 120 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	1			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

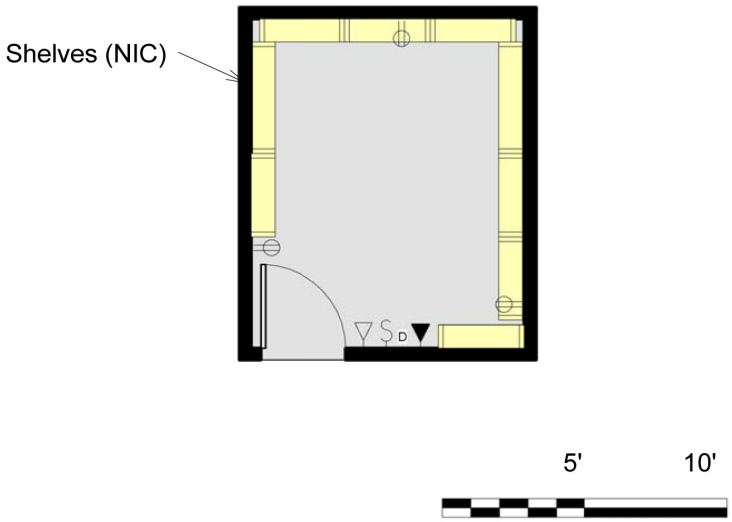
Space Name: Vocational Rehab Storage

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

VR-S1

NO.	ITEM	☑	NOTE	12'x10' - 120 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Transportation District Offices (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

TD-O1

NO.	ITEM	☑	NOTE				(Two) 12'x10' - 120 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Transportation district office				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	10			
			Area:	120			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐					
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	2	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Transportation District Offices (2)

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

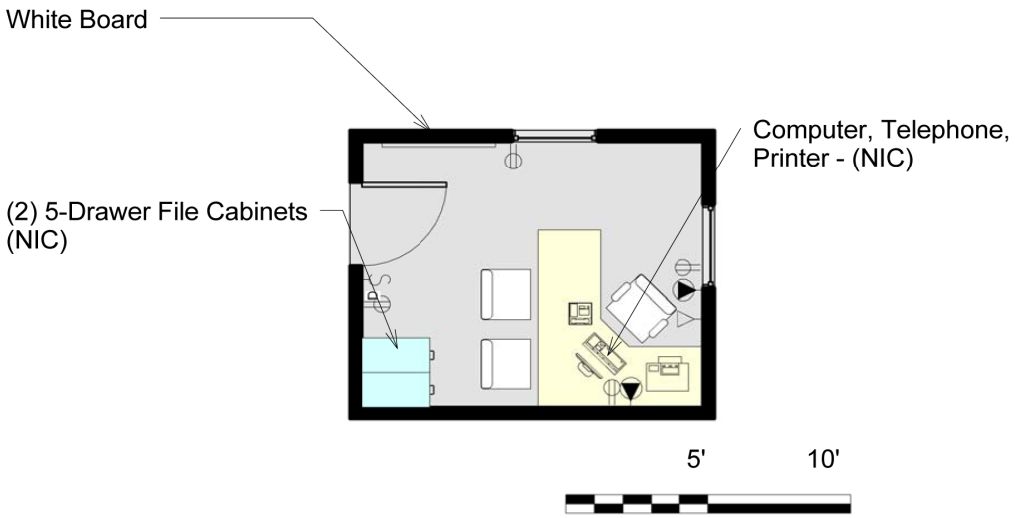
TD-O1

NO.	ITEM	☑	NOTE				(Two) 12'x10' - 120 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

TD-O1

NO.	ITEM	☑	NOTE	(Two) 12'x10' - 120 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space. The configuration and length & width orientation should not be construed as rigid.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Transportation District Storage

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

TD-S1

NO.	ITEM	☑	NOTE				12'x10' - 120 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Transportation district storage				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	10			
			Area:	120			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		2		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Shelves	Number:	Surrounding room		Adjustable metal storage shelves

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Transportation District Storage

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

TD-S1

NO.	ITEM	☑	NOTE				12'x10' - 120 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	1			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

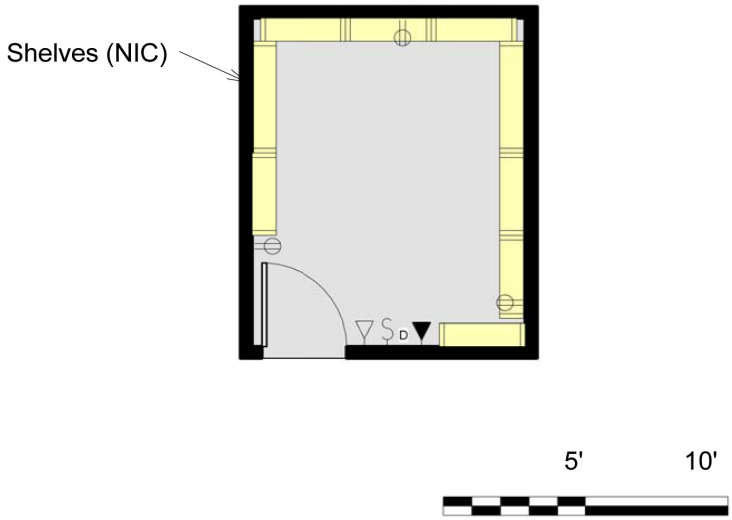
Space Name: Transportation District Storage

Entrepreneurship-RESEARCH / TECH TRANSFER

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

TD-S1

NO.	ITEM	☑	NOTE	12'x10' - 120 SF
25				



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Dean of Campus Space

Individual space lists for each room designated.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Dean's Office

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-O2

NO.	ITEM	☑	NOTE				14'x15' - 210 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Dean's Office				
3	Hours of Operation	☒	From: 7a.m. - 7 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	14			
			Length:	15			
			Area:	210			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☒	Day Lighting - windows				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	6				
10	Security	☐	None				
		☒	Other: Locked door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	4	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Conference	Number:	1	Size: 4 ft. oval	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Lateral	Number:	1	Size: 4 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~6 ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Dean's Office

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-O2

NO.	ITEM	☑	NOTE				14'x15' - 210 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	Other				
		☒	Type: Wood bookshelves		Length:		
		☒	Type: Wood finishes		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	3 - Voice/Data on 3 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power:☐	Manual:☐		
		☒	White Boards: Size:	4x6	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

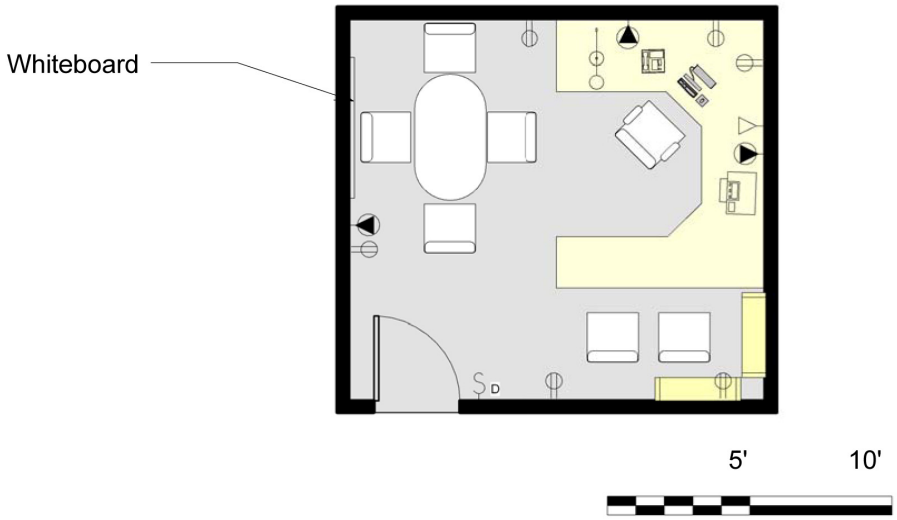
Space Name: Dean's Office

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-O2

NO.	ITEM	☑	NOTE	14'x15' - 210 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Dean's Conference (n~10)

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-Conf

NO.	ITEM	☑	NOTE				14'x14' - 196 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed				
2	Function	☒	Meeting / conference room				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	14			
			Length:	14			
			Area:	196			
5	Ceiling height		Height from floor:	10 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	8-10				
9	Number of Visitors	No.					
10	Security	☐	None				
		☒	Other: Locked door				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Powered screen				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 6-duplex outlets spaced on each wall				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☒	Side Chair	Number:	10	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size: 8 ft. conference table	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Bookcases (NIC)				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Dean's Conference (n~10)

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-Conf

NO.	ITEM	☑	NOTE				14'x14' - 196 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	See diagrammatic drawing for this space.				
		☒	Type: Bookshelves		Length:	14 ft.	
		☒	Type: Wood finishes		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	Voice / Data jacks (2) in floor			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☒	Built-In Video Projector				
		☒	Projector Screen	Power: ☒	Manual: ☐		
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

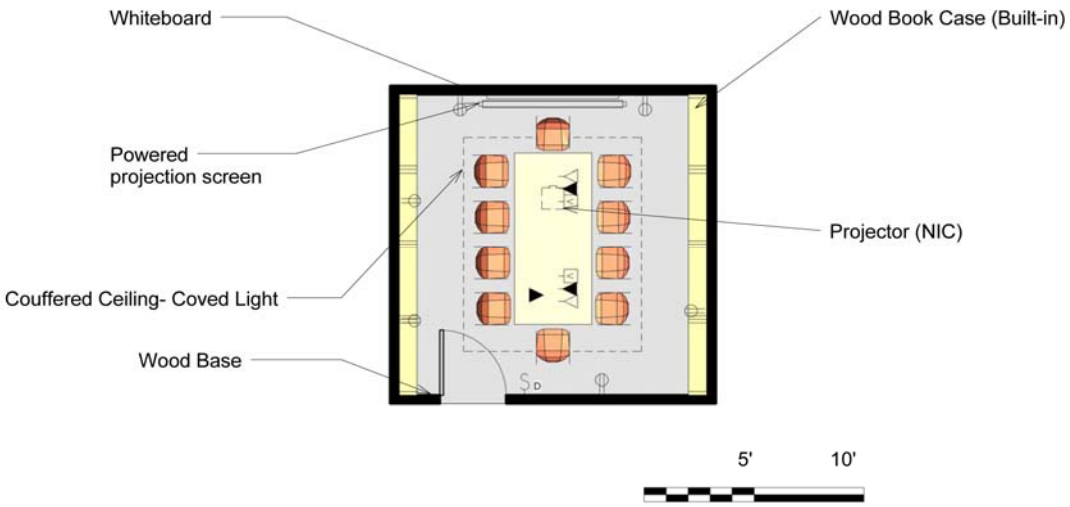
Space Name: Dean's Conference (n~10)

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-Conf

NO.	ITEM	☑	NOTE	14'x14' - 196 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Dean's Secretary's Office

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-O3

NO.	ITEM	☑	NOTE				12'x20' - 240 SF
1	Space Type	☒	Open	Modular furniture ☒			
		☐	Fixed - private				
2	Function	☒	Dean's secretary				
3	Hours of Operation	☒	From: 7a.m. - 6 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	20			
			Area:	240			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	4				
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☐					
		☐					
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on 3 walls.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	3	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Desk	Number:	1	Size: 6 ft.	
		☒	Tables - Desk	Number:	1	Size: 4 ft.	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	1	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☒	Other: Bookcase				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Dean's Secretary's Office

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-O3

NO.	ITEM	☑	NOTE				12'x20' - 240 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	3 - Voice/Data on 3 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

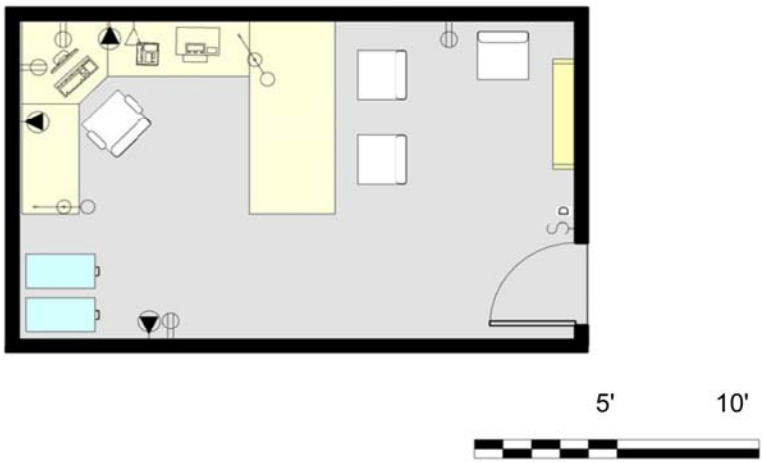
Space Name: Dean's Secretary's Office

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-O3

NO.	ITEM	☑	NOTE	12'x20' - 240 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Dean's Waiting Area

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-Wait

NO.	ITEM	☑	NOTE				10'x10' - 100 SF
1	Space Type	☒	Open	Modular furniture ☐			
		☐	Fixed - private				
2	Function	☒	Dean's Waiting Area				
3	Hours of Operation	☒	From: 7a.m. - 8 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	10			
			Length:	10			
			Area:	100			
5	Ceiling height		Height from floor:	10 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☒	Special	Spots lighting for wall pictures			
8	Number of Occupants	No.	0				
9	Number of Visitors	No.	5				
10	Security	☒	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☒	Side Chair	Number:	2	Size:	
		☒	Other: Loveseat	Number:	1	Size: 4 ft.	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☒	Tables - Side tables	Number:	2	Size: 18"	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Lamps	Number:	2	Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Dean's Waiting Area

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-Wait

NO.	ITEM	☑	NOTE				10'x10' - 100 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	None				
		☐	Built-In Video Projector				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

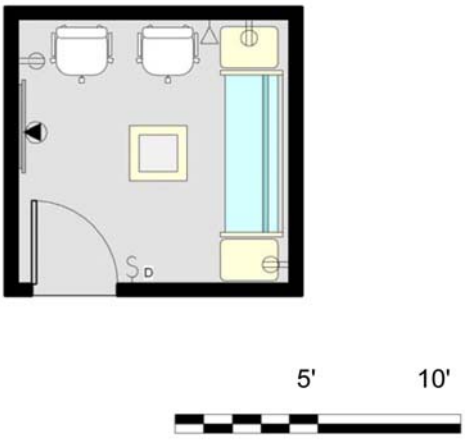
Space Name: Dean's Waiting Area

DEAN's SPACE

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

D-Wait

NO.	ITEM	☑	NOTE	10'x10' - 100 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
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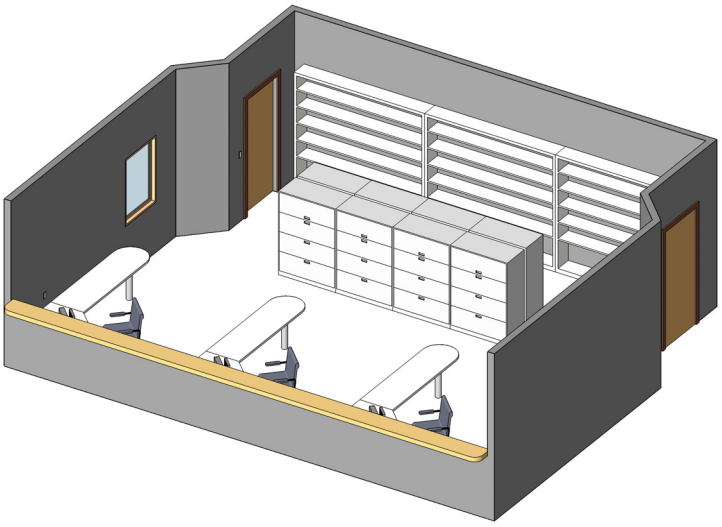

Support Spaces

Individual space lists for each room designated.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Mechanical Equipment Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Mech

NO.	ITEM	☑	NOTE				60'x30' - 1,800 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Mechanical equipment room				
3	Hours of Operation	☒	**24 hours / 7 days a week**				
		☐	Facility Standard				
4	Size		Width:	60			
			Length:	30			
			Area:	1,800			
5	Ceiling height		Height from floor:	Open to structure			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☒	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	0				
9	Number of Visitors	No.	0				
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract	☒	Standard				
		☒	Locking door hardware				
13	Power Outlets	☒	Standard				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Mechanical Equipment Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Mech

NO.	ITEM	☑	NOTE				60'x30' - 1,800 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☒	Special:				Sound isolate equipment from floor.
24	Other Requirements	☒	Walls				

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CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Mech

NO.	ITEM	☑	NOTE	60'x30' - 1,800 SF
25				

No image for this space.

NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space. The configuration and length & width orientation should not be construed as rigid.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: **Electrical Equipment Room (2)**

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Elec

NO.	ITEM	☑	NOTE				40'x20' - 800 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Eletrical services for building				
3	Hours of Operation	☒	**24 hours / 7 days a week**				
		☐	Facility Standard				
4	Size		Width:	40			
			Length:	20			
			Area:	800			
5	Ceiling height		Height from floor:	Open to structure			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☒	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	0				
9	Number of Visitors	No.	0				
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract	☒	Standard				
		☒	Locking door hardware				
13	Power Outlets	☒	Standard				
14	Special Power	☒	Standard				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Electrical Equipment Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Elec

NO.	ITEM	☑	NOTE				40'x20' - 800 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Electrical Equipment Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Elec

NO.	ITEM	☑	NOTE	40'x20' - 800 SF
25				

No image for this space.

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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Telephone/Communications Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Tele

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☐	Telephone and communications services for building				
3	Hours of Operation	☒	**24 hours / 7 days a week**				
		☐	Facility Standard				
4	Size		Width:	15			
			Length:	20			
			Area:	300			
5	Ceiling height		Height from floor:	Open to structure			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☒	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	0				
9	Number of Visitors	No.	0				
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Stardard				
		☒	Locking door hardware				
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space:		
14	Special Power	☒	Standard				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☒	Side Chair	Number:	1	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Desk	Number:	1	Size: 4 ft.	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Telephone/Communications Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Tele

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Plywood on walls to adhere cabling trays				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	Std.			Conduit only.
		☒	Number of Handset:	Std.	NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Telephone/Communications Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Tele

NO.	ITEM	☑	NOTE	15'x20' - 300 SF
25				

No image for this space.

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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: I.T. File Server Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Server

NO.	ITEM	☑	NOTE				(Two server rooms)10'x15' - 150 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Server room for I.T.				
3	Hours of Operation	☒	**24 hours / 7 days a week**				
		☐	Facility Standard				
4	Size		Width:	10			
			Length:	15			
			Area:	150			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	1-2				
9	Number of Visitors	No.	N/A				
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Computers				
		☒	Monitors				
12	Equipment in Construction Contract	☒	Racking system				
		☒	Cabling trays				
		☒	Plywood on walls to adhere cabling trays				
13	Power Outlets	☒	Standards. Outlets on all walls; **need set high and low on walls.**				
14	Special Power	☒	Special outlets and voltage: Standard for room.				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chair	Number:	2	Size:	Side chairs
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other: Server racks				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: I.T. File Server Room (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Server

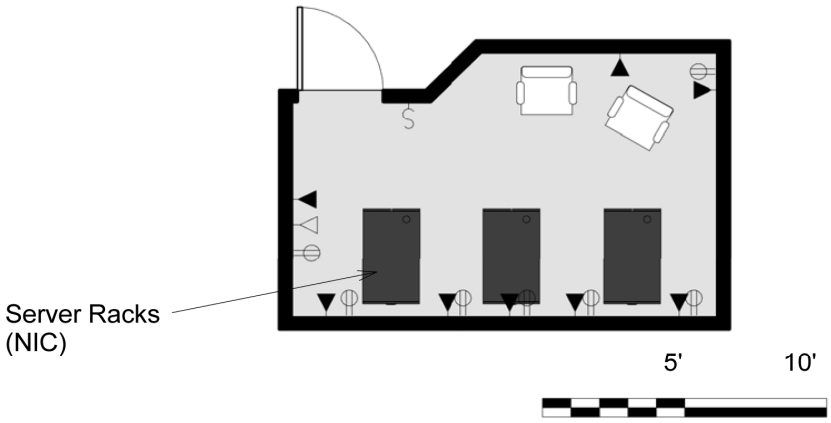
NO.	ITEM	☑	NOTE				(Two server rooms)10'x15' - 150 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☒	Special Power: Conduit standard for this room.				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power:☐	Manual:☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☒	Special Temperature Range: Air conditioned for operation.				
		☒	Special Humidity Range:				
		☒	Special Operating Times:	24/7			
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

AGENCY: USU ☒ ☐ ☐
Space Name: I.T. File Server Room (2)
SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Server

NO.	ITEM	☑	NOTE	(Two server rooms)10'x15' - 150 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: UEN Hub

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Hub

NO.	ITEM	☑	NOTE				20'x30' - 600 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	UEN Hub for television station				
3	Hours of Operation	☒	**24 hours / 7 days a week**				
		☐	Facility Standard				
4	Size		Width:	20			
			Length:	30			
			Area:	600			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒					
12	Equipment in Construction Contract	☒					
13	Power Outlets	☒	Standards. Outlets on all walls; **need set high and low on walls.**				See diagrammatic drawing for this space.
14	Special Power	☒	Special outlets and voltage: Standard for room.				
15	Furniture (NIC)	☒	Work Chair	Number:	4	Size:	Task
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	2	Size:	Side chairs
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	2	Size:	Studio setting
		☐	Tables - Continuous	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: UEN Hub

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

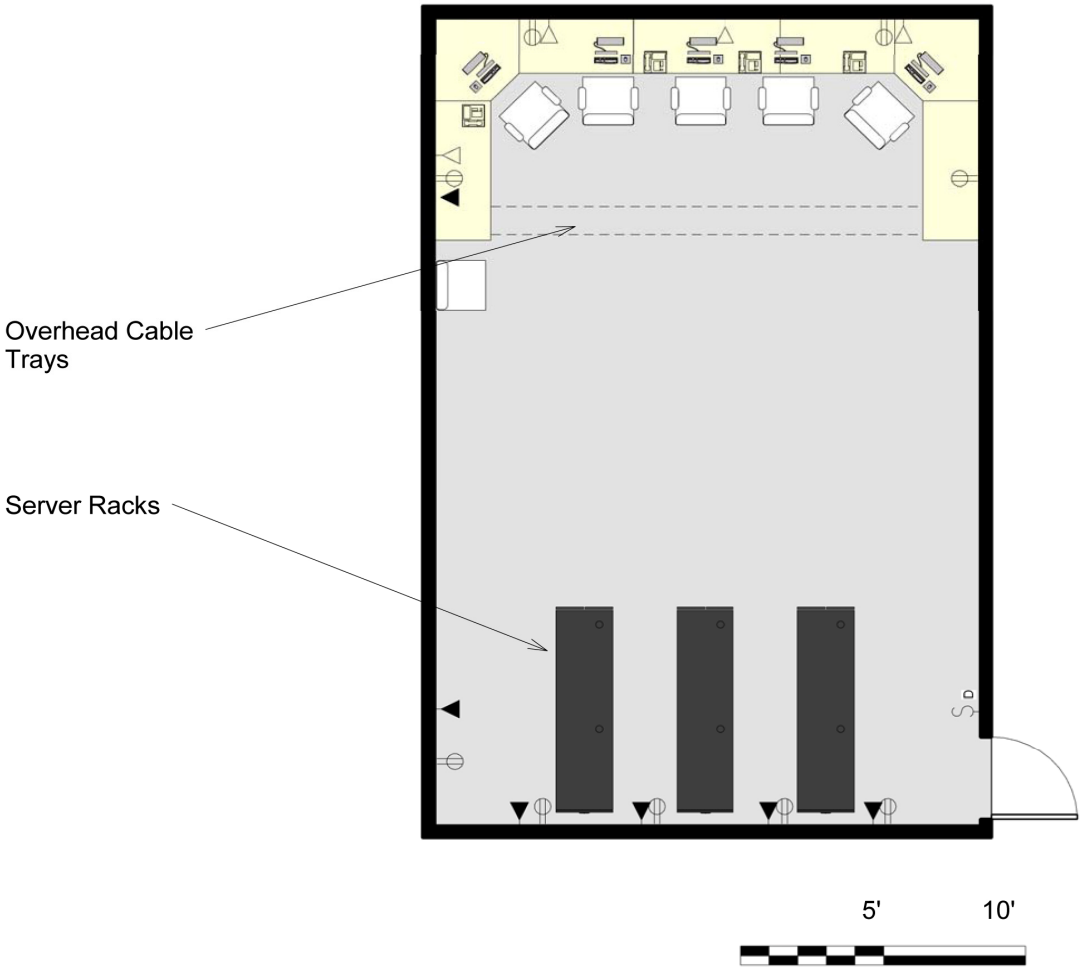
SS-Hub

NO.	ITEM	☑	NOTE				20'x30' - 600 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒					
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	4			Conduit only.
		☒	Number of Handset:	4	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☒	Special Power: Conduit standard for this room.				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power:☐	Manual:☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☒	Special Temperature Range: Air conditioned for operation.				Coordinate with Owner.
		☒	Special Humidity Range:				
		☒	Special Operating Times:	24/7			
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☒	Special:				
24	Other Requirements	☒	Walls				

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Hub

NO.	ITEM	☑	NOTE	20'x30' - 600 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: I.T. Work Room

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-I.T.

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	I.T. Work Room				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	15			
			Length:	20			
			Area:	300			
5	Ceiling height		Height from floor:	10 ft.			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Power and data strips at back of work surface				
12	Equipment in Construction Contract	☐					
13	Power Outlets	☒	Power strips	See diagrammatic drawing for this space.			
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Metal storage cabinets				
		☒	Work bench				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: I.T. Work Room

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-I.T.

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Racks				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

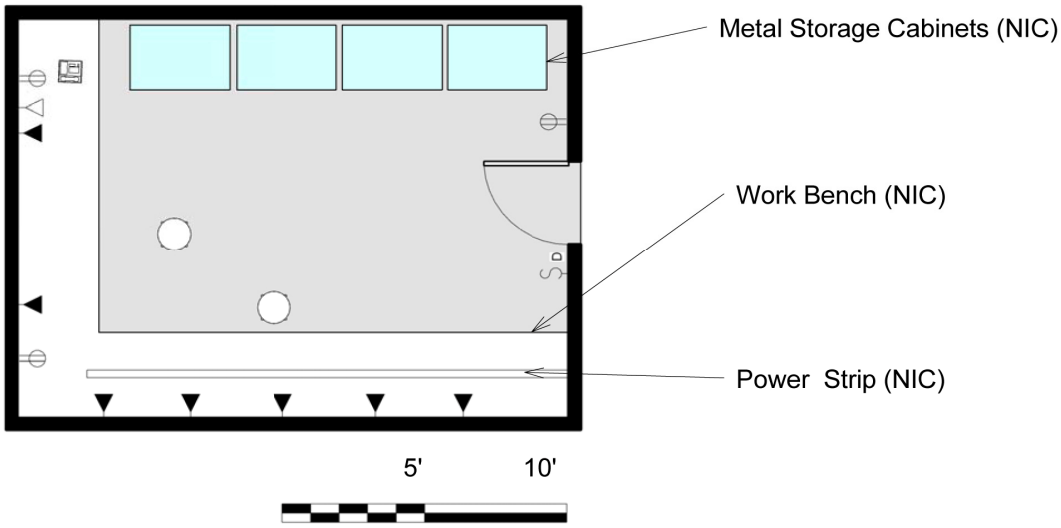
Space Name: I.T. Work Room

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-I.T.

NO.	ITEM	☑	NOTE	15'x20' - 300 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
The configuration and length & width orientation should not be construed as rigid.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Building Storage

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Stor

NO.	ITEM	☑	NOTE				40'x20' - 800 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Storage for building				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	40			
			Length:	20			
			Area:	800			
5	Ceiling height		Height from floor:	10 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	0				
9	Number of Visitors	No.	0				
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Open storage shelving				
12	Equipment in Construction Contract	☒	Locking hardware				
13	Power Outlets	☒	Number of Standard duplex outlets:		4		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Building Storage

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Stor

NO.	ITEM	☑	NOTE				40'x20' - 800 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☐	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Building Storage

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Stor

NO.	ITEM	☑	NOTE	40'x20' - 800 SF
25				

No image for this space.

NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space.
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Harris & Associates

AGENCY: USU ☒ ☐ ☐

Space Name: Dock / Receiving

PROGRAMMING CHECK LIST

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Dock

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Dock and Receiving area				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	15			
			Length:	20			
			Area:	300			
5	Ceiling height		Height from floor:	Open			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☒	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	0				
9	Number of Visitors	No.	0				
10	Security	☐	None				
		☒	Other: Locking door and roller door				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract	☒	Locking hardware				
		☒	Powered roll-up door				
		☒	Dock levelor (hydraulic/electric)				
13	Power Outlets	☐	Number of Standard duplex outlets:				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

AGENCY: USU ☒ ☐ ☐

Space Name: Dock / Receiving

PROGRAMMING CHECK LIST

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Dock

NO.	ITEM	☑	NOTE				15'x20' - 300 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Concrete				
		☐	Other:				
17	Base Finish	☐	Rubber				
		☐	Wood				
		☐	Tile				
		☒	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	3			Conduit only.
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☐	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

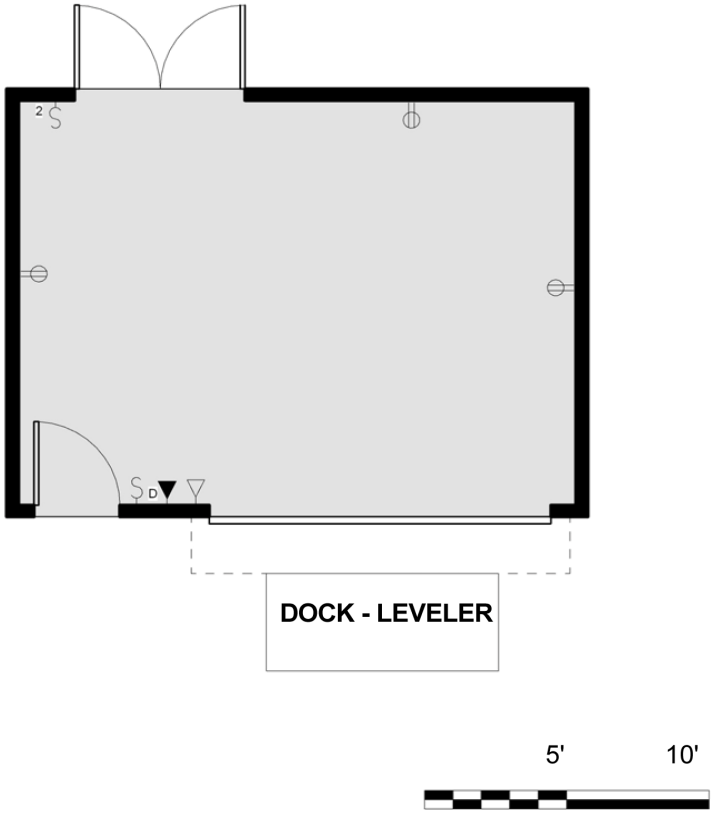
Space Name: Dock / Receiving

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Dock

NO.	ITEM	☑	NOTE	15'x20' - 300 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Registration Office

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Reg

NO.	ITEM	☑	NOTE				24'x30' - 720 SF
1	Space Type	☒	Open stations	Modular furniture ☐			
		☒	Fixed - contained				
2	Function	☒	Registration office / area				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	24			
			Length:	30			
			Area:	720			
5	Ceiling height		Height from floor:	12 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	5				
9	Number of Visitors	No.					
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computers + Monitors+ Printers - each station				
		☒	Telephones - each station				
		☒	Scanner				
		☒	Desktop copier				
12	Equipment in Construction Contract	☒	Locking door hardware				
		☒	Roll-down door - locking				
13	Power Outlets	☒	Number of quad outlets	8	2 Quads each wall: 8 outlets		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	5	Size:	Task chairs
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☒	Files - Type - Lateral	Number:	6	Size: 4'	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	5 Stations w/Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Registration Office

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Reg

NO.	ITEM	☑	NOTE				24'x30' - 720 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Work surface with lateral filing below				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	5			Conduit only.
		☒	Number of Handset:	5	NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	5 - Voice/Data at each station			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

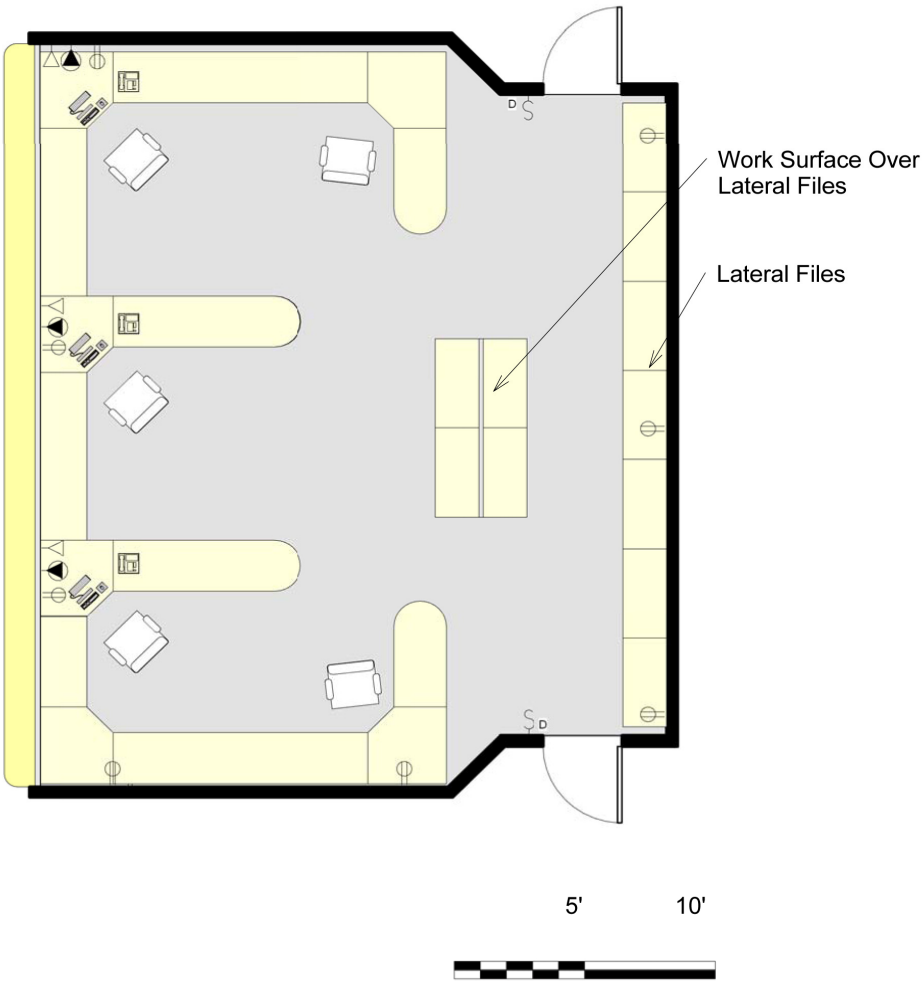
Space Name: Registration Office

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Reg

NO.	ITEM	☑	NOTE	24'x30' - 720 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Office - Advisor

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Adv

NO.	ITEM	☑	NOTE				12'x12' - 144 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Advisor's office				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	12			
			Area:	144			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☒	Day Lighting - windows				
		☐	Special				
8	Number of Occupants	No.	1				
9	Number of Visitors	No.	2				
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Computer + Monitor+ Printer				
		☒	Telephone				
12	Equipment in Construction Contract	☒	Locking door hardware				
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☒	Side Chair	Number:	2	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Files - Type - Vertical	Number:	2	Size: 5 ft.	
		☐	Files - Type	Number:		Size:	
		☐	Other:				
		☒	Desk - 6ft. modular furniture component, with penisula ~4ft.				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Office - Advisor

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Adv

NO.	ITEM	☑	NOTE				12'x12' - 144 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets:	2 - Voice/Data on 2 walls			
		☐	Special Power:				
21	Audio Visual	☐	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☒	White Boards: Size:	3x4 ft	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

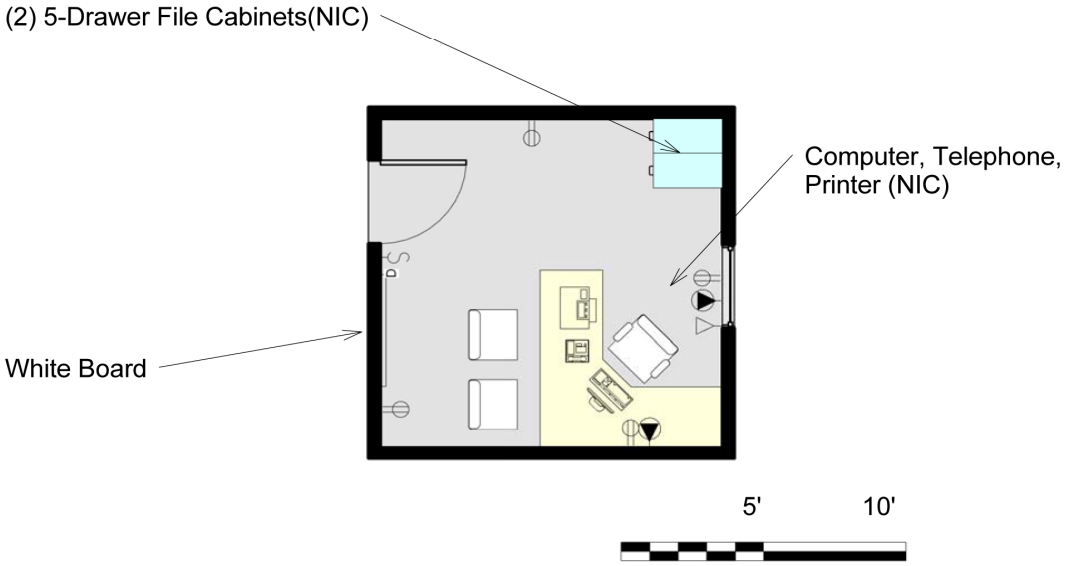
Space Name: Office - Advisor

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Adv

NO.	ITEM	☑	NOTE	12'x12' - 144 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Open Lab

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-L1

NO.	ITEM	☑	NOTE				22'x18' - 396 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Small open work lab for research				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	22			
			Length:	18			
			Area:	396			
5	Ceiling height		Height from floor:	10 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Lab equipment				Coordinate location & power requirment with user.
12	Equipment in Construction Contract	☒	C-Sink				
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space.		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☒	Work Chair	Number:	1	Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	8	Size:	Bench type stoools
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size:	Work desk
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Open Lab

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-L1

NO.	ITEM	☑	NOTE				22'x18' - 396 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	Chem Surface Lab Benches - See diagrammatic drawing for this space.				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space.				
		☐	Special Power:				
21	Audio Visual	☒	Built-In Video Projector (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	4 ft.	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Fume hood	1			1 Pecloric Acid Fume Hood
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

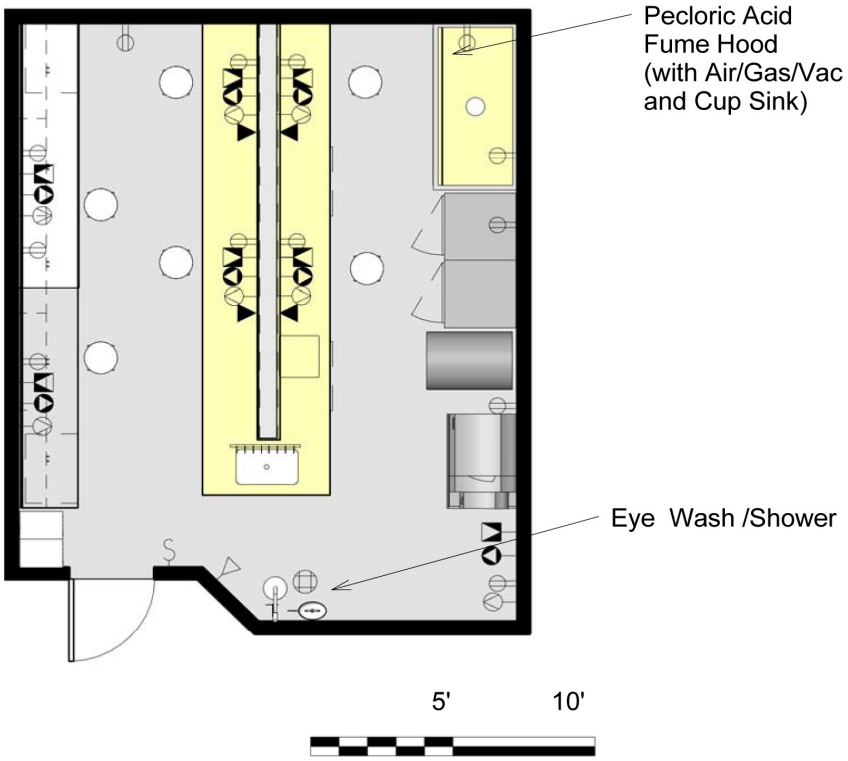
Space Name: Open Lab

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-L1

NO.	ITEM	☑	NOTE	22'x18' - 396 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Computer Room

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Com

NO.	ITEM	☑	NOTE				24'x24' - 576 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Open computer lab				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	24			
			Length:	24			
			Area:	576			
5	Ceiling height		Height from floor:	10 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	20				
9	Number of Visitors	No.					
10	Security	☒	Card Reader (NIC)				
		☒	Electric Strike (NIC)				
11	Equipment Not In Contract (NIC)	☒	Video Projector				
		☒	Power screen				
		☒	Television / DVD				
		☒	AV Station				
12	Equipment in Construction Contract	☒	Cabinets and storage shelving for storage				
13	Power Outlets	☒	Number of Standard duplex outlets:		See diagrammatic drawing for this space: Power/Data at each table		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☒	Other Chairs - Type	Number:	20	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Continuous	Number:	4	Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Computer Room

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Com

NO.	ITEM	☑	NOTE				24'x24' - 576 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	See diagrammatic drawing for this space: Cabinets and storage shelving for storage				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☒	Number of Handset:	1	NIC: ☒		
		☐	Special				
20	Data	☒	Number of Outlets: See diagrammatic drawing for this space: Power/Data at each table				
		☐	Special Power:				
21	Audio Visual	☒	Built-In Video Projector (NIC)				Provide conduit and power.
	See diagrammatic drawing for space.	☒	Projector Screen	Power: ☒	Manual: ☐	6x12	Provide conduit and power
		☒	White Boards: Size:	6x12	Number:	1	
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

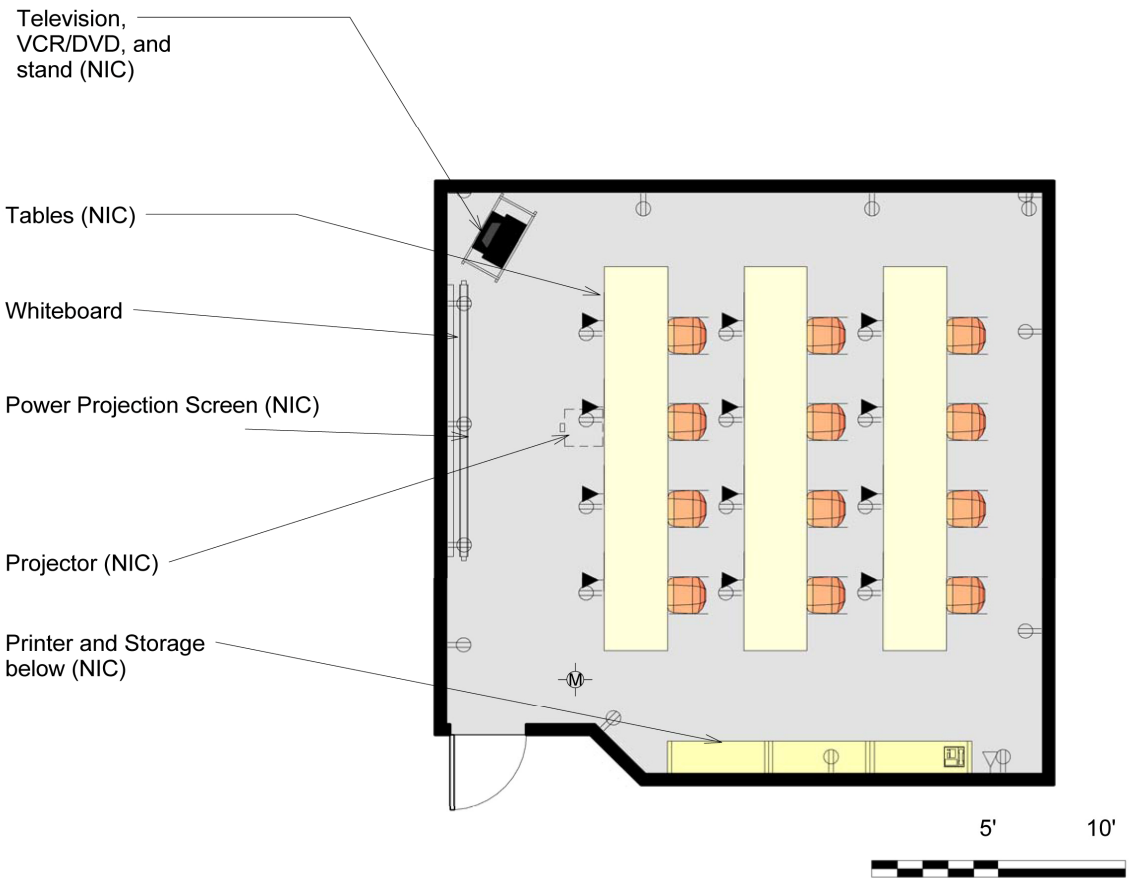
AGENCY: USU ☒ ☐ ☐

Space Name: Computer Room

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH **SS-Com**

NO.	ITEM	☑	NOTE	24'x24' - 576 SF
25				



NOTE: This illustration is diagrammatic only. It is not intended to be the actual layout of this space. The configuration and length & width orientation should not be construed as rigid.

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Lobby

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Lobby

NO.	ITEM	☑	NOTE				20'x20' - 400 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Lobby entrance / Commons				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	20			
			Length:	20			
			Area:	400			
5	Ceiling height		Height from floor:	Open			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☒	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☒	Other: Door locks / Card reader on exterior doors.				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
13	Power Outlets	☒	Number of Standard duplex outlets: 4; a duplex on each wall.				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☒	Side Chair	Number:	10	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - End tables	Number:	4	Size: 24"	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☒	Other:Loveseats/Benches	Number:	2	Size: 6 ft.	

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Lobby

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Lobby

NO.	ITEM	☑	NOTE				20'x20' - 400 SF
16	Floor Finish	☒	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other: Porcelain Tile				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☒	Number of Outlets:	1			Conduit only.
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☒	Number of Outlets:	Wireless			
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

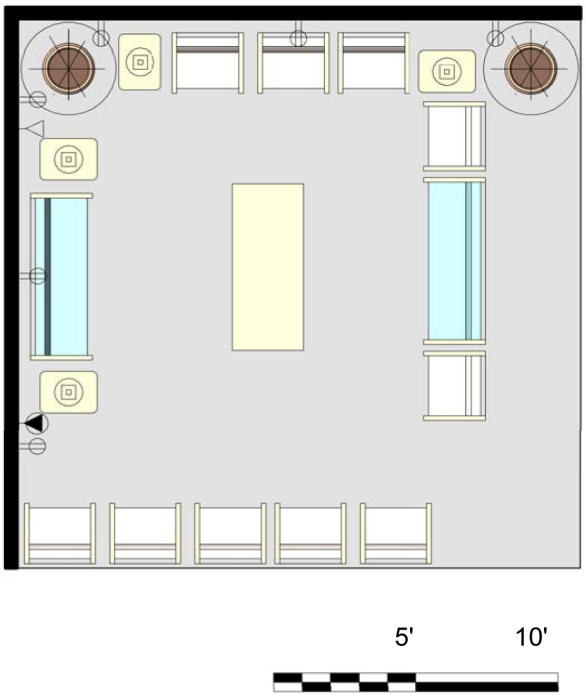
Space Name: Lobby

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Lobby

NO.	ITEM	☑	NOTE	20'x20' - 400 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Break Areas (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Break

NO.	ITEM	☑	NOTE				12'x15' - 180 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Breakroom / Eating area				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☐	Facility Standard				
4	Size		Width:	12			
			Length:	15			
			Area:	180			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☒	Acoustical Lay-In Ceiling				
		☐	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☐	Direct Fluorescence				
		☒	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	4-5				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)	☒	Refrigerator				
		☒	Microwave				
		☒	Dishwasher				
		☒	Coffee maker				
		☒	Toaster and Toaster oven				
12	Equipment in Construction Contract	☒	Cabinets, countertop, sink (with disposal)				
		☒	Lighting above sink				
		☒	Water line for ice in fridges / hot & cold dispenser				
		☒	Garbage disposal				
13	Power Outlets	☒	4-duplex outlets low on each wall (6 total); 3-quads above countertop (12 outlets)				
14	Special Power	☒	Special outlets and voltage:	Standard for kitchen appliances.			
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☒	Side Chair - Stacking	Number:	4	Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☒	Tables - Type	Number:	1	Size: 4 ft. rd.	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Break Areas (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Break

NO.	ITEM	☑	NOTE				12'x15' - 180 SF
16	Floor Finish	☐	Carpet				
		☒	Vinyl Tile				
		☐	Ceramic Tile				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☒	Type: **Upper cabinets**		Length:	12 ft.	
		☒	Type: **Countertops w/sink**		Length:	12 ft.	
		☒	Type: **Lower cabinets**		Length:	12 ft.	
		☒	Type: **Shelves**		Length:	12 ft.	
19	Telephone	☒	Number of Outlets:				Conduit only.
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

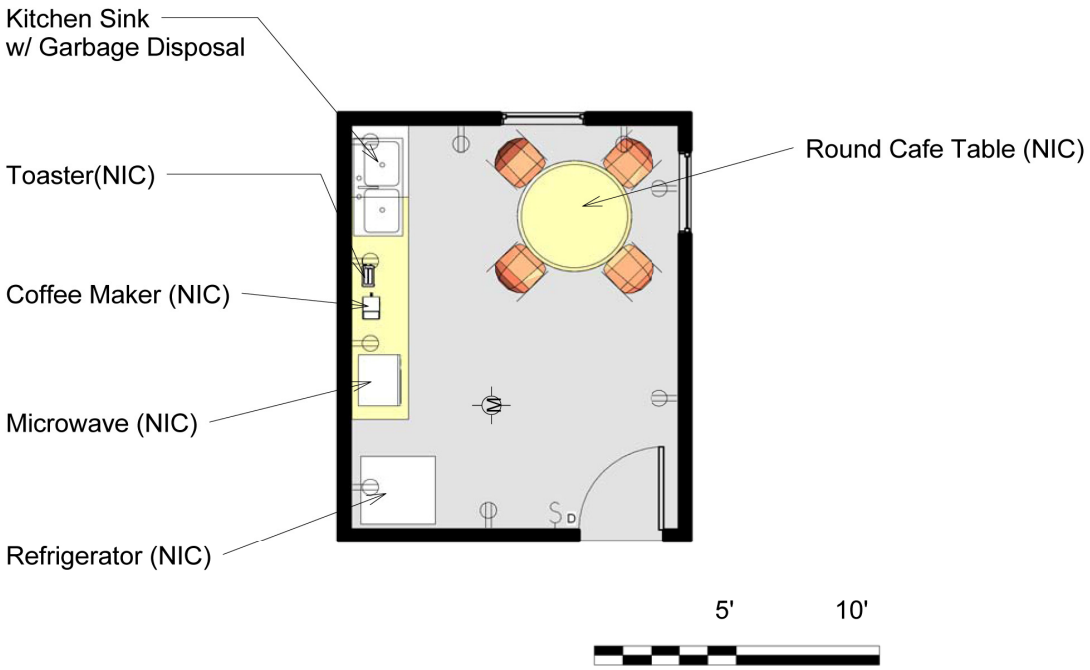
Space Name: Break Areas (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Break

NO.	ITEM	☑	NOTE	12'x15' - 180 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Custodial (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Janitor

NO.	ITEM	☑	NOTE				5'x8' - 40 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Stores mops, mop bucket, brooms, vacuums, cleaning supplies for custodian				
3	Hours of Operation	☒	**Hours: 24/7**	Days: All			
		☐	Facility Standard				
4	Size		Width:	5			
			Length:	8			
			Area:	40			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.					
9	Number of Visitors	No.					
10	Security	☐	None				
		☒	Other: Locking door				
11	Equipment Not In Contract (NIC)	☒	Mops				
		☒	Brooms				
		☒	Vacuums				
		☒	Buckets				
12	Equipment in Construction Contract	☒	Mop sink and Drain				
		☒	Shelving				
		☒	Hose bib				
		☒	Water - hot/cold outlets				
		☒	Wall rack to hold mops / brooms				
13	Power Outlets	☒	1-duplex outlet (Grounded) - GFI				
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Custodial (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Janitor

NO.	ITEM	☑	NOTE				5'x8' - 40 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☐	Ceramic Tile				
		☒	Sealed Concrete				
		☐	Other:				
17	Base Finish	☒	Rubber				
		☐	Wood				
		☐	Tile				
		☐	Other:				
18	Millwork (type and length)	☐	None				
		☒	Type: Wall rack for mops/brooms		Length:		
		☒	Type: Adjustable shelving		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☐	Other:				
23	Acoustical Control	☐	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Custodial (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Janitor

NO.	ITEM	☑	NOTE	5'x8' - 40 SF
25				

No image for this space.

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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Men's Shower, Locker - Staff

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-M Stff

NO.	ITEM	☑	NOTE				10'x16' - 160 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Men's staff shower and locker room				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☒	Facility Standard				
4	Size		Width:	10			
			Length:	16			
			Area:	160			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	Number: 2; including handicap shower				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract	☒	Shower - Accessible				
		☒	Countertops + Sinks + Mirrors				
		☒	Bench				
		☒	Lockers - Accessible				
		☒	Shelf				
13	Power Outlets	☒	Number of Standard duplex outlets:		2 GFI		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Men's Shower, Locker - Staff

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-M Stff

NO.	ITEM	☑	NOTE				10'x16' - 160 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☒	Ceramic Tile - Gloss FLOOR TO CEILING / Mosaic tile on FLOOR				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☐	Rubber				
		☐	Wood				
		☒	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Venting - Negative to other rooms				
23	Acoustical Control - N/A	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

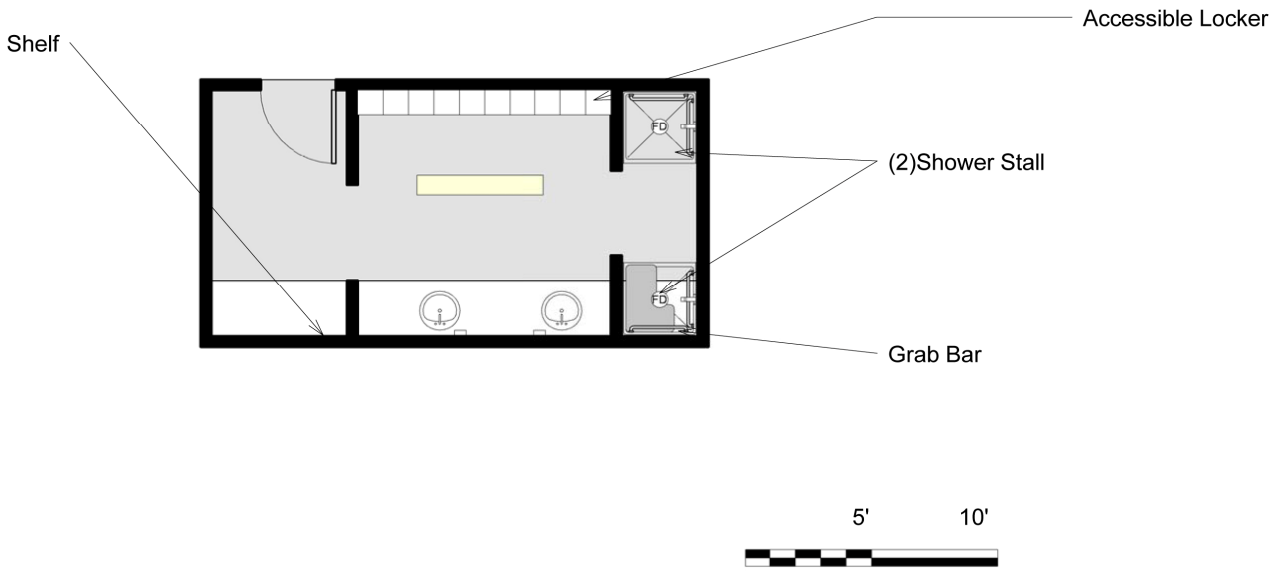
Space Name: Men's Shower, Locker - Staff

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-M Stff

NO.	ITEM	☑	NOTE	10'x16' - 160 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Women's Shower, Locker - Staff

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-W Stff

NO.	ITEM	☑	NOTE				10'x16' - 160 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Women's staff shower and locker room				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☒	Facility Standard				
4	Size		Width:	10			
			Length:	16			
			Area:	160			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	Number: 2; including handicap shower				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract						
		☒	Shower - Accessible				
		☒	Countertops + Sinks + Mirrors				
		☒	Bench				
		☒	Lockers - Accessible				
		☒	Shelf				
13	Power Outlets	☒	Number of Standard duplex outlets:		2 GFI		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Women's Shower, Locker - Staff

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-W Stff

NO.	ITEM	☑	NOTE				10'x16' - 160 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☒	Ceramic Tile - Gloss FLOOR TO CEILING / Mosaic tile on FLOOR				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☐	Rubber				
		☐	Wood				
		☒	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Venting - Negative to other rooms.				
23	Acoustical Control - N/A	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

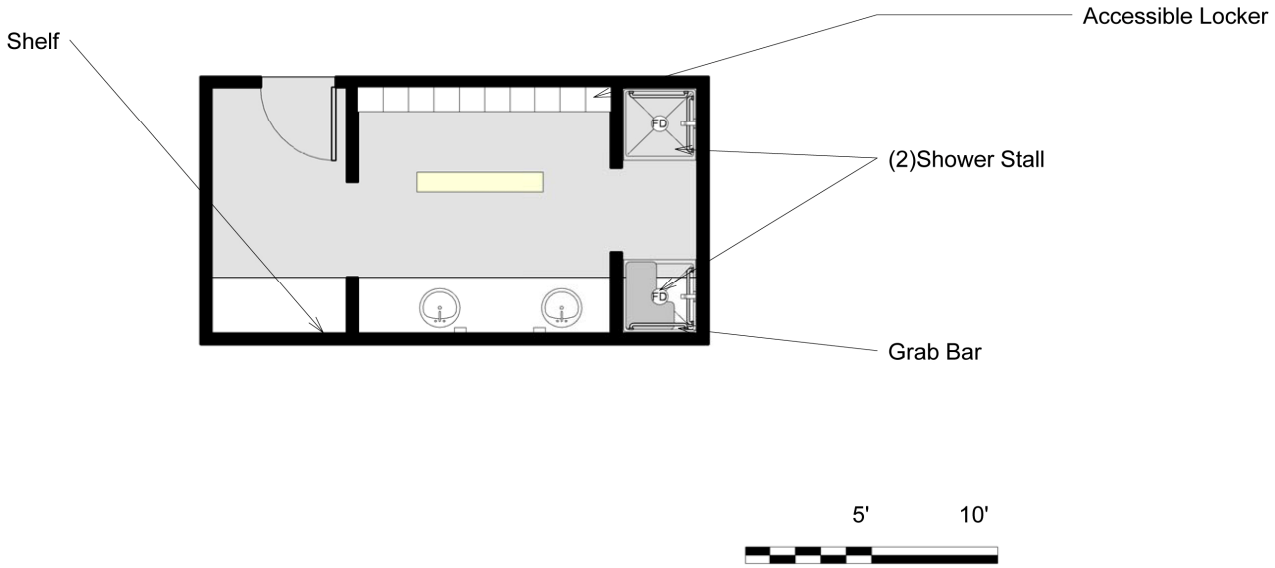
Space Name: Women's Shower, Locker - Staff

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-W Stff

NO.	ITEM	☑	NOTE	10'x16' - 160 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Men's Restroom (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH (Two each) SS-M Std

NO.	ITEM	☑	NOTE				10'x31' - 310 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Restrooms for Men				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☒	Facility Standard				
4	Size		Width:	10			
			Length:	31			
			Area:	310			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	Number: 5; including handicap stall				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract	☒	Stalls (including 1 handicap stall)				
		☒	Toilets & Urinals				
		☒	Countertops + Sinks + Mirrors				
		☒	Soap & Towel dispensers				
13	Power Outlets	☒	Number of Standard duplex outlets:		2 GFI		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Men's Restroom (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH (Two each) SS-M Std

NO.	ITEM	☑	NOTE				10'x31' - 310 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☒	Ceramic Tile - Gloss FLOOR TO CEILING / Mosaic tile on FLOOR				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☐	Rubber				
		☐	Wood				
		☒	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Venting - Negative to other rooms.				
23	Acoustical Control - N/A	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

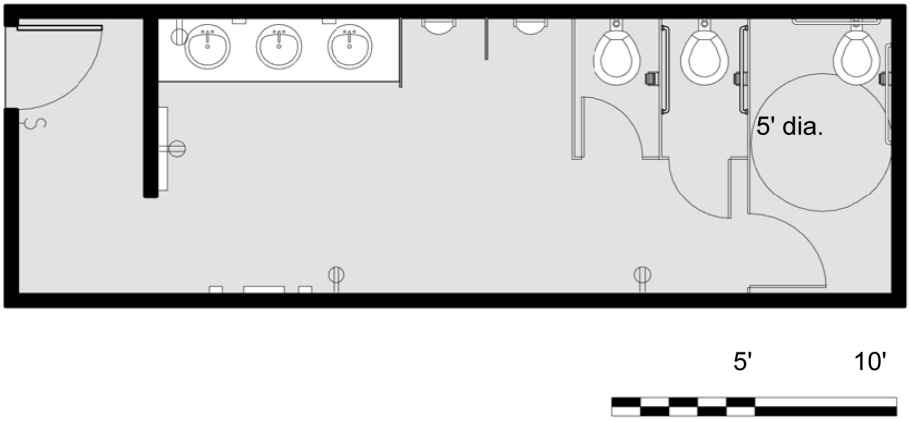
Space Name: Men's Restroom (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

(Two each) SS-M Std

NO.	ITEM	☑	NOTE	10'x31' - 310 SF
25				



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Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Women's Restroom (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

(Two each) SS-W Std

NO.	ITEM	☑	NOTE				10'x31' - 310 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Restrooms for Women				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☒	Facility Standard				
4	Size		Width:	10			
			Length:	31			
			Area:	310			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	Number: 5; including handicap stall				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract	☒	Stalls (including 1 handicap stall)				
		☒	Toilets				
		☒	Countertops + Sinks + Mirrors				
		☒	Soap & Towel dispensers				
13	Power Outlets	☒	Number of Standard duplex outlets:		2 GFI		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture (NIC)	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Women's Restroom (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH (Two each) SS-W Std

NO.	ITEM	☑	NOTE				10'x31' - 310 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☒	Ceramic Tile - Gloss FLOOR TO CEILING / Mosaic tile on FLOOR				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☐	Rubber				
		☐	Wood				
		☒	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Venting - Negative to other rooms.				
23	Acoustical Control - N/A	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

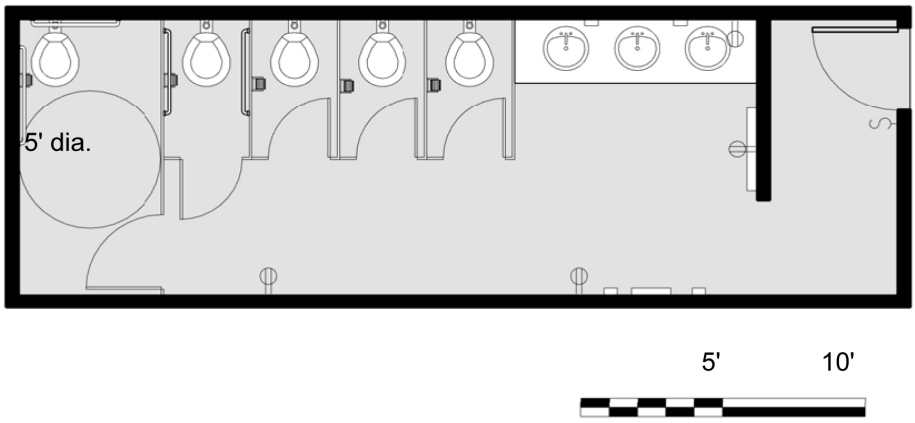
Space Name: Women's Restroom (2)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

(Two each) SS-W Std

NO.	ITEM	☑	NOTE	10'x31' - 310 SF
25				



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PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Unisex Restroom (1)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Unisex

NO.	ITEM	☑	NOTE				7'x8' - 56 SF
1	Space Type	☐	Open	Modular furniture ☐			
		☒	Fixed - private				
2	Function	☒	Unisex bathrooms for general use				
3	Hours of Operation	☒	From: 7a.m. - 11 p.m.	Days: MTWThF			
		☒	Facility Standard				
4	Size		Width:	7			
			Length:	8			
			Area:	56			
5	Ceiling height		Height from floor:	9 ft			
6	Ceiling type	☐	Acoustical Lay-In Ceiling				
		☒	Sheet Rock				
		☐	Open to Structure				
		☐	Other				
7	Lighting	☒	Direct Fluorescence				
		☐	Indirect Fluorescence				
		☐	Day Lighting				
		☐	Special				
8	Number of Occupants	No.	Number: 1; including handicap accessibility				
9	Number of Visitors	No.					
10	Security	☐	None				
		☐	Other:				
11	Equipment Not In Contract (NIC)						
12	Equipment in Construction Contract	☒	Accessible sink & countertop				
		☒	Accessible toilet				
		☒	Mirror				
		☒	Soap & Towel dispensers + Deodorant air fresheners-wall mount				
13	Power Outlets	☒	Number of Standard duplex outlets:		1		
14	Special Power	☐	Special outlets and voltage:				
15	Furniture	☐	Work Chair	Number:		Size:	
		☐	Side Chair	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Other Chairs - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Tables - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Files - Type	Number:		Size:	
		☐	Other:				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

Space Name: Unisex Restroom (1)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Unisex

NO.	ITEM	☑	NOTE				7'x8' - 56 SF
16	Floor Finish	☐	Carpet				
		☐	Vinyl Tile				
		☒	Ceramic Tile - Gloss FLOOR TO CEILING / Mosaic tile on FLOOR				
		☐	Sealed Concrete				
		☐	Other:				
17	Base Finish	☐	Rubber				
		☐	Wood				
		☒	Tile				
		☐	Other:				
18	Millwork (type and length)	☒	None				
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
		☐	Type:		Length:		
19	Telephone	☐	Number of Outlets:				
		☐	Number of Handset:		NIC: ☐		
		☐	Special				
20	Data	☐	Number of Outlets:				
		☐	Special Power:				
21	Audio Visual	☒	None				
		☐	Built-In Video Projector				
		☐	Projector Screen	Power: ☐	Manual: ☐		
		☐	White Boards: Size:		Number:		
		☐	Other:				
22	Special HVAC Requirements	☒	Standard				
		☐	Special Temperature Range:				
		☐	Special Humidity Range:				
		☐	Special Operating Times:	Hours:	Days:		
		☒	Other: Venting - Negative to other rooms				
23	Acoustical Control - N/A	☒	Standard				
		☐	Special:				
24	Other Requirements	☒	Walls				

Harris & Associates

PROGRAMMING CHECK LIST

AGENCY: USU ☒ ☐ ☐

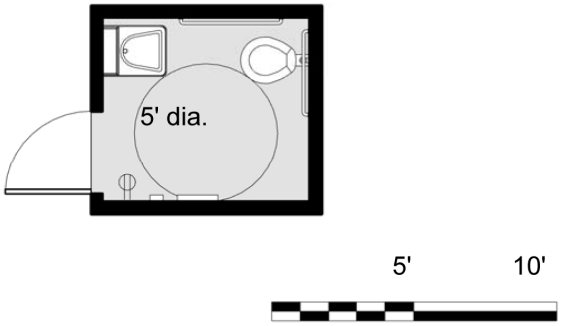
Space Name: Unisex Restroom (1)

SUPPORT SPACES - Common to All

CHECK LIST FOR SPACE AUDIT: BINGHAM BUILDING - VERNAL, UTAH

SS-Unisex

NO.	ITEM	☑	NOTE	7'x8' - 56 SF
25				



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7.00 Design Criteria - Special Criteria

Design and construction of the new Bingham Entrepreneurship and Energy Research Center will be under the design-build contractual delivery method, as managed by the State of Utah Division of Facilities Construction and Management (DFCM). Under this delivery method, a design team is contracted directly with a general contractor. Engineering consultants may or may not be a sub-consultant of the architect, dependent on the general contractor's contract with the design team. For this project it is required that professional engineers are retained by the design-builder to design the mechanical, electrical, plumbing, structural, and civil design. Additionally, a licensed landscape architect shall be retained for the landscape system design. These professional services shall not be delegated to a traditional construction subcontractor for a "design build" effort. For example, a subcontractor who builds and supplies mechanical systems cannot design the mechanical system. The design-builder must instead retain a registered professional mechanical engineer who is not an employee or consultant of the mechanical subcontractor. This applies to all professional disciplines.

Special Off-Shore Production and Design Restrictions: Because of the nature of this project as a center for "Utah" Entrepreneurship, it will be a requirement of this proposal that all design and drawing production be done in the State of Utah. Off-shore resources will not be allowed on this project.

The project shall comply with additional requirements, including requirements contained in the RFP, DFCM's "Design Manual" (current edition), and USU's "Design Criteria" (current edition), please see Appendix D. The following additional criteria will also be required:

1. This will be a LEED® "Silver" project. The project shall also comply with the DFCM "High-Performance Building Rating System", as defined in the DFCM Design Manual.

2. The Design/Builder will be responsible for a complete LEED® Certification of the Project through the Leadership in Energy and Environmental Design (LEED®) rating system of the U.S. Green Building Council (USGBC), and includes registration, design, construction and post construction phase services; certification; and all registration and certification costs and fees. The Project shall comply with the USGBC LEED® prerequisites and credits needed for the Project to obtain a minimum LEED® "Silver" certification based on LEED-NC, Version 2.2, or newer version if available and required by Owner prior to submittal of GMP. The final list of credits proposed by the Design/Builder is to be approved by the Owner prior to submittal of the GMP. Refer to Technical Requirements Section "Sustainable Design Requirements (LEED®)" for additional requirements.

3. Construction materials and colors will be as per the Master Plan criteria listed in Section 4.11.

4. All mechanical equipment shall be located internal to the facility. Roof top mechanical equipment is not allowed. Vents and exterior mechanical and electrical systems shall be integrated into the architecture and/or architecturally screened from view.

5. This program contains an ALTA survey (Appendix A) and a geotechnical survey (Appendix B) of the site for reference only. It is the responsibility of the Design-Builder to verify all geotechnical conditions and final surveys, and to coordinate with local entities for all utilities, easements, rights-of-ways, road conditions (current and future), and other requirements. The cost of permits, hook-up fees, coordination, and any additional surveys needed for this project will be the responsibility of the Design-Builder, and must be included in the GMP.

6. In case of conflicts between the RFP, design manuals, design criteria, program, and technical requirements, the Design-Builder shall obtain written clarification from the Owner prior to submitting the GMP. Where discrepancies or multiple interpretations occur, the most stringent (which is generally recognized as the most costly) shall be enforced.

8. All wiring shall be in minimum 3/4-inch conduit, and all conductors shall be copper. Design and provide cable tray systems so that station cable raceways do not extend more than 50 feet max to cable tray. Conduits shall stub to the cable tray. Include pull strings in all empty conduits. Include raceway for all technology systems, whether furnished as part of the construction contract or furnished by

the Owner. Where indicated, provide empty raceway for security systems. The Owner will provide and install security systems, intercom systems, telephone/ voice systems/equipment, AV control systems/ equipment, data communication wires, and computer file servers. Provide file server rooms that have service runs not exceeding 80 feet.

10. Locate the main electrical room close to the medium voltage transformer for building. Design with 480/277 3-phase services to interior main switchboards. Include 208/120 VAC 3-phase K-rated dry transformer(s) at new buildings, and distribution and panel boards for convenience outlets, control power, etc. Each main switchboard shall be provided with "Powerlogic" type digital metering, unless campus standards require a different type of meter. Provide capabilities to interface meter with the building management system. To the greatest extent possible, separate different types of loads onto different feeders and load centers, such as motors, lighting, convenience power, and "clean" computer power. In general, large motors and equipment shall be served at 480V, 3 phase; lighting at 277V; and outlets and small equipment at 120V. Verify voltage requirements with each specific equipment item.

11. Fire Protection Systems: Provide fire sprinkler protection systems suitable for building type, construction, hazard, and occupancy. Comply with applicable fire protection system requirements including DFCM, NFPA, State Building Official, and State Fire Marshal requirements.

12. Air Handling: Coordinate fan systems, and areas served, to allow shut down of fan systems when areas are not is use. Locate central fan systems in equipment rooms to facilitate service and maintenance and to control noise. Do not put sensitive spaces next to equipment rooms. All mechanical systems must be located inside the new facility. No roof top equipment is allowed. Consider heat recovery for exhaust systems where feasible, especially where a high percentage of the system volume is exhausted. Provide outside air ventilation to comply with ASHRAE 62-1989 "Ventilation for Acceptable Indoor Air Quality." Utilize minimum outside air settings based on CO2 sensing. If mechanical penthouses are used, they must be part of the facilities massing and form and not just a fixture on the roof. Cooling towers and other mechanical equipment must be sensitively placed to reduce noise and visual clutter. Cooling towers and electrical equipment shall be completely screened with architecturally designed screen walls. All equipment will be sound and vibration isolated from other building components.

13. All windows shall include interior window treatment, such as mini blinds.

14. The facility shall be a two-story facility to match the scale and massing of the existing facilities on the campus.

15. Provide an emergency generator for this project with a 24-hour fuel capacity. The generator shall be sized for all emergency egress lighting, the security system, and fire alarm system.

16. All laboratories shall have air, natural gas, vacuum, cold water, and hot water located at each workstation and fume hood. Distilled water, deionized water, and specialized gases will be provided by the facility user and are not in the contract.

17. This project will include a "1% for Arts" installation that will be funded by DFCM at 1% of the construction cost for the facility. The Design-Builder team shall assist in coordination and location of the artwork and provide power and special footings, if needed, as part of the Design-Builder's work. Please include a $25,000 allowance for Artwork Installation in the bid.

18. All doorways into teaching and research labs will be 4-'0" wide; this includes all doorways into lab storage rooms, prep rooms, instrument rooms, and stock rooms.

19. The RFP, design manuals, design criteria, program, and technical requirements, are considered minimum standards. It is the responsibility of the Design-Builder to provide a complete and fully functioning facility. Omissions in the RFP, design manuals, design criteria, program, or technical requirements do not relieve the Design-Builder from providing a complete and fully functioning facility for the intended use. The Design-Builder is responsible to develop and submit full construction documents, including specifications, for this project.

20. Energy Incentive Programs:

The Design/Builder shall assist, as necessary, in the process to obtain incentives from utilities for energy efficiency. Specifically Rocky Mountain Power and Questar Gas have programs that require energy modeling to achieve incentives. DFCM will engage Rocky Mountain Power, and they will provide an energy consultant through the FinAnswer Design assistance program. In addition, that consultant may be hired by DFCM to identify gas side savings and, if deemed worthwhile, prepare documentation for the Questar Custom Business Rebates Incentive program. As the LEED Certification will also require energy modeling, teams may opt to hire that same energy consultant to complete the LEED calculations as well.

Roles for participating in the Rocky Mountain Power FinAnswer Design Assistance program are defined as follows:

Design/Builder Responsibilities:

- Sign design team reimbursement agreement.
- Provide schedule guidance.
- Provide tentative milestone dates and deliverables to help align the assistance provided by Rocky Mountain Power.
- Participate in design assistance process.
- Attend meetings.
- Provide building design documentation when it is available.
- Evaluate suggestions provided during the process.
- Provide required inputs for the energy savings and economic analysis.
- Communicate changes to design to ensure model accuracy in the energy model.
- Communicate basis of design to energy consultant.
- Discuss the goals of the team and owner to minimize energy use and what energized systems and controls are acceptable to the owner.
- Guidance with EEM selection.
- Provide EEM Incremental Costs—incremental costs are the difference between the installed cost of a code compliant measure and the installed cost of the proposed measure that exceeds code.
- Provide final construction documents.

Building Owner Responsibilities:

- Guidance with EEM selection.
- Support the design team with EEM selection and budget.
- Provide EEM Incremental Costs—incremental costs are the difference between the installed cost of a code compliant measure and the installed cost of the proposed measure that exceeds code.
- Sign incentive agreement.
- Commissioning (i.e., fine tune the systems and verify installed savings of EEMs).

Rocky Mountain Power (account manager, project manager, and/or energy consultant hired by Rocky Mountain Power) Responsibilities:

- Facilitate the Design Assistance or Certification process.
- Provide design reviews and subsequent report of the CD drawings to insure EEMs have been implemented in the design.
- Provide funding for the building owner incentives, design team honorarium and reimbursement, design assistance, and report efforts.

(please refer to table on the following page)

The following table is a Roles and Responsibility matrix for the Rocky Mountain Power FinAnswer Design Assistance program .

Roles and Responsibilities Table

Item	Owner	Architect	Engineers	Rocky Mountain Power
Complete Project Application/Agreement	✓	✓	✓	
Attend Three Meetings	✓	✓	✓	✓
Provide Basis of Design	✓	✓	✓	
Provide Cost Documentation	✓	✓	✓	
Guide the EEM Selection	✓	✓	✓	✓
Sign incentive agreement	✓			✓
Sign design team reimbursement agreement		✓	✓	
Conduct Commissioning	✓			
Conduct energy simulation analysis				✓
Provide final construction documents	✓	✓	✓	
Conduct CD Review				✓
Provide Owner & Design Team Incentives				✓

Appendix

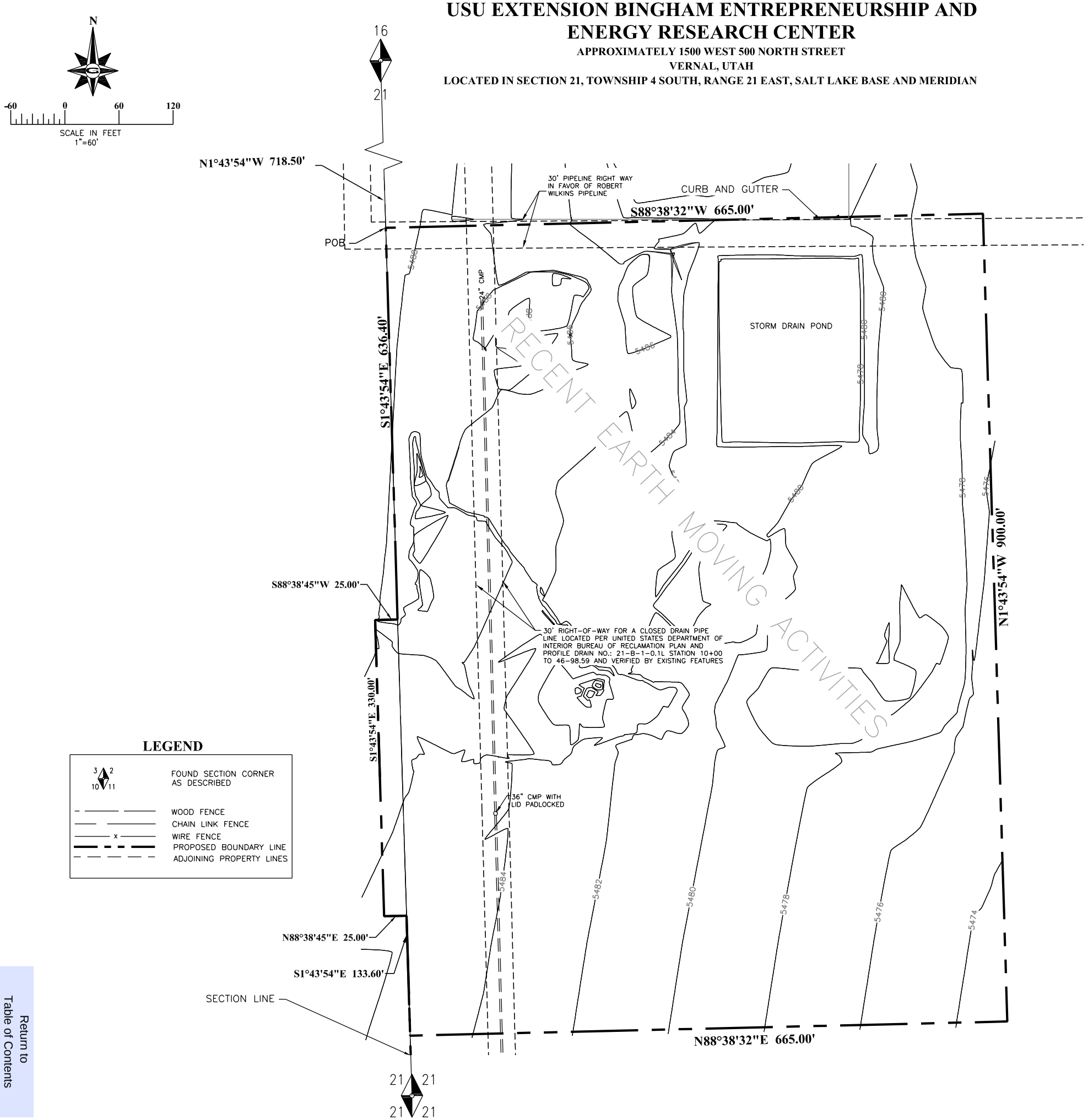
Go To A - Site ALTA Survey
Go To B - Geotechnical Report
Go To C - Equipment Lists
Go To D - DFCM/USU Design Guides
Go To E - Technical Requirements
Go To F - Proposed Project Schedule
Go To G - Diagrammatic Space Images

Appendix A

The ALTA Survey and Overall Site Survey are on the following pages. The electronic files are also located in Folder A.

USU EXTENSION BINGHAM ENTREPRENEURSHIP AND ENERGY RESEARCH CENTER

APPROXIMATELY 1500 WEST 500 NORTH STREET
VERNAL, UTAH
LOCATED IN SECTION 21, TOWNSHIP 4 SOUTH, RANGE 21 EAST, SALT LAKE BASE AND MERIDIAN



LEGEND

3 2 / 10 11	FOUND SECTION CORNER AS DESCRIBED
	WOOD FENCE
	CHAIN LINK FENCE
x	WIRE FENCE
	PROPOSED BOUNDARY LINE
	ADJOINING PROPERTY LINES

PROPOSED LEASE DESCRIPTION

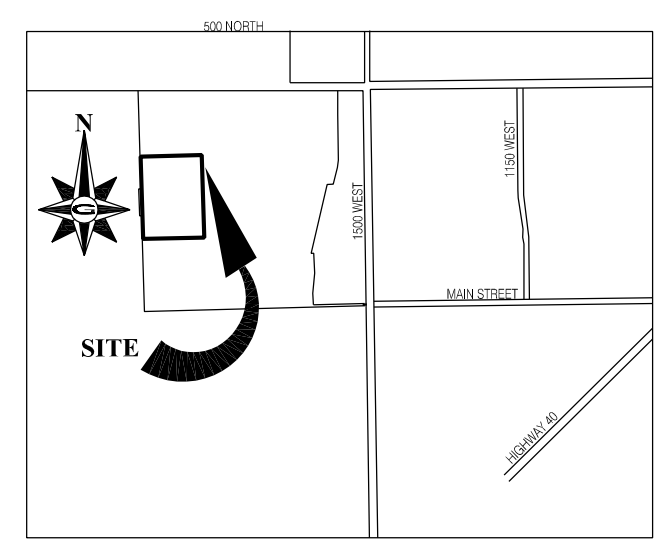
A PROPOSED PARCEL OF LAND LOCATED IN THE NORTH HALF OF SECTION 21, TOWNSHIP 4 SOUTH, RANGE 21 EAST, SALT LAKE BASE AND MERIDIAN, SAID PARCEL BEING A PORTION OF THE UTAH STATE UNIVERSITY PROPERTY, LOCATED IN THE CITY OF VERNAL, UTAH AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT LOCATED SOUTH 1°45'54" EAST 718.50 FEET ALONG THE CENTER QUARTER LINE FROM THE NORTH QUARTER CORNER OF SAID SECTION 21 AND RUNNING THENCE; SOUTH 1°43'54" EAST 636.40 FEET; THENCE SOUTH 88°38'45" WEST 25.00 FEET; THENCE SOUTH 1°43'54" EAST 330.00 FEET; THENCE NORTH 88°38'45 EAST 25.00 FEET; THENCE SOUTH 1°43'54" EAST 133.60 FEET; THENCE NORTH 88°38'32" EAST 665.00 FEET; THENCE NORTH 1°43'54" WEST 900.00 FEET; THENCE SOUTH 88°38'32" WEST 665.00 FEET TO THE POINT OF BEGINNING.

13.93 ACRES

NOTES;

1. CONSTRUCTION ACTIVITIES CURRENTLY UNDER WAY ON SITE, TOPOGRAPHY CHANGING DAILY. CONTOURS IN THE AREAS BEING STOCKPILED WITH MATERIALS ARE NOT DETAILED.
2. FIELD SURVEY DATA BASED ON SITE VISIT ON OCTOBER 13TH 2008.



CONSULTING ENGINEERS AND SURVEYORS
GILSON ENGINEERING INC.
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BUILDING C, UNIT 2
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540 NORTH 1700 WEST
RIVERDALE, UT. 84405
PHONE: (801)773-1191
FAX: (801)773-0001

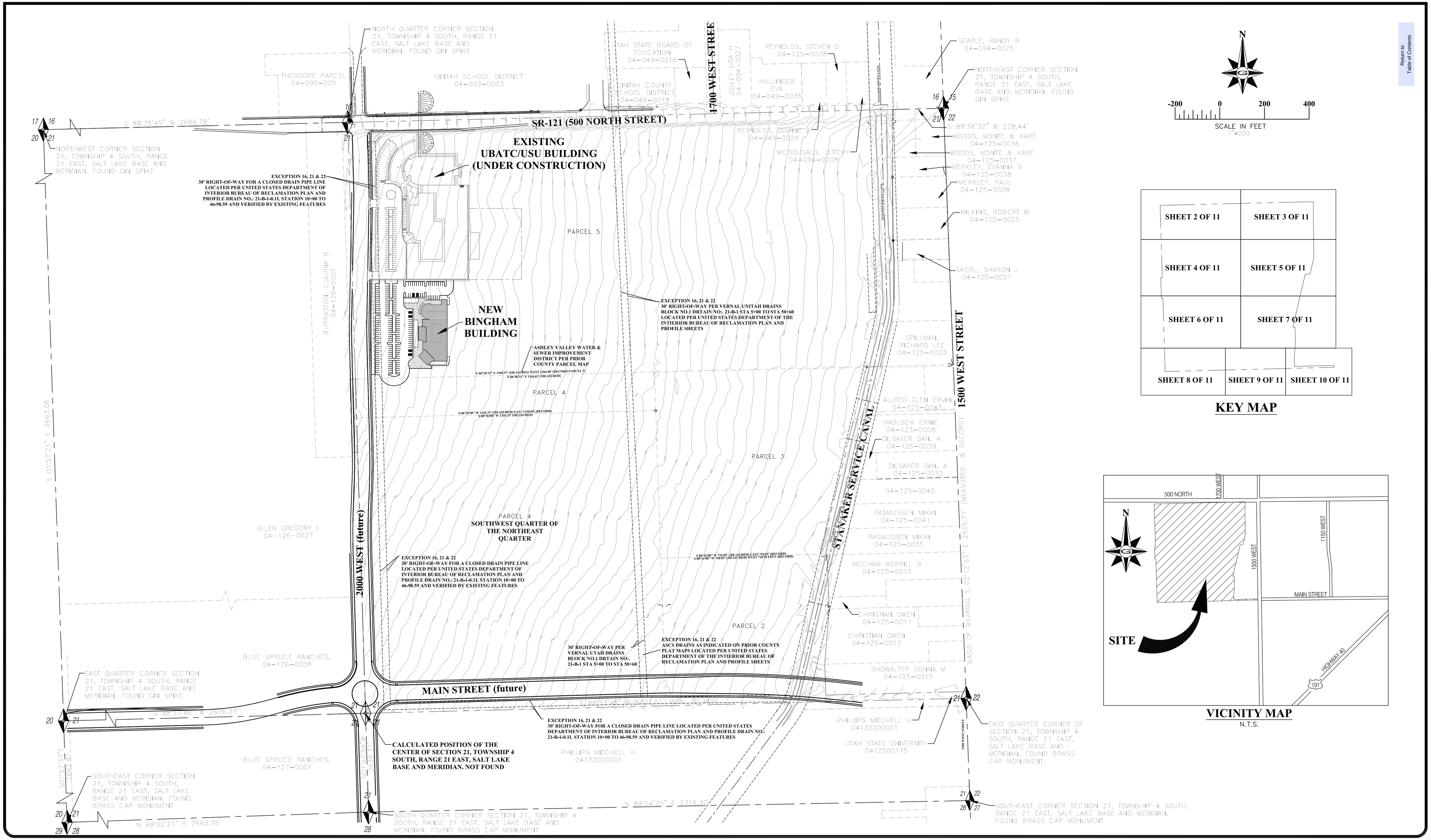
DATE:
PROJECT DATE
DRAWING NAME:
CALCULATED BY: CCS
CHECKED: JFM
CHECKED: JFM
1" SCALE DRAWING "ON FULL SIZE SHEETS ADJUST ACCORDINGLY FOR HALF SIZE SHEETS

TOPO EXHIBIT DRAWING
1500 WEST MAIN STREET
VERNAL, UTAH
LOCATED IN SECTION 21, TOWNSHIP 4 SOUTH, RANGE 21 EAST, SALT LAKE BASE & MERIDIAN

PAGE: A
PROJ.# HAR.010

Return to Table of Contents

Return to Table of Contents



SHEET 2 OF 11	SHEET 3 OF 11
SHEET 4 OF 11	SHEET 5 OF 11
SHEET 6 OF 11	SHEET 7 OF 11
SHEET 8 OF 11	SHEET 9 OF 11 / SHEET 10 OF 11

KEY MAP

VICINITY MAP
N.T.S.

CONSULTING ENGINEERS AND SURVEYORS
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HARRIS & ASSOCIATES
265 EAST 100 SOUTH
SALT LAKE CITY, UTAH

UTAH STATE UNIVERSITY
APPROXIMATELY 1500 WEST MAIN STREET
VERNAL, UTAH

LOCATED IN SECTION 21, TOWNSHIP 4 SOUTH, RANGE 21 EAST, SALT LAKE BASE AND MERIDIAN

DATE: 10/16/06	PG 1 OF 11
DRAWING NAME: HAR010ALTA.DWG	HAR.010.06
DRAWN BY: KSH/MLL	0 1 BAR SCALE MEASURES 1" ON FULL SIZE SHEETS ADJUST ACCORDINGLY FOR REDUCED SIZE SHEETS
CHECKED BY: KW	LAND TITLE SURVEY

Appendix B

Geotechnical Report begins on following page.

Gordon Spilker Huber
Geotechnical Consultants, Inc.

REPORT
GEOTECHNICAL STUDY
PROPOSED UTAH BINGHAM RESEARCH CENTER
APPROXIMATELY 250 NORTH 2000 WEST STREET
VERNAL, UTAH

Submitted To:

Harris & Associates, Inc.
265 East 100 South, Suite 350
Salt Lake City, Utah 84111

Submitted By:

Gordon Spilker Huber Geotechnical Consultants, Inc.
4426 South Century Drive, Suite 100
Salt Lake City, Utah 84123

October 7, 2008

Job No. 0461-003-08

GSH
Gordon Spilker Huber
Geotechnical Consultants, Inc.

October 7, 2008
Job No. 0461-003-08

Harris & Associates, Inc.
265 East 100 South, Suite 350
Salt Lake City, Utah 84111

Attention: Mr. Steve Ehninger, AIA

Gentlemen:

Re: Report
Geotechnical Study
Proposed Utah Bingham Research Center
Approximately 250 North 2000 West Street
Vernal, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed Utah Bingham Research Center, which is located at approximately 250 North 2000 West Street in Vernal, Utah. The general location of the site with respect to major topographic features and existing facilities, as of 1978, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing the locations of existing and proposed facilities is presented on Figure 2, Site Plan. The locations of the borings drilled in conjunction with this study are also presented on Figure 2.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of our study were planned in discussions between Mr. Steve Ehninger of Harris & Associates, Inc., and Mr. Alan Spilker of Gordon Spilker Huber Geotechnical Consultants, Inc. (GSH).

In general, the objectives of this study were to:

1. Define and evaluate the subsurface soil and groundwater conditions across the site.

2. Provide appropriate foundation, earthwork, pavement, and geoseismic recommendations to be utilized in the design and construction of the proposed structure.

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In accomplishing these objectives, our scope has included the following:

1. A field program consisting of drilling, logging, and sampling of 10 borings.

2. A laboratory testing program.

3. An office program consisting of the correlation of available data, engineering analyses, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of Harris & Associates, Inc., Subconsultant Agreement for Professional Services, Harris Project No. 0734006.01 dated August 28, 2008.

1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration borings, projected groundwater conditions, and the layout and design data discussed in Section 2., Proposed Construction, of this report. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, GSH must be informed so that our recommendations can be reviewed and amended, if necessary.

Our professional services have been performed, our findings developed, and our recommendations prepared in accordance with generally accepted engineering principles and practices in this area at this time.

2. PROPOSED CONSTRUCTION

A one- to two-level research facility is proposed to be constructed at the site. The structure will be established slab-on-grade at or near the existing ground surface and is likely to be of wood or light steel-framing with brick, stucco, or similar-type veneer.

Anticipated maximum real column and wall loads for the proposed structure are projected to be on the order of 200 to 225 kips, and 5 to 6 kips per lineal foot, respectively. Floor slab loads are anticipated to be light (less than 200 pounds per square foot average uniform loading).

Site development will require a small to moderate amount of earthwork in the form of cuts and fills. We estimate that maximum fills to achieve design grades will be on the order of one to three feet.

Extensive at-grade paved parking and roadway areas are anticipated to be part of the overall development. Projected traffic over the parking areas is anticipated to consist of a light volume of automobiles and light trucks and occasional medium-weight trucks. In primary roadway areas, traffic is projected to consist of a moderate volume of automobiles and light trucks, a light volume of medium-weight trucks, and occasional heavy-weight trucks.

3. SITE INVESTIGATIONS

3.1 FIELD PROGRAM

In order to define and evaluate the subsurface soil and groundwater conditions at the site, 10 borings were explored to depths ranging from 5.0 to 16.5 feet below existing grade. The borings were drilled using a drill rig equipped with hollow-stem augers. Locations of the borings are presented on Figure 2.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the drilling operations, a continuous log of the subsurface conditions encountered was maintained. In addition, samples of the typical soils encountered were obtained for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications have been supplemented by subsequent inspection and testing in our laboratory. Detailed graphical representation of the subsurface conditions encountered is presented on Figures 3A through 3J, Log of Borings. Soils were classified in accordance with the nomenclature described on Figure 4, Unified Soil Classification System.

A 3.25-inch outside diameter, 2.42-inch inside diameter drive sampler (Dames & Moore) was utilized in the majority of the subsurface sampling at the site. Additionally, a 2.0-inch outside diameter, 1.38-inch inside diameter drive sampler (SPT) was utilized at select locations. The blow-counts recorded on the boring logs were those required to drive the sampler 12 inches with a 140-pound hammer dropping 30 inches.

Following completion of drilling operations, one and one-quarter-inch diameter slotted PVC pipe was installed in Borings B-1 through B-5 in order to provide a means of monitoring the groundwater fluctuations.

3.2 LABORATORY TESTING

3.2.1 General

In order to provide data necessary for our engineering analyses, a laboratory testing program was initiated. The program included moisture and density, consolidation, partial gradation, and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.2.2 Moisture and Density Tests

To aid in classifying the soils and to help correlate other test data, moisture and density tests were performed on selected samples. The results of these tests are presented on the boring logs, Figures 3A through 3J.

3.2.3 Consolidation Test

To provide data necessary for our settlement analyses, a consolidation test was performed on each of three representative samples of the silty clay soils encountered at the site. The results of the test indicated that the clay soils encountered in the upper five feet are moderately over-consolidated. Underlying the surficial clays and extending to the underlying granular soils is normally to slightly over-consolidated silty clays. These normally and slightly over-consolidated clays, when loaded below the over-consolidation pressure, will exhibit high compressibility characteristics. Detailed results of the tests are maintained within our files and can be transmitted to you, upon your request.

3.2.4 Partial Gradation Test

To aid in classifying the granular soils, a partial gradation test was performed. Results of the test are tabulated below:

Boring No.	Depth (feet)	Percent Passing No. 200 Sieve	Soil Classification
B-1	15.5	14.8	SM/GM

3.2.5 Chemical Tests

To determine if the site soils will react detrimentally with concrete, chemical tests were performed on a representative sample of the silty clay soils encountered in Boring B-2 at a depth of one and one-half feet below existing grade. The results of the chemical tests are tabulated below:

Boring No.	Depth (feet)	pH	Total Water Soluble Sulfate (mg/l)
B-2	1.5	7.54	90

4. SITE CONDITIONS

4.1 SURFACE

The site is located within the Uintah Basin Applied Technology College (UBATC) Campus at approximately 250 North and 2000 West Street in Vernal, Utah. The general site layout is shown on Figure 2.

The site is relatively flat with a slight downward slope to the east and an overall relief of approximately two to three feet. Non-engineered fills were encountered within fill piles scattered across the northern portions of the site. The non-engineered fills consist of silty clay with some fine sand with an occasional pile containing silty gravel. The non-engineered fills will exhibit variable and likely poor engineering characteristics. The majority of the site is covered with knee-high alfalfa, weeds, and grasses and was previously used for agriculture.

Bordering the site to the north is a newly constructed building that is also part of the UBATC Campus. The structure is one to two levels, constructed slab-on-grade. Due to soft soils, the newly constructed structure was placed overlying soil improvements (Geopiers®). Northeast of the site is a storm water detention pond. Bordering the site on all remaining sides is similar undeveloped land.

4.2 SUBSURFACE SOIL AND GROUNDWATER

The subsurface sequence encountered in the borings is relatively similar across the site. In general, silty clays were encountered from the surface to depths of 8.5 to 17.0 feet below existing grade. The clays extend to the explored depths of 5 to 17 feet in Borings B-4 through B-10. The surficial clays (zero to five feet) are moderately over-consolidated and will exhibit moderate strength and compressibility characteristics within the anticipated loads. At the depths ranging from approximately 5 to 14 feet, the silty clays are soft to medium stiff, saturated, and brown. These deeper clays are slightly over-consolidated and will exhibit low strength and high compressibility characteristics within the anticipated loads.

The surface soils to a depth of approximately two to three inches are loose, contain major roots, and have been classified as topsoil.

The surface silty clays are underlain by silty sands and gravels that extended to the explored depths of 13.5 to 16.5 feet below grade in Borings B-1 through B-3. The sands and gravels are loose to very dense, saturated, light brown and brown, and will exhibit moderately high strength and moderately low compressibility characteristics under the anticipated loadings.

During the course of drilling operations, groundwater was measured at depths ranging from six to eight feet below existing grade. One day following drilling operations, groundwater levels were measured at approximately 5.7 to 11.1 below the existing grade. The groundwater levels are not stabilized and GSH will measure groundwater levels again at our earliest convenience. If

stabilized groundwater elevations influence the geotechnical design, GSH will provide additional recommendations at that time. Seasonal and longer-term groundwater fluctuations on the order of one to one and one-half feet are projected with the highest seasonal levels generally occurring during the late spring and early summer months.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The most significant geotechnical aspects of the site are:

1. The highly compressible, normally to slightly over-consolidated layer of silty clay generally encountered at depths from approximately 5 to 17 feet below the existing grade. These soils will exhibit poor engineering characteristics under the anticipated loadings and will consolidate beyond acceptable limits. The soft soils are not suitable for support of conventional spread and continuous wall foundations without being improved.

2. Non-engineered fill piles encountered in the northern portion of the site.

3. The moderately high groundwater table.

Three alternatives were considered to mitigate the problematic soils described above: preloading complete replacement of soft soils below footings; and soil improvement (Geopiers®). Based upon our experience in the area and a cost estimate of each method, it is our opinion that Geopiers® is the most cost effective alternative.

Based on estimates provided by Geopiers®, spread footing foundations supported by Geopiers® displacement pier reinforcement may be proportioned for a maximum allowable bearing pressure of 4,000 pounds per square foot. Geopiers® displacement piers would have an average diameter of 24 inches and would be located below foundations based on an allowable capacity of 40 kips per pier. All Geopier elements would completely penetrate the soft silty clay at the site and would be terminated in the sands and gravels at depths of 8.5 to 17.0 feet below existing grade to limit total and differential settlement to one inch and one-half inch, respectively.

The design parameters should be verified by a full-scale Geopiers® modulus test (similar to a pile load test) performed in the field. GSH should be retained to monitor the modulus test and subsequent installation of production Geopiers® elements.

The non-engineered fills encountered in the northern portions of the site are not suitable for the support of foundations, floor slabs, pavements, and exterior flatwork and must be completely removed under such.

During our subsurface investigation, groundwater was encountered at a depth of 5.7 to 11.1 feet below the existing grade. The groundwater levels are not stabilized and GSH will measure groundwater levels again at our earliest convenience. Based on experience in the area, it is anticipated that groundwater fluctuations are potentially on the order of one to two feet. Highest levels will occur during the late spring and summer months. Floor slabs are anticipated to be at or near the existing ground surface. If lower slabs are anticipated, the tops of all slabs must be established at least four feet above the existing groundwater level (approximately one and one-half feet below existing grade). If stabilized groundwater elevations influence the geotechnical design, GSH will provide additional recommendations at that time.

In the following sections, detailed discussions pertaining to earthwork, foundations, lateral resistance and pressure, floor slabs, pavements, and the geoseismic setting of the site are provided.

5.2 EARTHWORK

5.2.1 Site Preparation

Site preparation is to consist of the removal of all non-engineered fills, surface vegetation, root bulbs, sod, rubbish, and any other deleterious materials from an area extending at least three feet beyond the perimeter of the building, exterior flatwork, and pavements.

We estimate that approximately three inches of stripping will be necessary to remove the majority of roots, vegetation, and organics. Topsoil and loose surficial soils must also be removed from an area extending at least three feet beyond the perimeter of the building, pavement, and exterior flatwork. Vegetation and other deleterious materials should be removed from the site. Stripped topsoil will be unsuitable for structural fill but may be stockpiled for subsequent landscaping purposes.

Prior to the placement of structural site grading fill, pavements, floor slabs, or footings, the exposed natural subgrade shall be proofrolled by running moderate-weight rubber tire-mounted construction equipment uniformly over the surface at least two times. If excessively soft or otherwise unsuitable soils are encountered beneath footings, they must be completely removed. In pavement, floor slab, and outside flatwork areas, unsuitable natural soils should be removed to a maximum depth of two feet and replaced with compacted granular structural fill.

5.2.2 Excavations

Temporary construction excavations through cohesive soils, not exceeding four feet in depth, and above or below the water table may be constructed with near-vertical sideslopes. Temporary excavations up to eight feet in cohesive soils above and below the water table may be constructed with sideslopes no steeper than one-half horizontal to one vertical. Excavations deeper than eight feet are not anticipated. Groundwater should be anticipated at a depth of five and one-half feet below grade and possibly shallower. If excessive sloughing occurs and if

layers of clean granular material are encountered, the sideslopes must be flattened and dewatering and/or shoring provided. Excavations below the groundwater in the granular soils will be extremely difficult, if not impossible, since the granular soils will tend to flow into the open excavation.

All excavations must be inspected periodically by qualified personnel. If any signs of instability or excessive sloughing are noted, immediate remedial action must be initiated.

5.2.3 Structural Fill

Structural fill is defined as all fill which will ultimately be subjected to structural loadings, such as imposed by footings, floor slabs, pavements, etc. Structural fill will be required as backfill over foundations and utilities, as site grading fill, and in some areas, possibly as replacement fill below footings. All structural fill must be free of sod, rubbish, topsoil, frozen soil, and other deleterious materials.

Structural site grading fill is defined as fill placed over relatively large open areas to raise the overall grade. For structural site grading fill, the maximum particle size should generally not exceed four inches; although, occasional larger particles, not exceeding eight inches in diameter may be incorporated if placed randomly in a manner such that "honeycombing" does not occur and the desired degree of compaction can be achieved. The maximum particle size within structural fill placed within confined areas, such as around foundations and within utility trenches, should generally be restricted to two inches.

Structural fill placed below a level one foot above the water table at the time of construction, and/or in order to stabilize soft subgrade, shall consist of a mixture of clean coarse gravels and cobbles and/or one and one-half to two-inch minus clean gap-graded gravel (stabilizing fill).

Non-structural site grading fill is defined as all fill material not designated as structural fill and may consist of any cohesive or granular soils not containing excessive amounts of degradable material. The on-site soils are suitable for use as non-structural site-grading fill. It should be noted that unless moisture control is maintained, utilization of the fine-grained soils as non-structural site grading fill <u>will be very difficult, if not impossible</u>, during wet and cold periods of the year.

5.2.4 Fill Placement and Compaction

Coarse gravel and cobble mixtures (stabilizing fill) if utilized, shall be end-dumped, spread to a maximum loose lift thickness of 15 inches, and compacted by dropping a backhoe bucket onto the surface continuously at least twice. As an alternative, the fill may be compacted by passing moderately heavy construction equipment or large self-propelled compaction equipment at least twice. Subsequent fill material placed over the coarse gravels and cobbles shall be adequately compacted so that the "fines" are "worked into" the voids in the underlying coarser gravels and cobbles.

All structural fill shall be placed in lifts not exceeding eight inches in loose thickness. Structural fills 5 to 10 feet thick, as well as all structural fills beneath footings and floor slabs, must be compacted to at least 95 percent of the maximum dry density as determined by the AASHTO[1] T-180 (ASTM[2] D-1557) compaction criteria. Structural fills greater than 10 feet are not anticipated at the site. Fills less than 5 feet thick, which are not beneath an area extending out at least 3 feet from the perimeter of the structure, shall be compacted to at least 90 percent of the above-defined criteria.

Non-structural fill may be placed in lifts not exceeding 12 inches in loose thickness and compacted by passing construction, spreading, or hauling equipment over the surface at least twice.

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (flatwork, floor slabs, roads, etc.) should be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill should be proofrolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proofrolling may be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proofrolling, they should be removed to a maximum depth of two feet below design finish grade and replaced with structural fill.

Most utility companies and City-County governments are now requiring that Type A-1 or A-1a (AASHTO Designation – basically granular soils with limited fines) soils be used as backfill over utilities. These organizations are also requiring that in public roadways the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D-1557) method of compaction. We recommend that as the major utilities continue onto the site that these compaction specifications are followed.

The natural fine-grained cohesive soils are not recommended for use as trench backfill.

5.3 FOUNDATIONS

5.3.1 General

In conjunction with this study, we have evaluated the feasibility of supporting the proposed structures upon conventional spread and continuous wall foundations established upon varying thickness of replacement granular structural fill, preloading the site with overburden fills, and deep foundations.

---

1 American Association of State Highway and Transportation Officials
2 American Society for Testing and Materials

Due to the soft compressible soils, our analyses indicate that settlements could not be adequately controlled with replacement fills. Preloading the site would require an extensive amount of overburdened soils and is not likely practical. GSH believes deep foundations would not be economical in this application. Therefore, it is our recommendation that the proposed structure be supported on a series of Geopiers®.

5.3.2 Conventional Spread and Continuous Wall Foundations

5.3.2.1 Design Data

Conventional spread and continuous wall foundations can be installed over the Geopiers® displacement pier. For footings, the following design parameters are provided:

Minimum Recommended Depth of Embedment for Frost Protection	- 30 inches
Minimum Recommended Depth of Embedment for Non-frost Conditions	- 15 inches
Recommended Minimum Width for Continuous Wall Footings	- 18 inches
Minimum Recommended Width for Isolated Spread Footings	- 24 inches
Bearing Pressure	- (To be developed by Geopiers®*)

* Geopiers® elements are spaced singly or in close groups beneath interior footings to support concentrated column loads. Beneath continuous footings, Geopiers® elements typically are spaced at 6 to 12 feet on center, depending on loads, soil conditions, and other design requirements.

The term "net bearing pressure" refers to the pressure imposed by the portion of the structure located above lowest adjacent final grade. Therefore, the weight of the footing and backfill to lowest adjacent final grade need not be considered. Real loads are defined as the total of all dead plus frequently applied live loads. Total load includes all dead and live loads, including seismic and wind.

Geopiers® soil reinforcement should be designed and constructed by an installer licensed by the Geopiers® Foundation Company, Inc. The installer should provide a Geopiers® layout and detailed design calculations sealed by a professional engineer licensed in the state of Utah. The design calculations should demonstrate that Geopiers® soil reinforcement is designed to control long-term settlement to magnitudes within the criteria for this project.

5.3.2.2 Installation

Conventional spread and continuous wall foundations shall be established directly upon the tops of the Geopiers® systems. GSH recommends that all site grading be completed prior to the installation of the Geopiers® system.

5.3.2.3 Settlements

Settlements of foundations will be determined by Geopiers® subsequent analysis but are anticipated to be less than five-eighths of an inch.

5.4 LATERAL RESISTANCE

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance, a coefficient of 0.45 should be utilized for footings established on granular fill soils. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

5.5 FLOOR SLABS

Floor slabs may be established upon suitable natural soils and/or upon structural fill extending to these suitable natural soils. Under no circumstances shall floor slabs be established upon loose or disturbed soils/fills, sod, rubbish, non-engineered fills, deleterious materials, frozen soils, or within ponded water. To facilitate construction and to provide a capillary moisture break, we recommend that all at-grade slabs be immediately underlain by a minimum of four inches of "free-draining" granular material, such as three-quarter to one-inch-minus clean gap-graded gravel. The gravel may be placed directly upon properly prepared suitable natural soils and/or granular structural fill. Settlements of lightly loaded floor slabs (less than 200 pounds per square foot) will be less than one-quarter of an inch.

The tops of all floor slabs in habitable areas must be established at least four feet above the measured groundwater levels and preferably at or above the existing ground surface.

5.6 PAVEMENTS

The natural fine-grained soils will exhibit very poor pavement support characteristics when saturated or nearly saturated. Considering the silty clays as the design subgrade soils and the projected traffic conditions, the following pavement sections are recommended:

Parking Areas

(Light Volume of Automobiles and Light Trucks,
Occasional Medium-Weight Trucks,
and No Heavy-Weight Trucks)
[1 equivalent 18-kips axle load per day]

Flexible:

2.5 inches	Asphalt concrete
7.0 inches	Aggregate base course
12.0 inches	Granular subbase
Over	Properly prepared subgrade

Rigid:

5.0 inches	Portland cement concrete (non-reinforced)
4.0 inches	Aggregate base course
12.0 inches	Granular subbase
Over	Properly prepared subgrade

Primary Roadway Areas

(Moderate Volume of Automobiles and Light Trucks,
Light Volume of Medium-Weight Trucks,
and Occasional Heavy-Weight Trucks)
[15 equivalent 18-kips axle load per day]

Flexible:

3.5 inches	Asphalt concrete
8.0 inches	Aggregate base course
12.0 inches	Granular subbase
Over	Properly prepared subgrade

Rigid:

6.0 inches	Portland cement concrete (non-reinforced)
4.0 inches	Aggregate base course
12.0 inches	Granular subbase
Over	Properly prepared subgrade

For dumpster pads, we recommend a pavement section consisting of six and one-half inches of Portland cement concrete, 4 inches of aggregate base course, 12 inches of subbase, over properly prepared natural subgrade or site grading structural fills.

These rigid pavement sections are for non-reinforced Portland cement concrete. Concrete should be designed in accordance with the American Concrete Institute (ACI) and joint details should conform with the Portland Cement Association (PCA) guidelines. The concrete should have a minimum 28-day unconfined compressive strength of 4,000 pounds per square inch and contain 6 percent ±1 percent air-entrainment.

5.7 CEMENT TYPES

Laboratory tests indicate that the site soils contain negligible amounts of water soluble sulfates. Therefore, all concrete which will be in contact with the site soils may be prepared using Type I or IA cement.

5.8 GEOSEISMIC SETTING

5.8.1 General

Utah municipalities adopted the International Building Code (IBC) 2006 on January 1, 2007. The IBC 2006 code determines the seismic hazard for a site based upon 2002 mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points).

The structure must be designed in accordance with the procedure presented in Section 1613, Earthquake Loads, of the IBC 2006 edition.

5.8.2 Faulting

Based on our review of available literature, no active faults pass through or immediately adjacent to the site.

5.8.3 Soil Class

For dynamic structural analysis, the Site Class D - Soft Soil Profile as defined in Table 1613.5.2, Site Class Definitions, of the IBC 2006, can be utilized.

5.8.4 Ground Motions

The IBC 2006 code is based on 2002 USGS (United States Geologic Survey) mapping, which provides values of short and long period accelerations for the Site Class B-C boundary for the Maximum Considered Earthquake (MCE). This Site Class B-C boundary represents a hypothetical bedrock surface and must be corrected for local soil conditions. The following table summarizes the peak ground and short and long period accelerations for a MCE event and incorporates a soil amplification factor for a Site Class E soil profile in the second column. Based on the site latitude and longitude (40.461588 degrees north and 109.565792 degrees west, respectively), the values for this site are tabulated below:

Spectral Acceleration Value, T Seconds	Site Class B-C Boundary [mapped values] (% g)	Site Class E [adjusted for site class effects] (% g)
Peak Ground Acceleration	13.5	30.0
0.2 Seconds, (Short Period Acceleration)	$S_S = 33.8$	$S_{MS} = 75.0$
1.0 Seconds (Long Period Acceleration)	$S_1 = 9.0$	$S_{M1} = 31.6$

The IBC 2006 code design accelerations (S_{DS} and S_{D1}) are based on multiplying the above accelerations (adjusted for site class effects) for the MCE event by two-thirds (⅔).

5.8.5 Liquefaction

Liquefaction is defined as the condition when saturated, loose, fine sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event.

Due to their density, our analysis indicates that the saturated granular soils will not likely liquefy during the design seismic event. The other soils encountered at the site are clays and are not susceptible to liquefaction. Calculations were performed using the procedures described in NCEER-97-0022 entitled, "Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils," and only apply to the saturated cohesionless deposits.

We appreciate the opportunity of providing this service for you. If you have any questions or require additional information, please do not hesitate to contact us.

Respectfully submitted,

GSH Geotechnical Consultants, Inc.

Alan D. Spilker, State of Utah No. 334228
Professional Engineer

Reviewed by:

Michael S. Huber, State of Utah No. 343650
Professional Engineer

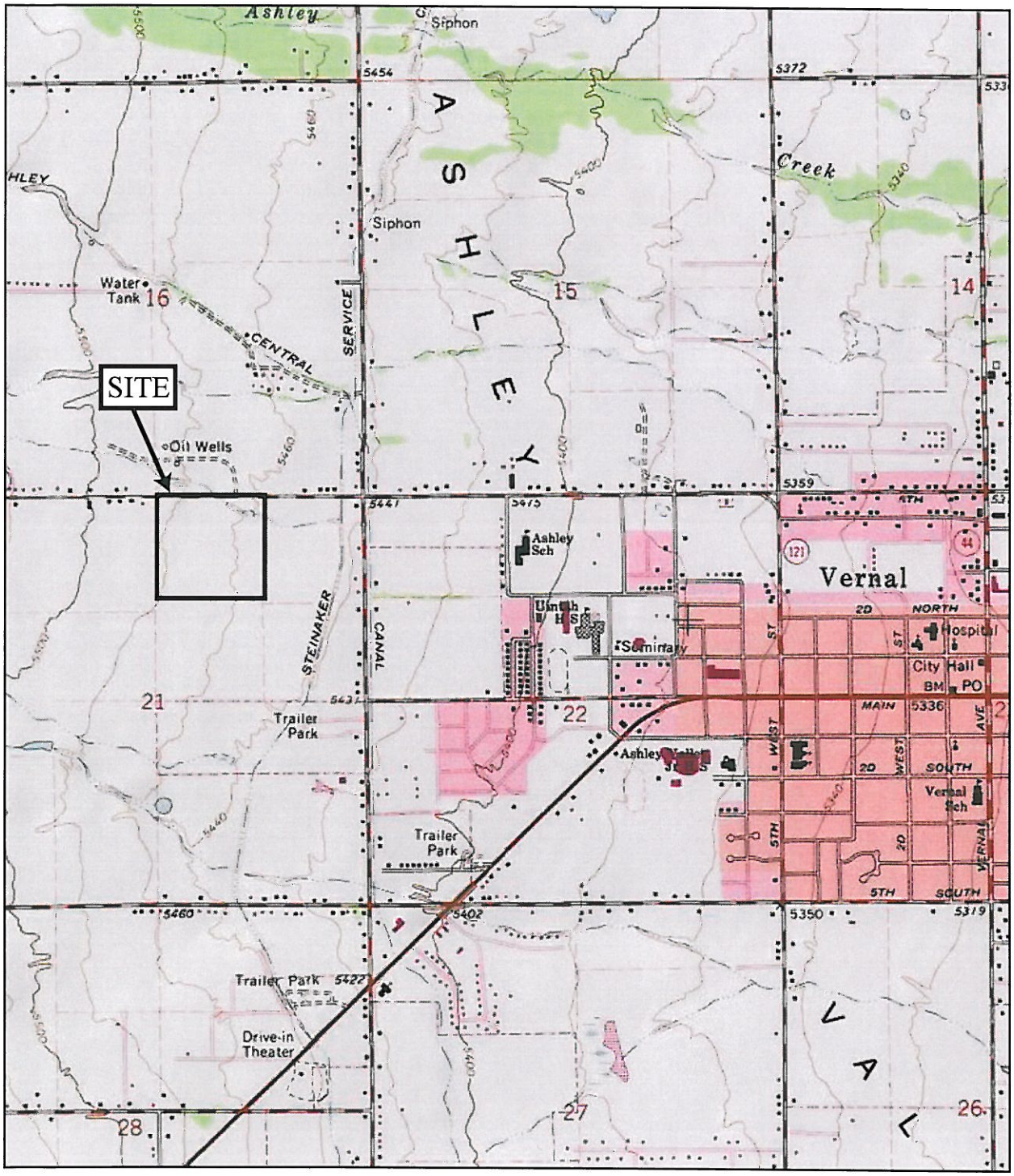
ADS/MSH:jlh

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3J, Log of Borings
Figure 4, Unified Soil Classification System

REGISTERED PROFESSIONAL ENGINEER
No. 334228-2202
ALAN DONALD SPILKER
10-7-08
STATE OF UTAH

Addressee (3 + email)

HARRIS & ASSOCIATES, INC
JOB NO. 0461-003-08



SCALE IN FEET
1000 0 1000 2000

FIGURE 1
VICINITY MAP

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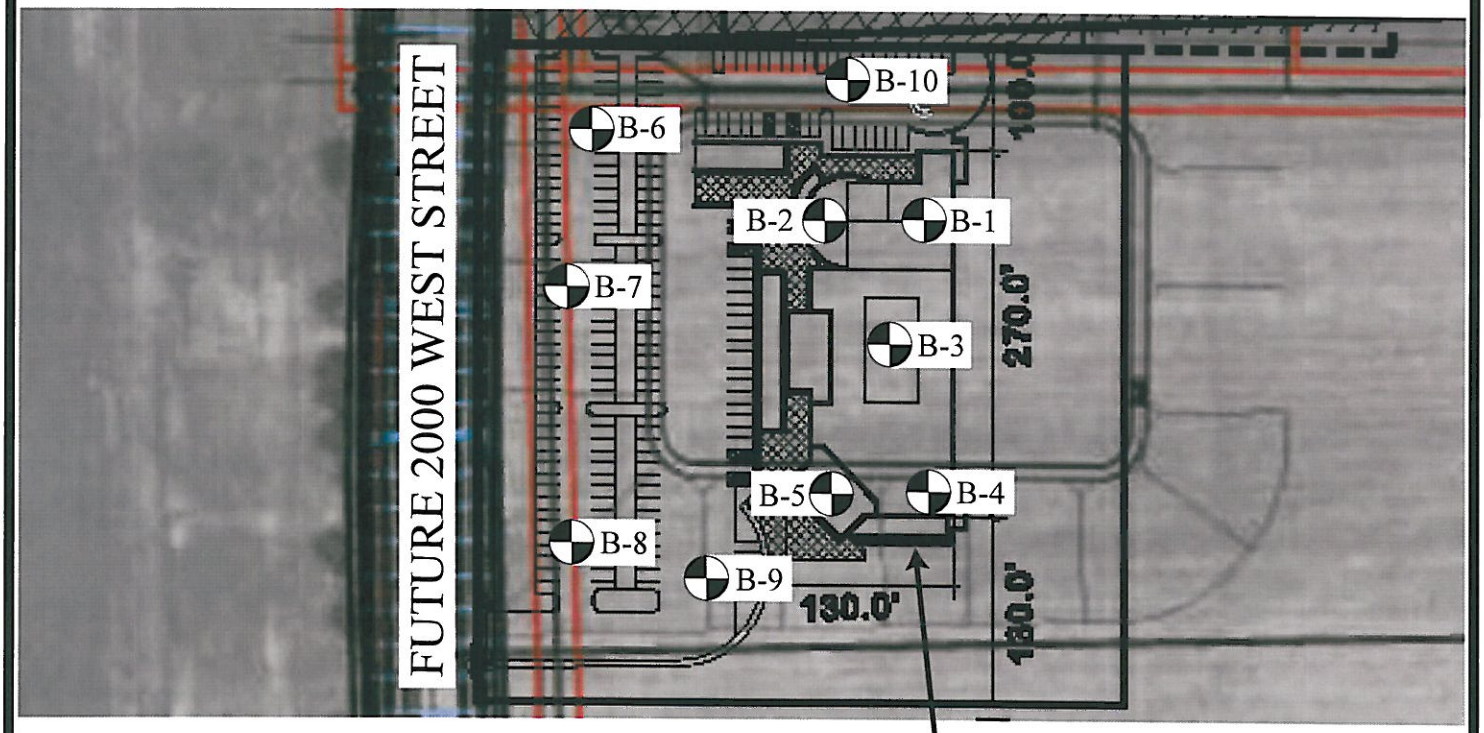
Geotechnical Consultants, Inc.

REFERENCE:
USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP
TITLED "VERNAL NE, UTAH" DATED 1978

HARRIS & ASSOCIATES, INC
JOB NO. 0461-003-08



APPROXIMATE SCALE: 1" = 150'

SITE

FIGURE 2
SITE PLAN

REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"UTAH STATE UNIVERSITY"
PROVIDED BY CLIENT, NOT DATED

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Gordon Spilker Huber
Geotechnical Consultants, Inc.

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: 7.0' (09-05-08) 5.7' (09-06-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY CLAY with some fine sand; no topsoil; brown with oxidation mottling (CL)									loose very moist medium stiff
				6		20.6		100			
			5								
				P		24.2		86			soft sample pushed saturated
		grades with occasional fine and coarse gravel		3		24.2		103			
			10	23							
		SILTY SAND AND GRAVEL fine to coarse sand; fine and coarse gravel; brown (SM/GM)									saturated loose
		grades silty fine sand; light brown	15	8		23.9	14.8				
		Stopped drilling at 15.0'.									
		Stopped sampling at 16.5'.									
		Installed 1-1/4" diameter slotted PVC pipe to 16.5'.	20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3A

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: 6.0' (09-05-08) 6.3' (09-06-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY CLAY with some fine sand; no topsoil; brown with oxidation and light brown mottling (CL)									loose to 1"-2" moist medium stiff
				10							
		grades with occasional layers to 1/8" thick of silty fine sand; brown with oxidation mottling		10		22.4		100			very moist
			5								
		grades with occasional fine and coarse gravel		15		27.5		96			saturated stiff
		grades light brown	10	7		23.5		101			medium stiff
		GRAVEL AND SAND fine to coarse sand; fine and coarse gravel; occasional layers up to 3" thick of silty fine sand; light brown (SM/GM/GP)		37							saturated dense
		Stopped drilling at 13.0'.	15								
		Stopped sampling at 14.5'.									
		Installed 1-1/4" diameter slotted PVC pipe to 14.5'.	20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3B

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: 8.0' (09-05-08) 11.1' (09-06-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface									
		SILTY CLAY/CLAYEY SILT with some fine sand; major roots (topsoil) to 1"-3"; trace organics; light brown with oxidation (ML/CL)	0								saturated "-2" moist stiff
				15		7.0		96			
		oxidation mottling	5								soft
				4		28.5		83			
		SILTY GRAVEL with some fine to coarse sand and occasional cobble; fine and coarse gravel; light brown (GM)		33							medium dense
			10								saturated
		grades silty fine and coarse gravel; light brown		50+							very dense
		Stopped drilling at 13.5'.	15								
		Stopped sampling at 13.5'.									
		Installed 1-1/4" diameter slotted PVC pipe to 13.5'.	20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3C

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: 8.0' (09-05-08) 7.1' (09-06-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SANDY CLAY/SILTY CLAY with some fine sand; no topsoil; trace organics; light brown with oxidation (SC/CL)									loose to 1"-2" very moist medium stiff
				9		21.2		103			
			5	4		18.2					
											saturated
		grades silty clay with some fine sand	10	3		32.9		86			soft
		grades grayish-brown with white mottling	15	7							stiff
		Stopped drilling at 17.0' on gravel and cobble. Stopped sampling at 16.5'. Installed 1-1/4" diameter slotted PVC pipe to 17.0'.	20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3D

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: 7.0' (09-05-08) 6.7' (09-06-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY CLAY with some fine sand; major roots (topsoil) to 1"-2"; trace organics; pinholes; light brown with oxidation (CL)									loose to 1"-2" moist stiff
				19							
		grades with occasional layers to 2" thick of silty fine and coarse sand; brown	5	4		14.6		106			soft
											saturated
				3		28.3		96			
			10	3		28.9		93			
		Stopped drilling at 14.0' on gravel and cobble.	15								
		Stopped sampling at 11.5'.									
		Installed 1-1/4" diameter slotted PVC pipe to 14.0'.	20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3E

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: No groundwater encountered (09-05-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY CLAY with some fine sand; major roots (topsoil) to 1"-2"; brown with oxidation (CL)									loose to 1"-2" moist "stiff"
											very moist "medium stiff" to "stiff"
			5								
		Stopped drilling at 5.0'.									
		Stopped sampling at 5.0'.									
		No groundwater encountered at time of drilling.									
			10								
			15								
			20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3F

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 200 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: No groundwater encountered (09-05-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY CLAY with some fine sand; major roots (topsoil) to 1"-2"; brown (CL)									loose to 1"-2" moist "stiff"
											very moist "medium stiff"
			5								
		Stopped drilling at 5.0'.									
		Stopped sampling at 5.0'.									
		No groundwater encountered at time of drilling.									
			10								
			15								
			20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3G

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: No groundwater encountered (09-05-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY CLAY with some fine sand; major roots (topsoil) to 1"-2"; light brown (CL)									loose to 1"-2" moist "stiff"
		grades brown	5								very moist "medium stiff" to "soft"
		Stopped drilling at 5.0'.									
		Stopped sampling at 5.0'.									
		No groundwater encountered at time of drilling.									
			10								
			15								
			20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3H

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: No groundwater encountered (09-05-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY CLAY with some fine sand; major roots (topsoil) to 1"-2"; brown (CL)									loose to 1"-2" moist "stiff" "medium stiff"
			5								
		Stopped drilling at 5.0'. Stopped sampling at 5.0'. No groundwater encountered at time of drilling.	10								
			15								
			20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3I

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed Utah Bingham Research Center
Project No.: 0461-003-08
Location: Appx. 250 N 2000 W, Vernal, Utah
Client: Harris & Associates, Inc.
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-05-08
Elevation: Overall Site Approximately 5480' +/-
Water Level: No groundwater encountered (09-05-08)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY CLAY with some fine sand; major roots (topsoil) to 1"-2"; brown (CL)									loose to 1"-2" moist "medium stiff"
											very moist "soft"
			5								
		Stopped drilling at 5.0'.									
		Stopped sampling at 5.0'.									
		No groundwater encountered at time of drilling.									
			10								
			15								
			20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 3J

UNIFIED SOIL CLASSIFICATION SYSTEM

FIELD IDENTIFICATION PROCEDURES				GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size. ‡ (The No. 200 sieve size is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes		GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes		SW	Well graded sands, gravelly sands, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	Poorly graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)		SM	Silty sands, poorly graded sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		SC	Clayey sands, poorly graded sand-clay mixtures.

IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN No. 40 SIEVE SIZE		DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)		
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size. (The No. 200 sieve size is about the smallest particle visible to the naked eye)	SILTS AND CLAYS Liquid limit less than 50	None to slight	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sand with slight plasticity.
		Medium to high	None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Slight to medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS Liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		High to very high	None	High	CH	Inorganic clays of high plasticity, fat clays.
		Medium to high	None to very slow	Slight to medium	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		Readily identified by color, odor, spongy feel and frequently by fibrous texture.			Pt	Peat and other highly organic soils.

‡ Boundary classifications: Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW-GC, well graded gravel-sand mixture with clay binder.
‡ All sieve sizes on this chart are U.S. standard.

GENERAL NOTES

1. In general, Unified Soil Classification Designations presented on the logs were evaluated by visual methods only. There rore, actual designations (based on laboratory testing) may differ.

2. Lines seperating strata on the logs represent approximate boundaries only Actual transitions may be gradual.

3. Logs represent general soil conditions observed at teh point of exploration onthe date indicated.

4. No warranty is provided as to the continuity of soil conditions between individual sample locations.

FINE - GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE UNDRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
Very Soft	<2	<0.125	<0.25	Easily penetrated several inches by Thumb. Squeezes through fingers.
Soft	2 - 4	0.125 - 0.25	0.25 - 0.5	Easily penetrated 1 " by Thumb . Molded by light finger pressure.
Medium Stiff	4 - 8	0.25 - 0.5	0.5 - 1.0	Penetrated over 1/2 " by Thumb with moerate effort. Molded by strong finger pressure.
Stiff	8 - 15	0.5 - 1.0	1.0 - 2.0	Indented about 1/2 " by Thumb but penetrated only with great effort
Very Stiff	15 - 30	1.0 - 2.0	2.0 - 4.0	Readily indented by Thumbnail
Hard	>30	>2.0	>4.0	Indented with difficulty by Thumbnail

LOG KEY SYMBOLS

- Bulk / Bag Sample
- Standard Penetration Split Spoon Sampler
- Rock Core
- Water Level
- Thin Wall
- No Recovery
- 3-3/4" ID D&M Sampler
- 3" ID D&M Sampler
- California Sampler

COARSE -GRAINDE SOIL

APPERENT DENSITY	SPT (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
Very Loose	<4	0 - 15	Easily penetrated with 1/2 " reinforcing rod pushed by hand
Loose	4 - 10	15 - 35	Difficult to penetrated with 1/2 " reinforcing rod pushed by hand
Medium Dense	10 - 30	35 - 65	Easily penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Dense	30 - 50	65 - 85	Difficult to penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Very Dense	>50	85 - 100	Penetrated only a few inches with 1/2 " reinforcing rod driven with 5-lb hammer

STRATIFICATION

DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2 "
LAYER	1/2 - 12 "

DESCRIPTION	THICKNESS
Occasional	One or less per foot of thickness
Frequent	More than on per foot of thichness

CEMENTATION

DESCRIPTION	DESCRIPTION
Weakely	Crumbles or breaks with handling of slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumbles or breaks with finger pressure

MODIFIERS

DESCRIPTION	%
Trace	<5
Some	5 - 12
With	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible water, usually soil below Water Table

FIGURE 4

GSH
Gordon Spilker Huber
Geotechnical Consultants, Inc.

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Appendix C

Table 1 Lists Equipment for Labs — **In Contract**

Table 2 Lists Equipment for Future Labs — **Not in Contract**

Cost and Space Requirements for Current USU-UB Instrumentation

Current Instruments	Costs Operation	Space ft^2	Quantity	Total Operation	Total ft^2
ISE Meters		2	1	$0.00	2
GC-MS	$5,000.0	21.5	1	$5,000.00	21.5
Balances		2	1	$0.00	2
ThermoNicolet 6700 FTIR	$5,000.0	21.5	1	$5,000.00	21.5
Perkin Elmer AA/AES spectrometer	$10,000.0	40	1	$10,000.00	40
Evolution 600 UV-Vis spectrometer	$5,000	16.1	1	$5,000.00	16.1
DNA sequncer		40	1	$0.00	40
Anasazi 60 MHz NMR		100	1	$0.00	100
Total				$25,000.00	243.1

Notes on Instrument Matrix

The two tables above contain lists of the current and required instrumentation to support research in the BEERC. Several of the instruments, such as the NMR and high resolution mass spectrometer, may not be possible to acquire initially but will require physical facility support that should be included in the design of the BEERC.

Acquisition costs are estimates based on quotes made within the last two years for new instruments. It may be possible to acquire some of these instruments at lower costs if used or refurbished instruments are available. Maintenance costs are estimated at 10% of the new acquisition cost and could vary.

The square footage estimates are for the instruments alone and do not include desks, bench tops, hoods, solvent cabinets, etc. Items such as refrigerators and freezers are included on the list but square footage or cost estimates are not included as they are common items.

Some of the instruments have safety requirements that require they be put in rooms separate from the main laboratory space. This is particularly true for the NMR, X-Ray, high resolution ms and any instrument that has a laser beam passing outside of a enclosed space. This is necessary to be able to minimize potential risks and to reduce the training load for those users who will not work on these instruments.

Those instruments with extra needs are listed below. A brief description of the instrument , what it will be useful for and special considerations are given.

ICP-MS

The inductively coupled plasma-mass spectrometer is a very powerful instrument that is used for elemental analysis work. With the capacity to perform isotope and multi-element composition analyses ICP-MS instruments are used in every area of physical and biological science. Faculty at the USU-UB have already had inquiries regarding these types of analysis work from natural resource researchers, extractive industries, as well as from government agencies.

Considerations:

If laser desorption source is used there is a potential for special training by staff members using any piece of equipment in the same room as the ICP-MS.
Dedicated cooling water line required.
Ventilation to remove exhaust from the system is required
Gas cylinder (Argon gas)
200-240 V, 50-60 Hz (two outlets minimum)
100-120 V, 50-60 Hz

LC-MSn

The liquid chromatography mass spectrometer (ms^n capable) ($LC\text{-}MS^n$) instrument allows for analysis of many physical and biologically related samples. Some common uses for this technique is analysis of petrochemical sample, proteomics, drug characterization, etc. In addition to the wide range of applications this instrument can isolate a component of the original assay and further analyze it to obtain a clear identification of the compound. When coupled with the desorption electron spray ionization (DESI) for surface analysis, this instrument will be utilized across all proposed science research areas at the USU-UB.

Considerations:

Space for gas cylinders (or very clean building nitrogen gas)
100-120 V 50-60 Hz
200-240 V 50/60 Hz 3200 VA
Space for liquid chromatography system

DESI-DART Source

This is a source that is mated with the LC-MS instrument and will provide us the ability to mass spectrally analyze samples with little or no sample preparation. The technique has wide applicability to many fields.

200 – 400 MHz NMR w/solids probe

NMR analysis is a benchmark technique for any chemical characterization laboratory. Equipped with a solids probe the proposed NMR instrument will be able to support not only chemistry but geology and potentially biological analyses as well. At this time USU does not have any NMR instruments capable of analyzing solids so acquisition will expand the research capabilities of the entire USU system.

Considerations:

Although acquisition of a NMR will probably not occur initially there are significant physical facilities requirements that need to be designed into the BEERC.

Room with a minimum of 12 ft height and a 8 ft radius free of magnetic material surrounding the point of installation of the NMR.
120V 30A with ~5 kVA of single phase line voltage
Vibration isolation
Climate control (humidity and temperature)
Ventilation to remove gasses produced during magnet quench (no toxic gasses just asphyxiation hazard) Cryogenic fluid handling facilities for liquid nitrogen and helium.

FTICR/Orbitrap High Resolution MS

High resolution mass spectrometry is a research area where Dr. Langley, a current assistant professor of Chemistry, has expertise and would like to establish a program. Among the areas that high resolution mass spectrometry is applicable to are: characterization of complex samples such as those in the petroleum industry, proteomics, biological analysis and many others. High resolution mass spectrometers fall into two categories, magnetic and non magnetic. Magnet based separations are the most common and generally the most affordable, but have many of the same physical considerations as NMR. The non magnetic instruments (Orbitrap) are relatively new while they do not have the demand for cryogens, they are expensive.

Considerations:

Planning for similar facilities as NMR will allow flexibility in the type of high resolution mass spectrometer that can be acquired. See NMR for general guidelines for details.

GC-MS

A gas chromatography mass spectrometer (GC-MS) instrument is required to supplement the current instrument available. Depending on the research/teaching demands the second GC-MS may not be needed immediately. These instruments are a standard analysis tools across a very wide range of research areas.

Considerations(for both new and current instruments):

Ventilation and adequate climate controls are required
Isolated 110/120 V lines are required

SPME Robot

Solid Phase Micro Extraction allows for rapid analysis of complex liquid samples. Robots can be purchased that will allow for near automated analysis. Once the samples are loaded on a tray and necessary information queued the system will automatically conduct the analysis and save the results on computer. This type of robot allows for maximum efficiency of the equipment as samples are processed as quickly as possible and work can continue 24/7.

ThermoNicolet 8700 FTIR/Raman Spectrometer

We have recently acquired a photoacoustic spectrometer (PAS) attachment for our Thermo 6700 FTIR. However a more advanced spectrometer is necessary to take full advantage of the ability to conduct depth profile analysis of solids and liquids. The 8700 spectrometer will allow us use the PAS attachment to actually probe the chemical composition of solids below the surface layer. This has a large potential application in a wide variety of fields including the tar sands and shale. In addition, all attachments currently available for the 6700 (ATR bounce probe, and others) are compatible with the 8700 spectrometer.

Raman spectroscopy can provide complimentary information about the structure and composition of a sample. Because it is not affected by the water like IR, Raman is very powerful in analyzing samples where significant water content is present.

The proposed instrument would integrate FTIR, PAS, and Raman in a single instrument and would allow for simultaneous characterization of IR and Raman and the depth profiling capability of PAS, providing the research center faculty one of the most powerful spectroscopy approaches to chemical characterization. These methods are also widely used in every area from forensics to agriculture.

Considerations (applicable to 6700):

Purified air source will be required
Helium cylinder storage will be needed for PAS.
Potential safety constraints with lasers used in Raman spectrometer

UV-Vis Spectrometer

Although one UV-Vis spectrometer is available a second unit will be required. This does not need to be nearly as complex as the Evolution 600 currently on hand.

Perkin Elmer AA/AES Spectrometer

This instrument is owned by the BLM and is used by current faculty member Dr. Clare Beelman in studying selenium concentrations in soil. When used in conjunction with the proposed ICP-MS the BEERC faculty and staff will have very strong elemental analysis capability. If the instrument is moved it should be serviced following the move. Depending on the condition of the equipment, there could be a cost of several thousand dollars for the service.

Considerations:
110/120 V 50/60 Hz
220/240 V 50/60 Hz
Gas cylinder
Purified air source
Exhaust ventilation
Climate control

Anasazi 60 MHz NMR

This instrument is a low resolution NMR intended to support the undergraduate chemistry courses. The low resolution limits the use of this instrument to research problems. This instrument is also covered by a five year warranty, which will still be in effect when the BEERC comes on line, so maintenance costs will be minimal.

Considerations:

Needs to be in a room with adequate climate control
Floor vibrations are an issue.

Table 2. Analytical Instruments Matrix for UB Bingham Building. Focus is on platforms with multiple uses or cross-disciplinary applications.

New Instruments	Acquisition	Operation ~10% cost	Water Chemistry & Environmental Quality	Earth Systems – Petroleum	Earth Systems – Framework	Natural Resources, Agricultural resources
ICP-MS (Laser Capable)	$200,000	$20,000	XXX	XX	XXX	X
LC-MSn	$200,000	$20,000	XX	X		XX
DESI/DART Source (for LC-MSn)	$40,000	$4,000	XX	XX		X
200-400 MHz NMR w/Solids Probe	$300,000	$30,000	XXX	XX		XX
FTICR/Orbitrap High Resolution MS	$750,000	$75,000	XX	XX		XX
Gas Chromatograph-MS	$100,000	$10,000	XXX	XXX	X	XX
SPME robot for current GC-MS	$50,000	$5,000	XX	XX		X
ThermoNicolet 8700 FTIR/Raman Spectrometer	$170,000	$17,000	XX	XX	X	X
Uv-Vis Spec (instruction instrument to replace current)	$15,000	$1,500	XX	XX	XX	X
Total Organic Carbon Analyzer	$35,000	$3,500	XXX	XXX	X	XX
X-Ray Diffraction	$160,000	$11,200	XX	X	XXX	X
SEM w/EDS	$220,000	$15,400	XX	XX	XXX	XX
Sediment Processing Lab	$30,000	$2,100	X	XXX	XXX	XXX
HPLC	$60,000	$6,000	XXX	XXX		X
Gas Chromatograph	$30,000	$3,000	XXX	XXX		X
LIDAR (ground based)	$120,000	$8,400	X	XX	XXX	XXX
TOTAL Stations	$9,500	$950		XX	XXX	XXX
PCR Machine	$100,000	$7,000	X	X		XXX
Gene Sequencer (existing)			X			XXX
TOTALS	**$2,589,500**	**$240,050**				

Note: Viability of much of this equipment will depend on hiring of appropriate faculty and at least 1 or 2 technicians. Some instruments require special venting and room size.

Table 2.

New Instruments	Costs Acquisition	Costs Operation	Space ft^2	Quantity	Total Acquisition	Total Operation	Space ft^2
ICP-MS (Laser DI Capable)(Quadripole)	$200,000	$20,000.0	43.1	1	$200,000	$20,000.00	43.1
LC-MS^n	$200,000	$20,000.0	21.5	1	$200,000	$20,000.00	21.5
DESI/DART Source (used with LC-MS^n)	$40,000	$4,000.0	10.8	1	$40,000	$4,000.00	10.8
200-400 MHz NMR w/Solids Probe	$300,000	$30,000.0	215.3	1	$300,000	$30,000.00	215.3
FTICR/Orbitrap High Resolution MS	$750,000	$75,000.0	107.6	1	$750,000	$75,000.00	107.6
Gas Chromatograph-MS	$100,000	$10,000.0	21.5	1	$100,000	$10,000.00	21.5
SPME robot for current GC-MS system	$50,000	$5,000.0	10.8	1	$50,000	$5,000.00	10.8
ThermoNicolet 8700 FTIR/Raman Spectrometer	$170,000	$17,000.0	21.5	1	$170,000	$17,000.00	21.5
Uv-Vis Spec (instruction instrument to replace current)	$15,000	$1,500.0	21.5	1	$15,000	$1,500.00	21.5
Total Organic Carbon Analyzer	$35,000	$3,500.0	10.8	1	$35,000	$3,500.00	10.8
X-Ray Diffraction	$160,000	$12,800.0	32.3	1	$160,000	$12,800.00	32.3
SEM w/EDS	$220,000	$17,600.0	32.3	1	$220,000	$17,600.00	32.3
HPLC	$60,000	$6,000.0	21.5	1	$60,000	$6,000.00	21.5
pH Meters	$1,000	$100.0	2.0	2	$2,000	$200.00	4.0
Gas Chromatograph	$30,000	$3,000.0	16.1	1	$30,000	$3,000.00	16.1
Balances	$1,500	$150.0	2.0	4	$6,000	$600.00	8.0
LIDAR (ground based)	$120,000	$8,400.0	0.0		$0	$0.00	0.0
TOTAL Stations	$9,500	$665.0	0.0		$0	$0.00	0.0
PCR Machine			10.8	1	$0	$0.00	10.8
Refridgerators			0.0		$0	$0.00	0.0
-80 freezers			0.0		$0	$0.00	0.0
microcentrifuges			10.8	2	$0	$0.00	21.5
centrifuges			10.8	2	$0	$0.00	21.5
autoclave			0.0		$0	$0.00	0.0
Gel/plate documentation/analysis equipment			10.8	1	$0	$0.00	10.8
electrophoresis apparati			10.8	2	$0	$0.00	21.5
Totals					**$2,338,000**	**$226,200**	**684.7**

Current Instruments	Costs Operation	Space ft^2	Quantity	Total Operation	Total space ft^2
ISE Meters	$0.0	2	1	$0.00	2
GC-MS	$5,000.0	21.5	1	$5,000.00	21.5
Balances	$0.0	2	1	$0.00	2
ThermoNicolet 6700 FTIR	$5,000.0	21.5	1	$5,000.00	21.5
Perkin Elmer AA/AES spectrometer	$10,000.0	40	1	$10,000.00	40
Evolution 600 UV-Vis spectrometer	$5,000	16.1	1	$5,000.00	16.1
DNA sequncer	$0.0	40	1	$0.00	40
Anasazi 60 MHz NMR (teaching instrument)	$0.0	100	1	$0.00	100
				$25,000.00	243.1
Operational Cost estimated at 10% of purchase price per year. **$2,462,000**	**$259,715**			**$251,200**	**927.8**

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Appendix D

The following pages contain:

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- DFCM Design Process

Go To
- DFCM Design Requirements

Go To
- USU Design Guides and Criteria

DESIGN PROCESS

March 15, 2006

PREFACE

In order for the Division of Facilities Construction and Management (DFCM) to be one of the nation's premier facility construction and maintenance managers, it is essential that we consistently provide the best value in the facilities that serve the citizens of the State of Utah.

DESIGN PROCESS

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DESIGN PROCESS

1.0 GENERAL

1.1 General

A. The Design Process applies to the capital development and capital improvement activities of DFCM. It contains specific information for the preparation of contract documents administered by the Division of Facilities Construction and Management. It delineates and supplements (either directly in the document or indirectly by reference) codes, industry recognized standards, and guide specifications. Many of the criteria are based upon the experience of DFCM and the input of professional and industry representatives.

B. Each entity which has a contract with DFCM will be evaluated on its performance in accordance with the Design Process which includes both self-performed work and the performance of its subconsultants. As a result, it is critical that the A/E, which is in contract with DFCM, communicate to its subconsultants the requirements of the Design Process and that the subconsultants communicate to the A/E and DFCM any deviations from the Design Process.

1.2 Related Documents

A. The Design Process (refer to http://dfcm.utah.gov/) includes the following documents which are incorporated herein by reference:

1. Programming Standards documents requirements for Facility Program documents. Refer to http://dfcm.utah.gov/

2. Design Requirements documents DFCM requirements which have resulted from DFCM's expertise and experience from previous projects. Refer to http://dfcm.utah.gov/

B. DFCM incorporates by reference Codes, Standards, Rules, and Regulations in the Design Requirements document.

C. Date of Applicable Documents

1. The date of the applicable Design Process, Regulatory, and Standards documents shall be defined as follows:

a. For the facility program, this date is usually the scheduled end date for completion of the Facility Program;

b. For the facility design and construction, this date is usually the date of the design contract.

1.3 Communication

A. DFCM's Designated Representative shall arrange for implementing an effective process for communicating with Agency for the purposes of determining facility requirements, Agency's inquiries, and concerns related to the project.

1.4 Conflicts, Exclusions, Omissions, and Revisions

A. Conflicts

1. In case of conflict between any of the provisions of the Design Process and other requirements, the most stringent requirement shall govern.

2. In cases where references in the Design Process have changed or are otherwise incorrect, document issues to DFCM's Designated Representative.

B. Exclusions

1. Where any requirement cannot be applied due to project specific requirements that conflict with the Design Process, they will be considered for exclusion. A requirement may be excluded only when the exclusion may not affect DFCM's ability to deliver high quality facilities and does not absolve DFCM, or entities which contract with DFCM, from the responsibility to provide facility realization services that comply with the Design Process.

2. DFCM's Designated Representative is responsible for submitting exclusions from the Design Process for a specific project to the Director of DFCM. The Director has the responsibility and authority for examining whether the proposed exclusions are appropriate and for approving them.

2.0 PROJECT SPECIFIC REQUIREMENTS

2.1 Image to Public and Occupants

A. General

1. The facility shall be economically efficient considering the function to be performed and the life expectancy of the structure.

2. Provide facilities that are aesthetically compatible with the function and importance of the facility. Obtain permission from DFCM's Designated Representative to expose facility components which detract from the aesthetic quality of the facility.

3. Review aesthetic features, which are defined as architectural elements other than finishes that are not required for the facility to function efficiently for the Agency, with the DFCM's Designated Representative. Examples of aesthetic features are: atriums, fountains, skylights, spaces with excessive volume, and exterior free standing architectural elements.

4. Honor the context of the site.

B. Appearance and Image of the Facility

1. Determine, with the DFCM's Designated Representative, the required appearance and image of the facility.

Appearance and Image of the Facility	
Facility Category	Materials, Finishes, and Entry
Prestigious Facility: highly regarded by most people and very welcoming to visitors and staff.	The materials and finishes are prestigious and the best available. The approach and entry have convenient access and many welcoming features and enhancements.
Above Average appearance: regarded as attractive, clean, and welcoming to visitors and staff.	The materials and finishes are above average quality for the community. The approach and entry are above average and have some welcoming features and enhancements.
Average appearance: basically clean with approaches and entrances that project a standard image.	The materials and finishes are of a quality usually found in the community. The approach and entry present a standard appearance of an office building.
Overall appearance of the facility and of the entrance is of minimum significance.	The materials and finishes are of a quality usually found in industrial facilities. The approach and entry present a standard appearance of an industrial building.

2.2 Budget

A. Provide Design Services that do not exceed the project budget in the Agreement with DFCM.

B. The project budget, which must not be exceeded in order to have a successful project, is established prior to the commencement of the design of the project.

1. In projects where the services of an A/E are procured, the A/E with DFCM shall develop a cost model within the budget for the construction of the project. The different portions of the cost model will be assigned to the A/E and the Design Subconsultants for identifiable elements of the project. Refer to the Cost Model Requirements for additional requirements.

C. Alternates

1. Obtain approval from DFCM's Designated Representative for any alternates prior to advertisement. Do not exceed six alternates, unless approved by DFCM's Designated Representative.
2. Describe completely all bidding alternates.
3. Do not increase the scope of the original project with alternates.
4. Specify only additive alternates and only with the intent of keeping the project within the construction budget.
5. Do not include in an alternate work which is an integral part of the project.

2.3 Schedule

A. Provide Design Services that are completed on schedule as documented in the Agreement with DFCM for the specific project.

1. Written approval of any changes in the schedule is required from DFCM's Designated Representative.

2.4 Agency Related Requirements

A. Provide Design Services, within the constraints of the Design Process and other DFCM specified constraints, which meet requirements specified by the Agency, requirements not stated by the Agency but which are necessary for the intended use, statutory and regulatory requirements, and additional requirements specified by the participants in the Facility Program (if one is prepared).

1. Minimize the disruption of the Agency's mission.

2. Provide a facility that has a reasonable degree of flexibility to permit future reasonably foreseeable changes in use.

3.0 REGULATORY, STANDARDS, AND DFCM REQUIREMENTS

3.1 General

A. Document in the Basis of Design the assumptions utilized in the design, including codes and other regulatory requirements (including dates and amendments), consensus based standards, and DFCM requirements.

B. Comply with all applicable laws, rules, and regulatory requirements. Regulatory requirements include (but are not limited to) the documents referenced in the Design Requirements.

1. A/E shall be responsible to submit the Contract Documents and obtain approval from all Authorities Having Jurisdiction.

C. Utilize design practices and provide facilities (including products and services incorporated into facilities) that comply with current editions of consensus based standards.

1. Exceptions

a. If a proposed system is not designed in accordance with a consensus based standard, notify the DFCM's Designated Representative. This requirement provides DFCM the opportunity to determine whether the risk of an option that does not comply with a consensus based standard is acceptable.

4.0 PROJECT PROCESS

4.1 General

A. This section defines, in general, the stages in the facility life cycle based upon the Construction Specification Institute's Project Resource Manual. The DFCM's Designated Representative has the flexibility to adapt or combine stages to the needs of the project subject to DFCM processes and procedures.

B. Meeting Requirements

1. The A/E shall be responsible for arranging for meeting agendas and meeting minutes.

2. Meeting Minutes

a. Record attendance, document action items, and document distribution of the meeting minutes. Action items include project related direction given to any project participant during the meeting or prior to the meeting which has not been documented.

C. Documentation Requirements

1. DFCM encourages document submittals to be submitted in digital pdf format; however, provide paper copies in accordance with agreements and as required to fulfill requirements. Copies in digital format may be

transmitted by email, except for copies which shall become a permanent record which shall be submitted in DVD format.

2. Permanent Record Documents include:

   a. System Selection
   b. Schematic Design
   c. Design Development
   d. Contract Documents

3. Digital Documents in pdf, DWG, DGN, DOC, XLS, and similar formats.

   a. Documentation of Virus Free Format: Virus Scanning Software, Version, Date; Scan Date.

D. Verification

1. DFCM expects that each project task can be completed right the first time. In order to meet this expectation, the goal is to eliminate nonconformity by concentrating the efforts of all participants necessary to contribute to proper planning. Without proper planning, rework absorbs resources that often results in compressing the schedule which can increase costs, cause additional schedule compression, and reduce quality. To avoid rework, DFCM requires that each member of the A/E team is expected to verify that their work is complete prior to submitting it for observation by DFCM or its agents. DFCM's verification process shall not be a substitute for the verification process required by the parties in contract with DFCM and shall not relieve these parties of their responsibilities.

   a. All participants shall familiarize themselves with the existing site and facility conditions as a prerequisite prior to their participation or presentation of a proposal. If the participant does not comply with this prerequisite, changes in the participant's scope of work that could have been avoided by compliance with this prerequisite shall not be accepted.

   b. Notwithstanding this expectation, it is understood that the planning, programming, and design services develop through an iterative process; however, it is expected that the deliverables required at each phase of the process shall be substantially complete prior to obtaining approval of DFCM's Designated Representative to proceed to the next phase of the process. The reason for this requirement is to avoid compressing the schedule which contributes to poor quality. Major changes in approved documents shall be avoided and require approval of the DFCM's Designated Representative.

E. Validation. The A/E shall fully cooperate in providing information required to validate the design.

1. DFCM may validate, or arrange to have validated, that the work process and the facility complies with the Design Process, the Facility Program (if prepared), and other Agency Design Criteria. Refer to the related documents for Design Requirements.

2. DFCM may arrange for the validation of the Structural Design by a Structural Engineering Peer Review. The Structural Engineering Peer Review shall be performed by a Utah registered SE experienced in similar project types.

3. DFCM may arrange for the validation of the Energy Design for conformance with DFCM's energy conservation requirements by a Utah Professional Engineer specializing in mechanical engineering.

4. DFCM may arrange for the validation of the Irrigation Design for conformance with DFCM's water conservation requirements by a certified Landscape Irrigation Auditor.

4.2 Project Conception Stage

A. All DFCM projects start off as a need statement. The need statement can be as short as a few paragraphs, or it can evolve into a full program document. During this phase the scope and budget for the project are established. The program or needs statement is the guide to follow as the design progresses.

B. DFCM shall assemble a steering committee which includes the appropriate representation from DFCM and the Agency to provide guidance to the design team throughout the process.

C. DFCM shall allocate the funding in accordance with its procedures and prepare a schedule documenting the major milestones for the funded portions of the project. DFCM shall define project quality by requiring compliance with the Design Process and other specific requirements necessary for project success.

4.3 Project Delivery Stage

A. DFCM shall determine the project delivery method and selection procedures. The project delivery method gives direction to the design process. Each delivery method brings with it a different set of expectation and requirements.

B. Construction Delivery Methods:

1. Construction Management/General Contractor (CM/GC): This method of construction is the preferred construction delivery method for the

development projects. The CM/GC assists the A/E by preparing a project schedule, cost estimating the designs presented at the different stages and different systems/components as required. The CM/GC also provides input on materials selected for availability, cost and constructability. The preferred method of design in this delivery method is the Single Bid Procurement as described below. An alternate to the single bid package is Multiple Bid Procurement.

2. Design-Bid-Build: The basis of this delivery method is that design is completed prior to selection of the contractor. Design is completed using the Single Bid Procurement process.

3. Design-Build: DFCM contracts with a single-entity for the complete design and construction of a project. The selection of this delivery method requires approval of the Director. Either the Single Bid or Multiple Bid Procurement methods are acceptable in this construction delivery method.

C. Design Delivery Methods

1. Single Bid Procurement: Design is complete for each A/E and the contract documents are issued in a single bid package.

2. Multiple Bid Procurement: "The Building Official is authorized to issue approval for the construction of foundations or any other part of a building or structure before the construction documents for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code." The project is separated into two bid packages. Construction can start while the remaining design elements are completed. Design Development shall be completed for all disciplines prior to issuing contract documents for any early bid package. The two bid packages are:

   a. Site Grading, Utilities, Footings, Foundations, Core and Shell Bid Package: Includes all documents necessary for demolition, relocation, and construction of site utilities, including site grading, overall building layout, excavation, and structural elements for the primary structural framing system, stairs, elevators, major mechanical and electrical equipment and exterior skin. The A/E documents shall include final overall building dimensions including slab edges, slab openings, and all information necessary to prepare the structural shop drawings.

   b. Final Bid Package: Includes contract documents for all other elements to be incorporated into the project.

4.4 Design Stages

Note: If the project is small and uncomplicated the different design stages may be combined with approval of the DFCM Designated Representative.

A. Definitions:

1. "Basis of Design" Basis of Design and Assumptions for each Design Discipline. This document conveys the essence and important features of the project along with the different options for each of the systems. The document should contain information such as square footage, space efficiency and comparisons with the program requirements. Include a description of any additional spare capacity included in any of the engineered systems. Summarize the codes that will apply and submit a code analysis.

2. "Cost Model" This document refers back to the Basis of Design document and informs the steering group about the cost implications of the different systems. The Cost Model must include appropriate contingency for undocumented design issues.

B Expectations of Design Team.

1. DFCM expects that the A/E, together with its subconsultants, have responsible charge of the Design. The A/E shall designate the person who is in responsible charge of a specific design service for a specific project and through a qualification's process assure DFCM that the person is qualified legally and by experience to perform the specific design service. This designated person shall be the primary day to day contact for the discipline throughout the project.

2. The goal is a quality coordinated design that minimizes the need for RFI's or change orders, and achieves a high value for cost. It is necessary that drawings, notes, and specifications be coordinated so as to minimize conflicting provisions. A design that relies upon a preponderance of vendor expertise and design effort, generally, will not accomplish this goal. Include the necessary expertise in your A/E team. Obtain permission from DFCM for the use of any performance specifications which do not show the extent of the work on the drawings and which are significantly a product of vendor input. Coordinate all work between disciplines.

3. DFCM may utilize the services of an independent commissioning agent. The A/E shall coordinate with the selected commissioning agent to incorporate the commissioning requirements in to the specification. The commissioning agent shall provide the information that must be included in the specification. The goal of the commissioning agent is to focus on key systems identified with DFCM that, from past experience, have been

problematic. The commissioning agent validates that the key systems will comply with the Design Process, DFCM's Project Constraints, and the Basis of Design at each phase of the project after their services have been procured.

C. DFCM has established cover sheets for the drawings for each design phase. These are available through the DFCM web site. Utilize these cover sheets for each submittal phase to DFCM.

D. System Selection Design Phase

1. In the System Selection Design phase (at approximately 50% to 75% completion of Schematic Design), the A/E shall confirm the facility program requirements defined in the facility program document or as otherwise defined by DFCM.

2. The A/E shall document its Basis of Design including any design assumptions, and confirm the assumptions with the authorities having jurisdiction, the Agency and DFCM.

3. The A/E shall provide the steering committee with system options and evaluate the impact of each. Adjust the allocation of resources within the cost model, without exceeding the budget, based upon the direction from the steering committee. Obtain mutual agreement in order to proceed.

4. System Selection Submittal Requirements:

a. Written Requirements:

(1) Basis of Design
(2) Cost Model with system narratives for each option.

b. Drawings Requirements

(1) Use the DFCM provided cover sheets and input the required information.

(a) Other Drawing Requirements

- Plan North/True North Symbol: Show on all plans in the lower right hand corner of the drawings.
- Plan Orientation: Orient plans consistently throughout the set of drawings.
- Graphic Scale: Show graphic scale for all drawings or views.

(b) Comprehensive List of Sheets
(c) General Sheets

(2) Civil

(a) Civil Drawings: should include information on such items as existing benchmarks, lot lines, distance from existing buildings, existing and new utility lines and proposed footprint of the new structure.

(3) Landscape

(a) Potential landscape areas.

(4) Architecture

(a) Architectural Drawings: should include floor plans and room names, exit pathways and exterior rough elevations to show the essence of the building material types.

(5) Structural

(a) Structural Drawings: should include basic information on grid lines, bay spacing and locations for lateral force resisting elements.

(6) Mechanical

(a) Mechanical Drawings: should include basic information on system locations, connection points and utility sizing and capacity.

(7) Electrical

(a) Electrical Drawings: should include basic information on system locations, connection points and utility sizing and capacity.

(8) Communications

(a) Communications: should include basic information on system locations, connection points and utility sizing and capacity.

E. Schematic Design Phase

1. Continue to develop and refine the system selection requirements.

2. In the Schematic Design phase, the A/E documents the general extent, scale, and relationship of the project components, the type of construction and incorporates the systems selected in the previous phase.

3. The A/E shall be responsible to communicate with the State Fire Marshall's Office to receive any direction required to move to the next phase of design.

4. Schematic Submittal Requirements:

   a. Written Requirements.

      (1) Updated basis of design and assumptions for each Design Discipline
      (2) Updated Cost Model
      (3) Project Manual (refer to CSI Project Resource Manual)

   b. Drawing Requirements. Continue to refine the previous drawings and add the following information.

      (1) General

         (a) Key Plans: show key plans on all drawings where one element requires two or more drawings to delineate a level.
         (b) Column Grid Lines: show on all views, except that they may be omitted on Civil, Landscape and Site Plans.

      (2) Civil

         (a) Symbol Legend and Abbreviation List
         (b) Site Demolition Plans
         (c) Civil Site Utilities Plans
         (d) Civil Utility Profiles
         (e) Civil Utility Sections
         (f) Civil Utility Details and Notes

      (3) Landscape

         (a) Concept landscape areas.

(4) Architecture

(a) Symbol Legend and Abbreviation Lists
(b) Roof Plan
(c) Floor Plans
(d) Penthouse roof plan: Show on the same drawing if possible. Skylights.
(e) Exterior Elevations
(f) Sections

(5) Structural

(a) General Structural Notes/Design Criteria
(b) Foundation Plans and Slab-On-Grade Plans
(c) Floor and Roof Framing Plans

(6) Fire Protection

(a) Symbol Legend and Abbreviations List

(7) Mechanical

(a) Mechanical Plans
(b) Mechanical Equipment Schedules (Boiler, Chiller, Cooling Tower, Air Handlers, etc.)

(8) Electrical

(a) Lighting (Area, Horizontal IES category, Horizontal IES task illuminance, Design Issues): Site Lighting (Area, Illuminance, Design Issues).
(b) Power Quality {Design (%), Design Approach}; Neutral Conductor sizing for non-linear loads (Type, Design Approach).
(c) Symbol Legend and Abbreviations
(d) Electrical Site Plan
(e) Electrical Power Plans
(f) Electrical Schedules and Diagrams

(9) Communications

(a) Structured Cabling Plans (Tt-1nn)
(b) Other Submittals

F. Design Development Phase

1. Continue to Develop and Refine the Schematic Design Requirements

2. After written approval of Schematic Design has been obtained from DFCM's Designated Representative, the A/E shall proceed with the design development phase of the project upon receipt of written confirmation to initiate the next phase of design. The design development phase fixes and describes the size and character of the entire project. In order for the project design to be considered successful, only minor modifications to the location of the facility on the site, the floor plans, and facility sections should be required during the Construction Documents Stage.

3. The A/E shall be responsible to communicate with the State Fire Marshall's Office to receive any direction required to move to the next phase of design.

4. Design Development Plan Review

   a. The design professional shall meet with the building official to review the building code requirements of the proposed project.

   b. A dimensioned site plan with distances to property lines, grades and location of new and existing buildings on the lot.

   c. Complete code analysis which shall include the occupancy classification, type of construction, allowable area calculations and actual building area, height allowed in feet and stories, sprinkler requirements, exit width required and exit width provided, fire assemblies, and accessibility requirements.

   d. Elevation drawings showings grades and height of building.

   e. Typical floor plans

5. Design Development Submittal Requirements:

   a. Written Requirements:

      (1) Updated basis of Design and Assumptions for each Design Discipline.
      (2) Updated Cost Model.
      (3) Project Manual (refer to CSI Project Resource Manual)
      (4) Code analysis and plan review

b. Drawing Requirements: Continue to update and refine what was previously shown and add the following information.

(1) General

(2) Landscape

(a) Concept Landscape Areas and Plans

(3) Civil

(a) Symbol legend and abbreviation
(b) Site demolition plan
(c) Site plan
(d) Grading plan
(e) Paving plan
(f) Civil site utility plan
(g) Civil utility profiles and sections
(h) Typical details

(4) Architecture

(a) Architectural Demolition Plan
(b) Layout of existing architectural elements identifying items to be demolished, relocated, or to remain.
(c) Building dimensions
(d) Floor Plans
(e) Roof elevations
(f) Exterior building elevations
(g) Wall sections
(h) Material selections
(i) Typical details

(5) Structural

(a) Classification for fire rated construction
(b) Special Inspection
(c) Lateral elements
(d) Typical details
(e) Structural Demolition Plans

(6) Fire Protection

(a) Fire Detection and Alarm Plans
(b) Fire Detection and Alarm Schedules and Diagrams
(c) Fire Suppression Details

(7) Mechanical

(a) Symbol Legend and Abbreviations List
(b) Mechanical Demolition Plans
(c) Equipment schedules
(d) Single line duct drawings
(e) Mechanical piping plans
(f) Plumbing general piping arrangements
(g) Flow diagrams
(h) Plumbing fixture schedules
(i) Large Scale Mechanical Room Plans

(8) Electrical

(a) Electrical Large Scale Plans
(b) Electrical Details
(c) Electrical Lighting Plans
(d) Electrical Diagrams and Schedules
(e) Electronic Security System, General
(f) Electronic Security Sheets, Plan

(9) Communications

(a) Communications Demolition Plans
(b) Audio Visual Plans
(c) Audio Visual Diagrams And Schedules
(d) Structured Cabling Plans, Large Scale Views
(e) Layout of communication rooms showing all components in the room. Show plan view layout of racks and equipment complying with TIA/EIA requirements.
(f) Structured Cabling Schedules and Diagrams

(10) Interior

(a) Interior Drawings
(b) Interior Demolition Plans
(c) Interior Plans

G. Construction Documents Phase

1. After written approval of the Design/Development Documents has been obtained from the DFCM's Designated Representative, the A/E shall proceed with the construction documents phase of the project. The construction documents are the written and graphic documents prepared or assembled by the A/E for communicating the project design for construction and administering the construction contract. The documents

are reviewed by the authorities having jurisdiction, members of the steering committee, and others selected by members of the steering committee.

2. Coordinate requirements for the following items with the DFCM's Designated Representative and assist DFCM as needed.

    a. Project Identification
    b. Description of Work
    c. Type of Bid
    d. Obtain list of contractors from DFCM's Designated Representative, if applicable.
    e. Time of Completion
    f. Liquidated Damages.
    g. Pre-Bid Meeting
    h. Evaluation and consideration of bids.

3. DFCM will initiate and prepare, with assistance as required from A/E, the following standard documents.

    a. Notice to Contractors
    b. Bid Form
    c. Bid Bond (DFCM)
    d. Bidder's Proposed Subcontractors (DFCM)
    e. Contractor Agreement Form (DFCM)
    f. Payment Bond (DFCM)
    g. Performance Bond (DFCM)
    h. Certificate of Substantial Completion (DFCM)
    i. General Conditions (DFCM)
    j. Supplementary Conditions

4. Construction Documents Submittal Requirements

    a. Written Requirements:

        (1) Updated basis of Design and Assumptions for each Design Discipline.

        (2) Updated Cost Model

        (3) Specifications: In written form on drawings or separate book, covering the following:

            (a) Masterformat 2004; all divisions used on project.
            (b) Material description.
            (c) Installation description (when not shown on drawings).

(4) Fault current calculations and coordination study.
(5) Project Manual: (refer to CSI Project Resource Manual)

(a) Energy model report
(b) Code analysis
(c) Inspection requirement

(6) Source of Specifications Identified. If A/E incorporates any proprietary specifications or any proprietary portion of its work from a source other than A/E, then such original source must be clearly identified in the A/E's work in order for DFCM to be aware of its identity and to be able to accept or reject such use of said proprietary source. Only those items specifically approved for "sole source" in writing by the Director of the Division of Facilities construction and management may be used as a "sole source" specification. In all specifications, the provision of Utah code, Title 63, Chapter 56, the Utah Procurement code, and all applicable rules enacted pursuant thereto, must be fully complied with the A/E.

b. Drawing Requirements: Complete, coordinated drawings ready for final review and comment by DFCM, the Agency and Authorities having jurisdiction include the following:

(1) Project Title Page: Template provided by DFCM.
(2) Seals Page
(3) List of Drawing Sheets

c. The A/E will provide the following documents required for Building Official review and approval.

(1) Site Plan.

(a) Property description:

- Written "Legal Description" of property boundaries.
- Survey information
- Geotechnical/soils report, stamped, signed and dated by a P.E.
- Existing hazardous materials information

(2) Construction Description Table

(a) Use or occupancy
(b) Type of construction

(c) Square footage allowed.
(d) Actual square footage of proposed structure.
(e) Height of proposed structure in feet and stories.
(f) Area increase allowances for:

- Yards
- Stories
- Fire walls
- Automatic fire sprinkling system

(g) Occupancy separations
(h) Means of egress. Show the location, construction, size and character of all portions of the means of egress. Construction documents shall designate the number of occupants to be accommodated on every floor, and in all rooms and spaces.
(i) Design occupant loads
(j) Accessibility requirements

(3) Structural Calculations: Stamped, signed and dated by the engineer of record.

(4) Fire Assemblies: Detailed on the drawings for walls, floor/ceiling assemblies and roof/ceiling assemblies as per "design number" or "file number" of one of the current publications of the following:

(a) Fire resistance tables of Chapter 7 of the International Building Code.
(b) "Fire Resistance Directory," Underwriter's Laboratory.
(c) "Fire Resistance Design Manual," Gypsum Association.
(d) ICC evaluation reports.

(5) Flood Control/Drainage Drawings: As required, stamped, signed and dated by a professional engineer.

(6) Special Inspection: The registered design professional in responsible charge shall submit a statement of special inspection. The statement shall include a complete list of materials and work requiring special inspection and the inspections to be performed.

(7) Performance Based Design: Include any performance based design which has been approved by the building official.

H. Contract Documents Phase

1. After the construction documents have been modified to comply with requirements of the authorities having jurisdiction and requirements of the steering committee written approval by the DFCM's Designated Representative is required to issue the Contract Documents.

   a. Provide two complete and corrected sets of drawings. Drawings shall be wet-stamped, signed and dated by a State of Utah licensed Architect or Engineer and submitted for approval by the State Building Official. One set to be retained by DFCM, the other set to be given to the General Contractor and kept at the construction site.

I. Pre-Construction Stage

1. General

   a. Each system or group of systems shall be integrated with other system components prior to release of the shop drawings by the A/E team and the Contractor team for construction. Pre-installation meetings are normally required for:

      (1) Site and Infrastructure
      (2) Facility Structure and Skin, including curtain walls and masonry.
      (3) Building Systems (Mechanical, Electrical, Plumbing, Building Automation, Fire Alarm)
      (4) Life Safety and Security Systems (Fire Protection, Fire Alarm, Security Electronics, Door Hardware)
      (5) Roofing

2. Pre-Construction Meeting

   a. DFCM's Designated Representative shall arrange for a preconstruction meeting. Shop drawing scheduling shall be coordinated so that the information is available for each discipline and trade to review and coordinate prior to the Pre-installation conference.

3. Pre-Installation Conference

   a. During the pre-installation conference, the A/E team and the contractor team (all members required to coordinate a system or group of systems) shall meet and resolve any issues related to shop drawing coordination and RFIs.

b. Within 10 working days, after the pre-installation conference, responses to RFIs and construction modifications shall be issued by the A/E.

5.0 DFCM QUALITY ASSURANCE REQUIREMENTS

5.1 General

A. DFCM has determined that many of the Quality Control problems can be reduced by a structured approach to interdisciplinary coordination and integration. The A/E shall integrate the drawings and specifications of all disciplines. The A/E shall inform DFCM of the process they will implement with the design team for dimensional control and comprehensive coordination of all elements of each of the following:

1. Site Plan
2. Floor Plan
3. Reflected Ceiling Plan
4. Exterior Elevations
5. Selected Interior Elevations with cabinets or other types of complexity in the elevations.
6. Sections at locations where above ceiling systems are congested shall delineate all building systems (e.g. Structural elements, Mechanical piping and ductwork, Electrical conduit and cable trays, and Fire Protection piping).
7. Division 1 sections of the specifications.

B. DFCM has determined that the functionality of systems can be improved and the costs reduced by the integration and convergence of building systems. The A/E shall implement a process with the design team for the comprehensive coordination of all elements. Elements that are typically a concern include:

1. Communication Systems (structured cabling, audio-visual systems, other similar systems, and structured cabling connections to other electronic systems).
2. Integrated Automation Systems (HVAC control, lighting control, electrical monitoring, monitoring of equipment, fire alarm).
3. Security and Life Safety Systems (security systems, fire alarm systems, fire protection systems, door hardware, and similar systems).
4. Equipment Connections (HVAC, electrical, plumbing).

6.0 COST MODEL REQUIREMENTS

6.1 General

A. The goal of the Cost Model Requirements is to provide clear criteria which the cost models and bids for a facility must meet to achieve DFCM's requirements for the project to be considered successful.

B. The DFCM's Designated Representative shall define in the "Agreement between the DFCM and A/E" the Cost Model submittals required by the A/E. Unless otherwise indicated in the "Agreement Between DFCM and A/E," Cost Models are submitted at the following phases:

1. Programming
2. System Selection
3. Schematic Design
4. Design Development
5. Construction Documents

C. The A/E shall prepare a Cost Model at each phase of the Design which identifies a sub-cost model for each discipline. Based upon this Cost Model, the A/E with each of the Design Subconsultants shall summarize in the Cost Model narrative what can be constructed in accordance with the Cost Model. Document any variances that do not comply with the Design Process, Facility Program, or Agency Requirements. Prepare design document submittals that comply with the Cost Model.

On projects where a CM/GC has been selected the CM firm will be responsible for providing an additional cost estimate. The CM/GC and the design team must work together to reconcile any differences between the two cost estimates. The project may only proceed once the cost estimate is agreed upon.

D. If the Steering Committee determines that the design for an element of the project does not comply with the project requirements, the cost model shall be adjusted and documented; however, the project budget shall not be exceeded.

E. At each cost model submittal, the Cost Consultant (member of the A/E team) and/or Contractor shall independently review that the cost model for the A/E team shall not be exceeded based upon the narrative and supporting documents provided at each phase of the design.

F. DFCM defines Construction Contingency as funds for unforeseeable conditions and design errors and omissions after the time of contract award. Reasonable allowance for all foreseeable work items must be made in the cost model.

6.2 Standards

A. The Cost Model shall be prepared according to the Construction Specification Institute's uniform classification of construction systems and assemblies.

1. RS Means is an acceptable source of cost information as long as it is adjusted to local market conditions and project requirements.
2. Exception: a proprietary Cost Estimating data base may be utilized when validated by objective evidence and approved by DFCM's Designated Representative.

6.3 Cost Model Report Table of Contents

A. Executive Summary

1. Project Summary: Brief summary of overall project, including total square footage (current vs. program), net square footage (current vs. program), and space efficiency (current vs. program);
2. Funding
3. Total Construction Cost Model: Facility Cost (Lump Sum, Cost/gross sf), On-site Cost (Lump Sum, Cost/gross sf), and Off-site Cost (Lump Sum, Cost/gross sf);
4. DFCM Furnished Cost Model (Lump Sum, Cost/gross sf);
5. Delivery Method

B. Project Narrative

1. Site Narrative
2. Facility Narrative

C. Construction Cost Model summarizing costs in the following categories.

1. Footing and Foundation
2. Structural Core and Shell
3. Exterior Cladding
4. Interiors
5. Mechanical
6. Electrical
7. Fire Protection
8. Special Demolition
9. Civil/Site Work
10. General: General Conditions, Fee, Design Contingency, Escalation Contingency, Construction Contingency

D. Assumptions and Qualifications

1. Market Conditions
2. Project Assumptions

6.4 Scope of Estimate

A. Facility Program preliminary cost model requires a mixture of costs per functional space (such as office, classroom, etc.), cost per cubic foot, cost per square foot, and cost per linear foot (for items where the cost is not easily forecast by a cost per square foot model such as site utilities). In some cases, design options shall be selected to reduce the range of costs for the program. These design options shall be defined as assumptions.

B. Schematic Design Cost model requires a mixture of cost per cubic foot, cost per square foot, and cost per linear foot (for items where the cost is not easily forecast by a cost per square foot model such as site utilities). The cost model shall be based upon the design options selected and other assumptions identified in the narrative.

C. Design/Development Cost model shall be developed based upon unit costs for approximate quantities of materials and installation shown on the design development documents or identified in the assumptions.

D. Construction Documents Cost model shall be developed based upon unit costs for actual quantities of materials and installation shown on the construction documents or identified in the assumptions.

7.0 PROJECT MANUAL REQUIREMENTS

7.1 General

A. The Project Resource Manual published by The Construction Specifications Institute serves as a reference document covering a wide range of information required by those involved in the Facility Development Process. As a generic standard, it informs the A/E about industry-wide expectations which must be adapted to the constraints of the Design Process and to specific project requirements.

B. Apply CSI MasterFormat 2004 for organizing the numbering of sections, the SectionFormat for the organizing individual sections and the PageFormat for each individual page. (Note: MasterFormat 1995 may be utilized for projects with A/E agreements dated before January 1, 2006.)

C. The only parties to the construction contract are the DFCM and Contractor. The A/E shall therefore address all instructions to the Contractor. Do not address individual subcontractors or trades.

D. Provide an orderly and logical arrangement by complying with the CSI requirements that establishes a standard location for specific information and to state that information only in that location.

1. Index all documents in the Project Manual.

E. Edit guide specifications carefully to convey the necessary requirements for each project discipline. Avoid elaborate and expensive requirements for items that are not critical to the success of the project. Delete from guide specifications irrelevant items. Modify guide specifications to add clarity and special requirements to conform to project requirements.

1. Coordinate Project Manual with Drawings.
2. Carefully coordinate Structural General Notes with the specifications.
3. Do not use lump sum allowances in any specification sections.

7.2 Preferred Source Documents

A. DFCM requires written disclosure and project manager approval if specifications are prepared by a manufacturer. Manufacturer written specifications generally should not be used in order to avoid unfair influence by a manufacturer in the procurement process.

B. DFCM requires that specifications be prepared in compliance with CSI requirements and that the specification masters be prepared using a documented quality process.

C. DFCM does not require, but accepts the Full Language version of ARCOM Masterspec or BSD SpecLink Construction Specifications as the specification template. They are derived independently from the manufacturers and because they follow a quality and tested process.

7.3 Construction guarantees and warranties shall:

A. Protect DFCM against faults, defects, or failure, in spite of technical compliance with the terms of the contract.

B. Extend the manufacturer's responsibility beyond the end of the one year guarantee period on selected items as approved by DFCM.

C. The one year guarantee period shall not limit the effect of warranties provided in or required by the contract. The Contractor shall correct failures during the one year guarantee period after substantial completion.

7.4 Product and Service Life Cycle Requirement:

A. Assure there is a high value for the cost by:

1. Maximize competition consistent with the purpose. In addition, minimize sole source procurements (Refer to http://www.rules.utah.gov/publicat/code/r023/r023-001.htm). Provide a minimum of three manufacturers for each material or installation, except where authorization from the Director of DFCM has been obtained for sole source procurements. The use of an "or equal" clause in the specifications shall define a process for determining "equal products or services" which requires approval by the A/E and shall not leave it to the vendor to make this determination.

2. In order to avoid excessive addition and replacement costs, use open source and open protocol systems when possible.

   a. Where proprietary software and service organizations are required to service a component, obtain price information for DFCM and the Agency identifying the long term cost (10 years) in order to include this in the evaluation.

3. Provide facility components which are durable, with low failure rates, and low cost to maintain.

4. New Technologies: Reduce life cycle costs by incorporating proven technologies in facilities, and by performing "due diligence" prior to procuring new technologies.

7.5 Materials

A. Specify materials which are new, unless approved by DFCM's Designated Representative. Provide certification or label with the name of the manufacturer or supplier and the approved testing laboratory where consensus based standards have been developed.

8.0 CAD REQUIREMENTS

8.1 General

A. The goal of the CAD Standards is to provide clear criteria which the Drawings for a facility must meet to achieve DFCM's requirements. Comply with the requirements of the National Cad Standard as supplemented by this standard.

B. Coordinate with DFCM's Designated Representative to determine the drawing format.

C. The performance requirements are given as appropriate as minimum criteria to allow flexibility within the constraints of the CAD Standards. If a variance from the standard is desired, the approval of the DFCM's Designated Representative is required.

8.2 Standards

A. CAD Standards

1. National CAD Standard, current version.

B. CAD Software

1. AutoCAD, current version
2. Microstation, current version

8.3 Guidance

A. Assumptions

1. Any CAD information that will be shared between multiple sheets, such as floor plans, should be contained in a separate CAD file. For AutoCAD the file would be an XREF.
2. All disciplines shall use the same title block for all drawings submitted for the same project. For AutoCAD, create the title block as an X-ref.

B. Other Design Tools

1. Isometric and perspective views may be used to supplement and explain the design.
2. Models and renderings may be used to supplement and explain the drawings.

C. Quality of Drawings

1. These documents shall convey to all participants the graphic information necessary for the required work. It is essential that the documents be accurate and explicit.
2. All elements of the Contract Documents shall be properly coordinated to minimize conflicts between drawings and specifications.
3. Include the extent, size shape and generic types of materials, and the relationship to other materials.
4. Avoid duplication of items in Contract Documents. If items are duplicated, the A/E and Subconsultants shall carefully coordinate to prevent conflicts.

5. List all drawings in the index, including the cover sheet as the first sheet of the set.

D. Project CD: A/E shall prepare Project CD that establishes the project setup for the other members of the A/E Team. Distribute Project CD at the kickoff meeting to all members of the project team. Include:

1. Title Block
2. Common CAD Layers
3. Common Fonts
4. Model Files, such as floor plans
5. Sheet files including title block information that varies with each sheet.
6. Initial sheet index

8.4 CAD Layer Guidelines - Supplemental Requirements

A. Layer Name: Use Mandatory Level 1 Discipline Designator, Mandatory Major Group, Optional Minor Group.

B. Identify user-defined layers using standard alphanumeric format.

8.5 Uniform Drawing Standards - Supplemental Requirements

A. Drawing Set Organization

1. Reference the border/title block and model files into a sheet file.

2. Include a "ready-to-plot" sheet tab for both full size plotting and reduced size plotting.

3. File Naming Convention: DFCM's preference is to use two character discipline designators. One character discipline designators may be used for sheets that apply to all the drawings in a discipline or if the project is small. For small projects, the use of one character discipline designators must be approved by DFCM's Designated Representative for the project.

B. Sheet Organization

1. Use a common sheet size for all sheets for a specific project to facilitate filing hard copy documents, plotting capabilities, and to maintain a consistency for Facility Management users. Use Architectural Standard "D size" (24" X 36") or "F size" (30" X 42").

2. Obtain written approval, prior to submitting sheets that vary from this standard, from the DFCM's Designated Representative. Request shall be in writing and include a justification for the variance.

3. Sheet Margins:

Sheet Margins	
Top and Bottom Margin	½”
Left Margin	1-1/2”
Right Margin	¾”

C. Schedules: Comply with National Cad Standards Module 03.

D. Drafting Conventions: Comply with Drafting Conventions Module 04

1. AutoCAD users should choose either the architectural (feet and inches) or engineering (feet and tenths).

2. Global Origin: The origin of a drawing file is important because it serves as the point of reference from which all other elements are located. Origins are typical defined (located) in a drawing file by the Cartesian coordinate system of x, y, and z or for AutoCAD users 0, 0, 0.

3. Title Block: For DFCM projects the title block area will be placed on each sheet in the NCS horizontal text format with the title block placed in the right hand margin of the border sheet. DFCM requires additional information in the standard blocks of the NCS format using a horizontal layout. Utilize the DFCM provided cover sheet template.

4. All revisions to the Contract Documents shall be accomplished using the delta symbol placed adjacent to the revised element with the most current revision number. The portion revised shall be clouded on the drawings encompassing the delta symbol. Only the current revisions shall have the clouded area depicted. Previous revision delta symbols shall remain, but the clouded line shall be erased or frozen. If an entire drawing is revised or a new drawing is added to the set, place the revision delta in the issue block. Include revision block with change order numbers, dates and descriptions.

5. Text/Fonts: For drawing content, use standard fonts provided with the CAD software. If specialty fonts are used in the title block, provide specialty font to DFCM.

6. Scale: Scale shall be expressed both numerically and graphically. For building project plans, use 1/8” or ¼” scale, unless approved otherwise by DFCM’s Designated Representative. Large scale views may use standard scales larger than ¼”. For Site plans, use 1/1, 1/10, 1/20, 1/30, 1/40, 1/50, 1/60, or 1/100 scale, unless approved otherwise by DFCM’s Designated Representative.

7. Sheet Types: Comply with the requirements of the sheet types section of this module. Comply with the descriptions of requirements for plans generated by each discipline.

E. Terms and Abbreviations: Comply with Terms and Abbreviations National Cad Standards Module 05.

F. Symbols: Comply with the Symbols Module 06. Standard symbols ensure clear and concise communication.

1. Exception No. 1: Lighting fixture symbols may be added to the symbol list which more graphically describe the lighting fixture, if identified on the symbol schedule.

2. Exception No. 2: Fire alarm symbols that comply with NFPA 170 are preferred.

G. Notations: Comply with Module 07.

H. Code Conventions. Provide the code information as required in the design process and in the DFCM cover sheet templates.

DESIGN REQUIREMENTS

February 06, 2008

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PREFACE

In order for the Division of Facilities Construction and Management (DFCM) to be one of the nation's premier facility managers, it is essential that we consistently improve our performance. In order to do this, the Design Requirements provides a document and review process for consistently improving our processes and standards.

Updates to this standard will be added with highlighted backgrounds and dated at time of occurrence, until such time that a new version may be adopted for use. (02/06/2008)

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1.0 GENERAL

1.1 General

A. These Design Requirements apply to all plans, processes, and procedures required for compliance with the Design Process.

1.2 Procedure

A. Complete the Design Requirement/Variance Form to make recommendations for additions, deletions, and changes to the Design Requirements.

B. Complete the Design Requirement/Variance Form to request approval by the Director to vary from these Design Requirements based upon the specific project needs.

C. All Design Requirement modifications require approval by the Director.

(1) If the Design Requirement is approved by the Director, then the DFCM's Designated Representative shall distribute the Design Requirements Procedure document to the appropriate project participants and shall file it in the project file.

(2) If the Design Requirement is approved by the Director and has general applicability to other projects, the Director shall arrange for the Design Requirement modification to be added to the appropriate document.

a. Verify with the DFCM person responsible for the specific professional discipline and the appropriate DFCM maintenance person that the proposed Design Requirement meets their requirements.

1.3 Hierarchy of Requirements

A. The hierarchy of requirements is as follows:

(1) Comply with the minimum requirements of all applicable laws, rules, and regulatory requirements.

a. Exceptions: Wherever there are practical difficulties involved in carrying out these provisions, the State Building Official with the approval of the Director of DFCM and/or the State Fire Marshall shall have authority to grant modifications. The modifications granted by the State Building Official shall be documented in this standard under the heading "Design Requirements."

(2) Comply with the consensus based ANSI standards for design, products, installation, and services unless the applicable laws, rules, and regulatory requirements are more stringent.

(3) Comply with the "Performance Requirements: Design Requirements" unless the ANSI standards or the applicable laws, rules, and regulatory requirements are more stringent.

(4) Comply with the Contract Documents, unless the "Performance Requirements: Design Requirements", the ANSI standards, or the applicable laws, rules, and regulatory requirements are more stringent.

1.4 Changes and Additions to Design Requirements

(1) Complete the following document and submit it to the person to whom you are responsible to for ultimate decision by the Director, for requested changes/additions to the Design Requirements.

Design Requirement/Variance Change Request

Project Name	**Date**
	DFCM Project Number
	Risk Management Number
Requested by	**Entity**
Brief Description of the Problem	
Design Requirements	
Justification	
Director Approval	**Date**
Action to Include This Design Requirements in the Design Requirements	
Professional Reviewer	**Position**
Maintenance Reviewer	**Position**
Director Approval	**Date**

2.0 CODES / LAWS/ RULES AND REGULATORY REQUIREMENTS

2.1 General

A. Comply with adopted State Codes and all other applicable Standards and Codes at the time submitted to the State Building Official, including but not limited to Section 2.2 through Section 2.10:

2.2 DFCM requirements include (but are not limited to):

A. Administrative Services: Comply with Title R23: Administrative Services, Facilities Construction and Management. Refer to http://www.rules.utah.gov/publicat/code/r023/r023.htm.

B. DFCM Services: Comply with Services requirements. Refer to http://dfcm.utah.gov. Services requirements include:

(1) Inspections and Testing, refer to http://dfcm.utah.gov/bldg_official.php.

(2) Standards and Standard Project Documents, refer to http://dfcm.utah.gov/standard_docs.php.

(3) Roofing, Paving, and Hazardous Materials, refer to http://dfcm.utah.gov/const_roofing.php.

(4) Other requirements which may be added after this document is published.

2.3 Building Code Commission

A. Comply with Utah Uniform Building Standards Act. Refer to http://www.dopl.utah.gov/licensing/statutes_and_rules/R156-56.pdf. Enforcement of these codes is the responsibility of the State Building Official.

2.4 Fire Prevention Board

A. Comply with Fire Codes in accordance with "Laws, Rules" of the State Fire Marshall. Refer to http://firemarshal.utah.gov/Laws_Rules/laws_rules.html. Enforcement of these codes is the responsibility of the Utah Fire Marshall.

2.5 Accessibility Code

A. Comply with the US Department of Justice Federal Registers – Americans with Disabilities Act. Refer to http://www.usdoj.gov/crt/ada/adahom1.htm.

2.6 Labor-Industrial Commission

A. Comply with requirements of the Labor-Industrial Commission. Refer to http://www.labor.state.ut.us.

(1) Boiler and Pressure Vessel Compliance Manual, Refer to http://laborcommission.utah.gov/Safety_Division/BLRCompManRev8-306.pdf.

(2) Utah Occupational Safety and Health, refer to http://www.rules.utah.gov/publicat/code/r614/r614.htm.

(3) Elevator Rules: American National Standard Safety Code for Elevators and Escalators, ANSI/ASME A17.1 with amendments administered by Labor-Industrial Commission of Utah, Department of Occupational Safety and Health Elevator Division. Refer to http://www.rules.utah.gov/publicat/code/r616/r616-003.htm.

2.7 Department of Health

A. Comply with requirements of Department of Health. Refer to http://www.health.utah.gov.

(1) Health Care Rules, refer to http://health.utah.gov/hflcra.

(2) Utah Indoor Clean Air Act, refer to http://www.tobaccofreeutah.org/r392-510.htm.

2.8 Department of Environmental Quality

A. Comply with requirements of Department of Environmental Quality. Refer to http://www.deq.utah.gov.

(1) Public Drinking Water Rules, refer to http://drinkingwater.utah.gov/rules.htm.

(2) Utah Division of Air Quality: R307-801, Asbestos, refer to http://airquality.utah.gov/HAPS/ASBESTOS/rules/newrules.pdf; Environmental Protection Agency (EPA): Regulations for Asbestos – Code of Federal Regulations Title 40, Part 61 Subpart M; and Toxic Substances Control Act PART 763 (Updated 1997) – ASBESTOS: OSHA Standards 1910.1001, 1915.1001, and 1926.1101

(3) Underground Storage Tank Act, refer to http://www.undergroundtanks.utah.gov/.

(4) Air Conservation Act, refer to http://www.rules.utah.gov/publicat/code/r307/r307-008.htm.

(5) Fugitive Dust Plan, Refer to http://www.rules.utah.gov/publicat/code/r307/r307-309.htm.

(6) Utah Pollutant Discharge Elimination System, Refer to http://www.rules.utah.gov/publicat/code/r317/r317.htm.

(7) Operating Permits of the Division of Air Quality, refer to http://www.rules.utah.gov/publicat/code/r307/r307-415.htm.

2.9 County Health Department (for the county where the facility is located)

A. Food Service Sanitation Rules

2.10 Department of Commerce

A. Pipeline Safety, refer http://www.rules.utah.gov/publicat/code/r746/r746-409.htm.

B. Qualifications: Refer to the Project Participants heading of this document.

3.0 DFCM REQUIREMENTS

These requirements are enhancements of code requirements that DFCM has initiated for best practices for State owned facilities.

3.1 General

A. Distributed Live Loads

(1) Modify IBC Table 1607.1 "Minimum Uniformly Distributed Live Loads and Minimum Concentrated Live Loads" by the following:

a. Increase the Uniformly Distributed Live Loads to 80 psf for: Office use in Access floor systems; Operating room, laboratories, private rooms, wards in Hospitals; Reading rooms in Libraries; Offices in Office buildings; Classrooms in schools.

b. Increase the Minimum Concentrated Live Loads to 2500 lbs for: Office use and Computer use for Access floor systems; Operating rooms, laboratories, corridors above the first floor for Hospitals; Reading rooms, Stack rooms, Corridors above first floor in Libraries; Lobbies and first-floor corridors, offices, corridors above first floor in Office Buildings; Classrooms, Corridors above first floor, First floor corridors in Schools.

B. Enhanced Accessibility

(1) "It is the policy of the Utah State Building Board that, when appropriate for the intended use of the building and achievable within the project budget, the following accessibility enhancements beyond those required by the Americans with Disabilities Act be provided for in state owned buildings and buildings leased by DFCM: (1) powered door openers for the primary entrance designated for use by people with disabilities, and (2) powered door openers for one uni-sex restroom or for one male and one female restroom in the building unless restrooms with a door-less entry are provided. This policy is not intended to limit the use of powered door openers to the standard set forth herein. This policy applies to the construction or major renovation of state-owned facilities and new leases where the entire building is being leased by DFCM. This policy is not intended to create any rights to any third parties.

(2) Determinations that one or both of these enhancements are not appropriate for the intended use of the building or not possible within the project or lease budget shall be made by the Director or his designee. Determinations of whether this enhancement to accessibility is appropriate should consider the potential of access by people with disabilities. The Director may determine that powered door openers are appropriate for the primary entrance while not warranted or not possible within the budget for access to restrooms. The Director may also determine that one or both of these enhancements are not feasible in (a) the renovation of an existing

building due to its design or configuration or (b) in a leased facility due to the nature and circumstances of the lease."

C. Energy Efficient Products:

(1) Select, where life-cycle cost-effective, products that are in the upper 25 percent range of the energy efficiency rating. Energy efficient products include:

a. Heating and cooling equipment;

b. Motors;

c. Lighting fixtures, compact fluorescent light bulbs, exit signs;

d. Windows, doors and skylights;

e. Roof products;

f. Food service equipment;

g. Transformers;

h. Office equipment;

i. Electronics; and

j. Appliances.

(2) Exceptions:

a. Energy efficient products that have been stipulated as life-cycle cost-effective by DFCM.

b. ENERGY STAR® products that are certified and labeled through the US Environmental Protection Agency.

c. Energy Efficient Products listed items on General Service Administration, GSA Advantage website. "Energy Efficient Products" mean items that meet Federal Energy Management Program (FEMP) energy efficiency levels as required by the Federal Acquisition Regulation (FAR) Subpart 23.203, Executive Order 13123, and Executive Order 13221.

D. Energy Design Standards:

(1) Buildings except Low-Rise Residential Buildings. Design facilities according to the applicable ANSI/ASHRAE/IESNA Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, (Standard 90.1) at the time submitted to the State Building Official for mandatory

requirements and either the prescriptive, simplified, or energy-cost-budget methods:

a. Building Envelope Prescriptive Method. Design an integrated system of building envelope components to reduce the envelope performance factor by 10 percent or more to what is required by Standard 90.1. Submit the Envelope Compliance Certificate declaring the building envelope meets Standard 90.1 requirements using DOE Comcheck software or Appendix C of Standard 90.1. The certificate shall show the envelope is 10 percent better than Code.

b. Interior Lighting System Prescriptive Method. Design the interior lighting system to reduce the interior lighting power density by 10 percent or more to what is required by Standard 90.1 using either the whole-building or space-by-space methods of Standard 90.1. Submit the Lighting and Power Certificate declaring the lighting and power system meet Standard 90.1 requirements using DOE Comcheck software. The certificate shall show the lighting power is 10 percent better than Code.

c. Mechanical Systems Simplified Method. Design the HVAC system type to meet Standard 90.1 requirements. Submit the Mechanical Certificate declaring the mechanical systems meet Standard 90.1 requirements using DOE Comcheck software.

d. Energy-Cost-Budget Method (Optional). Design the building to save 20 percent or more of the annual energy cost using the energy-cost-budget method. The energy-cost-budget method is an optional method to the prescriptive or simplified methods. Submit the Energy-Cost-Budget report from the Standard 90.1 User Manual. The form shall show annual energy cost is 20 percent better than Code.

(2) Low-Rise Residential Buildings. Design facilities according to International Energy Conservation Code for mandatory requirements and either the component or system analysis methods:

a. Building Envelope. Design the building envelope to meet the envelope performance factor by 10 percent or more using the building envelope component performance approach. Submit the Envelope Compliance Certificate declaring the building envelope meets IECC requirements using DOE Rescheck software. The certificate shall show the envelope is 10 percent or more than Code.

b. System Analysis (Optional). Design the building to save 20 percent or more of the annual energy use according to system analysis method.

(3) Industrial, Laboratory, Research, and Other Energy-Intensive Facilities. Design industrial, laboratory, research, and other energy-intensive facilities or processes to reduce energy use by 10 percent or more over standard practice.

E. Hazardous Materials

(1) DFCM shall procure a qualified abatement consultant during the Schematic Design phase of the Design stage. The abatement consultant shall survey all renovation and demolition projects for hazardous materials such as asbestos-containing building materials, lead-based paint, mold, universal wastes such as PCBs, CFCs, mercury, household/janitorial cleaning products, identified/unidentified containers of chemicals or products, or any other materials or waste that may be environmentally unsafe.

(2) Prior to the start of a survey by the abatement consultant, the A/E shall provide drawings at the design development phase of the design stage to the abatement consultant with sufficient information to define the building or facility areas affected by the renovation or demolition. The abatement consultant shall coordinate abatement documents with the updated Contract Documents prior to final preparation. The abatement consultant shall prepare a complying and comprehensive hazardous materials survey report identifying and quantifying all hazardous and non-hazardous building materials to include asbestos-containing building materials, lead-based paint, mold and universal wastes that affect the areas of renovation or demolition.

(3) DFCM shall procure a qualified abatement contractor to remove all hazardous materials prior to the beginning of any building demolition or renovation.

F. Vibration

(1) Design structure in accordance with the following minimum requirements for vibration:

Space Category	Vibration Sensitivity
Laboratories with equipment sensitive to vibration	Comply with manufacturer's requirements for vibration.
Offices, classrooms, and other similar spaces.	There are no vibrations from machines or traffic which are detectable by people.
Common Area spaces.	There is occasional movement in the floor when heavy equipment are moved nearby.
Storage spaces.	There is obvious and annoying movement when people walk by or equipment is being moved nearby.

G. Utah Space Standards

(1) Comply with the "Utah Space Standards," August 1994. Refer to http://www.dfcm.state.ut.us/downloads/3pubs/1994_08_space_standards.pdf.

H. Infrastructure Flexibility

(1) Interior Shear Walls: Minimize interior shear walls, bearing walls and braced frames which may disrupt future additions or modifications to the facility.

(2) Spare Mechanical Space: Provide 25% spare space in pipe chases and for mechanical equipment (except air handlers).

(3) Main Electrical Room: Locate main electrical room close to transformer and near the center of the load (which is usually located near where central mechanical equipment is located). Locate panelboards in satellite electrical rooms dedicated for electrical equipment and which stack vertically in the facility.

(4) Spare Electrical Capacity: Provide 25% future space for additional overcurrent protection devices in panelboards and switchboards. Provide 25% additional load capacity in addition to the capacity required for continuous loads in panelboards and switchboards.

(5) Communication Rooms: Locate communications rooms so they stack vertically and comply with TIA/EIA standards.

(6) Spare Communication System Capacities: Provide 100% future space (this is not necessarily horizontal space, but may be vertical space in racks for future equipment) for cabling, data, and communications electronic equipment.

(7) Equipment Access: In new facilities, provide access for replacement of equipment which does not require demolition.

(8) Storage Space: Provide a minimum 6' X 6' space for storage of janitorial supplies or .2% of the gross square footage, whichever is greater.

I. Standard Building Plaque

(1) For development projects, provide a design for a building plaque to be mounted on a prominent wall near the entrance to the building in compliance with the DFCM plaque standard. Refer to http://dfcm.utah.gov/downloads/plaque_policy.pdf . (02/06/2008)

3.2 Civil

A. Paving

(1) Use untreated base course under all curbs and gutters. Use untreated base course material under all sidewalks exterior flatwork and paved areas.

(2) Untreated base course under asphalt paving: Asphalt - 8" minimum compacted base (96%)

(3) Concrete – curbs, gutters, sidewalks, exterior flatwork – Minimum 6" compacted base (96%) or minimum 4-3/4" crushed gravel.

Untreated Base Course	
Size	**% by Weight Paving Sieve**
1"	100
½"	70 to 100
#4	41 to 68
#16	21 to 41
#50	10 to 27
#200	4 to 13

(4) Surface course (asphalt) aggregate:

Surface Course (asphalt)	
Size	**% by Weight Paving Sieve**
½%	100
3/8"	70 to 100
#4	50 to 78
#16	30 to 48
#50	18 to 31
#200	7 to 13

(5) Base course (lower lift) can be ¾" asphalt if placed in more than 1 lift.

(6) Construct asphalt paving only when atmospheric temperature is above 50 degree F and underlying base is from moisture. Permit no vehicular traffic for at least 24 hours after laying asphalt pavements.

(7) Striping paint: State of Utah #780. Spread at the rate of 103-113 sf/gal. Minimum thickness shall be 7 dry mil.

(8) Tack coat all adjoining materials, i.e. previously constructed asphalt, concrete, etc. except untreated base course.

(9) Surface smoothness: variation in the finished surface must not exceed 1/8" in 10 ft. in any direction.

(10) Asphalt shall comply with Marshall Design with voids 1.5% to 3.0%

(11) Drainage: Slope all asphalt concrete paving surfaces for positive drainage a minimum of 1.5% and preferable 2%.

(12) Minimum thickness for parking areas: 3". Minimum thickness for road areas and truck traffic is 3" including dumpster access.

(13) Maximum thickness for lifts: 3"

3.3 Architectural

A. Suspended Ceiling Systems

(1) Brief Description of the Problem. In as much as the IBC requires that suspended ceiling comply with the requirements of section 9.6.2.6 of ASCE 7 for installation in high seismic areas, the code section has 3 requirements which have been problematic in application:

a. The width of the perimeter supporting closure angle must be not less than 2 inches and the grid must have a ¾" clearance from the wall. This requirement has created an aesthetic nightmare for architects and contractors since the 2" angle brings out all irregularities on the plane of the wall and requires increased inspection time to ensure a ¾" clearance.

b. Except where rigid braces are used to limit lateral deflection, sprinkler heads and other penetrations shall have a 2 inch oversize ring, sleeve, or adapter through the ceiling tile to allow for free movement of at least one inch in all horizontal directions. Alternately, a swing joint is permitted to accomplish the same movement. The issues with this requirement is that the Fire Marshall and the fire protection community will not approve any oversize rings, sleeves or adapters which are not listed for this use and currently there are not listed systems on the market. The use of the swing joint is not defined in the code and no one has been able to establish how many joints are necessary to accomplish the horizontal movement of one inch in all directions.

c. Special inspection is required for suspended ceilings. This requirement is once again a problem since the ICC does not have a certification system for a ceiling inspector and we end up using a regular code inspector.

(2) IBC section 104.11 allows the Building Official to approve alternate designs or methods of construction which he feels are equivalent or meet the intent of the current code. Uniform Building code Standard 25-2 for metal suspension systems for acoustical tile and for lay-in panel ceilings that can be found in the 1997 edition of the UBC is an equivalent standard that has been used in the codes for many years. This standard offers protection in all the seismic areas in the state and does eliminate all three of the issues identified above.

(3) The State of Utah will allow the use of the 1997 UBC Standard 25-2 as an alternate means for the installation of suspended ceilings. This standard should remain available until all the issues identified above have been addressed by ICC and the listed materials are available in the market place. The designers may still use the current code requirements found in the 2003 IBC if they can show that they have met the intent of the current code.

B. Daylight and Outside Views

(1) Daylight and outside views are desirable for all occupied spaces. The needs of some occupied spaces may require special consideration for light control.

C. New Roofing Requirements

(1) Comply with Contractor Roofing Warranty: Include DFCM requirements. Refer to http://dfcm.utah.gov/downloads/Roofing/Contractor%20Roofing%20Warranty%20(final).pdf.

(2) Comply with Guaranty for Bituminous Roofing: Include DFCM requirements. Refer to http://dfcm.utah.gov/downloads/Roofing/Warranty%20for%20Bituminous%20Roofing%20(final).pdf.

(3) Comply with Guaranty for Single-Ply Roofing: Include DFCM requirements. Refer to http://dfcm.utah.gov/downloads/Roofing/Warranty%20for%20Single%20Ply%20Roofing%20(final).pdf.

(4) Comply with the list of DFCM approved manufacturers and approved installers.

(5) Where manufacturer's standards show one or more possible approach for compliance to the standard, provide their most stringent approach.

(6) Eliminate conflict between roof penetrations (i.e. vents, exhausts) and roof crickets, flashing, and valleys. Consider relocating penetrations to less visible areas. Provide 18" access for replacing roofing components.

(7) In new facilities, build slope into roof structure in lieu of built-up insulation to solve roof drainage issues.

(8) Minimum slope for all roofing and waterproofing systems shall be a ¼" per foot along the longest drainage path.

(9) Do not provide the following components, unless approved by the Director: Other Roofing Components: ballasted roofs.

(10) All roofing systems and components should meet or exceed all ASTM, UL and FM requirements.

(11) Minimum 60 mil thickness required for all single ply roofs.

(12) Minimum 4-ply, type VI felts with type III asphalt for all built-up roofs.

(13) All metal associated with the roof should be color clad, use standing seam joints where possible. Follow SMACNA guidelines for all metal work.

(14) Provide reasonable access to all roof levels for maintenance personnel.

(15) Steep slope roofing should be designed as directed by the DCM Program Manager.

(16) Comply with all other minimum standards as published by the DFCM roofing group.

D. Replacement Roofing Requirements

(1) Comply with Design Requirements Record Roofing Requirements.

(2) Existing Roof System Components: For existing roofs, evaluate the feasibility of using existing insulation, sheet metal and other existing roof system components if they are in like new condition and will not have a deleterious effect on the new roof system.

(3) Roof Slope: Each existing facility project shall be evaluated to determine existing roof slope and if additional slope is required to eliminate ponding.

(4) Roof Diaphragm: Evaluate the existing roof to determine whether the diaphragm needs to be upgraded to meet current seismic requirements. Report shall include: 1) Existing conditions related to current requirements; 2) Recommendations for upgrading the diaphragm relative to an upgrade of the facility; 3) Estimated costs for upgrading the diaphragm.

(5) Roof Load Evaluation: Evaluate the existing roof deck structure to determine the existing dead and live load capacity. The weight of the entire roof system shall not exceed an amount that would reduce the live load capacity of the roof structure below the current requirements. Report shall include: The existing conditions relative to current requirements; 2) Recommendations for upgrading the load capacity, relative to an upgrade of the facility; 3) Estimated costs for upgrading the structure.

(6) Vapor Retarder: Determine the need for vapor retarder based on dew point calculations, facility use, and existing facility and roofing system conditions.

E. Waterproofing and Sealants

(1) Warranty: For sealant systems, guarantee both labor and materials for a minimum of two years. For waterproofing project, guarantee both labor and materials for a minimum five years.

(2) Qualifications: For Dampproofing and Waterproofing, select products that have performed successfully for a minimum 15 years and select manufacturers that have been producing materials for 15 years.

F. Acoustical Quality

(1) When possible, design spaces in accordance with following minimum requirements for "Privacy."

Privacy	
Space Category	**Measured NIC Rating**
Confidential with high voice levels	58-60+
Confidential with slightly raised voice levels	52-58
Confidential with normal voice levels	50-52
Confidential with lowered voice levels	45-50

(2) Design spaces in accordance with the following minimum requirements for "Ambient Background Noise.

Ambient Background Noise	
Space Category	**Measured NC Rating**
Critical Performing Spaces	<20
Performing Spaces, Courtrooms, Executive Offices	20-30
Sleeping, testing, or relaxing spaces	25-35
Private offices, small conference rooms, classrooms, libraries	30 -35
Open offices, reception areas, cafeterias, gymnasiums	35-40
Lobbies, laboratories, maintenance shops	40 -45
Kitchens, industrial shops, equipment rooms	45-55

G. Guardrails

(1) Comply with code requirements for opening size but orient the members so that a ladder effect does not occur.

3.4 Structural

A. Concrete

(1) Warranty: Provide additional two-year written guarantee commencing on the date of substantial completion to promptly remove and/or repair defective concrete (pitting, spalling, cracking, honeycombing, etc.).

(2) Concrete Strengths & Testing: Provide minimum compressive strength measured at 28 days of 3000 psi for foundations, stem walls, piers, miscellaneous interior walls, etc., and 4000 psi minimum for all exterior flatwork, ramps, curbs, gutters catch basins, concrete pavements, interior floor slabs, elevated slabs, shear walls and columns. DFCM allows shear wall and columns to be specified in excess of 4000 psi. Specify pre-cast concrete with a minimum strength of 5000 psi.

(3) Cement Types: Comply with the recommendations of the Geotechnical report. DFCM requires one of these types: Type I or Type II (both low alkali) and Type V. In southern Utah, usually select Type V. In other parts of the state select Type I or Type II (low alkali).

(4) Concrete Mix: Provide low alkali cement for all concrete in direct contact with earth. Specify water/cement rations in accordance with ACI 318. Specify number of bags of cement per/yard in accordance with C150. Provide admixtures complying with the requirements of ASTM C260 for air entrained concrete. Do not use "IA", "IIA", etc. For frost resistant concrete, the following minimum air contents are required for concrete in direct contact with soils or exposed to severe salting: for ¾" maximum aggregate size per C33, provide air content per ASTM C260 of 6-1/2%+ 1-1/2%; for 1", provide 6%+ 1-1/2%; for 1-1/2", provide 5-1/2"+1%. Water cement ratios shall be limited to 0.50. (excluding grout mixes) The slump of all concrete shall be limited to 4" unless plasticizers are used. A maximum of 10% fly ash is allowed.

(5) Testing: DFCM shall pay for testing, unless other procedures are specified. The frequency and minimum numbers of test cylinders shall be as outlined in the IBC, however at least three test cylinders must be taken from each pour related to a structural member. The intent is to not to do testing on concrete for items such as curb, gutter, sidewalk, mow strips, light pole bases, etc.

(6) Reinforcement: Reinforce all concrete with conventional rebar or welded wire fabric. Slabs on grade supporting less than 400 psf uniform loads and no rack loads may be un-reinforced. The sub-base for all un-reinforced slabs must be uniformly compacted with on-site observation and per requirements specified in the project specifications.

3.5 Mechanical

A. Controllability of Systems

(1) Maintaining space comfort temperature is an important consideration in the design of the mechanical system along with the proper ventilation within each space. This is accomplished best by the proper zoning of the space with regards to the mechanical system installed and the ability to control the temperature within each zone. The zoning for control of the space temperature shall be such that corner spaces having multiple exposures, office spaces for directors, managers, or other such individuals, and conference rooms larger than 200 square feet, shall have individual space control. Other multiple spaces shall be zoned with these spaces of like size, occupancy, and exposures are one zone and do not exceed more than four spaces per zone. Open spaces, such as open offices, shall not exceed one zone per every 750 square feet. Individual classroom spaces may be zone as a single zone even if the space exceeds 750 square feet with consideration for noise and air distribution (some large classroom spaces may need more than one zone for temperature control). Laboratory space zoning will be matched to the exhaust requirements for the labs and size of the laboratory space.

B. Indoor Air Quality

(1) Comply with ASHRAE 62.1-2004 and all approved addenda for Indoor Air Quality performance.

(2) Comply with the carbon dioxide differentials for all types of occupancy are accordance with ASHRAE 62-2001, Appendix D.

C. Plumbing General Requirements

(1) Insulation: Completely insulate the following systems: all domestic cold water piping above ceiling; all domestic hot water piping and recirculation lines; roof drain and overflow piping including horizontal piping above ceilings, vertical piping below roof drain bowl, and roof drain bowls. Provide protective covering for exposed insulation in areas subjected to damage.

(2) Exterior piping insulation: Cover all insulation with aluminum jackets secured with aluminum bands 12 inches o.c. Seal joints watertight.

(3) Main plumbing connections: Locate main water, and sewer connections and mechanical rooms on the same side of site as service, preferably close to maximum demand points such as core toilet stack, kitchens, boiler room, and fire protection systems.

(4) Piping installation: Install piping overhead wherever possible. Avoid installing piping below or in concrete slab floors. Install piping on warm side of building insulation. Provide water-tight sleeve and caulking around pipe for all piping passing through floors.

(5) Exposed pipe: comply with ASTM 53.

(6) Underground pipe: comply with ASTM A106.

(7) Roof drains: provide minimum 3 inch roof drains.

(8) Equipment Pads: Provide minimum 4” high concrete bases for all pumps, air compressors, boilers, chillers, and other equipment.

(9) Valves: Install valves with bonnets at least 45 degrees above the horizontal to ensure debris does not collect in bonnet.

D. Water System

(1) Municipal Water Meter: Each facility shall have a compound water meter installed in the water line serving the facility in accordance with local water authority.

(2) Campus Water Meters. Install meter in the main mechanical room or within easy access of mechanical spaces. If conditions do not permit inside installation, provide meter box outside. Where fire sprinklers are

installed, the fire main shall be connected ahead of the meter. Where outside meters are used, the meter box shall be 52" x 81" x 71" high with a concrete base under the meter, but the rest of the floor shall be gravel. Top shall have recessed eyes. Top to be poured separate so it can be moved off with a crane and the eyes shall be left large enough to insert a chain by which can be lifted. Cover to have a 24 inch locking meter lid in center. Position meter so it can be read without personnel entering the vault. Water meter indicator shall be the totalize type reading directly in gallons of water. Water meter shall be installed with valves on both sides so meter can be removed and a bypass line installed. Sleeve around pipes passing through walls of meter box.

(3) Domestic Water Pressure shall be maintained at a reasonable operating pressure, i.e., 50 – 80 psig.

(4) Valves: Provide valves near the main with a union for all branch lines of water which supply more than one outlet or unit so areas of the building may be shut down for repair without having to shut down large areas. Provide isolation valves as necessary and provide, as a minimum, valves for each toilet group outside of the toilet room, each floor, and each branch line that is 2" or greater Provide a shutoff valve on all water supply lines on the room side of the fixture. Valves shall have a gasket seat, not a ground joint. Supply lines from the valve shall be 3/8" brass, chrome plated. Provide chases or access panels to access valves. In lieu of oversized globe valves, ball valves with full opening ports and adequate pressure and temperature rating may be provided up to two inches in size. For valves greater than two inches in size, butterfly valves with wheel and gear operator may be used.

(5) Water relief valves: Connect water relief valve exhaust or discharge to nearby floor drain. Provide sump in pipe tunnels at each cleanout. Provide floor drains in toilet and utility rooms.

(6) Faucets and hose bibs: Provide non-freeze type hose bibs with shut-off valves for the lines serving the hose bib located inside facility. Provide faucet with hose attachment and vacuum breaker in each restroom so floor can be washed with clean water. Provide hose bib with vacuum breaker in mechanical rooms and chiller rooms. Provide non-freeze hose bib with vacuum breaker near cooling tower. Provide hose bibs outside building for window washing, walk and area way washdown (generally not more than 150' on center).

(7) Inaccessible Water Piping: Provide Duiron cast iron pipe, PVC "Blue Brute", or copper up to 2 inches in size, for water lines under building slab or other inaccessible locations.

(8) Soil cover for outside services greater than 6000 HDD: Provide minimum cover of 48" or preferred cover of 60" for water. In no instance shall the minimum depth be less than the frost line.

(9) Soil cover for outside services less than 6000 HDD: Provide minimum cover of 36” or preferred cover of 48” for water.

E. Waste System

(1) Pipe Tunnel Sumps: Provide sump in pipe tunnels at each cleanout. Sump shall be three foot square and four feet deep with grating cover and porous walls. Floor drains may be used in lieu of sump if depth of waste line is such that drains may be tied in.

(2) Drains: Provide drains indirectly connected to building drainage system for walk-in refrigerators and other places where food is stored. Provide floor drains in toilet and utility rooms. Provide deep seal P-traps on all floor drains.

(3) Equipment Room Floor Drains: Trenches with grating covers with bottoms sloped to drain are preferred over multi-floor drains in mechanical equipment rooms and some laboratories.

(4) Water still drains: Provide Kimax glass to nearest main drain from water still drains or provide glass pipe for the first 20 feet horizontally or to the floor below. Provide cleanout at water still and at main drain line before glass is connected with soil piping

(5) Waterproofing pans: Provide membrane waterproofing pans for shower stalls and custodial floor sinks so they are 100% water tight. Provide clamping device which clamps drain to pans. Provide a mastic seal between floor drain bottom and lead or membrane so when clamping device is tightened there is a complete seal so no water can get through. Do not clog weep holes. Test pans by placing test plug in drain and filling with water overnight.

(6) Dishwasher connections: Provide indirect connection for waste on automatic dishwashing machines. Install minimum 3” drain so that it is accessible under conveyor table.

(7) Cleanouts: Provide cleanouts at base of each vertical rise, each turn in excess of 45 degrees and on straight runs every 50 feet.

(8) Horizontal Waste lines: Provide dedicated minimum 3” horizontal waste lines with adequate cleanouts for garbage disposals and dishwashers.

(9) Roof drains: Roof drain piping shall not be less than 3 inches.

(10) Flush valves: Provide screwdriver stop valves on flush valves for water closets and urinals. Provide exposed type flush valves.

F. Plumbing Fixtures and Equipment

(1) Water Heaters: Coordinate installation so that nothing will interfere with the removal of water heaters or for heating coils in heat exchangers to

allow for periodic cleaning. Provide unions for all connecting piping to facilitate the removal of piping. Provide combination temperature and pressure relief valve piped to adequate drain. Where feasible install flexible connections and tie-down straps to accommodate movement during seismic events.

(2) Toilet Room Fixtures: Provide exposed type flush valves with lever operator (no push buttons or floor operators), diaphragm type only. In restrooms subject to vandalism, provide concealed flush valves. If space and budget allows, flush valves may be concealed in other applications. Hands free sensor actuated valves are acceptable, if acceptable by the Agency. Provide fixtures manufactured by one manufacturer.

(3) Showers: Provide non-scald type shower valve with integral stops. Provide institutional type shower heads with flow adjustment and adjustable head and spray. Extend head out from wall so water does not run down wall when valve is turned off. Heads shall be vandal proof. Provide watertight shower escutcheon with weep hole in bottom.

(4) Waterproofing pans: Provide membrane or lead waterproofing pans for shower stalls and custodial floor sinks so they are 100% water tight. Provide clamping device which clamps drain to pans. Provide a mastic seal between floor drain bottom and lead or membrane so when clamping device is tightened there is a complete seal so no water can get through. Do not clog weep holes. Test pans by placing test plug in drain and filling with water overnight.

(5) Drinking Fountains: Provide refrigerated type, wall hung drinking fountains with stainless basins. Provide removable grid strainer to enable cable-style cleaning without having to dismantle the fountain.

(6) Do not specify the following components, unless approved by the Director: Toilet Room Fixtures: Tank type

G. HVAC General

(1) Heating systems: Hot water systems are the preferred heating systems. Provide air separators and expansion tanks for all hot water heating systems regardless of piping arrangement. Tie air separators into piping system on suction side of circulating pump. If campus system hot water system is turned off during the summer, provide alternate heating system for equipment requiring a heating source.

(2) HVAC: Locate mechanical rooms to take advantage of ductwork and piping proximities to major loads. Provide continuous cooling for telecommunication and main telecommunication room. Carefully coordinate the location of any exhaust or relief air with mechanical air intake systems to avoid short cycling. Provide dedicated relief air path for all systems which introduce outside air. Exfiltration through the building envelope does not comply with this requirement.

(3) Redundancy: Provide for continuous operation through redundancy and/or modularization for facilities greater than 30,000 sf or which have critical functions or critical care residents. The loss of one half or less of the design cooling or heating system for the entire facility shall be tolerated temporarily in the event of equipment failure for: heat pumps, boilers, refrigeration machinery (excluding cooling towers), and condensate pumps.

(4) Access: Provide stair access to equipment. Provide disassembly access for all valves, piping, and equipment.

(5) Water Treatment: Provide water treatment for heating water systems, chilled water systems, condenser water systems, and steam systems. Provide for one year on site service by water treatment company including supply of chemicals. Provide treated water in the heating system until facility is accepted by DFCM.

H. Air Distribution

(1) Filtration: Air handling equipment shall be fitted with filters in the medium efficiency category having and average efficiency of 25% to 35% based on MERV rating criteria. Specify that the Contractor replace all filters prior to building occupancy and provide one replacement set of filters for the entire facility. For air handlers exceeding 10,000 cfm, provide pressure differential instrumentation across the filter bank to facilitate maintenance.

(2) Ductwork Materials: Provide rectangular and round ductwork from galvanized steel, stainless steel or aluminum. Leakage requirements shall meet or exceed SMACNA standards.

(3) Volume Adjusting Devices: Provide devices that can be securely locking in place and that are accessible for adjustment after construction.

(4) Do not provide the following components, unless approved by the Director:

a. Duct Lining: lining of outside air ducts, lining of ductwork within 10 feet downstream of any device that adds moisture to the air stream, line of ductwork exposed to humid air stream above 70% RH such as swimming pool applications.

b. Ductwork: Fiberboard ductwork.

I. Piping System

(1) Design Requirements

(2) Piping Systems: Piping system shall be provided with manual air vent valves at system high points and drain valves at system low points. Suitable provisions, such as access panels, shall be furnished in building

construction to permit full access to these valves. Manual air vents shall be 3/8" globe valves with ¼" copper tubing to near floor or to locations where water may be caught in bucket. Drain valves shall be threaded for ¾" hose connections. Provide water-tight sleeve and caulking around pipe for all piping passing through floors.

(3) Pumps: Provide pressure gauge with gauge cocks as close to pump suction and discharge as possible and avoid pressure drops across valves, strainer, flexible connectors, etc. Provide suitable throttling valves on discharge side of all pumps, such as globe valves, or balancing cocks. Throttling valve shall have set point position indicator and shall not be used for shut-off valve.

(4) Exposed pipe: comply with ASTM 53.

(5) Underground pipe: comply with ASTM A106.

(6) Air Vents: Provide suitable air vents for all heat producing equipment (converters, unit heaters, coils, etc.).

(7) Valves: Provide valves near the main with a union for all branch lines of water or steam which supply more than one outlet or unit so areas of the building may be shut down for repair without having to shut down large areas. For valves 2" and larger on systems greater than 200 degrees F shall be flanged or grooved.

J. Steam

(1) Motor Operated Steam Valve: If the existing central plant serving the campus is a steam system, provide a motor operated steam valve for each new building. Coordinate location with the Agency. If equipment requires steam when the valve may be closed, connect equipment ahead of motor operated steam valve. Design for gravity flow of condensate in lieu of providing vacuum pumps. Provide tunnels, chases, access doors, or crawl spaces for accessing steam piping. Do not install underground or in split tile. Provide properly dripped steam mains. Provide drip legs ahead of all steam pressure reducing valves and steam coils to ensure clean, dry steam at the valve.

(2) Valves: Low pressure steam valves shall have a 200 psi rating and allow renewable seats and discs. For 100 psi steam line use 25 psi flanges and 300 psi screwed valves. Provide valves near the main with a union for all branch lines of steam which supply more than one outlet or unit so areas of the building may be shut down for repair without having to shut down large areas.

(3) Steam piping: For steam piping 2" and smaller, provide schedule 80 black steel. For sizes 2-1/2" or larger, provide schedule 40 black steel for low pressure steam (15 psig or less) and schedule 80 black steel for high pressure steam (higher than 15 psig). Provide low pressure steam valves

with a 200 psi rating and allow renewable seats and discs. Provide 250 psi flanges and 300 psi screwed valves for 100 psi steam lines.

(4) Condensate piping: Provide schedule 80 black steel pipe, including underground return lines.

(5) Underground steam lines: Provide Gilsulate, Ric-wil, Portage and Durrant insulated underground pipe for underground steam lines. If pre-insulated piping is used, provide separate insulated conduits for steam and condensate return piping.

(6) Expansion Provisions: Provide expansion loops, swing joints, offsets, etc., for expansion of piping. Do not use expansion joints except when expansion loops, offsets, swing joints, etc., are possible due to space constraints. If expansion joints are provided, provide adequate internal or external guides that are properly supported anchored. Do not provide swing joints on main runs; however, swing joints may be installed on risers off the main.

(7) Pressure reducing stations: Provide pilot-operated valve for pressure reducing stations. Provide a three-valve by-pass at all reducing stations with ample clearance to permit normal maintenance and inspection. Recommend parallel pressure reducing stations when low demand is expected. Provide safety relief valves on the low pressure side of regulator stations. Provide discharge piping to facility exterior in a safe location. For pipes discharging near grade, install pipes into an eight inch concrete tie set upright in the ground (buried) over a gravel base twelve inches deep. Provide pressure gauges on both the high pressure and low pressure sides of all regulator stations. Locate gauges so they will function when bypass is used.

(8) Steam Meter: Provide totalizing type meter which reads directly in pounds of steam.

(9) Miscellaneous Requirements: Provide eccentric reducers when steam piping changes pipe sizes. Provide water-tight sleeve and caulking around pipe for all piping passing through floors.

K. Natural Gas

(1) Seismic gas shut off valve: Provide a seismic gas shut off valve installed per manufacturer's instructions for each natural gas system.

(2) Natural Gas Piping: Weld all concealed natural gas piping if larger than 4". Where feasible install flexible connections and tie-down straps to accommodate movement during seismic events.

(3) Soil cover for outside services greater than 6000 HDD: Provide minimum cover of 24" or preferred cover of 36" for gas.

(4) Soil cover for outside services less than 6000 HDD: Provide minimum cover of 24” or preferred cover of 36” for gas.

L. HVAC Equipment

(1) Boilers: Provide boiler backup by redundancy or modularization. If a power burner is specified, the A/E shall determine the maximum allowable length of positive pressure flue.

(2) Unit Heaters: If a unit heater is higher than 10’ AFF, a centrifugal blower shall be provided and not a propeller fan. Provide all gas or oil unit heater with a 2-stage thermostat. On call for heat, the stage cycles the fan. The second stage fires the burner. For shop applications with heavy duty or corrosive atmospheres, provide sealed combustion units that bring combustion air from outside the space.

(3) Water Chillers: Specify appropriate ARI Standards and certification.

(4) Cooling Towers: Specify certification by the Cooling Technology Institute.

(5) Converters: Provide side inlets and side outlets for all converters. Provide pressure gauges with snubbers on the primary and secondary side of each converter. Install thermometers on the inlet and outlet of the secondary side of each converter.

(6) Do not provide the following components, unless approved by the Director: HVAC Equipment: electric resistance heat, furnaces.

M. Integrated Automation

(1) Direct Digital Control: Provide direct digital control in all facilities, except where operations personnel require pneumatic control as an extension of an existing system. Provide digital metering of electrical, hot water, steam, and chilled water sources to each facility. Provide flow metering devices hot water heating systems. Provide straightforward DDC control systems. Avoid locating thermostats on outside walls or on partitions between offices. For perimeter radiant systems, provide Hydronic piping subcircuits to match the cooling zones.

(2) Control valves: Provide visual position indicators. Provide control valves with stem in the vertical position. If possible, provide packless valves. Do not provide “self-contained” valves.

(3) Dampers: Provide low leakage design of felt or neoprene edges for fresh air and exhaust air dampers. Provide opposed blade type modulating dampers with maximum blade width of eight inches. Provide fresh air dampers that close in fan shutdown or power failure. Provide steel trunnions mounted in bronze sleeve bearing or ball bearings for damper blades. Do not exceed 48 inches in length between damper bearings. Provide dampers that close substantially tight and provide substantially the

full area of the opening when open. Provide substantial bar or channel frames for dampers. For rectangular dampers larger than four square feet in area, provide additional corner bracing.

(4) Thermostats: If system supports DDC monitoring, provide solid state thermostats. Thermostats in corridors, halls, restrooms and other similar unsupervised areas shall be flush mounted aspirating type with stainless steel cover. Thermostats in public, but supervised areas shall have locking covers with concealed adjustment. Thermostats in private offices may have exposed adjustments.

(5) Panels: Provide control devices, relays, piping, wiring and terminals in cabinets, except that switches, pilot lights, and push buttons mounted on the door. Provide minimum 14 gauge steel or 12 gauge aluminum. Equip doors with hinges, latches, and locks. Secure panels to walls, columns or floors with clearances required by NEC. Provide two (2) keys for each panel.

(6) Wall Mounted Control Diagrams: Provide plastic laminated copies of all applicable controls diagrams mounted on the wall in each equipment room.

(7) Control wiring: Provide control wiring in raceway complying with the requirements of DIV 16, except that ½" C may be installed for control wiring of less than 50 volts which complies with NEC conduit fill requirements.

N. Automatic Sprinkler Systems

(1) Provide an automatic sprinkler system in buildings when required by the building codes adopted by the State of Utah.

(2) It is desirable that all buildings constructed by the State of Utah be equipped with an automatic sprinkler system to provide added life safety for the occupants and to protect the building from fire loss.

(3) Fire sprinklers shall be considered as an integral component of building design when the availability of water supply and the cost do not make the installation prohibitive.

(4) Secondary structures and small buildings or buildings with low occupant loads may be excluded from this requirement with the approval of the Director.

3.6 Electrical

A. Emergency Electrical Requirements

(1) Modify paragraph 700.12 General Requirements of the NEC to:

"Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, emergency lighting, emergency power, or both shall be available within the time required for the application but not to exceed 10 seconds. The supply system for emergency purposes for buildings totaling less than 5000 sf, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or more of the types of systems described in 700.12 (A) through 7001.12 (E). Unit equipment in accordance with 700.12(F) shall satisfy the applicable requirements of this article for buildings totaling less than 5000 sf. The supply system for emergency purposes for buildings totaling 5000 sf or greater, in addition to the normal services to the building and meeting the general requirements of this section, shall be the type of system described by 700.12 (B). This requirement shall not prohibit the use of the supply systems 700.12 (A), or 700.12 (C) through (F), for buildings totaling 5000 sf or greater, if these systems are required for safety purposes and if these systems are automatically connected to a Generator Set as described in 700.12 (B)." [The balance of section 700 is unchanged.]

(2) Modify paragraph 701.11 Legally Required Standby Systems of the NEC to:

"Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, legally required standby power will be available within the time required for the application but not to exceed 20 seconds. The supply system for legally required standby purposes for buildings totaling less than 5000 sf, in addition to the normal services to the building shall be permitted to comprise one or more of the types of systems described in 701.11(A) through 701.11 (F). Unit equipment in accordance with 701.11(G) shall satisfy the applicable requirements of this article for buildings totaling less than 5000 sf. The supply system for legally required standby purposes for buildings totaling 5000 sf or greater, in addition to the normal services to the building shall be required to be the type of system described by 701.11 (B). This requirement shall not prohibit the use of the supply systems 701.11 (A), or 701.11 (C) through (G), for buildings totaling 5000 sf or greater if these systems are required for safety purposes and if these systems are automatically connected to a Generator Set as described in 701.11 (B)." [The balance of this section is unchanged.]

(3) The Director of DFCM may authorize battery packs in suitable applications when the standard is not achievable due to the unique circumstances of a particular project or the constraints of the project budget.

B. Lighting

(1) Occupants within an enclosed space shall have the capability to adjust the lighting within the enclosed space.

(2) Light Pollution Reduction: Comply with Light Pollution Reduction requirements, unless otherwise directed by the DFCM's Designated Representative.

(3) Comply with the Illuminating Engineering Society of North America (IESNA) Recommended Practice Manual: "Lighting for Exterior Environments (RP-33-99)." Provide exterior luminaires which are shielded. For luminaires with more than 3000 initial lamp lumens, provide Full Cutoff (IESNA Classification) luminaires. Interior lighting shall be positioned so that the maximum candela value does not fall outside the interior space, such as out through a window. Exterior lighting shall be located so that the maximum candela value of all exterior lighting shall fall within the property. Provide shielding for any luminaire within a distance of 2.25 times its mounting height from the property boundary so that no light from the luminaire illuminates past the property boundary.

(4) Lighting Fixtures. Provide lenses that will not yellow due to exposure to sunlight or to the light sources in the fixture. When acrylic diffusers are specified, provide 100% virgin acrylic. Provide electronic ballasts, except that magnetic ballasts may be used in outdoor applications. Provide program start ballasts, if available for the lamp type. Connect equipment grounding conductor to fixture housing. Provide a 10% spare lamps, diffusers or glass for each light fixture type with not less than one for less than 10.

(5) Interior Lighting: Provide T-8 lamps in fixtures, except for areas requiring special lighting. Provide independent safety-wires attached to structure at two diagonal corners of lighting fixtures in compliance with seismic requirements. For recessed fluorescent fixtures that are removable, locate outlet box with 3' of steel flexible conduit to the fixture to aid in removing and relocating fixture.

(6) Exterior Lighting: Provide -10 degree F. ballasts, either constant wattage or pulse start. Provide break-away fuse for all phase conductors for all outside pole mounted lighting fixtures. Provide a shorting fuse insert for neutral fuse holder. Do not use common neutral multi-wire circuits for this type of lighting.

(7) Reflected Ceiling Plan Coordination: Coordinate the lighting fixture with the reflected ceiling plan for lay-in and surface mounted fixtures. Recessed lighting fixtures in acoustical tile ceiling shall be located centered on a single tile or at the intersection of four tiles.

(8) Lighting Fixture Supports: Provide swivel bases for stems supporting lighting fixture which exceed 12" in length.

(9) HID Sources: Provide Constant Wattage ballasts. For metal halide, provide Pulse Start Metal Halide lamps and ballasts. For indoor, provide pulse start electronic ballasts. For outdoor up to 200 watts, provide pulse start electronic ballasts. For outdoor above 200 watts, provide magnetic ballasts if control, noise, and flicker requirements are satisfied.

C. Raceways to 600 V

(1) Raceways, Fittings, and Boxes. Provide steel raceway, fitting, and box system for all wiring, except that plastic conduit (minimum schedule 40) may be installed underground and aluminum cable trays may be installed for communications cabling. For steel raceway installed in contact with soil, provide rigid or IMC PVC coated or wrapped raceways, fittings, etc. Provide steel raceways for penetrating structural elements (minimum 10' each side) and rigid steel conduit (PVC coated or wrapped) for bends greater than 22 degrees. Provide minimum ¾" raceways, except ½" may be provided for HVAC Instrumentation and Control. For Communications raceway, the bend must be a minimum 6 times the diameter for sizes 2" or less and 10 times the diameter for larger then 2". Provide flexible steel conduit (minimum ½") in short lengths where movement, vibration, misalignment or cramped quarters exist. Provide insulated throat or equal type plastic bushings for box connection 1" or larger. Provide double lock nuts and plastic bushings for IMC and rigid conduit. Provide liquid-tight flexible conduit with approved moisture-tight fittings for wet, humid, corrosive or oily locations. Provide a minimum 18" liquid-tight flexible conduit at each motor. Provide minimum 4/s box 1-1/2" deep with plaster rings, except provide 3-1/2" deep masonry boxes for masonry. For boxes with 3 or more raceway entrances, provide minimum 2-1/8" box. For boxes with 4 or more raceway entrances, provide

(2) 4-11/16" boxes (except for masonry boxes). Provide gang boxes for multiple gang installations. Provide accessible junction boxes in interior raceway runs at minimum 100 foot intervals. Provide minimum 12" clearance from hot water and steam lines measured from outside of insulation.

(3) Electrical Supports. All raceways, boxes, and conductors shall be supported independently from all other electrical or mechanical systems, directly from building structure by a listed supporting device. Provide bracing parallel to trusses, beams, joist, bridging, etc. Provide anchors capable of supporting 4 times the weight of the unit supported, but not less than 100 lbs. For ceiling fixture outlet boxes, provide minimum supporting capacity of 200 lbs and a standard 3/8" stud. Provide outlet boxes with rigid support using metal bar hangers between studs. Provide concrete pads 6 inches beyond the largest dimension of the equipment. Extend equipment pad a minimum of 4" above finished floor or grade.

(4) Steel Raceway Supports. Provide minimum of 2 supports per ten foot length; Support within 12 inches of bends, couplings, fittings and boxes, minimum of two straps per ten foot length. For 2 runs or less of ¾" to 1-1/4" raceways, provide supports with full straps, clamps or hangers. For individual run 1-1/2" or larger raceways, provide supports with hangers. All other raceways, support with trapeze mounting channels.

(5) Future Raceways: Provide five capped spare ¾" conduits from each section of a branch panelboard into the ceiling and floor space. If the floor space is not accessible, provide an additional ¾" conduit from each section

of a branch panelboard into the ceiling. Provide 200-lb nylon pull cord in all empty conduit, then cap raceway using a blank cover similar to adjacent wiring device covers.

(6) Underground Raceway Identification and Installation: Provide direct buried conduit in an area outside a building not less 24" deep, with magnetic "yellow warning" ribbon 12" directly above and 6" below finished grade measured from the top of the conduit or duct bank.

(7) Do not provide the following, unless approved by the Director:

(8) Exposed cable wiring.

(9) Other raceway systems: Electrical Non-metallic Tubing, aluminum conduit, die cast fittings, steel cable trays.

D. Conductors

(1) Conductors. Provide minimum #12 copper conductors with 600 V insulation (THW, THWN, THWN-2, XHHW, or XHHW-2) for all phase conductors; unless ambient conditions require an increased insulation rating. Do not parallel less than #1/0 conductors. Do not feed conductors through one section of panelboard to connect to an overcurrent device in another section of panelboard. Provide separate neutrals for all GFI circuit breakers and for the load side of feed thru GFCI outlets. Provide minimum 12" clearance from hotwater and steam lines measured from outside of insulation.

(2) Do not provide the following, unless approved by the Director:

(3) Exposed cable wiring.

(4) Splices in panelboard, switchboard enclosures, or in conduit bodies.

(5) Other cabling methods: Non-metallic sheathed cables (Romex), Metal Clad Cables, aluminum conductors.

E. Grounding

(1) Grounding. Ground all medium voltage equipment and exposed metals in the immediate area with the neutral conductor of the primary cable and with a minimum 5/8" X 10' ground rod. Provide grounding electrode system at the service entrance with, at a minimum, two of the following electrodes as defined in the NEC: metal underground water pipe, concrete-encased electrode, or ground ring. In addition, bond to other available electrodes. Provide a separate green grounding conductor enclosed with phase conductors in all raceways on the load side of the service entrance. Provide grounding bushings for all service raceways and for raceways installed in concentric/eccentric knockouts. All grounding systems shall be interconnected and/or bonded to the grounding electrode system.

Upgrade as necessary existing electrical systems to comply with the NEC and these requirements.

F. Medium Voltage

(1) Medium Voltage Conductors: Provide copper conductors with copper tape shields and EPR insulation and 100% copper neutral in Medium Voltage Ductbanks; or, in utility tunnels or other areas without public access, provide armored cable or rigid conduit. Comply, as a minimum, to the installation requirements for Medium-Voltage Cable standard NECA 600-2003. Perform Hi-Pot test after terminations have been made, but before connections have been made to buses or apparatus. Perform continuity tests of all cables after entire installation and terminations have been completed. If a cable fails to perform, replace faulty cable and retest. All tests will be recorded and submitted with M & O manuals at project conclusion.

(2) Medium Voltage Duct Banks. For interior of buildings in non-public areas, provide rigid galvanized conduit or armored cable marked with red HIGH VOLTAGE. For exterior applications or public areas, provide concrete encased duct-banks (red dye) with raceways in multiples of two and a minimum of one spare conduit (with polypropylene pull wire) per feeder. Provide rigid metal conduit for the first 10 feet of duct bank from a facility or manhole. Provide minimum 4" raceway.

(3) Medium Voltage Transformer: A/E shall design harmonic mitigation to reduce current total harmonic distortion (based upon full load capacity of the transformer) below 5%. Provide copper or aluminum windings. Provide transformer taps and adjust voltage output to obtain the proper value. Provide primary and secondary terminations at medium voltage transformers, cable, splices, etc. necessary to complete installation. Do not use Askarel transformers.

(4) Lightning Protection: Provide lightning (surge) arresters for medium voltage transformers and switchgear located above ground outside.

G. Controller

(1) Motor controllers: Provide NEMA rated magnetic motor controllers with thermal overload relays for each phase. Provide auxiliary contacts, HOA switches or start-stop pushbuttons as appropriate, stop and run pilot lights, and reset pushbuttons. Provide fused control transformer in the starter for 120 V control. Provide safety interlock to prevent opening enclosure with equipment or control energized.

(2) Variable Frequency Controllers: Provide PWM variable frequency controllers suitable for the application, factory pre-wired with integral disconnect, input filter, and integral ventilation. Coordinate approved manufacturers with the Agency. Provide interface to HVAC or Building Automation System for control. For interior VFCs, size ventilation for ambient temperature of 32 degrees F. to 90 degrees F. Avoid exterior

mounted VFCs; but, if required, provide ventilation for ambient temperatures from -30 degrees F. to 120 degrees F. Fault current rating shall be sized based upon the fault current analysis of the nearest upstream overcurrent device. Include factory startup and tune to optimize life of motor. Provide VFCs which operate within the following normal ranges of inputs: +/- 10% input voltage; +/- 5% input frequency; less than 7% voltage THD. Provide VFCs which operate through voltage sags of 0% voltage for 1 cycle and 60% voltage for 10 cycles. For Motors 7.5 hp and larger, provide a minimum power quality performance of 12% current THD and 3% voltage THD at filter or VFC input by providing a broadband type filter or minimum 12 pulse VFC complying with the power quality performance requirements demonstrated by standard factory published data. For Motors less than 7.5 hp, provide AC Line Reactor or DC Link Reactor. For VFC output filtering, provide output filter if drive output at motor termination exceeds pulse-withstand capability. Provide 95% efficiency minimum including filter and 95% power factor. Provide local speed control, HOA switch, remote start/stop, external safeties, run annunciation, fault annunciation, and speed reference input connection. For maintenance purposes, provide stable operation including starting, stopping and running with the motor completely disconnected; provide auto restart after a power failure; provide capability for starting into a rotating motor at any speed.

(3) Provide a manual bypass of UFC as part of controller.

(4) Do not provide the following components, unless approved by the Director.

(5) Other Electrical Components: IEC motor controllers.

H. Electrical Distribution

(1) Overcurrent and Ground Fault Protection: Set overcurrent and ground fault protection based upon Fault Current Protection and Coordination Study prepared by the A/E.

(2) Submit study with M & O manuals.

(3) Transformers: Provide transformers with copper conductors. Provide transformer taps of 4 taps – 2.5% above normal and 2 taps – 2.5% below normal. Adjust voltage output to obtain the proper value at the main disconnect.

(4) Metering: Provide secondary digital metering (including demand monitoring) at the main distribution panel(s) in each facility. For secondary digital metering for facilities greater than

(5) 800 Amps include harmonic monitoring and an option for building automation monitoring or other remote monitoring. Indicate multiplying factor on meter face where current transformers are used.

(6) Utility Metering: Comply with serving utility's regulations, if applicable. Comply with utility's metering requirements. Include cost assessed by serving utility.

(7) Switchboards and Panelboards: Provide bus hardware installed on the bus for future over-current devices of not less than 25% minimum. Provide over-current devices in the same sequence as shown on the panel schedules or one-line diagrams. Coordinate that the height of the operating handle of the over-current device does not exceed 6'6" above the floor. Identify main over-current protection devices.

(8) Panelboards: Provide listed panelboard construction for all branch panels and circuit breaker distribution panels. For 3 phase 4 wire delta systems, connect Hi-Leg to center bus. Provide ground bus bonded to enclosure to terminate all equipment ground conductors. Include insulated ground bus for insulated ground circuits. Key all panelboards alike and provide 3 keys.

(9) Circuit Breakers: Provide one, two or three-pole over-current devices with common handle (not field modifiable). Provide bolted connections.

(10) Do not use the following components, unless approved by the Director:

(11) Other Electrical Components: load centers, plug-in circuit breakers.

I. Miscellaneous Electrical

(1) Lighting Contactors: Provide NEMA rated lighting contactors with HOA.

(2) Wiring Devices: Locate switches so as not to exceed 48" to the bottom above finished floor. Except for floor boxes, locate convenience outlets so that outlet is not less than 18" to the bottom and not greater than 48" to the top above finished floor. Coordinate heights with cabinetry and finishes. Use feed through GFCI outlets only if the outlet served is located in the same room. Convenience outlets (120 V) and switches (120/277V) shall be minimum 20A self-grounding with nylon faces and cover plates. Coordinate device colors and plates with the finishes. Provide industrial raised covers for surface switches and outlets. Arrange devices in gangs if multiple devices are located at the same location. Provide mounting strips and blank cover-plates for outlet boxes without devices. Do not connect more than eight (8) convenience outlets on each 20A circuit.

(3) Lightning Protection: If the risk analysis performed per NFPA 780 exceeds moderate risk, provide a lightning protection system. Minimum qualifications required: LPI-certified installer, designer, and inspector. Obtain a UL Master Label for the facility.

(4) Power Quality:

a. A/E shall include in the Basis of Design an evaluation of the potential harmonic risks to the electrical distribution system and

the approach to mitigate the risks to transformers, neutral conductors, and other equipment.

b. Design TVSS for the main service of each facility with services greater than 200 A. Include a second level of TVSS for panelboards serving primarily computer or other electronic equipment.

c. Specify harmonic testing of each transformer (voltage and current THD) after the facility is occupied to determine effectiveness of the Power Quality approach.

d. Hazardous Classifications: Coordinate with Fire Marshall hazardous classifications and requirements, including class, division, and group requirements.

e. Generator Fuel Tank Size: Size fuel tank to comply with Code requirements and facility needs. Allowance shall be made in the capacity so that there is adequate fuel to comply with these requirements when the tank indicates that it needs to be refilled. Provide a minimum tank capacity for 24 hour continuous operation.

J. Structured Cabling

(1) Test all structured cablings systems to demonstrate compliance with TIA/EIA standards for the category of system selected. Include warranty and the test results in the Project Resource Manual.

K. Fire Alarm

(1) Provide addressable fire alarm systems. Install class “A” looped systems or as approved by Fire Marshal.

(2) Do not use the following components, unless approved by the Director. Other Fire Alarm Components: Zoned Fire Alarm panels, ionization smoke detectors.

L. Misc. Systems

(1) Determine requirements for other systems such as security, cctv, etc.

4.0 LANDSCAPE AND IRRIGATION STANDARDS

4.1 Purpose

A. The Division of Facilities Construction and Management (DFCM) has found that for state owned or developed properties:

(1) Water is an increasingly scarce resource.

(2) Nearly two thirds of the culinary water resources are used for outdoor use, including watering landscapes.

(3) The DFCM desires to promote the design, installation and maintenance of landscapes that are both attractive and water efficient.

(4) All state facilities are to be landscaped and the site developed to the project limit lines or natural boundaries. If a facility is in a natural setting, all construction damaged areas are to be restored to the extent practicable.

(5) The Landscape design for DFCM projects should recognize the Geological and Historic nature or context of the site.

B. Applicability. The provisions of this section shall apply to all projects on state property that involve the development or major modification of landscaping regardless of funding source, and all other projects under the jurisdiction of the DFCM or under state mandates. This section does not apply to:

(1) Registered Historical Sites

(2) Sites submitted for variance to these guide lines due to unique context.

(3) Institutional or other sites with unique context.

C. Documentation for Plan Approval. A Landscape Development Package shall be submitted to DFCM and the appropriate institution, agency or site manager for approval. Both the Landscape Plan and the Irrigation Plan in the Development Package shall be prepared by a Landscape Architect or another licensed professional as recognized by the State of Utah to perform Landscape Architectural services. Soils reports and other necessary documentation for plan approval must be submitted by the appropriate licensed professionals as stipulated by the State of Utah. The Landscape Development Package shall consist of all documents as listed in Section 3.3.7.

4.2 Principles and General Guidelines

A. Soil Analysis: Quality topsoil is the foundation of quality landscapes. The growth rate, health and visual appearance of landscape plants are directly related to soil quality. Several chemical and physical characteristics influence topsoil quality: soluble salts, pH, texture, organic matter, course fragments, and nutrient content. The sodium adsorption ratio (SAR) is an additional property to consider if salinity

and/ or soil pH approach unacceptable levels. It is imperative that topsoil meet acceptable standards for these properties. If soil falls outside of acceptable standards for any one of these properties, reject the material or realize that amendments will need to be made in order to bring the top soil within the acceptable ranges. This will promote healthy plant growth. Soil types will vary from site to site. Soil type will affect irrigation scheduling. Soils may be improved if needed with organic matter to enhance drainage and moisture retention. Soil qualities to be tested but not limited to:

(1) Soluble Salts

(2) pH

(3) Texture

(4) Organic Matter

(5) Course Fragments

(6) Sodium Adsorption Ratio (SAR)

(7) Nutrient Concentrations

(8) % Sand

(9) % Silt

(10) % Clay

B. Appropriate Plant Selection and Zoning the Landscape: All plants shall conform to USDA zone requirements and be suitable to the local soils. Plants shall be selected according to appropriate solar aspect, exposure, and micro climates. Trees and shrubs should be placed to reduce solar gain in the summer and allow solar gain in the winter. Use healthy, well-adapted plants and zone the landscape by grouping plants together according to their water requirements. It is important to place the right plant in the right place. Avoid planting a high water-use plant next to a low water-use plant. Place plants in areas that will accommodate their mature size. Many beautiful trees, shrubs, perennials and groundcovers are available for use in a water-wise landscape. Select plants for their low water-use, drought tolerance, pest and disease resistance, size, color, form, texture, leaves, flowers, fruit and maintenance needs. Choose plants to provide year-round interest. Many plants have exceptional winter form, habit color, and texture. (Plant list is a comprehensive list of acceptable plants for DFCM projects. Some plants do not as of this time have a Water Zone or Plant Factor value. It is the designer's responsibility to understand the water requirements of these plants and to group the plants into the appropriate Hydra Zones. Any plants proposed to be used that are not on the list must be submitted to the DFCM for approval prior to being shown on the planting plan.)

C. Practical Turf Areas: Plant turf only in areas of manageable sizes and shapes. Limit turf to areas where it provides a functional benefit. Selection of appropriate

turf varieties should be determined by site location, functionality and climate. Excess turf may be replaced with a variety of other low water-use plants.

D. Efficient Irrigation: Irrigation systems are to be designed for minimal maintenance and maximum water conservation. Irrigate efficiently – not excessively. Use properly designed systems and apply the right amount of water at the right time. Irrigate turf areas separately from other plantings. Turf is best watered with overhead sprinklers. Trees, shrubs, flowers and ground covers are watered most efficiently with low-volume drip, spray or bubbler emitters. Do not rely solely on an automatic timer. ET based controllers and soil sensors are encouraged. All irrigations systems shall have "rain delay or rain shut-off" capabilities. Water efficiently and only when needed.

E. Mulching: Use mulches in tree, shrub and perennial borders to conserve soil moisture and increase soil nutrients. Mulch applied at the right depth will reduce weed growth and slow erosion. Organic mulches such as bark improve soil over time.

F. Appropriate Maintenance: Water-wise landscaping will reduce maintenance; however, it will not eliminate it. Low water-use landscapes are simply maintained differently than the average lawn. Maintain the landscape by pruning, fertilizing, watering, weeding mowing and proper deadheading of perennials and flowering plant material.

4.3 Water Allowances

A. The use of water allowance or water budgeting will greatly encourage the design of water-wise landscape design. The amount of water required is dependent on the site context, but should generally follow the allowable use indicated below as a minimum. The Landscape water allowance shown below is for each project's total landscape area per project.

Type of Facility		**Water Allowance (% of allowable water used)**
A.	Office type buildings	50%
B.	Existing campus/institution	70%
C.	New campus/institution	60%
D.	Recreational areas (ball fields etc.)	70%
E.	State Parks (natural areas)	10%

4.4 Definitions

"Administrative Standards" shall mean the set of rules, procedures and requirements set forth in a landscape ordinance associated with making permit application, assembling materials for public review, meeting the requirements of the landscape ordinance, seeking approvals, enforcement, conducting site inspections, and filing reports.

"Bubbler" shall mean an irrigation head that delivers water to the root zone by "flooding" the planted area, usually measured in gallons per minute. Bubblers exhibit a trickle, umbrella or short stream pattern.

"Central Control" shall mean a control system which can operate multiple controllers, sensors, and other irrigation devices from one central location. The Central Controller can monitor conditions in the system and surrounding areas then control the site controller to properly respond to the conditions. The system can make adjustments and operate without personal intervention. The monitor function of a central control system may consist of but not limited to the following: Flow sensors, soil moisture sensors, wind sensors, weather stations and rain sensors. These sensors monitor and report current conditions. The central control system can respond if any of the conditions are outside pre-defined limits.

"Drip Emitter" shall mean a drip irrigation fitting that delivers water slowly at the root zone of the plant, usually measured in gallons per hour. Drip emitters shall be a threaded emitter onto a 1/2" flex pipe, which shall be liquid welded to a lateral supply line.

"Evapotranspiration (ET)" shall mean the quantity of water evaporated from adjacent soil surfaces transpired by plants during a specific time, expressed in inches per day, month or year (see also Reference Evapotranspiration Rate).

"Extra-Drought Tolerant Plant" shall mean a plant that can survive without irrigation throughout the year once established, although supplemental water may be desirable during drought periods for improved appearance and disease resistance.

"Ground Cover" shall mean material planted in such a way as to form a continuous cover over the ground that can be maintained at a height not more than twelve (12) inches.

"Hardscape" shall mean patios, decks and paths. Does not include driveways, parking lots, and sidewalks.

"Hydra Zone" (or "Water Zone") shall mean grouping plants together according to similar water requirements. (Plant List for Hydra Zone values). Each zone is based on the amount of water required for vegetation to flourish. Each plant in these zones should have a plant factor that correlates to the Hydra Zone. The Plant factor is used in the Water Allowance Formula. Correlating values are as follows:

Hydra zone (or water zone)	**Plant Factor**
3+	1
2-4	.75
1-3	.50
0-1	.25
0	0

"Irrigated Landscape Area" shall mean all portions of a development site to be improved with planting and irrigation. Natural open space areas shall not be included in the Irrigated Landscaped Area.

"Irrigation Efficiency" shall mean the measurement of the amount of water beneficially applied, divided by the total amount of water applied. Irrigation

efficiency is derived from measurements and estimates of irrigation system hardware characteristics and management practices.

"Irrigation Contractor" shall mean a person who has been certified by The Irrigation Association to install irrigation systems or as otherwise noted.

"Irrigation Designer" shall mean a person who has been certified by The Irrigation Association to prepare irrigation system designs.

"Irrigation Plan" shall mean the plan which shows the components of the irrigation system with water meter size, backflow prevention, rain shut-off device, precipitation rates, flow rate and operating pressure for each irrigation zone, and identification of all irrigation equipment.

"Irrigation Water Auditor" shall mean a person who has been certified by The Irrigation Association to conduct a landscape irrigation audit.

"Landscape Architect" shall mean a person who holds a license to practice Landscape Architecture in the State of Utah.

"Landscape Designer" shall mean a person who has been certified by the Utah Nursery and Landscape Association to prepare Landscape Plans.

"Landscape Development Package" shall mean the preparation of graphic and written criteria, specifications and detailed plans to arrange and modify the effects of natural features such as plantings, ground and water forms, circulation, walks and other features to comply with the provisions of this ordinance. The Landscape Development Package shall include a project data sheet, a Planting Plan, and Irrigation Plan, a Grading Plan, a Soils Report, a Landscape Water Allowance Schedule and an Irrigation Schedule.

"Landscape Water Allowance" shall mean for design purposes, the upper limit of annual applied water for the established landscaped area. It is based upon the local Reference Evapotranspiration Rate, the ET adjustment factor and the size of the landscaped area.

"Landscaped Zone" shall mean a portion of the landscaped area having plants with similar water needs, areas with similar microclimate (i.e., slope, exposure, wind, etc.) and soil conditions, and areas that will be similarly irrigated. A landscape zone can be served by one irrigation valve or a set of valves with the same schedule.

"Landscaping" shall mean any combination of living plants, such as trees, shrubs, vines, ground covers, flowers, turf or ornamental grass; natural features such as rock, stone or bark chips.

"Mulch" shall mean any material such as bark, wood chips, rocks/stones or other similar materials left loose and applied to the soil.

"Non-Drought Tolerant Plant" shall mean a plant that will require regular irrigation for adequate appearance, growth and disease resistance.

"Plant Factor Shall" mean using a value associated to a group of plant material that has similar requirements for water consumption. This value is used in the calculation for the landscape water allowance. Example: Turf = 1, Non-drought tolerant trees, shrubs and ground cover = 0.75, Water-conserving trees, shrubs and ground cover = 0.50, Extra drought tolerant trees, shrubs and ground cover = 0.25, Mulch areas not irrigated = 0.0. The Plant Factor correlates to the Hydra Zone. The Plant factor is used in the Water Allowance Formula. Correlating values are as follows:

Hydra zone (or water zone)	Plant Factor
3+	1
2-4	.75
1-3	.50
0-1	.25
0	0

"Plant Hydra Zone" (or water zone) shall mean the grouping of plants together according to similar water requirements.

"Planting Plan" shall mean a plan which clearly and accurately identifies and locates new and existing trees, shrubs, ground covers, turf areas, driveways, sidewalks, hardscape features and fences.

"Precipitation Rate" shall mean the rate at which water is applied per unit of time, usually measured in inches per hour.

"Rain Shut-Off Device" shall mean a device wired to an automatic controller that shuts off the irrigation system when it rains.

"Reference Evapotranspiration Rate" or ET shall mean a standard measurement of environmental parameters which affect the water use of plants. ET is expressed in inches per day, month or year and is an estimate of the evapotranspiration of a large field of four to five inches tall, cool season grass that is well watered. See also Evapotranspiration.

"Runoff" shall mean irrigation water that is not absorbed by the soil or landscape area to which it is applied and which flows onto other areas.

"Soils Report" shall mean a report by a soils laboratory indicating soil type(s), soil depth, soluble salts, texture, organic matter, course fragments, sodium adsorption ratio (SAR), nutrient concentrations, uniformity, composition, bulk density, infiltration rates, and pH for the top soil and subsoil for a given site. The soils report also includes recommendations for soil amendments.

"Spray Sprinkler" shall mean an irrigation head that sprays water through a nozzle.

"Stream Sprinkler" shall mean an irrigation head that projects water through a gear rotor in single or multiple streams.

"Turf" shall mean a surface layer of earth containing mowed grass with its roots.

"Waste of Water" shall mean and include, but not be limited to:

- The use of water for any purpose, including landscape irrigation, which consumes or for which is applied substantial amounts of excess water beyond the reasonable amount required by the use, whether such excess water remains on the site, evaporates, percolates underground, goes into the sewer system or is allowed to run into the gutter or street. Every water consumer is deemed to have under his control at all times the water lines and facilities, through which water is being supplied and used to his premises and to know the manner and extent of his water use and excess runoff.

- The excessive use, loss or escape of water through breaks, leaks or malfunctions in the water user's plumbing for any period of time after such escape of water should reasonably have been discovered and corrected. It shall be presumed that a period of 8 hours after the water user discovers such break, leak or malfunction or receives notice of such condition, whichever occurs first, is a reasonable time to correct such condition.

- Washing sidewalks, driveways, parking areas, tennis courts, patios or other paved areas except to alleviate immediate fire, health or safety hazards.

"Water Use Efficiency Review" (audit) shall mean an on-site survey and measurement of irrigation equipment and management efficiency and the generation of recommendations to improve efficiency.

"Water Conserving Plant" shall mean a plant that can generally survive with available rainfall once established, although supplemental irrigation may be needed or desirable during the growing season.

"Water Zone" See Hydra Zone

4.5 Landscape Design Standards

A. Creating Plant Hydra Zones or Water Zones: There are guidelines that should be used when creating the four water use zones that may occur in a water-wise landscape. Each zone is based on the amount of water required for vegetation to flourish. Grouping plants together according to similar water requirements avoids wasteful over watering and encourages proper growth. Avoid high plant hydrazones being adjacent to low hydrazones. Without transition zones, water from the wet zones will be wasted on the adjacent dry zones. For many water efficient plants, there is such a thing as too much water. Water needs are dependent on the soil type, weather conditions, plant material, and amount of competition with weeds or desirable plants. Careful selection of a "low-volume" irrigation system will conserve large amounts of water.

(1) Plant Hydra Zone 0: No supplemental water is required after plants are established. This is the lowest water zone in a water-wise landscape and will provide the greatest savings when compared to conventional landscaping.

(2) Plant Hydra Zone 1: At least 1-inch of supplemental water per month may be required after plants are established. Plants growing in this zone need more water than natural precipitation.

(3) Plant Hydra Zone 2: At least 1-inch of supplemental water every 2 weeks may be required after plants are established. This is still less than most conventional landscapes.

(4) Plant Hydra Zone 3: At least 1-inch of supplemental water each week may be required after plants are established. This zone should be kept small and functional in size. It could be considered a mini-oasis and is best used when incorporated carefully into the landscape design. Turf/Lawn is generally the primary plant used in this zone.

B. Plant Selection. Plants selected for landscape areas shall consist of plants that are well-suited to the microclimate and soil conditions at the project site. Plants with similar water needs shall be grouped together as much as possible.

C. For projects located at the interface between urban areas and natural open space (non-irrigated), Extra-Drought Tolerant Plants shall be selected that will blend with the native vegetation and are fire resistant or fire retardant. Plants with low fuel volume or high moisture content shall be emphasized. Plants that tend to accumulate excessive amounts of dead wood or debris shall be avoided.

D. Areas with slopes greater than 33% shall be landscaped with deep-rooting, Water Conserving Plants for erosion control and soil stabilization.

E. Park strips and other landscaped areas less than 8 feet wide shall be landscaped with Water Conserving Plants and/or grass. Areas less than 5 feet wide shall not be planted in turf.

F. Planting material should be used as a screening device for parking areas, service yards, transformers, and other site utilities etc. Trees in parking areas shall be selected based on reducing leaf litter and be “sap-drip” free.

G. Mulch. After completion of all planting, all irrigated non-turf areas shall be covered with a minimum layer of 3” of Mulch to retain water, inhibit weed growth and moderate soil temperature. Non-porous material shall not be placed under the mulch.

H. Soil Preparation. Soil preparation shall be suitable to proved healthy growing conditions for the plants and to encourage water infiltration and penetration. Soil preparation shall include scarifying the soil to a minimum depth of six (6) inches and amending the soil with organic materials as per specific recommendations of the Landscape Architect based on the Soils Report.

I. All plant material shall be installed according to the ANLA (American Nursery & Landscape Association) guidelines.

4.6 Irrigation Design Standards

A. Recommended Point of Connection (POC) component installation order: 1-connection to source, 2-stop and waste valve/ or shut off, 3-filtration device, 4-pressure regulator, 5-backflow preventer, 6-quick coupler blowout, 7-master valve, and 8-flow meter – (if required).

B. In situations of secondary water supply, provide filtration system necessary to clean water supply and protect irrigation system components. Provide accessible pressure gauges immediately upstream and downstream of the filtration device. (Non self cleaning units)

C. Landscape Water Meter. A separate irrigation system water meter and backflow prevention assembly that are in compliance with state code shall be installed for all new landscape irrigation systems. The landscape water meter and backflow prevention assembly shall be separate from the water meter and backflow prevention assembly installed for indoor uses. The size of the meter shall be determined based on irrigation demand.

D. Pressure Regulation. A pressure regulating valve shall be installed and maintained by the consumer if the static service pressure exceeds 80 pounds per square inch (psi). The pressure-regulating valve shall be located between the landscape water meter and the first point of water use or first point of division in the pipe and shall be set at the manufacture's recommended pressure for sprinklers and or drip/micro systems. Pressure regulation devices may include one or all of the following: 1-pressure regulation valve at the main line POC, 2-pressure regulation device on individual sprinkler heads, 3-regulation of low volume drip/micro systems.

E. Irrigation systems with 1" POC or 10,000 square feet and larger of landscaped area shall have a flow sensor and master valve installed. Systems with irrigated area of 1 acre and larger shall have a normally closed master valve. Where necessary, the master valve shall be capable of manual operation to allow manual use of the irrigation system. A normally open master valve is acceptable if the controller is capable to shut the valve off in event of unscheduled flow.

F. Automatic Controller. All irrigation systems shall include an electric automatic controller with multiple programs and multiple repeat cycle capabilities and a flexible calendar program. Controller shall be programmable for multiple start times for repeat and rest periods, and shall be capable of water budget adjustment. Controller shall be able to provide separate programs for turf zones, shrub zones, and drip zones. All controllers shall be capable of temporarily shutting down the system by utilizing internal/external options (such as rain, wind, and freeze devices) and the ability to adjust run times based on a percentage of maximum ET or by use of a soil sensor. Power wire and control wire shall not be contained in the same conduit.

G. On slopes exceeding 33%, the irrigation system shall consist of Drip Emitters, Bubblers or sprinklers with a maximum Precipitation Rate of 0.85 inches per hour and adjusted sprinkler cycle to eliminate Runoff. Lateral lines are to run parallel to slope when possible.

H. Each valve shall irrigate a landscape with similar site, slope and soil conditions and plant materials with similar watering needs. Turf and non-turf areas shall be

irrigated on separate valves. No single zone shall be designed or installed with sprinklers of differing pressure requirements or precipitation rates. (Rotors, spray heads, drip emitters, micro sprays, etc. may not be mixed within a zone.

I. Drip Emitters or Bubblers shall be provided for each tree where practicable. Bubblers shall not exceed 1.5 gallons per minute per device. Bubblers for trees shall be placed on a separate valve unless specifically exempted by the DFCM.

J. Sprinklers shall have matched Precipitation Rates with each control valve circuit. All sprinkler heads shall be spaced at a maximum of 50% of design performance diameter of the sprinkler. In known windy areas sprinklers are to be designed with reduced head spacing or low angle nozzles. Spacing shall be reduced below 50% of design performance diameter when conditions demand.

K. Check valves shall be required where elevation differences will cause low-head drainage. Pressure compensating valves and sprinklers shall be required where a significant variation in water pressure will occur within the irrigation system due to elevation differences.

L. Drip Irrigation lines shall be placed underground or otherwise permanently covered, except for Drip Emitters and where approved as a temporary installation. Filters and end flush valves shall be provided as necessary and as per industry standards.

M. Irrigation zones with overhead spray or stream sprinklers shall be designed to operate between 6:00 pm and 10:00 am to reduce water loss from wind and evaporation. Drip or bubbler zones are excluded from this requirement.

N. Program valves for multiple repeat cycles where necessary to reduce runoff, particularly slopes and soils with slow infiltration rates.

4.7 Contract Documents

A. Project Data Sheet. The Project Data Form shall contain the following:

(1) Project name and address;

(2) Type of project

(3) Landscape Architect's name, address, phone and fax number; and

(4) Landscape Contractor's name, address, phone and fax number.

B. Planting Plan. A detailed Planting Plan shall be drawn at a scale that clearly identifies the following:

(1) Location of all plant materials, a legend with botanical and common names, and size of plant materials;

(2) Property lines and street names;

(3) Existing and proposed buildings, walls, fences, light poles, utilities, paved areas and other site improvements;

(4) Existing trees and plant materials to be removed or retained; and

(5) Designation of Landscape Zones.

(6) Details and specifications for tree staking, soil preparation, and other planting work.

C. Irrigation Plan. A detailed Irrigation Plan shall be drawn at the same scale as the planting plan and shall contain the following information:

(1) Layout of the irrigation system and a legend summarizing the type and size of all components of the system, including manufacturer name and model numbers;

(2) Static water pressure in pounds per square inch (psi) at the point of connection to the public water supply ; and

(3) Flow rate in gallons per minute and design operating pressure in psi for each valve and precipitation rate in inches per hour for each valve with sprinklers.

(4) Installation details for irrigation components.

D. Grading Plan. A Grading Plan shall be drawn at the same scale as the Planting Plan and shall contain the following information:

(1) Property lines and street names, existing and proposed buildings, walls, fences, utilities, paved areas and other site improvements; and

(2) Existing and finished contour lines and spot elevations as necessary for the proposed site improvements.

E. Soils Report. A Soils Report will be required where irrigated landscaped areas consisting of grass or similar turf exceed 33% of the overall landscaped area or where the total landscaped area exceeds 2,500 square feet. The Soils Report shall describe the depth, composition and bulk density of the top soil and subsoil at the site and shall include recommendations for soil amendments. The Planting Plan shall incorporate the recommendations of the Soils Report into the planting specifications.

F. Landscape Water Allowance. The annual Landscape Water Allowance shall be calculated using the following equation:

Landscape Water Allowance (gallons) = ET x PF x AREA / IE x .62

Where Landscape Water Allowance is in gallons per growing season,

ET = Reference Evapotranspiration in inches per growing season

PF = Plant factor (see chart below)

AREA = Total Irrigated Landscape Area in square feet

IE = Irrigation efficiency (see chart below)

.62 = Conversion to gallons

Estimated Landscape Water use = ET x PF x AREA/IE x .62

G. Plant Factor (PF) shall be the following for each type of plant material:

Plant Type	Plant Hydra Zone	Plant Factor (PF)
Turf	3+	1.0
Non-drought tolerant trees, shrubs and ground cover	2-3	0.75
Water-conserving trees, shrubs and ground cover	1-2	0.50
Extra drought-tolerant trees, shrubs and ground cover	0-1	0.25
Mulch areas not irrigated, or plants not needing additional water after being established	0	0.0

H. Irrigation Efficiency (IE) shall be the following for each type of irrigation:

Irrigation Type	Irrigation Efficiency (IE)
Bubblers	0.85
Drip Emitters	0.85
Stream Sprinklers in planter strips 8 feet or wider	0.75
Spray Sprinklers in planter strips 8 feet or wider	0.625
Spray Sprinklers in planter strips less than 8 feet wide	0.4

I. Irrigation Schedule. A monthly Irrigation Schedule shall be prepared that covers the initial 120-day plant establishment period and the typical long-term use period. This schedule shall consist of a table with the following information for each valve:

(1) Plant type (for example, turf, trees, low water use plants);

(2) Irrigation type (for example, sprinklers, drip, bubblers);

(3) Flow rate in gallons per minute;

(4) Precipitation rate in inches per hour (sprinklers only);

(5) Run times in minutes per day;

(6) Number of water days per week; and

(7) Cycle time to avoid runoff.

J. The irrigation schedule shall rely on the estimated landscape water use calculations and shall be adjusted as necessary for irrigation efficiency, soil conditions, slope, and microclimate conditions. (See Irrigation Schedule Form)

4.8 Irrigation Record Drawings and Operations and Maintenance Manuals

A. Irrigation record drawings and operations and maintenance manuals are to be turned over to the DFCM at project completion prior to final acceptance.

B. The following shall be included on Irrigation Record Drawings. In addition, provide a reduced color-coded drawing(s) showing all zones and assigned valves.

C. Note all points of connection (P.O.C.) include tap size, line size and static water pressure (P.S.I.) of service.

D. Provide name and phone number of the servicing water purveyor. Include the name and date the installation was completed and the date the as-build drawing was approved.

E. Accurately locate all the following major components by dimension and their size as installed on the project: (But not limited to the Following)

(1) Water Meters

(2) Backflow Preventers

(3) Pressure Reducing Valves (note pressure settings)

(4) Filters

(5) Stop and Waste

(6) Master Control Valves

(7) Isolation and Gate Valves

(8) Control wire junction boxes

(9) Pumps

(10) Flow Sensors

(11) Remote Control Valves (note station assignment, size, flow rate, pressure setting. D.U. and actual flow rates, if available from water audit)

(12) Drip System Pressure Regulators and Filters

(13) Quick Couplers and Hose Bibs

(14) Pressure Main Lines and Sizes

(15) Main Line Sleeves and Sizes

(16) Capped main Lines and Future P.O.C.'s

(17) Manual Drain Valves and Sumps

(18) Remote Control Wire (label both ends and in junction box)

(19) Controller Location(s) (Note manufacturer, model, size and number of stations used)

(20) Central Control

(21) Rain Sensors

(22) Moisture Sensors

(23) Note and identify location(s) of existing utility systems as encountered during installation, i.e.; gas, phone, sewer, etc.

(24) Air Release Valves

F. Indicate and show the following additional components installed on the project:

(1) All Sprinkler Heads

(2) Lateral Lines and sizes

(3) Lateral Line Sleeves and sizes

(4) Manual or Automatic Flush Valves

G. Operations and Maintenance Manual

(1) A signed and dated written description of the contractor's warranty and warrantee period. Include name, address, phone number and license number.

(2) A description of system start up and winterization process.

(3) All product literature and customer service information for products used/installed on project.

4.9 Plan Review, Construction Inspection and Post-Construction Monitoring

A. As part of the Site Plan and Building Approval Process, a copy of the Landscape Development Package shall be submitted to the DFCM for review and approval before construction begins. With the Landscape Development Package, a copy of the Landscape Water Allowance Worksheet shall be completed by a Landscape

Architect or another licensed professional as recognized by the State of Utah to perform Landscape Architectural services and submitted to the DFCM.

B. All Landscape Plan Documentation Packages submitted must be prepared by a licensed Landscape Architect, or another licensed professional as recognized by the State of Utah to perform Landscape Architectural services

C. The Irrigation Plan must be prepared by a Landscape Architect, or another licensed professional as recognized by the State of Utah to perform Landscape Architectural services.

D. All landscape irrigation systems shall be installed by an Irrigation Contractor. The person representing the contracting firm shall be a full-time employee of the firm and shall be directly involved with the project including at least weekly site visits during construction.

E. All installers, designers and auditors shall meet state and local license, insurance and bonding requirements and be able to show proof of such upon demand.

F. During construction, site inspection of the landscaping may be performed by the DFCM, the local institution or agency.

G. During construction a mainline pressure and leak test will be conducted.

H. Following construction an inspection shall be scheduled with the DFCM to verify compliance with the approved landscape and irrigation plans. A Certificate of Substantial Completion Form shall be completed by the Contractor or Landscape Architect and submitted to the DFCM.

I. Following construction a Water Use Efficiency Review (Audit) will be conducted by a certified Landscape Irrigation Auditor. The auditor shall be independent of the contractor, design firm and owner/developer of the project. The water performance audit will verify that the irrigation system complies with the minimum standards required by this ordinance. The auditor shall furnish a certificate to the DFCM, Landscape Architect, and installer certifying compliance with the minimum distribution requirements and an irrigation schedule.

J. The DFCM reserves the right to perform site inspections at any time before, during or after the irrigation system and landscape installation, and to require corrective measures if requirements of this guideline are not satisfied.

4.10 Soils Definitions & Guidelines

A. Soluble salts. High levels of soluble salts make it difficult for plants to absorb water and can have direct toxic effects on many landscape plants. Electrical conductivity of the extracted soil solution (ECe) is the measure of soluble salts. Soluble salts are removed (leached) relatively easily by applying excess, low salt water to a well drained soil. This must be done before seeding or transplanting, since plants are most sensitive to salts at these times. See the related Utah State University Extension Bulletins Salinity and Plant Tolerance and Selection and Planting of Landscape Trees for more information about salinity tolerance.

B. pH. pH is an indication of the acidity or alkalinity (basic nature) of soil. A pH of 7.0 is neutral, while values below 7.0 are acidic and values above 7.0 are alkaline or basic. Most Utah soils have pH values in the mid-7.0 to low 8.0 range. Many plants grow well over a broad range of soil pH; however, some acid-loving plants such as blueberry, rhododendron and azalea will not grow well above pH7. Other sensitive plants are susceptible to iron deficiency (iron chlorosis) above pH 7.5. See the related Utah State Extension Bulletins Control of Iron Chlorosis in Ornamental and Crop Plants and Managing Soil pH in Utah for more information about iron chlorosis and soil pH.

C. Texture. Texture refers to the proportion (%) of sand-, silt, and clay-sized particles in the soil. The percentages by weight of sand, silt and clay are used to assign soil to a specific texture class (e.g., silt loam). Texture influences the water holding capacity, aeration (gas exchange), drainage, tilth and compaction and nutrient retention of soil. A mixture of sand, silt and clay is desirable. Soils are unacceptable if they are dominated by one particle size. It is not practical to change soil texture on a large scale. Large amounts of sand, silt or clay would be required to change soil texture and it is difficult to incorporate this material thoroughly. Large amounts of organic matter will improve the physical characteristics of soil composed of too much sand, silt or clay.

D. Organic matter. Organic matter is essential in the formation of soil structure, reducing soil compaction and retaining essential plant nutrients. Generally, the higher the level of organic matter, the better the soil quality. In Utah, native soil organic matter levels are low, often less than 1% by weight. Soil organic matter content can be increased by adding compost, peat moss or other organic amendments.

E. Coarse fragments. Coarse fragments (gravel, rocks, etc.) can, if present in large amounts, make it difficult to till, seed, aerate and generally manage soil in a landscape. Construction wastes such as concrete can also contribute unacceptable coarse fragments to soil. If percentage of coarse fragments is high, the soil should be screened before use.

F. Sodium adsorption ratio (SAR). The sodium adsorption ratio is a measure of the amount of sodium (an undesirable element) relative to calcium and magnesium (desirable elements) in soil. Soils with high SAR values tend to have poor structure and low water infiltration and percolation rates. Soils with a high SAR also have a high pH and/or ECe. If pH and ECe are within acceptable ranges, SAR should also be acceptable.

G. Nutrient concentrations. Nutrients are essential for plant growth. High quality topsoils normally have adequate phosphorus (P), potassium (K) and ire (Fe). Additional nitrogen (N) is usually required on an annual basis. If the topsoil meets these nutrient guidelines, then no additional fertilizer is needed until further soil tests indicate a deficiency.

Summary of Topsoil Quality Guidelines

Category	Soluble salts (dS/m or mmho/cm)	pH	Sand (%)	Silt (%)	Clay (%)	Texture class*	Organic Matter (%)	% Coarse fragments (>2 mm in diameter)**	Sodium Adsorption Ratio (SAR)*

Ideal	< 2	5.5 to 7.5	< 70	< 70	< 30	L,SiL	≥ 2.0	≤ 2	< 3 for any texture
Acceptable	< 4	5.0 to 8.2	< 70	< 70	< 30	SCL, SL, CL, SiCL	≥ 1.0	2.1 to 5.0	3 to 7 (SiL, SiCL, CL) 3 to 10 (SCL, SL, L)
Unacceptable	> 4	< 5.0 or > 8.2	> 70	> 70	> 30	LS, SC, SiC, S, Si, C	< 1.0	> 5.0	> 10 for any texture

* L = loam; SiL = Silt loam; SCL = sandy clay loam; SL = sandy loam; CL = clay loam; SiCL = silty clay loam; LS = loamy sand; SC = sandy clay; SiC = silty clay; S = sand; C = clay

** This guideline also includes no fragments larger than 1 ½ inch in diameter.

Nutrient Guidelines for Landscaping

Category	Nitrate-nitrogen (ppm or mg N/kg soil)	Phosphorus (ppm or mg P/kg soil)	Potassium (ppm or mg K/kg soil)	Iron (ppm or mg Fe/kg soil)
Acceptable	> 20	> 15	> 150	>10

Course Fragment Guidelines

Category	% Course fragments (Rocks) > 2mm	≥ 1.5" in diameter
Ideal	≤ 2.0	None
Acceptable	2.1 – 5.0	None
Unacceptable	> 5.0	Present

Compost Quality Guidelines for Landscaping

Category	pH	Soluble Salts dS/m or mmho/cm	Sodium Absorption Ratio (SAR)	Carbon:Nitrogen Ratio (C:O)	% Moisture	% Rocks (Coarse Fragments) > 2mm
Ideal	6 to 8	≤ 5	< 10	≤ 30:1	25 to 35	0
Acceptable	5-6, 8-9	≤ 20	≤ 20	31:1 to 50:1	< 25, > 35	≤ 5
Unacceptable	< 5, > 9	> 20	> 20	< 12:1, > 50:1	< 20, > 50	> 5

4.11 Plant List

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
DECIDUOUS TREES				
5 - 9			Acer buergeranum	Trident Maple
4 - 8	1 - 2	.50	Acer campestre	Hedge Maple
2 - 8	1 - 2	.50	Acer ginnala	Amur Maple
2 - 8	1	.25	Acer glabrum	Rocky Mountain Maple
4 -7	1	.25	Acer grandidentatum	Bigtooth Maple
4 - 8			Acer griseum	Paperbark Maple
2 -9	1	.25	Acer negundo	Boxelder, Ash-leaved or Manitoba Maple
4 - 8	1	.25	Acer nigrum	Black Maple
5 - 8			Acer palmatum	Japanese Maple
3 - 7	3	1	Acer platanoides	Norway Maple
5 - 7	2	.50	Acer pseudoplatanus	Sycamore Maple
3 - 9			Acer rubrum	Red Maple

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
3 - 9			Acer saccharinum	Silver Maple
4 - 8			Acer saccharum	Sugar Maple
3 - 8	1 - 2	.50	Acer tataricum	Tatarian Maple
4 - 8	2	.50	Acer trucatum	Shantung Maple or Purpleblow
7 - 8			Aesculus californica	California Buckeye
3 - 7			Aesculus glabra	Ohio Buckeye
3 - 8	2	.50	Aesculus hippocastanum	Horsechestnut
	2	.50	Aesculus sp.	Horsechestnut
3 - 8			Aesculus X carnea	Red Horsechestnut
4 - 8	0	0	Ailanthus altissima	Tree of Heaven
6 - 9			Albizia julibrissin	Mimosa, Silk Tree, Albizia
3 - 7	3	1	Alnus glutinosa	European or Common Alder
1-6	3	1	Alnus incana	Mountain Alder
1 - 7			Alnus tenuifolia	Thinleaf Alder or Mountain Alder
2 - 7			Amelanchier alnifolia	Saskatoon, Western Serviceberry
4 - 9			Amelanchier arborea	Downy Serviceberry
4	1	.25	Amelanchier laevis	Princess Diane Serviceberry, Cole's Select Serviceberry, Laevis Serviceberry
4 - 8			Amerlancier uthahensis	Utah Serviceberry
2 - 7			Betula papyrifera	Paper Birch
4 - 9			Betula nigra	River Birch
3 - 7	3	1	Betula occidentalis	Western Water Birch
2 - 7			Betula pendula	European White Birch
4 - 8			Carpinus betulus	European Hornbeam
3 - 9			Carpinus caroliniana	American Hornbeam, Musclewood
4 - 9			Castanea mollissima	Chinese Chestnut
5 - 9			Catalpa bignonioides	Southern Catalpa
5 - 9			Catalpa bignonioides 'Nana'	Umbrella Catalpa
4 - 9	1	.25	Catalpa speciosa	Western Catalpa
4 - 8	1	.25	Catalpa speciosa	Northern Catalpa
2 - 9	0 - 1	.25	Celtis occidentlis	Common Hackberry
5 - 9	0	0	Celtis reticulata	Netleaf Hackberry
4 - 8			Cercidiphyllum japonicum	Katsuratree
3 - 9	2	.50	Cercis canadensis	Eastern Redbud or Judas Tree
7 - 9			Cercis occidentalis	California or Western Red Bud
3 - 8			Cercocarpus ledifolius	Curlleaf Mountain Mahogany
			Cercocarpus montanus	Mountain Mahogany
8 - 10			Chilopsis linearis	Desert Willow
3 - 9			Chionanthus virginicus	Fringetree, White Fringetree
4 - 8			Cladrastis lutea	Yellowwood
4 - 9			Corylus americana	American Hazelnut
3 - 7			Cornus alternifolia	Pagoda or Alternate-Leaf Dogwood
5 - 9			Cornus florida	Flowering Dogwood
3 - 7			Cornus kousa	Kousa Dogwood
4 - 8			Cornus mas	Corneliancherry Dogwood
2 - 8			Cornus sericea	Red-osier or Red-Stemmed Dogwood
4 - 7			Corylus colurna	Turkish Filbert, Turkish Hazel

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
4 - 8			Corylus cornuta	Beaked Hazelnut
4 - 9			Cotinus coggyria	Common Smoketree, Smokebush
3 - 8			Cotinus obovatus	American Smoketree, Chittamwood
5 - 9			Cowania mexicana	Cliffrose, Quininebush
3 - 8	1	.25	Crataegus crusgalli	Cockspur Hawthorn
2 - 8			Crataegus douglasii	River Hawthorn, Black or Douglas Hawthorn
4 - 8			Crataegus laevigata	English Hawthorn
3 - 8	2	.50	Crataegus phaenopyrum	Washington Hawthorn
3 - 8	1 – 2	.50	Crataegus sp.	Hawthorn
4 - 8			Crataegus viridis	Green Hawthorn
4 - 8			Crataegus X lavallei	Lavalle Hawthorn
2 - 7	0 - 1	.25	Eleagnus angustifolia	Russian Olive
8 - 10			Eriobotrya japonica	Loquat
3 - 9			Fagus grandifolia	American Beech
4 - 7			Fagus sylvatica	European Beech
3 - 9	2	.50	Fraxinus pennsylvanica	Green Ash
3 - 9			Fraxinus americana	White Ash
6 - 9			Fraxinus anomala	Singleleaf Ash
3 - 9			Fraxinus excelsior	Eurpean Ash
4 - 7			Fraxinus quadrangulata	Blue Ash
7 - 9	0	0	Fraxinus velutina	Velvet or Modesto Ash
3 - 8	2	.50	Ginkgo biloba	Ginkgo, Maidenhair Tree
3 - 9	1	.25	Gleditsia triancanthos inermis	Thornless Honey Locust
3 - 8	1	.25	Gymnocladus dioicus	Kentucky Coffee Tree
5 - 9			Ilex opaca	American Holly
3 - 7			Juglans cinerea	Butternut
7 - 9			Juglans major	Arizona Walnut
4 - 9	2	.50	Juglans nigra	Black Walnut
4 - 8			Juglans regia	English or Persian Walnut
5 -9	1	.25	Koelreuteria paniculata	Goldenraintree
5 - 7			Laburnum X watereri	Goldenchain tree, Waterer Laburnum
7 - 9			Lagerstroemia indica	Crapemyrtle
2 - 6	3	1	Larix decidua	European Larch
5 -9			Liquidambar styraciflua	Sweetgum, American Sweetgum
4 - 9			Liriodendron tulipifera	Yellow-Poplar, Tuliptree, Tulip Poplar
4 - 9	1	.25	Maclura pomerifera	Osage Orange
3 - 8			Magnolia acuminata	Cucumber Tree, Cucumber Magnolia
6 - 9			Magnolia grandiflora	Southern Magnolia
6 - 9			Magnolia kobus	Kobus Magnolia
3 - 8			Magnolia X loebneri	Loebner Magnolia
4 - 9			Magnolia x soulangiana	Saucer Magnolia
3 - 9			Malus pumila	Apple
2 - 8	1 - 2	.50	Malus sp.	Apple including crabapples (many varieties)
8 - 10			Melia azedarach	Chinaberry
4 - 8	1 - 2	.50	Morus alba	Fruitless Mulberry
5 - 9			Morus rubra	Red Mulberry
6 - 9			Ostrya knowltonii	Knowlton Hophornbeam
3 - 9			Ostrya virginiana	Eastern Hophornbeam, Iron Wood
3 - 8			Phellodendron amurense	Amur Corktree

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
6 - 9			Pistacia chinesis	Chinese Pistache
4 - 9			Pistacia vera	Pistachio
4 - 9			Platanus occidentalis	American Sycamore or Plane Tree
4 - 8	2	.50	Platanus x acerifolia	London Plane Tree, Sycamore
3 - 9			Populus alba	White Poplar
3 - 8	1 - 2	.50	Populus alba 'Pyramidalis' or 'bolleana'	Bolleana Poplar
3 - 9			Populus angustifolia	Narrowleaf Cottonwood
2 - 5			Populus balsamifera	Balsam Poplar
2 - 8			Populus candicans	Balm of Gilead
2 - 9	2	.50	Populus deltoides	Eastern Cottonwood
5 - 9			Populus fremontii	Freemont Cottonwood
3 - 9			Populus nigra 'Italica'	Lombardy Poplar
	2	.50	Populus sp.	Cottonwood, improved "cottonless" varieties
3 - 7	3	1	Populus tremuloides	Quaking Aspen
3 - 8			Populus trichocarpa	Black Cottonwood
3 - 9			Populus X canadensis	Carolina Poplar
7 - 10			Prosopis juliflora	Honey Mesquite
4 - 9			Prunus armeniaca	Apricot
3 - 8			Prunus avium	Sweet Cherry, Mazzard
5 - 8			Prunus cerasifera	Purpleleaf, Cherry or Myrobalan Plum
3 - 9			Prunus cerasus	Sour Cherry
4 - 9			Prunus domestica	Common Plum
3 - 6			Prunus padus	European Birdcherry, May Day Tree
5 - 9			Prunus persica	Peach
4 - 7			Prunus sargentii	Sargent Cherry
5 - 9			Prunus serrulata	Japanese Flowering or Oriental Cherry
4 - 9			Prunus subhirtella	Higan Cherry
2 - 9	0	0	Prunus virginiana	Common Chokecherry
2 - 9	1	.25	Prunus virginiana "Canada Red"	Cananda Red Chokecherry
5 - 8			Prunus X yedoensis	Yoshino Cherry
3 - 9			Ptelea angustifolia	Common or Western Hoptree, Wafer-Ash
5 - 8	2	.50	Pyrus Calleryana	Callery Flowering Pear
4 - 9			Pyrus communis	Common Pear
3 - 7			Pyrus ussuriensis	Ussurian Pear
5 - 9			Quercus acutissima	Sawtooth Oak
3 - 9			Quercus alba	White Oak
3 - 8			Quercus bicolor	Swamp White Oak
4 - 8			Quercus cerris	Turkey Oak
4 - 8	0	0	Quercus gambelii	Gambel Oak / Scrub Oak
2	0	0	Quercus gambelii	Gambel's Oak
4 - 8			Quercus imbricaria	Shingle or Laureal Oak
2 - 8	1	.25	Quercus macrocarpa	Bur Oak
4 - 7			Quercus muehlenbergii	Chinkapin Oak
4 - 8			Quercus palustris	Pin Oak
4 - 8	2	.50	Quercus robur	English Oak
4 - 8	2	.50	Quercus rubra	Northern Red Oak
5 - 9			Quercus shumardii	Shumard Oak
7 - 9			Quercus trubinella	Shrub Live Oak
7 -9			Quercus undulata	Wavyleaf Oak

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
6 -9			Robinia neomexicana	New Mexico Locust
3 - 9			Robinia pseudoacacia	Black Locust
	0	0	Robinia pseudoacacia 'Purple Robe'	Purple Robe Locust
3 - 8	0 - 1	.25	Robinia x ambigua 'Idaho'	Idaho Flowering Locust
2 - 8			Salix amygdaloides	Peachleaf Willow
5 -8			Salix babylonica	Weeping Willow
			Salix exigua	Cotyote Willow
4 -9			Salix fragilis	Crack Willow
4 - 9			Salix matsudana	Hankow Willow 'Globe Navajo'
4 - 9			Salix nigra	Black Willow
5 - 9			Sambucus cerulea	Blue Elder
5 - 8	2	.50	Sophora japonica	Japanese Pagoda Tree
3 - 7			Sorbus alnifolia	Korean Mountain Ash
2 - 7			Sorbus americana	American Mountain Ash
3 - 7			Sorbus aucuparia	European Mountain-Ash or Rowan
2 - 6			Sorbus scopulina	Green Mountain Ash
	2	.50	Sorbus sp.	Mountain Ash
3 - 7	2	.50	Syringa retuculata	Japanese Tree Lilac
5 - 8			Tamarix ramosissima	Tamarisk, Salt-Cedar
	1	.25	Taxodium distichum	Bald Cypress
2 - 9	2	.50	Tilia americana	American Basswood, American Linden
3 - 7	3		Tilia cordata	Littleleaf Linden
4 - 7	2	.50	Tilia tomentosa	Silver Linden
3 - 7			Tilia X euchlora	Crimean Linden
4 -9			Ulmus parvifolia	Lacebark or Chinese Elm
3 - 9			Ulmus pumila	Siberian Elm
6 - 9			Yucca brevifolia	Joshua Tree
5 - 8	2	.50	Zelkova serrata	Japanese Zelkova
6 - 9			Zizyphus jujuba	Chinese Date
EVERGREEN TREES				
3 - 7	2 - 3	.75	Abies concolor	White Fir
1 - 5	3	1	Abies lasiocarpa	Subalpine or Alpine Fir
5 - 8	0	0	Calocedrus decurrens	Incense Cedar
6 - 9			Cedrus atlantica	Atlas Cedar
7 - 9			Cedrus deodara	Deodar Cedar
5 - 7			Cedrus libani	Cedar of Lebanon
5 - 9	1	.25	Cedrus sp.	Cedar
4 - 8			Chamaecyparis obtusa	Hinoki falsecypress
7 - 9			Cupressus arizonica	Arizona Cypress
7 - 9			Cupressus sempervirens	Italian Cypress
			Juniperis osteosperma	Utah Juniper
3 - 9			Juniperus chinensis	Chinese Juniper
3 - 7	0	0	Juniperus scopulorum	Rocky Mountain Juniper
4 - 7	0	0	Juniperus sp.	Juniper
2 - 9	0	0	Juniperus virginiana	Eastern Red Cedar
2 - 6	3	1	Larix decidua	European Larch
4 - 7			Larix kaempferi	Japanese Larch
4 -8			Metasequoia glyptostroboides	Dawn Redwood
2 - 7	2	.50	Picea abies	Norway Spruce
2 - 5	1	.25	Picea engelmannii	Engelmann spruce
2 - 6	2	.50	Picea glauca	White or Blackhills Spruce
4 - 7			Picea omorika	Serbian Spruce
2 - 7	2	.50	Picea pungens	Blue Spruce
5 - 7	1	.25	Pinus aristata	Bristlecone Pine

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
4 - 8			Pinus bungeana	Lacebark Pine
2 - 6			Pinus contorta var. latifolia	Lodge Pole Pine
3 - 7	1	.25	Pinus densiflora	Japanese Red Pine
4 - 8	0	0	Pinus edulis	Pinyon Pine
4 - 7	1	.25	Pinus flexilis	Limber Pine
8 - 10			Pinus halepensis	Aleppo Pine
	1	.25	Pinus heldreichii leucodermis	Bosnian Red Cone Pine
	1	.25	Pinus jeffreyi	Jeffrey Pine
4 - 7	1	.25	Pinus longaeva	Bristlecone Pine
5 - 9	1	.25	Pinus monophylla	Singleleaf Pinyon Pine
5 - 8			Pinus monticola	Western White Pine
2 - 8	1	.25	Pinus mugo	Mugo Pine
4 - 7	1	.25	Pinus nigra	Austrian Pine
4 - 7			Pinus parviflora	Japanese White Pine
3 - 7	1	.25	Pinus ponderosa	Ponderosa Pine
5 - 9			Pinus strobiformis	Southwestern White Pine
3 - 8			Pinus strobus	Eastern White Pine
2 - 8	1	.25	Pinus sylvestris	Scotch Pine
5 - 9	1	.25	Pinus thunbergiana	Japanese Black Pine
5 - 7	1	.25	Pinus wallichiana	Himalayan White Pine
4 - 6	2	.50	Pseudotsuga menzeisii 'Glauca'	Rocky Mountain Fir
4 - 6			Pseudotsuga menziesii	Douglas Fir
6 - 8	2	.50	Sequoiadendron giganteum	Giant Sequoia
4 - 9			Taxodium distichum	Baldcypress
6 - 9			Thuja (Platycladus) orientalis	Oriental Arborvitae
2 - 8	2	.50	Thuja occidentalis	American Aborvitae or Northern White Cedar
5 - 7			Thuja plicata	Western Red Cedar
SHRUBS				
3 - 5	2	.50	Abies balsamea 'Nana'	Dwarf Balsam Fir
4 - 9			Amelanchier utahensis	Utah Serviceberry
4 - 5	0 – 1	.25	Amerlancier alnifolia	Saskatoon Serviceberry
2	0 - 1	.25	Amorpha canescens	Lead Plant
2	1	.25	Amorpha fruticosa	False Indigo
2 - 6	0		Arctostaphylos patula	Greenleaf manzanita
3 - 8	1 - 2	.50	Aronia melanocarpa	Black Chokeberry
	0	0	Artemisia tridentata	Big Sage, Sagebrush
3	0	0	Artemsia cana	Silver Sagebrush
			Artemsia filifolia	Sand Sagebrush
2	0	0	Artemsia frigida	Fringed Sagebrush
			Artemsia ludoviciana	Prairie Sagebrush
			Artemsia nova	Black Sagebrush
	0	0	Atriplex canescens	Fourwing Salt Bush
			Atriplex confertifolia	Shade Scale
	0	0	Atriplex gardneri	Gardner Salt Bush
	1 – 2	.50	Berberis sp.	William Penn Barberry, Crimson Pygmy Barberry
5 - 8	1 – 2	.50	Berberis sp. (screening varieties)	Mentor Barberry, Red Leaf Barberry, Rose Glow Barberry
5 - 9	2	.50	Buddleia sp.	Butterfly Bush
	2	.50	Buxus Microphylla 'Winter Gem'	Winter Gem Boxwood
5 - 6	2	.50	Buxus Sempervirens	Common Boxwood
2 - 7	0 - 1	.25	Caragana arborsecens	Siberian Peashrub
3 - 7	1	.25	Caragana pygmaea	Pygmy Peashrub
	1	.25	Caryopteris clandonensis	Blue Mist Spirea

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
			Ceanothus intergerrimus	Deer Brush
			Ceanothus martinii	Utah Mountain Lilac
			Ceratoides lanata	Winterfat
2	0	0	Cercocarpus ledifolius	Curl-leaf Mountain Mahogany
2	0	0	Cercocarpus montanus	True Mountain Mahogany
4 - 8	1	.25	Chaenomeles japonica	Flowering Quince
4	0 - 1	.25	Chamaebatiaria millifolium	Fernbush
			Chilopsis linearis	Desert Willow
			Chrysothammnus ssp.	Rabbit Brush
	0	0	Chrysothamnus nauseosus	Rubber Rabbitbrush
			Clematis ligusticifolia	White Virgin's Bower
5 - 7	0	0	Collutea arborescens	Bladdersenna
5 - 9	2	.50	Continus coggygria	Smoke Tree or Smokebush
2 - 8	2	.50	Cornus Sericea	Redstem Dogwood
	2	.50	Cornus Sericea 'Kelseyi'	Dwarf Kelsey Dogwood
2 - 8	2	.50	Cornus sp.	Red Twig Dogwood, Yellow Twig Dogwood, Tartarian Dogwood
4 - 7	1	.25	Cotoneaster acutifolius	Peking Cotoneaster
5 - 7	1	.25	Cotoneaster apiculatus	Cranberry Cotoneaster
5 - 7	1	.25	Cotoneaster divaricatus	Spreading Cotoneaster
4 - 7			Cotoneaster horizontalis	Rock Cotoneaster
4 - 7	1	.25	Cotoneaster lucidus	Hedge Cotoneaster
	0	0	Cowania mexicana	Cliff Rose
5 - 8	1	.25	Cytisus sp.	Broom
4 - 8	2	.50	Daphne burkwoodii	Daphne
3 - 6	0	0	Ephedra viridis	Mormon Tea or Brigham Tea
			Eriogonum corymbosum	Freemont's Buckwheat
3 - 8	2	.50	Euonymous alata	Winged Euonymous
5 - 8	2	.50	Euonymous alatus 'Compacta'	Dwarf Winged Euonymus or Dwarf Frebush
7 - 9	2	.50	Euonymus japonica	Evergreen Euonymous
7 - 9	2	.50	Euonymus japonica 'Microphylla'	Box Leaf Euonymous
5 - 8	2	.50	Euonymus kiatschovica 'Manhatten'	Manhatten Euonymous
5	0	0	Fallugia paradoxa	Apache Plume
6	0	0	Forestiera neomexicana	New Mexico Privet or Desert Olive
	1	.25	Forsythia sp.	Forsythia
5 - 8	2	.50	Forsythia x intermedia	Forsythia
	1	.25	Genista Lydia	Lydia Broom
			Grayia spinosa	Snakebrush/Hop Sage
5 - 8	1	.25	Hibiscus syriacus	Confederate Rose, Rose of Sharon
	1	.25	Holodiscus discolor	Ocean Spray
3	0 - 1	.25	Holodiscus dumosus	Rockspray Spirea
			Jamesia americana	Waxflower, Cliff Jamesia
3 - 9	0 - 1	.25	Juniperus chinesis	Phitzer Juniper, Blue Point Juniper and other upright varieties
2 - 6	0 - 1	.25	Juniperus communis	Common Juniper
3 - 9	1	.25	Juniperus horizontalis	Creeping Juniper
3 - 9	0 - 1	.25	Juniperus Sabina	Tam Juniper or Savin Juniper (many varieties)
	1	.25	Kolkwitzia amabilis	Beauty Bush

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
5 - 7	2	.50	Ligustrum vulgare	Common Privet (several varieties for screening)
	1	.25	Lonicera sp.	Zabelli Honeysuckle, Tatarian Honeysuckle
5 - 8	1 - 2	.50	Mahonia aquifolium	Oregon Grapeholly
3	0	0	Mahonia fremontii	Fremont Barberry
3	1	.25	Mahonia repens	Creeping Mahonia
	2	.50	Pachistma myrsinites (may also be listed as "Paxistima")	Mountain Lover
	2	.50	Paeonia Suffruticosa	Tree Peony
	0	0	Peraphyllum ramosissimum	Squaw Apple
			Petrophytum caespitosum	Rock Spirea, Tufted Rock Mat
7 - 8			Philadelphus microphyllus	Littleleaf Mockorange
4 - 8	1	.25	Philadelphus sp.	Mockorange, Sweet Mockorange (dwarf varieties also available)
			Physocarpus malvaceus	Mountain Ninebark
2 - 7	1	.25	Physocarpus sp.	Ninebark
2 - 6	2	.50	Picea glauca 'Conica'	Dwarf Alberta Spruce
2 - 7	1	.25	Pinus mugo	Mugo Pine
	1	.25	Pinus mugo pumilo	Dwarf Mugo Pine
2 - 7	1	.25	Potentilla fruticosa	Shrubby Cinquefoil
3 - 6	0 - 1	.25	Prunus besseyi	Western Sand Cherry
4 - 8	2	.50	Prunus glandulosa	Dwarf Flowering Almond
2	0	0	Prunus tomentosa	Nanking Cherry
2 - 6	1	.25	Prunus virginiana	Chokecherry
	2	.50	Prunus x cistena	Purple Sand Cherry
3 - 6	0	0	Purshia mexicana var. stansburiana	Cliff Rose
	0	0	Purshia tridentata	Antelope Bitterbrush
	2	.50	Pyracantha angustifolia	Dwarf Pyracantha
5 - 9	2	.50	Pyracantha coccinea	Pyrancantha, Firethorn
2 - 7	1	.25	Rhamnus cathartica	Tallhedge Buckthorn
2 - 9	0 - 1	.25	Rhus glabra	Smooth Sumac
2 - 9	1	.25	Rhus glabra 'Cismontana'	Dwarf Mountain Sumac
2	0	0	Rhus trilobata	Oakbrush Sumac, Oakleaf Sumac, Skunkbrush
3 - 8	1	.25	Rhus typhina	Staghorn Sumac
2 - 7	1	.25	Ribes sp.	Alpine Currant, Golden Currant
3 - 6	2	.50	Ribes aureau	Golden Current
4	0 – 1	.25	Rosa foetida	Copper Rose
5 - 8	1	.25	Rosa foetida bicolor	Austrian Brier Rose
5 - 8	1	.25	Rosa foetida 'Persiana'	Persian Yellow Rose
	2	.50	Rosa meideland	Meideland Rose and Others
2 - 8	1	.25	Rosa rubrifolia	Redleaf Rose
2 - 7	0 - 1	.25	Rosa rugosa	Rugosa Rose
2	1	.25	Rosa woodsii	Woods Rose
	1	.25	Rubus deliciosus	Colorado Thimbleberry
3	2	.50	Salix purpurea	Dwarf Blue Arctic Willow
3 - 6	0	0	Salvia dorrii	Dorr's Sage
			Sambucus caerulea	Blue Elderberry
	1	.25	Sambucus sp.	Elderberry
2 - 6	0	0	Shepherdia argentea	Silver Buffaloberry
3 - 6	0	0	Shepherdia rotundifolia	Roundleaf Buffaloberry
2 - 6	0	0	Shepherdia sp.	Buffaloberry
			Sorbus scopulina	Rocky Mountain Ash

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
3 - 8	2 - 3	.75	Spiraea x bumalda	Bumald Spiraea
3 - 8	2	.50	Spiraea x vanhouttei	Bridal Wreath Spiraea
3 - 7	1 - 2	.50	Symphoricarpos albus	Common Snowberry
			Symphoricarpos occidentalis	Mountain Snowberry
2	2	.50	Symphoricarpos oreophilus	Mountain Snowberry
3 - 7	2	.50	Syringa meyeri 'Palibin'	Dwarf Korean Lilac
3 - 7	1 - 2	.50	Syringa patula 'Miss Kim'	Dwarf Korean Lilac or Miss Kim Lilac
3 - 7	1	.25	Syringa vulgaris	Common Lilac (many varieties)
6 -7	3	1	Taxus baccata	English Yew
4 - 7	3	1	Taxus cuspidata	Japanese Yew
4 - 7	3	1	Taxus x media	Anglojap Yew
6	2	.50	Taxus sp. (low, spreading)	Spreading English Yew, Dwarf Japanese Yew and Others
4 - 7	2	.50	Taxus sp. (screening)	Hick's Yew, Japanese Yew, Upright Yew, Brown's Yew and Others
			Tetradymia	Horsebrush
5	2	.50	Thuja sp. (low, spreading)	Woodward Globe Arborvitae, Little Giant Arborvitae and Others
	2	.50	Thuja sp. (screening)	Emerald Arborvitae, Blue Cone Arborvitae and Others
3 - 8	2	.50	Viburnum rhytidophyllum	Leatherleaf Viburnum
3 - 8	2	.50	Viburnum sp.	Arrowwood Viburnum, Burkwood Viburnum, Cranberry Bush
5 - 8	2	.50	Weigela florida	Weigela
			Yucca angustissima	Narrow Leaved Yucca
			Yucca elata	Soaptree Yucca
4 - 6	0	0	Yucca filamentosa	Yucca
4			Yucca glauca	Great Plains Yucca
	0	0	Yucca sp.	Yucca
VINES AND GROUND COVERS				
	2	.50	Aegopodium podagraria	Bishop's Weed
	2	.50	Arabis caucasica	Rock Cress
	2	.50	Arctostaphylos uva-ursi	Kinnikinnick
4 - 9	1	.25	Campsis radicans	Trumpet Vine
	1	.25	Cerastium tomentosum	Snow In Summer
	1 – 2	.50	Clematis 'Hybrids'	Clematis
	1	.25	Convallaria majalis	Lilly-of-the-Valley
5 - 7	1 – 2	.50	Cotoneaster sp.	Cotoneaster
	2	.50	Delosperma cooperi	Delosperma, Ice Plant
	2	.50	Delosperma nubigenum	Yellow Ice Plant
4 - 8	2	.50	Euonymus fortunei	Winter Creeper
	0	0	Euphorbia myrsinites	Spurge
	1	.25	Fragaria sp.	Wild Strawberry
	2	.50	Galium odoratum	Sweet Woodruff
5	1	.25	Genista pilosa	Vancouver Gold Genista
	2	.50	Hedera helix	English Ivy
	1	.25	Helianthemum nummularium	Sunrose, Rockrose
5	2	.50	Hypericum calcinum	Aaron's Beard, St. John's Wort
3 - 9	0 – 1	.25	Juniperus sp.	Juniper (many species and varieties)
4	1	.25	Lonicera japonica	Japanese Honeysuckle

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
5	0	0	Mahonia repens	Creeping Oregon Grape
	2	.50	Pachistima canbyi	Mountain Lover
	2	.50	Pachysandra terminalis	Pachysandra
	0 – 1	.25	Parthenocisisis sp.	Virginia Creeper, Boston Ivy
4 - 7	1	.25	Polygonum aubertii	Silverlace Vine
3 - 9	1	.25	Rhus aromatica	Grow Low Sumac
5 - 7	1	.25	Rosa sp.	Spreading Rose
	1	.25	Sedum sp.	Utah Green Sedum, Goldmoss Sedum, Green Stonecrop, Dragon's Blood Sedum
	1	.25	Sempervivum tectorum	Hens And Chicks
4	2	.50	Thymus sp.	Woolly Thyme, Pink Creeping Thyme
	1	.25	Vinca major	Periwinkle
	2	.50	Vinca minor	Dwarf Periwinkle
	1 – 2	.50	Vitis sp.	Grapes
4 - 9	2	.50	Wisteria	Wisteria
ORNAMENTAL GRASSES				
			Achantherum lettermanii	Needlegrass
			Achnatherum hymenoides	Indian Rice Grass
			Aristida purpurea	Purple Threeawn "No Eat-Um"
			Bouteloa curtipendula	Sideoats Grama
	1	.25	Bouteloa gracilis	Blue Grama
			Bromus anomalus	Nodding Brome
			Bromus carinatus/marginatus	California, Mountain Brome
	0	0	Buchloe dactyloides	Buffalograss
	1	.25	Calamagrostis x acutiflora 'Stricta'	Feather Reed Grass
			Danthonia intermedia	Oat Grass
			Deschampsia caespitosa	Tufted hairgrass, Salt & Pepper
			Elymus elymoides	Bottlebrush Squirrel Tail
	0	0	Elymus glaucus	Blue Oat Grass
			Elymus lanceolatus	Thickspike Wheatgrass
			Elymus trachycaulus	Slender Wheatgrass
CS	2	.50	Festuca arundinacea	Tall Fescue
			Festuca idahoensis	Idaho Fescue
CS	0	0	Festuca ovina	Sheep Fescue
	1	.25	Festuca ovina glauca	Blue Sheep Fescue
CS	3	1	Festuca rubra	Red Fescue
			Festuca subulata	Bearded Fescue
			Hesperostipa comata	Needle and Thread Grass
			Hilaria jamesii	Galleta Curly Grass
			Koeleria macrantha	June Grass
			Leymus cinereus	Great Basin Wild Rye
CS	3	1	Lolium perenne	Pernnial Rye
			Melica bulbosa	Onion Grass
			Melica spectabilis	Purple Onion Grass
	1	.25	Miscanthus sinensis 'Gracillimus'	Maidenhair Grass
			Muhlenbergia montana	Scratch Grass
			Muhlenbergia richardsonis	Mat Muhly
CS	0	0	Oryzopsis hymenoides	Indian Ricegrass
			Pascopyrum smithii	Western Wheatgrass
	0	0	Pennisetum ruppelii	Fountain Grass
			Poa ampla	Big Bluegrass

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
			Poa curta	Wasatch Bluegrass
			Poa fendleriana	Mutton Bluegrass
CS	3	1	Poa pratensis	Kentucky Bluegrass
			Poa secunda	Sandbergs Bluegrass
			Pseudoregneria spicatum	Bluebunch Wheatgrass
			Schizachyrium scoparium	Little Bluestem
			Sporobolus airoides	Alkali Sacaton
			Sporobolus cryptandrus	Sand Dropseed
	1	.25	Stipa sp.	Needlegrass, Needle and Thread Grass
			Stipa speciousa	Desert Needlegrass
			Stipa viridula	Green Needlegrass
HERBACIOUS PERENNIALS				
3	0	0	Achillea millifolium	Milfoil Yarrow
	0	0	Achillea sp.	Yarrow (many varieties)
			Actaea rubra	Baneberry
4 - 8	3	1	Aegopodium podagraria 'Variegatum'	Bishop's Weed
	1	.25	Aesclepias tuberosa	Butterfly flower
HERBACIOUS PERENNIALS				
3	0	0	Achillea millifolium	Milfoil Yarrow
	0	0	Achillea sp.	Yarrow (many varieties)
			Actaea rubra	Baneberry
4 - 8	3	1	Aegopodium podagraria 'Variegatum'	Bishop's Weed
	1	.25	Aesclepias tuberosa	Butterfly flower
			Agastache ssp.	Wild Hyssop
	2	.50	Alcea rosea	Hollyhock
			Allium ssp.	Wild Onion
	2	.50	Alyssum saxatalis	Basket of Gold
	2	.50	Anacyclus depressus	Mount Atlas Daisy
4	1	.25	Anaphalis margaritacea	Pearly Everlasting
			Anemone patens	Wind Flower
	1	.25	Anemone pulsatilla	Pasque Flower
			Antennaria dimorpha	Pussy Toes
			Antennaria microphylla	Pearly Pussy Toes
4	2	.50	Antennaria rosea	Pink Pussy Toes
			Apocynum	Spreading Dogbane
	2	.50	Aquilegia sp.	Columbine
5	2	.50	Arabis caucasica	Rock Cress
			Arabis ssp.	Rockcress
			Arenaria ssp.	Sandwort
			Argenone munita	Armed Prickly Poppy
4	2	.50	Armeria maritima	Common Thrift or Sea Pink
			Arnica cordifolia	Heart Leaf Arnicea
3	0	0	Artemesia frigida	Fringed Sage
			Artemesia ludoviciana	Prairie Sagebrush
3	0	0	Artemisia schmidtiana	Silver Mound
	0 – 2	.25	Artemisia sp.	Wormwood, Sagebrush
			Asclepias asperula	Spider Milkweed
3	1	.25	Asclepias tuberosa	Butterfly Milkweed or Butterfly Weed
	0 – 2	.25	Aster sp.	Alpine Aster, Hardy Aster, Michaelmas Daisy, Pacific Aster
			Astragulas ssp.	Milkvetch
4	1	.25	Aubrieta deltoidea	Purple Rock Cress
4	2	.50	Aurinia saxatile campactum	Dwarf Basket of Gold

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
			Balsamorhiza ssp.	Balsamroot
4	2	.50	Baptisia australis	Blue False Indigo
			Berberis fendlerii	Freemont Barberry
	2	.50	Bergenia cordifolia	Bergenia, Saxifrage
			Brickellia grandiflora	Tasselflower
	1	.25	Bulbs	Spring Flowering Bulbs
3	0 - 1	.25	Callirhoe involucrata	Poppy Mallow
			Calochortus nuttallii	Sego Lilly
			Calylophus lavandulifolia	Evening Primrose
			Camassia quamash	Blue Camas
3	3		Campanula rotundifolia	Bell Flower or Bluebells of Scotland
	2	.50	Campanula sp.	Carpathian Harebell, Serbian Bellflower, Bluebells of Scotland and others
			Castelleja ssp.	Indian Paint Brush
3	1	.25	Centaurea montana	Bachelor Button
4	1	.25	Centranthus ruber	Keys Of Heaven, Jupiter's Beard, Red Valerian
3	2	.50	Cerastium tomentosum	Snow-in-Summer
			Chaenactis douglasii	Dusty Maidens
	2	.50	Cheiranthus cheiri	Wallflower
	2	.50	Chrysanthemum maximum	Shasta Daisy
4	2	.50	Chrysanthemum x superbum	Shasta Daisy
			Clemantis hirsutissima	Lionsbeard, Sugarbowls
	2	.50	Coreopsis grandiflora	Coreopsis, Pot of Gold
4	2	.50	Coreopsis verticillata	Threadleaf Coreopsis
	1	.25	Corydalis lutea	Yellow Corydalis
			Crepis acuminata	Hawksbeard
			Crypthantha flava	Yellow Forget-Me-Not
			Crypthantha humilis	Dwarf Forget-Me-Not
			Dephinium nuttalianum	Perrenial Larkspur
2	2	.50	Dianthus "Zing Rose"	Zing Rose Dianthus
2	2	.50	Dianthus barbatus	Sweet William
2	2	.50	Dianthus sp.	Hardy Carnation, Sweet William, Maiden Pinks
3	3	1	Dicentra eximia	Fringed Bleeding Heart
2	3	1	Dicentra spectabilis	Bleeding Heart
3	0 - 1	.25	Echinacea purpurea	Purple Coneflower
			Epilobium angustiolium	Fireweed
	2	.50	Epimedium x rubrum	Barrenwort
			Erigeron ssp.	Yellow Daisy, Fleabane
	0	0	Eriogonum umbellatum	Sulphur Flower
			Eriophyllum lanatum	Woolyleaf, Oregon Sunshine
			Erogonum ssp.	Buckwheat
	2	.50	Eryngium alpinum	Blue Sea Holly
			Erysimum asperum	Pretty Wallflower
			Erythronium grandiflorum	Glacier Lily, Dogtooth Violet
	2	.50	Euphorbia epithymoides	Cushion Flower, Spurge
4	0	0	Euphorbia polychroma	Cushion Spurge
			Fragaria vesca	Woodland Strawberry
			Fritillara pudica	Yellow Bell
3	0	0	Gaillardia aristata	Blanketflower
3	0	0	Gaillardia aristata	Indian Blanket Flower
3	0 – 1	.25	Gaillardia sp.	Blanket Flower, Firewheel
			Gaura coccinea	Scarlot Guara
	2	.50	Gaura lindheimeri	Gaura, Whirling Butterflies

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
	0 – 2	.25	Geranium sp.	Cranesbill, Wild Geranium
			Geranium viscosissimum	Sticky Purple Geranium
	0 – 2	.25	Geum sp.	Geum, Grecian Rose
			Geum Triflorum	Prairie Smoke, Old Man's Beard
			Gilia aggregata	Scarlet Gilia
	2	.50	Gypsophila paniculata	Baby's Breath
			Haplopappus acaulis	Goldenweed, Jimmyweed
			Hedysarum boreale	Sweetvetch
			Helenium hoopesii	Orange Sneezeweed
			Helianthella uniflora	Little Sunflower
3	1 -2	.50	Hemerocallis hybrid	Daylily
	1	.25	Herniaria glabra	Green Carpet, Rupture Wort
			Heterotheca villosa	Golden Hoary Aster
			Heuchera rubescens	Coralbells, Alumroot
	2	.50	Heuchera sanguinea	Coral Bells
	2	.50	Hibiscus moscheutos	Perennial Hibiscus
	2	.50	Hosta sp.	Plantain Lily
			Hydrophyllum capitatum	Ballhead Waterleaf
			Hymenoxys acaulis	Stemless Woolybase
3	2	.50	Iberis Sempervirens	Candytuft
			Iliamna rivularis	Wild Hollyhock
3	1	.25	Iris Hybrids	Iris
	1	.25	Iris missouriensis	Missouri Iris
	2		Iris sibirica	Siberian Iris
	1	.25	Iris x germanica	German Bearded Iris
5	1	.25	Kniphofia uvaria	Red Hot Poker
			Lathryus pauciflorus	Utah Sweet Pea, Wild Sweet Pea
	1	.25	Lavandula angustifolia	English Lavender
			Lesquerella multiceps	Bladderpod
			Lewisia rediviva	Bitterroot
	2	.50	Liatris spicata	Gayfeather
	2	.50	Limonium latifolium	Statice, Sea Lavender
			Linanthastrum nuttallii	Flaxflower
	1	.25	Linaria purpurea	Toad Flax
3	0	0	Linum perenne	Flax
	0 – 1	.25	Linum sp.	Golden Flax, Perennial Flax, Native Blue Flax
			Lomatium ssp.	Biscuitroot
			Lonicera involucrata	Utah Twinberry
3	3		Lupinus 'Russel Hybrid'	Lupine
3	2	.50	Lychnis sp.	Maltese Cross, Rose Campion
			Mentzelia laevicaulis	Blazing Star
			Mertensia brevistyla	Wasatch Bluebell
			Mertensia ciliata	Mountain Bluebell
			Mertensia oblongifolia	Western Bluebell
			Mirabilis multiflora	Showy Four-O-Clock
3	1	.25	Monarda didyma	Bee Balm
			Mondardella odoratissima	Cloverhead Horsemint
3	2	.50	Narcissus species	Daffodil
2	2	.50	Oenothera elata	Showy Primrose
3	1	.25	Oenothera missourensis	Missouri Primrose
2	0 – 1	.25	Oenothera sp.	Evening Primrose
			Osmohiza occidentalis	Western Sweet Cicely
			Oxytropis lambertii	Crazyweed, Locoweed
			Oxytropis sericea	Silky Crazyweed

4.12 Irrigation Schedule Form Instructions

A. A monthly irrigation schedule shall be prepared to cover the initial 120-day plant establishment period and the following one-year period. The irrigation schedule shall be prepared by a Landscape Architect or another licensed professional as recognized by the State of Utah. Attached is a suggested form for the irrigation schedule. The preparer may use this form or follow another appropriate format.

B. The schedule should rely on monthly Reference Evapotranspiration (ET_o) data for the Salt Lake County area. Once established, turf can be maintained in an attractive manner at approximately 100 percent of the ET_o rate under normal weather conditions. Water-Conserving Plants typically need 50 percent or less of the ET_o under normal weather conditions. The amount of water applied for each valve should also be adjusted for Irrigation Efficiency, local rainfall, specific site conditions (e.g., water holding capacity and infiltration rate). Ultimately, the amount and frequency or irrigation will need to be monitored regularly to adjust for plant growth, climatic changes and site conditions.

C. For valves with overhead Spray or Stream Sprinklers, set valves to operate between 6:00 pm and 10:00 am to reduce water loss from wind and evaporation. Early morning irrigation is recommended for turf and ground cover. On slopes and soils with slow infiltration rates, program valves for multiple repeat cycles to reduce runoff.

D. The following chart is an example for the Salt Lake Count Area. For the water allowance formula the relative ET_o is to be used in accordance to the location of the project.

Estimated Monthly ET_o for Salt Lake (Airport)												
											Annual	
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**ET_o**
--	--	0.31	1.89	3.39	4.64	5.39	4.53	2.72	1.38	--	--	24.26

IRRIGATION SCHEDULE FORM

Project Name:	
Project Address:	
Prepared By:	
Company	
Telephone #	
Fax #	

Valve Station Number (A)	Plant Type (B)	Irrigation Type (C)	Flow Rate (D)	Precip-itation Rate (E)	Initial Plant Establishment Period (4 Months)				Following One-Year Period (12 Months)											

Note: This irrigation schedule should be used as a guide. The landscaping should be monitored regularly and the schedule adjusted as needed for plant growth, local rainfall, and climate conditions. Check irrigation system frequently to minimize run off and over-spray. Schedule valves with sprinklers to irrigate between 6 PM and 10:00 AM to reduce water loss from wind and evaporation.

Jul	Month
15	Run time (minutes per day)
3	Run time (Days per week

WATER ALLOWANCE WORK SHEET

Project Name: _____

Project Location:_____

ET Rate: _____

Water Use (gallons) = ET x PF x Area / IE x .62

Where:

ET = Reference Evapotranspiration in inches per growing season
PF = Plant Factor
Area = Total irrigated landscape area in square feet
IE = Irrigation Efficiency
.62 = Conversion to gallons

Total Gallons Allowed

Hydro Zone		ET*	PF	Total Area	IE	conv.	Gallons
Bench Mark			1.00		1.0	0.62	

* 24.26 is the ET rate for the Salt Lake Airport

Total Gallons Needed

Hydro Zone	Plant Description	ET	PF	Area	IE	conv.	Gal's per zone
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						Total	

Total gallons needed divided by total gallons allowed = % of allowable water: _____

SUBSTANTIAL COMPLETION FORM

Project Name: _____

Project Address: _____

I/We hereby certify the following:

1. The landscaping work for the above project has been completed in substantial conformance to the DFCM Landscape and Irrigation Standards (Guidelines)

2. The automatic controller has been set according to the approved irrigation schedule for the plant establishment period.

3. A Water Use Efficiency Review (audit) has been conducted on the completed landscape. The irrigation system has been adjusted to meet the minimum Irrigation Efficiency required by the DFCM and minimize overspray and runoff.

4. A copy of the irrigation schedule has been give to the property owner, and the DFCM.

5. A completed set of record drawings have been given to the DFCM.

Comments: _____

_____

Substantial Completion Form prepared by:

Signature: _____ Date: _____

Company: _____ License No.: _____

Address: _____

_____

Telephone: _____

Water Use Efficiency Review (Audit) Certified by:

Signature: _____ Date: _____

Company: _____ License No.: _____

Address: _____

_____

Telephone: _____

PROJECT DATA FORM

Project Name: _____

Project Address: _____

Type of Facility:

Type of Facility	Water Allowance (% of allowable water used)	
A.	Office type buildings	50%
B.	Existing campus/institution	70%
C.	New campus/institution	60%
D.	Recreational areas (ball fields etc.)	70%
E.	State Parks (natural areas)	10%

Landscape Architect:

Signature: _____ Date: _____

Company: _____ License No.: _____

Address: _____

_____

Telephone: _____

Landscape Contractor:

Signature: _____ Date: _____

Company: _____ License No.: _____

Address: _____

_____

Telephone: _____

4.13 Resources

Larry A. Rupp, William A. Varga, Teresa A. Cerny, Chad R. Reid, Mike Kuhns, *Selection and Culture of Landscape Plants in Utah. A Guide for High Mountain Valleys (Rich, Morgan, Summmit, Daggett, and Wasatch Counties).* Utah State University Extension, December 2002

Larry A. Rupp, Dana Libbey, Selection and Culture of Landscape Plants in Utah. *A Guide for Castleland RC&D Carbon, Emery, Grand, and San Juan Counties.* Utah State Extension, April 1996

Teresa A. Cerny, Larry A. Rupp, Chad R. Reid, Mike Kuhns, *Selection and Culture of Landscape Plants in Utah. A Guide for Southwestern and Central Utah (Iron, Beaver, Kane, Millard, Juab, Sanpete, Sevier, Piute, Wayne, Garfield, and parts of Washington Counties).* Utah State University Extension, December 2002

Mike Kuhns, Larry Rupp, *Selecting and Planting Landscape Trees.* Utah State University Extension, Second Edition July 2000

The Planning Division of the Salt Lake City Community & Economic Development Department, *Water Conserving Plants for Salt Lake City.* Salt Lake City , Utah, September 1995

Lone Peak Conservation Nursery State of Utah, Utah State University, Natural Resource and Environmental Policy Program, Department of Landscape Architecture and Environmental Planning, *Utah Native Plant List.* April 2002

Rich Koenig, Von Isaman, *Top Soil Quality Guidelines for Landscaping.* Utah State University Extension, June 2002

Utah Irrigation Association, *Water Efficient Landscape Ordinance for Commercial Business Number.* Draft, Aug. 26, 2000

Utah Irrigation Association, *Water Efficient Landscape Ordinance for Commercial Business Number.* Draft, May 22, 2001

Utah Irrigation Association, *Water Efficient Landscape Ordinance for Commercial Business Number.* Draft, June 7, 2001

Irrigation Standards Committee of The Utah Irrigation Association, *Minimum Standards for Efficient Landscape Irrigation System Design and Installation.* Version 2002

Utah Irrigation Association, *Best Management Practices of Landscape Irrigation.* Draft, 4/25/02

Utah Irrigation Association, *Glossary of Terms.* Version 2002

Jim Knopf, *Water Wise Landscaping with Trees Shrubs & Vines, A Xeriscape Guide for the Rocky Mountain Region California & the Desert Southwest.* Chamisa Books 1999

Jim Knopf, The Xeriscape Flower Gardener, *A Waterwise Guide for the Rocky Mountain Region.* Johnson Books: Boulder 1991

Dr. Rich Koenig, Utah State University Cooperative Extension Soil Specialist, and Von Isaman, President of QA Consulting and Testing, *LLC.Topsoil Quality Guidelines for Landscaping,* June 2002, AG/SO-02

Von Isaman, President of QA Consulting and Testing LLC., Dr. Rich Koenig, USU Cooperative Extension Soils Specialist, and Teresa Cerny, USU Cooperative Extension Horticulturist, March 7, 2002. Draft Guidelines

5.0 HIGH PERFORMANCE BUILDING RATING SYSTEM

5.1 General

A. This section defines a High Performance Building Rating System for Buildings except Low-Rise Residential Buildings.

B. If required by contract, a building shall comply with the Prerequisites (Section 5.5) and Energy Requirements (Section 5.6), and scores with 20 points or more with the Sustainability Credits (Section 5.7).

5.2 Definitions

"Agency" is any state agency, board, commission, department, or division.

"Designer" is the architect(s), engineer(s), and other professionals responsible for the building design.

"Institution" means the University of Utah, Utah State University, Southern Utah University, Weber State University, Snow College, Dixie State College of Utah, College of Eastern Utah, Utah Valley State College, Salt Lake Community College, Utah College of Applied Technology, and any other university or college which may be established and maintained by the state.

"Low-Rise Residential Buildings" means single-family houses, multi-family buildings of three stories or less above grade, and manufactured houses.

"Life-cycle costs" means the sum of the present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs, and disposal costs, over the lifetime of the project, product, or measure.

"Life-cycle cost-effective" means the life-cycle costs of a product, project, or measure are estimated to be equal to or less than the base case (i.e., current or standard practice or product).

5.3 Referenced Standards and Codes.

The design shall comply with all applicable Standards and Codes at the time submitted to the State Building Official, including but not limited to:

ANSI/ASHRAE Standard 52.2, *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*

ANSI/ASHRAE Standard 55, *Thermal Environmental Conditions for Human Occupancy*

ANSI/ASHRAE Standard 62, *Ventilation for Acceptable Indoor Air Quality.*

ANSI/ASHRAE/IESNA Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*, including Appendix G.

USDA Zone	Water Zone	Plant Factor	Botanical Name	Common Name
	2	.50	Paeonia hybrida	Peony
3	2	.50	Papaver orientale	Oriental Poppy
	1	.25	Papaver sp.	Poppy, Oriental Poppy
2	0 – 1	.25	Penstemon sp.	Firecracker Penstemon, Palmer Penstemon, Shrublet Penstemon, Wasatch Penstemon
			Perideria gairdneri	False Yarrow
3	1 - 2	.50	Perovskia atriplicifolia	Russian Sage
			Phacelia sericea	Silky Phacelia
			Phlox hoodii	Carpet Phlox
			Phlox longifolia	Longleaf Phlox
3	1 - 2	.50	Phlox subulata	Creeping Phlox
3	3		Physostegia virginiana	Obedient Plant
	2	.50	Platycodon grandiflorus	Balloon Flower
	1	.25	Polemonium caeruleum	Jacob's Ladder
			Polemonium foliosissimum	Leafy Jacobsladder
			Potentilla gracilis	Showy Cinquefoil
5	1	.25	Pulsatilla vulgaris	Pasque Flower
4	0 - 1	.25	Ratibida columnaris	Prairie Coneflower, Mexican Hat
3	1	.25	Rudbeckia hirta	Gloriosa Daisy
	0 – 2	.25	Rudbeckia sp.	Black Eyed Susan, Dwarf Rustic Coneflower
	2	.50	Salvia sp.	Salvia
	1	.25	Santolina sp.	Lavender Cotton
3	2	.50	Saponaira ocymoides	Rock Soap Wort
			Sedum lanceolatum	Stonecrop
4	0 - 1	.25	Sedum sp.	Sedum (many species and varieties)
			Sidlacea oregana	Oregon Checkermallow
			Silene acaulis	Douglas Campion
			Sisyrinchium ssp. Idahoensis	Purple-eyed Grass
	2	.50	Solidago Canadensis	Goldenrod
2	2	.50	Solidago hybrids	Goldenrod
			Solidago sparsiflora	Goldenrod
			Sphaeralcea ssp.	Globemallow
4	1 - 2	.50	Stachys bysantina	Lambs Ears
			Stanleya pinnata	Prince's Plume
	2	.50	Teucrium chamaedrys	Germander
3	2 - 3	.75	Thymus sp.	Thyme (many varieties)
			Townsendia incana	Easter Daisy
	2	.50	Tradescantial virginiana	Spiderwort
			Trifolium maci lentrun	Leanclover
2	3	1	Tulipa hybrids	Tulip
	2	.50	Verbena sp.	Verbena
	2	.50	Veronica sp.	Speedwell
3	1	.25	Veronica spicata	Spike Speedwell
	0	0	Viguiera multiflora	Showy Godeneye
4	3	1	Vinca minor	Periwinkle
			Viola adunca	Blue Violet
			Viola nuttallii	Yellow Prairie Violet
	0 – 2	.25	Viola sp.	Violet Pansy
			Wyethia amplexicaulis	Mule's Ears
	1	.25	Zauschneria californica	Hummingbird Fuchsia
			Zauschneria latifolia	Hummingbird Flower

Illuminating Engineering Society of North America, *IESNA Lighting Handbook*.

U.S. Green Building Council, *Leadership in Energy & Environmental Design for New & Major Renovations* (LEED-NC).

5.4 Design and Technology Charrette

A. DFCM may conduct a Design and Technology Charrette with the designers to review the requirements of the standard and strive for an integrated design of energy efficiency and environmental measures. In addition, the charrette shall also consider sustainable site design including:

(1) Natural shade to reduce heat island effect from parking lots and landscaping areas;

(2) Shielded or reduced parking and façade lighting to reduce night sky pollution;

(3) Reuse of existing building to conserve our resources;

(4) Avoiding sewer and waterway contamination;

(5) Use local building materials and products to support local economy and reduce the environmental impacts from transportation;

(6) Encourage the use of public transportation;

(7) Protect wet-lands and green spaces; and

(8) Provide recycling center.

5.5 Prerequisites

A. Fundamental Building Systems Commissioning. DFCM may engage a Commissioning Agent that is not an individual directly responsible for project design or employed by one of the designers. Commissioning Agent shall ensure that fundamental building components are installed and calibrated to operate as intended.

B. Life-Cycle Cost Analysis. Designer shall use life-cycle cost analysis in making decisions about their investments in products, services, construction, and other projects to lower the State Government's costs and to reduce energy and water consumption.

C. CFC Reduction in HVAC and Refrigeration Equipment. Designer shall select HVAC and refrigeration equipment without chlorofluorocarbons (CFC) based refrigerants.

D. Ventilation Systems. Designer shall provide mechanical ventilation system according to Standard 62. Mechanical ventilation system shall have the capability

to operate continuously during occupancy and designed not to be easily shut-down or otherwise defeated, such as blocked registers.

E. Drainage Systems. Designer shall design surface grades, storm drainage system, HVAC system, and other systems to avoid accumulation of standing water around or in the building.

F. Landscape and Irrigation Systems. Designer shall design landscape and irrigation systems according to DFCM Guidelines for Landscape & Irrigation Standard.

G. Fundamental Lighting Design. Designer shall design the lighting system according to IESNA Lighting Handbook.

H. Mold Prevention during Construction. Contractor shall ensure porous type building materials, such as wood, insulation, paper, and fabric, is kept dry to prevent the growth of mold and bacteria. Materials that have been affected by mold shall be abated or replaced. Building insulation that is damp or wet for 72 hours shall be replaced.

I. Filtration Media Replacement before Occupancy. Contractor shall ensure that filtration media is replaced before occupancy.

J. Thermal Comfort. Designer shall ensure that thermal comfort requirements are meet according to Standard 55. Exceptions:

(1) Winter humidification is not required;

(2) Summer dehumidification is not required; and

(3) Upper temperature limit in natural ventilated buildings is not required.

5.6 Energy Efficiency Requirements:

A. Energy Performance. DFCM may select an integrated system of components to reduce source energy use what is required by Standard 90.1.

(1) DFCM shall engage an Energy Specialist with 3 years of experience with hourly energy modeling. Energy Specialist is not an individual directly responsible for project design or employed by one of the designers. Energy specialist shall perform the energy analysis according to Appendix G of Standard 90.1. Energy Specialist shall prepare report according to DFCM template and shall specify which energy efficiency measure should be commissioned. Energy Specialist shall consider reducing energy use in each major categories: 1) lighting, 2) cooling, 3) heating, 4) pumps/cooling tower, 5) internal loads, and 6) external loads. Energy specialist should also consider the following technologies:

a. Daylighting;

b. Natural ventilation;

c. Evaporative cooling;

d. Demand-controlled ventilation using CO2 or occupancy sensors;

e. Green roof;

f. Ground source heat pumps;

g. Spectrally selective glazings;

h. Underfloor air distribution;

i. Radiant cold beam system; and

j. Displacement ventilation system.

(2) Commissioning Agent shall ensure the selected energy efficiency measures are installed and calibrated to operate as intended.

B. Small Buildings Prescriptive Energy (Optional). For nonresidential buildings with 3 floors or less and 75,000 square feet or less, Designer may substantially design the Building Envelope, Lighting System, HVAC system, and Service Water Heating system according to the recommended performance levels shown in Tables 1 through 4 in compliance with Standard 90.1.

Table 1 – Small Buildings Prescription Energy Option: Building Envelope[4]

Category	Component	Recommendation
Roof	Insulation entirely above deck	R-20 continuous insulation and Energy-Star® rated surface
	Metal building	R-13 + R-19
	Attic and other	R-38
	Single rafter (insulated flat or vaulted ceilings)	R-38 + R-5 continuous insulation
Walls	Mass (HC > 7 Btu/ft2) [1]	R-11.4 continuous insulation
	Metal building	R-13+R-13
	Steel framed	R-13+ R-7.5 continuous insulation
	Wood frame and other	R-13 + R-3.8 continuous insulation
	Below-grade walls	R-7.5 continuous insulation
Floors	Mass	R-10.4 continuous insulation
	Steel framed:	R-30
	Wood framed and other	R-30
Slab	Unheated	None[2]
	Heated	R-10 for 36 in.
Doors	Swinging	U-0.70
	Non-swinging	U-0.50
Vertical Glazing	Window-to-wall ratio (WWR)	40% maximum
	Overall thermal transmittance	U-0.42
	Shading Coefficient	SC-0.40[3]
	Exterior sun control (S, E, W only)	Projection Factor-0.5 [5]
	Low-e coating	Emittance < 0.05
Orientation	$(A_{north} * SC_{north} + A_{south} * SC_{south}) > (A_{east} * SC_{east} + A_{west} * SC_{west})$	Area (A) and Shading Coefficient (SC) of the Window
Skylight	Percent of roof area	3% maximum
	Overall thermal transmittance	U-0.69
	Overall solar heat gain coefficient	SC-0.42

[1] Fully grouted CMU walls or 6 inch concrete walls qualify for a mass wall.

(2) R-10 for 24 in. located in counties of Box Elder, Cache, Carbon, Daggett, Duchesne, Morgan, Rich, Summit, Uintah, and Wasatch.
(3) SC-0.44 for glazing located on the street side of the street level with continuous overhang with projection factor of 0.5 (S, E, W only).
(4) Reference documents: ASHRAE *Advanced Energy Design Guide for Small Office Buildings* and Standard 90.1.
(5) Projection Factor = (Horizontal Projection) / (Height Above Sill)

Table 2 – Small Buildings Prescription Energy Option: Lighting

Category	Component	Recommendation
Interior Lighting	Lighting power density (LPD)	10% Savings over Standard 90.1
	Premium T8 lamps	≥ 3100 Lumens
	Premium T8 ballasts	BF ≤ 0.8
	Window daylighting controls	Dim within 12 ft of windows
	Skylight daylighting controls	Dim within 8 ft of skylight
	Occupancy sensors	Auto-off in non-24 hour rooms
	Ceiling reflectance	80%
	Wall and partitions reflectance	70%
	High or low bay lighting	High or low bay T5(1) fixtures

(1) In semi-heated or unheated spaces, use pulse start metal halide.

Table 3 – Small Buildings Prescription Energy Option: HVAC

Category	Component	Recommendation
HVAC	Air Conditioner (< 65,000 Btu/hr)	15 SEER
	Air Conditioner (≥ 65,000 Btu/hr and < 135,000 Btu/hr)	11.0 EER and 11.4 IPLV
	Air Conditioner (≥ 135,000 Btu/hr and < 240,000 Btu/hr)	10.8 EER and 11.2 IPLV
	Air Conditioner (> 240,000 Btu/hr)	10.0 EER and 10.4 IPLV
	Air Conditioner Water or Evaporatively Cooled	14.0 EER
	Heat Pumps (< 65,000 Btu/hr)	13 SEER (Cooling) 8.0 HSPF (Heating, Split System) 7.5 HSPF (Heating, Single System)
	Heat Pumps (≥ 65,000 Btu/hr and < 135,000 Btu/hr)	11.0 EER and 11.4 IPLV (Cooling) 3.4 COP (Heating, 47° OSA) 2.4 COP (Heating, 17° OSA)
	Heat Pumps (≥ 135,000 Btu/hr and < 240,000 Btu/hr)	10.8 EER and 11.2 IPLV
	Heat Pumps (> 240,000 Btu/hr)	10.0 EER and 10.4 IPLV
	Air Conditioner Water or Evaporative Cooled	14.0 EER
	Water-source heat pump	14.0 EER (Cooling) 4.6 COP (Heating)
	Semi-cooled spaces	Direct or Indirect Evaporative Cooling (< 25,000 cfm)
	Gas furnace (≤ 225,000 Btu)	80% AFUE or Et (Single Package AC) 90% AFUE or Et (Split AC)
	Gas furnace (> 225,000 Btu)	80% Ec
Boiler	Hot Water Boiler (≤ 300,000 Btu)	90% AFUE
Motors	All pump and fan motors (≥ 1 hp)	NEMA Premium Efficiency Motors
Economizer	Air conditioners and heat pumps (single package)	Cooling capacity > 54,000 Btu
Ventilation	Outdoor air dampers	Motorized control
Duct	Friction rate	0.08 in. w.c. per 100 feet
	Sealing	Sealing class B
	Insulation level	R-6

Table 4 – Small Buildings Prescription Energy Option: Service Water Heating

Category	Component	Recommendation
Service Water Heating	Gas storage	90% Et
	Gas instantaneous	0.81 EF or 81% Et
	Electric storage 12 kW	EF > 0.99 – 0.0012 x Volume
	Pipe insulation	1 in. (diameter < 1.5 in.) 1.5 in. (diameter > 1.5 in.)

5.7 Sustainability Credits

A. Daylighting Credits

(1) Daylighting. Designer shall use daylight as the primary lighting system for 40 to 90 percent of the space, excluding copy rooms, storage areas, mechanical, laundry, and other low occupancy support areas. Daylight zones shall have a minimum Daylight Factor of 2 percent and a maximum illumination of 200 footcandles. "Daylight Factor" means the ratio of interior to exterior illumination. Design shall lower peak and annual cooling loads compared to a building meeting Standard 90.1.

a. The Commissioning Agent shall ensure the daylighting control system is installed and calibrated to operate as intended.

2 points Daylighting in 40 percent of the space.
3 points Daylighting in 52 percent of the space.
4 points Daylighting in 62 percent of the space.
5 points Daylighting in 74 percent of the space.
6 points Daylighting in 90 percent of the space.

B. Energy Credits

(1) Evaporative Cooling. Designer shall select the evaporative cooling system to reduce mechanical cooling by 15 percent based on calculation method of Appendix G, Standard 90.1. Design the HVAC controls to turn off the evaporative cooling system whenever the indoor humidity level exceeds 60 percent. It should be integrated with the air economizer system and mechanical cooling system:

a. The Commissioning Agent shall ensure the evaporative cooling system is installed and calibrated to operate as intended.

2 points Evaporative cooling system.

(2) Demand-Controlled Ventilation using CO2 Sensors. Designer shall select the ventilation system to have a means to automatically reduce outside air intake using CO2 Sensors according to Standard 62.

a. The Commissioning Agent shall ensure the Demand-Controlled Ventilation system is installed and calibrated to operate as intended.

1 points Demand-controlled ventilation system.

(3) Underfloor Air Distribution. Designer shall provide an underfloor air distribution system with ceiling return or equivalent air displacement system, excluding copy rooms, storage areas, mechanical, laundry, and other low occupancy support areas.

2 points Underfloor air distribution system.

C. Renewable Energy Credits

(1) Renewable Energy. Designer shall select on-site renewable energy such as photovoltaic, wind, geothermal, and fuel cells utilizing biogas to reduce source energy use.

2 point	5 percent reduction in source energy use.
3 points	12 percent reduction in source energy use.
4 points	22 percent reduction in source energy use.
5 points	34 percent reduction in source energy use.
6 points	50 percent reduction in source energy use.

D. Indoor Air Quality Credits

(1) Low-Emitting Materials. Designer shall select adhesives and sealants, paints and coatings, carpet, and composite woods with low-emitting materials.

1 point	Select adhesives and sealants that meet USGBC LEED™ - NC, Credit 4.1, requirements.
1 point	Select paints and coatings that meet USGBC LEED™ - NC, Credit 4.2, requirements.
1 point	Select carpets that meet USGBC LEED™ - NC, Credit 4.3, requirements.
1 point	Select composite woods that meet USGBC LEED™ - NC, Credit 4.4, requirements.

(2) Pollutant Source Control. Designer shall design the HVAC system to vent pollution sources, minimize cross-contamination of chemical pollutants, avoid dust and microbial growth, and install rated filtration media.

1 point	Install source ventilation system to vent pollution sources such as copy rooms, chemical storage rooms, janitorial rooms, food preparation spaces, and other polluting activities. Install separation walls that extend to the structure to prevent cross-contamination.
1 point	Design HVAC system to avoid areas where mold and dust can accumulate, such as return plenums and fibrous ductwork.
1 point	Select MERV rated filters of 11 or greater according to Standard 52.2.

(3) Construction Indoor Air Quality Management Plan. Contractor shall ensure that Volatile Organic Compounds (VOC), dust, oils, and odors have been contained and removed before occupancy.

a. Prior to installation of materials and products that emits VOC or odors, allow materials and products to off-gas in a well ventilated staging area. Remove any oil films and dust.

b. During installation of materials and products that emits VOC or odors, use HVAC fans, open windows, or temporary fans to continuously ventilate the area until emissions dissipate, and protect porous materials with polyethylene vapor retarders.

c. During dust producing activities (such as drywall installation and finishing), protect HVAC fans and ductwork from accumulating dust by turning off the fans and cover air grilles, registers, and other duct openings. Use temporary fans to ventilate the space.

d. Prior to operating HVAC system, vacuum dust that has accumulated in HVAC fans, plenums, and ductwork with HEPA vacuum and remove any oil films from metal surfaces.

e. Prior to substantial completion, vacuum carpet and other soft surface with HEPA vacuum.

1 point	Construction Indoor Air Quality Management Plan
1 point	Prior to occupancy and after Substantial Completion, flush building for 15 days with 100 percent outside air.

E. Commissioning and Training Credits

(1) Additional Commissioning. Commissioning Agent shall ensure the building is designed, constructed, and calibrated to operate as intended. Implement the following additional commissioning tasks beyond the Prerequisites Fundamental Commissioning requirements:

a. Review and provide recommendations on the design document prior to issuing the construction documents.

b. Review the contractor submittals relative to the systems being commissioned.

c. Develop Recommissioning Plan to schedule commissioning activities to assure the building is continuously tuned to optimize performance.

2 points	Additional commissioning.

F. Acoustics Credits

(1) Improve Acoustical Performance. Designer shall design work spaces to provide acoustic levels that limit excess noise from exterior sources, HVAC systems, and other sources.

1 point	Acoustical level of 36 to 40 dBA background, and 0.6 second reverberating times or less.
2 points	Acoustical level of 35 dBA background or less, and 0.6 second reverberating times or less.

G. Sustainable Material Credits

(1) Recycled Content. Designer shall select building products that have incorporated recycled-content in major materials from the Construction Products category of the US Environmental Protection Agency (EPA) Comprehensive Procurement Guidelines. Major materials include parking areas, floor, roof, partition, walls, or serving a structural function throughout the building.

1 point	Four to seven major materials with recycled-content.
2 points	Eight or more major materials with recycled-content.

H. Waste Reduction Credits

(1) Site Waste Reduction. Contractor shall ensure that construction waste, demolition, and land clearing waste are recycled, composted, and salvaged. "Recycle Rate" is the ratio of recycled waste (by weight) to total waste (by weight).

1 point	Recycle Rate of 50 to 74 percent.
2 points	Recycle Rate of 75 percent or greater.

I. Water Reduction Credits

(1) Water Efficient Fixtures and Appliances. Designer shall select water-efficient, fixtures and appliances with maximum flow shown below:

a. Sensor faucet, 0.5 gpm

b. Showerhead, 1.5 gpm

c. Sensored flushometer toilet, 1.1-1.3 gpf, or dual flush valve

d. Waterless or ultra-low flow urinal, 0.5 lpf

2 points Water efficient fixtures and appliances.

J. Performance Measurement and Verification Credits

(1) Building Performance Monitoring on Multi-Building Campus. On a multi-building campus, agencies and institutions shall meter each energy type for each building. Energy type includes electricity, natural gas, central chilled

water, central heating water, and central steam. The energy management system shall the capability to monitor and log sub-metering energy use and electrical demand. Provide sub-meter water use on landscaping and other irrigation strategies.

1 point Building performance monitoring on multi-building campus.

(2) System Performance Monitoring. Designer shall provide continuous metering equipment for the following equipment performance shall the capability to monitor and log equipment performance:

a. Lighting system (kWh and kW)

b. Motor loads >20 hp (kWh and kW)

c. Variable speed drive operation

d. Chiller efficiency or chiller plant efficiency (i.e. chiller, cooling tower and pumps)

e. Air and water economizer operation

f. On variable volume system, supply air static pressure and volume

g. Boiler efficiency or boiler plant efficiency (i.e. boiler and pumps)

h. Process loads (kWh and kW)

1 point System performance monitoring.

K. Innovation in Design

(1) The Director of DFCM, based on justified recommendations by the Energy Manager, may award up to 4 additional points for exceptional energy or environmental measures not specifically address in the rating system.

1 to 4 points Exceptional energy or environmental measures.

5.8 Submittals

A. DFCM shall establish letter templates to document compliance with the High Performance Building Rating System used by the designers, contractors, agencies, institutions, commissioning agents, and energy specialists.

Utah State UNIVERSITY

ADMINISTRATIVE SERVICES FACILITIES DESIGN AND CONSTRUCTION

DESIGN CRITERIA

MAY 2002

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Utah State University Design Criteria Modifications

Ref: Version May 2002 10/16/2008

The following items will be deleted from the USU Design Criteria
for the facility program for the new Bingham Building on the USU Vernal Campus.

Reference Section	Item	Note
USU Design Criteria no.3	Survey	Note 1
USU Design Criteria no.4	Subsoil	Note 1
USU Design Criteria no.6	Snow load - 37 psf (Logan)	Not Applicable
USU Design Criteria no.21	USU Delegated Project	Not Applicable
USU Design Criteria no.23	USU Installed Items	By Contractor
USU Design Criteria no.24	Entrances	Not Applicable
USU Design Criteria no.25	Accessibility	Covered by Code
USU Design Criteria no.30	Snow Blower Storage	Not Applicable
USU Design Criteria no.37	Transformer valults	Not Applicable
USU Design Criteria no.40	High voltage system planning	Not Applicable
Division 0	Bidding	Covered by DFCM
Division 1	General Requiements	Covered by DFCM
Division 2	Site Construction 02400 Utility Tunnels	Not Applicable
Division 2	Site Construction 02550 and 02555 special utilities	Not Applicable
Division 2	Site Construction 02950 Restoration	Not Applicable
Division 2 Revised	Site Construction 02500 Utility Services - Tunnels	Not Applicable
Division 4 and 4 Revised	Masonry	Note 2
Division 5	Metals - 05520 Handrails	Note 2
Division 7	Thermal and Moisture Protection 07050 Membrane Roof	Note 2
Division 8	Doors and Windows 08520 Aluminum Frames	Note 2
Division 8	Doors and Windows 08700 - F.Keys	Note 2
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INTRODUCTION

This manual is Utah State University's supplement to the State of Utah Division of Facilities Construction and Management (DFCM) manual of "Design Criteria for Architects and Engineers" 2000 edition. The purpose of this manual is to provide guidelines and requirements specific to Utah State University projects which are in addition to those in the DFCM manual.

Revisions to this manual as well as additions will occur periodically. All consultants are required to contact Facilities Design and Construction at the beginning of each project to obtain all current requirements and guidelines.

FORMAT

The format of this manual follows the master list of numbers and titles for the construction industry know as *MasterFormat* published by the Construction Specifications Institute, 1995 Edition.

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USU DESIGN CRITERIA

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USU DESIGN CRITERIA

1. **1. Site Visit:** The Consultant shall become familiar with all site conditions. Review all site conditions and locations of utilities with Facilities Planning and Design at an early stage of design.

2. **Campus Master Plan:** Meet with Facilities Planning and Design to review the Campus Master Plan. All new facilities must meet Master Plan objectives as required by Facilities Planning and Design.

3. **Survey:** The University will provide a contour map showing existing grades, streets, walks and any special situations that might be within the site of the new building. The Consultant also will receive a map of the area showing the location of campus utilities: sewer, water (culinary and irrigation), electric lines, telephone, communications, gas lines, and steam lines.

   A. If the utility work involves crossing of city streets the Consultant must obtain information on location and depth of sewer lines, water lines, etc. from Logan City and private utility companies.

   B. Elevations of survey monuments on University maps and drawings are based upon U.S. Geodetic Surveys.

   C. The Consultant will establish the facility location and elevations from available survey bench marks.

4. **Subsoil:** Testing for subsoil data shall be performed by outside testing companies. The testing consultant shall be contracted by USU Facilities Design & Construction.

5. **Sound Control:** Consider the need for sound control in the facility. Analyze existing and future sound problems; also consider sound control during construction.

6. **Climatic Conditions:** Consider the positive and negative effect of wind conditions on the site. Winds coming out of the canyons are of particular concern. This shall affect glass design, orientation of entrances, etc. The consultant shall design for 90 mile per hour winds (3 second gusts) and 37 pounds per sq. ft. snow loads. Solar orientation shall also be considered.

7. **Energy conservation:** Provide entrance vestibules to all buildings. Where possible, provide at least ten feet of walking distance within vestibules.

8. **Materials Selection:** Site paving materials and building exterior materials shall be compatible with existing facilities. The Consultant shall select building materials that are low maintenance, economical to operate, and have lasting value. The Consultant is required to perform an adequate evaluation before selection of materials.

9. **Service Access:** Provide easy access to mechanical and electrical rooms for maintenance and replacement of equipment and transformers. Locate air intakes well away from loading docks and exhaust outlets. Provide easy access for re-cycling collections.

10. **Exterior Equipment:** Emergency engine generators, transformers and garbage dumpsters shall be located underground or enclosed by a screen. Screens shall be an integral part of the facility design.

11. **Review:** Submit four complete copies of the documents to the Facilities Design and Construction office.

12. **Schematic Design Approval:** The Consultant shall obtain in writing the approval of the University before proceeding beyond the Schematic Design.

13. **Program Changes:** Deletion of any items in the program during Design Development will require the Consultant to provide Facilities Design and Construction with a list of these items and written justification for their deletion.

14. **Coordination:** The Consultant shall be responsible to coordinate with his sub-consultants to ensure that all review comments have been satisfactorily dealt with. This will necessitate meeting with the Facilities Design and Construction project coordinator to indicate clearly how each comment has been incorporated before proceeding to the next phase. The Consultant shall budget sufficient time for these reviews.

15. **Design Development Review:** The consultant shall submit color boards of all materials and cut sheets of all light fixtures and equipment. The consultant shall obtain in writing the approval of the University before proceeding beyond Design Development.

16. **Contract Document Approval:** The Consultant shall obtain signatures of Department Heads, Facilities Design and Construction Director, and the University Vice President before releasing documents for bidding. In order to do so, the consultant must submit a final check set indicating all revisions, along with the previously marked up review set to verify that corrections have been made and that the documents are sufficient for bid purposes. Blank cover sheets may be submitted for signatures but will not be released until all review comments have been satisfactorily dealt with.

17. **Computer-Aided Drafting:** CAD drawings are recommended and when consultants use CAD and word processors for the preparation of drawings and specifications they shall provide digital copies of their work on three and one-half inch high density disks or CD's to the University. Copies shall be of the final bid package, including all addenda, and at the completion of the project, the final as-built drawings. If the software used to produce the work is not the same as Facilities Design and Construction arrangements will be made for file translation.

18. **Electrical Drawings symbols** shall be according to ANSI/IEEE Y32.9 (part of Y32E) "electrical and electronics Graphic Symbols and Reference Designations

19. **Drawings shall show complete electrical circuits:**. Devices circuited with a circuit ID only must be avoided. Suggestions that the circuits will be added when "As Builts" are done is not acceptable.

20. **University Requirements:** The Consultant shall become familiar with all the requirements of Utah State University and be governed by the functional requirements of the project. Facilities Design and Construction will coordinate the project working with appropriate representatives from the faculty users.

21. **USU Delegated Projects:** Projects assigned to USU for administration shall use USU's contract forms. Bidding shall be done though the Purchasing department as coordinated by Facilities Design and Construction.

22. **Separate Contracts:** The Consultant shall provide separate contracts from the construction contract for furniture, and other movable equipment. These shall ***not*** be listed as work under the General Contractor.

23. **USU Installed Items:** The Consultant shall include in the project budget funding for the following items and their installation by USU.

    A. Fire extinguishers for each wall cabinet. Allow $50.00 per cabinet.

    B. Elevator Lock Box Lids (two (2) required). Allow $25.00 each.

    C. Cylinders for each door requiring a lock. Allow $65.00 each.

    D. Panic lock cylinders for each exterior door. Allow $85.00 each.

    F. Identification signs as required by the project. These include interior room signs, exterior building identification signs and interior building directories

24. **Entrances:** Major building entrances shall be designed with vestibules and have entrance mats located between the doors sized to fit the entrance area. "Nuway" type floor mats are the preferred entrance mat. They shall not be fixed or glued in place. When "Nuway"" type mats are impossible, use a PVC backed mat such as Coral Plus or equal. Rubber-cored tile is not acceptable. Walk off gratings shall be used outside entrance doors.

25. **Accessibility for Persons with Disabilities** Conform to state and federal ADA regulations and in addition provide the following for the University's severely disabled student and/or faculty:

    A. Provide double drinking fountains at normal and ADA required heights.

    B. Provide each building with a public telephone at ADA height. Adjoining the telephone provide a bench situated to allow wheelchair and casual access.

    C. Entrance ramp(s) where necessary shall be and integral part of design of the building.

D. Automatic swinging doors with motion sensors shall be used at entrances and at one accessible restroom.

E. Elevator control panel shall meet ADA requirements.

F. Provide access to the front of classrooms for mobility impaired faculty and provide a varity of locations for wheelchairs within classrooms for students.

26. **Custodial Closet:** Custodial closet size shall be based on the gross floor area of each floor of the building. Provide a "Primary" custodial room on the main floor. On large buildings there may be a need for more than one "Primary" room. Provide a secondary custodial room on all other floors with assignable space. Each closet shall have at least 6' of mop and broom rack, for 48" wide adjustable shelves 12" deep.

27. **Attic Stockroom:** Provide an attic stockroom large enough for efficient storage of required overages of materials such as carpet, paint, ceiling tile, etc. The room shall be located to allow easy storage and removal of carpet rolls. The room shall be a minimum twelve feet six inches long and five feet wide (12'-6" X 5') for projects of thirty-five thousand square feet or less. A platform raised five inches above the floor is required for carpet storage. Three (3) adjustable shelves two feet (2') deep shall be installed along one wall above carpet platform. The shelves shall support fifty pounds per lineal foot of shelf. For projects thirty-five to one hundred thousand square feet the room shall be a minimum twelve foot six inches long by even feet wide with carpet platform and shelves along two walls. Projects greater than one hundred thousand square feet shall be a minimum of twelve foot six inches square and a layout to accept all required maintenance stock. If possible attic stock rooms should be accessible from custodial or mechanical specs.

28. **Window Maintenance:** The building design shall provide for interior and exterior window maintenance.

29. **Fire Marshal** Any communication with the Campus Fire Marshal shall be copied to Facilities Design & Construction. The University may impose standards in excess of the code requirements.

The following items are emphasized because of past problems.

A. Where fire separation walls and floors are installed provide UL approved and rated caulkings at all penetrations. All pipe or conduit penetrations shall have UL or approved laboratory assembly ratings for the appropriate pipe for each wall/floor assembly.

B. Submit to Facilities Design and Construction, for the University's Fire Marshal's approval, shop drawings, showing how penetrations of rated walls are being made.

C. All concealed penetrations of fire separation walls and floors must be inspected by the Campus Fire Marshal during installation. The contractor shall be responsible for giving 48 hours notice before requesting and inspection.

D. Fire and smoke partitions at demountable ceilings shall be labeled indicating the type of wall it is (i.e. two (2) hour wall). These labels shall be a minimum of one inch (1") tall with a stroke of three sixteenths inches (3/16") and must be of a contrasting color from the wall color. Labels shall be located twenty feet on center (20' o.c.) maximum and be above the demountable ceiling.

E. University Fire Marshal inspection is required on all water supply lines before any portion of it is covered. Minimum ground cover over all supply lines shall be sixty six inches (66"). Supply lines located under vehicular circulation shall be deeper when possible. Flushing of the system shall be done in the Fire Marshal's presence.

F. Construction sites shall be equipped with a portable fire extinguisher(s) (not included in allowance) and shall have a water source available for fire fighting. Fire truck access shall be maintained at all times.

G. Provide recessed fire extinguisher cabinets without keys.

30. **Snow Blower Storage:** Each building is provided with a snow blower for custodial use. Design of snow blower storage must meet the requirements of the IFC. Therefore, a separate storage building for the snow blower shall be designed to be visually compatible with the new facility.

31. **Vending:** Each building shall provide for vending facilities sized and coordinated by Facilities Design and Construction and USU Vending.

32. **Audio-Visual Equipment Accessibility:** Interior facility design shall provide for efficient movement of mobile audio-visual equipment in corridors and in aisles within rooms.

33. **Recycling Areas:** Provide space for recycling areas as programmed. Interior areas shall be located near entrances to the facility. The design of these areas shall be integral with the corridor design such that collection facilities do not extend into corridor space. Also, this space shall include facilities for the distribution of University papers, information and trash collection. Exterior areas shall have an architectural design compatible with the new facility.

34. **Rear Service Entrance:** Major buildings shall require a rear service entrance. The design of this area shall be compatible with the building. Entry into the building shall allow easy access to building elevator without encountering difficult turns, stairs or narrow corridors. Other features such as raised and/or extended landings, loading dock abutments and bumpers, and oversize doors may be required by the intended uses of the building.

35. **Refuse Dumpster:** Provide a suitable site for the location of exterior trash dumpsters. Generally the site should be recessed or otherwise designed to coordinate with existing and /or

proposed landscaping and the building. The location shall be accessible for large tandem axle collection vehicles and allow clearance for required turning radii.

36. **Storage Cabinets:** Laboratories requiring storage of flammable and combustible liquids shall have cabinets that meet the following requirements:

A. Cabinets must be conspicuously labeled in red letters on contrasting background **"FLAMMABLE-KEEP FIRE AWAY".**

B. Doors shall be well fitted, self-closing and equipped with a spring actuated latch.

C. The bottom must be liquid tight to a height of at least two inches (2").

D. **Metal cabinets** shall be constructed of steel having a thickness of not less than 0.044 inch (18 gauge). The cabinet, including door, shall be double walled with one and one-half inch (1-1/2") airspace between the walls. Joints must be riveted or welded and be tight fitting.

E. **Wooden cabinets**, including doors, shall be constructed of not less than one inch (1") exterior grade plywood. Joints shall be riveted and shall be fastened in two directions with wood screws. Door hinges shall be steel or brass. Cabinets shall be painted with an intumescent-type varnish.

37. **Transformer Vaults**: Electrical transformer vaults inside buildings shall be constructed with an outside air ventilation opening that is one hundred fifty percent (150%) of the electrical design requirements for the installed transformer rating. This is to provide for future transformer capacity increase. An outside access through the ventilation opening or a door shall be provided for removal/installation of transformers. Minimum opening size shall be forty-eight inches (48") horizontal and seven feet (7') vertical. An interior building access door shall be provided that is a minimum of 42 inches wide. Access shall be provided for service vehicles outside the vault airway access. Forced ventilation is not acceptable. Louvers are to have bird/insect screens and have the space reduction for louvers and screens included in the calculations for the effective opening size.

38. **Electrical Rooms, clearances and entrances**: Coordinate clear space around electrical equipment and panels with the electrical consultant. Provide the front, top and side clearances required by the NEC 110-26. Note that USU requires a minimum of forty eight inches (48") in front of electrical equipment and all panels and Motor control centers shall be clear of pipes or ducts. to the structure above irrespective of NEC requirements. This also applies to communications equipment spaces under USU requirements. A transformer vault may have its interior access door between the vault and the main switchboard room, but it shall not be the entrance to the switchboard room or the high voltage switch room. High voltage switch room shall be separate from either the transformer vault or the main electrical switchboard room, though it's entrance may be through the main electrical switchboard room provided the doors and access are sufficient for equipment removal/installation. Coordinate Electrical and Mechanical designs. Corrective action costs will be by the consultants, not the project funding source.

39. **Communications System Planning**: Provide space allocation and budget costs for telephone cables, optical fiber cables, instructional TV, and Aggie TV. Provide conduit and cable tray raceways from each wall outlet to communication closets at 60 meter maximum distances.

40. **High Voltage system Planning**: Provide space and cost planning for high voltage cables, high voltage switching, over current protection, transformers, and low voltage service entrance with over current protection. High voltage switching, high voltage protection, and low voltage switching shall be located in separate rooms and shall be separated from the transformer vault. High voltage cables external to the building shall be installed in six inch PVC ducts, concrete encased, containing a minimum of two (2) space ducts. Communications spaces are to be separate from all electrical spaces, but shall be adjacent to provide the required grounding connection to the main ground system.

41. **Project Identification Sign:** The Consultant shall provide the design for the project identification sign. Each project over a million dollars shall have a color rendering of the sign.

DISCLAIMER

THIS FILE CONTAINING THE:

UTAH STATE UNIVERSITY
FACILITIES DESIGN AND CONSTRUCTION
A & E DESIGN CRITERIA
MAY 2002

IS FOR INFORMATION ONLY. ANY UNAUTHORIZED CHANGES MADE TO THESE DOCUMENTS WILL NOT BE HONORED BY UTAH STATE UNIVERSITY.

THESE FILES WILL BE UPDATED AS CHANGES ARE DESIRED BY USU. WE WILL NOTIFY YOU AS CHANGES ARE MADE IF YOU WILL EMAIL ME AT debra.parrish@usu.edu.

IF YOU HAVE ANY QUESTIONS OR PROBLEMS WITH THESE FILES, PLEASE CONTACT DEBRA PARRISH AT 435-797-3747, FAX 435-797-3888 OR EMAIL AT debra.parrish@usu.edu.

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DIVISION 0 BIDDING REQUIREMENTS

00100 Bid Solicitation

In advertising for bidders, the wording of the Notice to Contractors shall indicate that the award will be a value-based selection.

00200 Instructions to Bidders

The Instructions to Bidders shall require a mandatory pre-bid registry meeting. It shall also indicate whether or not the bidders will be required to register with the Owner Controlled Insurance Program (OCIP).

00600 Bonds and Certificates

All USU projects in excess of $20,000 are required to be bonded. Bid bonds for 5% of the amount of the bid are required at the time of bidding. In the event that a contractor is unable to provide a performance bond plus a labor and material payment bond, the bid bond will be forfeited.

00800 Supplementary Conditions

Our projects required to be insured through the Owner Controlled Insurance Program (OCIP), the details of the insurance requirements shall be indicated in Supplementary Conditions that override the General Conditions. The dollar threshold for OCIP projects may vary, so consultant shall check with Facilities Design and Construction on each project.

DIVISION 1 GENERAL REQUIREMENTS

01100 SUMMARY

01180 PROJECT UTILITY SOURCES

Temporary Utilities: The Contractor shall make arrangements with available utility(s) for temporary connections and bear all costs for these utilities. On the campus proper and some peripheral areas the utilities are University utilities and the contractor shall make arrangements through FD&C for connections. The University will install meters for measuring use of utilities purchased from Utah State University. FD&C shall read or have the meters read at the beginning of the project, monthly, and at the end of the project. The contractor shall be responsible for all utility costs including those from the University.

01310 PROJECT MEETINGS

A. **General**: The following requirements shall be incorporated in the Contract Documents:

B. Schedules: The Contractor shall provide a construction schedule with each pay request. Pay Requests w/o schedules will not be processed. The Contractor shall deliver this schedule and pay request to the Consultant. The Consultant shall review the pay request to verify accuracy and amount completed. Consultant will then transmit to the FD&C Construction Coordinator for approval of schedule so payment can be made.

C. **Progress Meetings:** The Consultant shall be in charge of the progress meetings, set the agenda and take minutes of the meeting. The consultant shall distribute copies of the agenda and minutes to Facilities Design & Construction, and the Contractor prior to each meeting. The agenda for weekly scheduled progress meetings shall cover the following:

1. Problems and potential field orders or change orders.

2. Update of the construction schedule.

3. Work completed during the last week.

4. Items to be completed during the next week.

01330 SUBMITTALS

A. General: The following requirements shall be incorporated in the Contract Documents:

1. **Shop drawings, product data and samples:** The following submittals shall be given to the FD&C Project Coordinator for review simultaneously with the Architects' and Engineers' review. FD&C will maintain this set and transmit comments to the Architects and Engineers for their incorporation into any review set that is approved. Before returning any "Approved" submittals to the Contractor, the Consultant shall provide FD&C with one (1) copy of the stamped approved set.

   a. All exterior materials including glazing and frames.

   b. Roofing and waterproofing

   c.. Finish hardware and hollow metal frames

   d. Floor coverings

   e. Paint samples and color schedules

   f. Fire protection systems

   g. Toilet and bath accessories

   h. Entrance mats

   i. Elevator

   j. Electrical

B. Final Submittal: Before final payment is made to the Consultant, black line volumes of as-builts conditions, operation and maintenance instructions per Cad Criteria, guarantees, balance reports, signed transmittal forms on material delivered to the University (color samples, keys, extra stock, salvage materials, service parts, etc.

shall be provided to the University in addition to any DFCM requirements. These materials shall be packaged together and delivered to FD&C in one (1) submittal.

01350 SPECIAL PROJECT PROCEDURES

A. General: The following requirements shall be incorporated in the Contract Documents.

1. **Utilities Mapping:** The Contractor shall notify FD&C twenty-four (24) hours before back filling any site utility excavations to allow for the mapping of new and existing utilities by the University. This applies to all site excavations in which utility lines are encountered. Utility mapping by the University does not relieve the Contractor from the responsibility of preparing as-built drawings of utility work performed under contract.

2. **Utility and Systems:** Construction documents shall require contractor to give 10 days advanced notice of required shut downs in writing, followed by 5 days and 2 days.

3. **Dust Control:** Provide dust separation in all remodeling areas.

4. **Contract Limits:** The limits of responsibility for the Contractor and the Consultant shall include all landscape areas affected by termination of irrigation as a result of construction. Such extended areas will be shown on the drawings and indicate that the Contractor has responsibility to maintain and restore the landscape and irrigation systems.

5. **Contractor's Use of Building Equipment:** The Contractor may have limited use of building equipment such as electric motors, blowers, heat exchangers, filters, lighting fixtures, etc., with the permission of FD&C. Elevators shall not be used during construction.

01400 QUALITY REQUIREMENTS

01410 REGULATORY REQUIREMENTS

A. General : The following requirements shall be incorporated in the Contract Documents.

1. **Permits:**

   a. **Building Permits** are not required on the University campus or for connection to University utilities.

   b. **Digging permits** are required for any excavation, including utility installation, interruption, shut-off or outage, etc. They are obtained

through FD&C and require a minimum of forty-eight (48) hours notice during USU working hours.

B. Campus Restrictions: The following shall apply during construction:

1. Abide by all posted campus regulations in regard to traffic, parking, smoking, etc.

2. All trash is to be hauled from campus to a legal disposal site. At no time shall on-site burning be allowed. Do not use University dumpsters for trash disposal.

3. Class schedules should be observed to avoid undue disturbances.

4. Parking permits are required from 7:30 a.m. to 2:00 p.m. Monday through Friday unless otherwise posted. Metered areas are enforced 7:00 a.m. to 5:00 p.m. Areas that are enforced twenty-four (24) hours a day include red curbs, roadways, driveways, fire hydrants, restricted areas, parking for persons with disabilities, and reserved spaces.

5. Contractor parking shall be within the contract staging limits. Any contractor or sub-contractor vehicles outside the staging will require a permit which can be obtained through Parking Services for a fee. Consultants may purchase an annual permit from Parking Services, which allows parking prior to the contract fences being installed.

6. Consultants and Contractors performing work for USU are subject to federal and state laws regarding affirmative action, equal employment opportunity, and sexual harassment.

7. During construction of the project the Contractor shall limit noise from the site as much as possible. Coordinate with Facilities Design and Construction for appropriate times to use loud equipment such as jackhammers or shot-nailers. Radios, tape players, and other devices will not be permitted on-site.

C. Temporary Utilities:

1. **Electrical:**

   a. Where commercial power is not readily available, Utah State University may at their option provide electric power to a temporary service drop of single or three phase 120/208 – 208/120 up to 100 A. This may be to a pole provided and set by the Contractor located inside the contract limits or other termination as arranged for through the FD&C office. USU will provide the service drop meter base, meter and disconnect at the pole or other approved drop location. The Contractor shall provide his own services from the service drop disconnect. These services shall conform to

NEC requirements. Meter readings at the time of meter installation shall be observed by the Contractor's representative. When permanent electric power is installed in the building and the building system has been inspected and approved as operational, the temporary service may be removed at the Contractor's request. Power system shall not be energized before the main switchboard is inspected by USU and the metering system is correctly installed.

b. The Contractor shall be billed for electrical power consumed on both the temporary and permanent power systems until final acceptance of the complete contract.

D. Culinary Water:

1. The contractor shall provide a source of culinary water on the site.

2. The site or building permanent culinary water may be used on the project after permanent connection and meter(s) is installed and the lines are tested, inspected and flushed. Fire service connections and lines shall not be used for site water.

3. The contractor will be billed for all culinary water used on site unless excepted at the beginning of the work by USU FD&C.

E. Steam and Condensate:

1. The Contractor shall provide a source of heat for the site.

2. The site or building permanent steam and condensate may be used on the project after permanent connection and meter(s) is installed and the lines are tested, inspected and flushed.

3. The Contractor will be billed for all steam (condensate) used on site unless excepted at the beginning of the work by FD&C.

F. Natural Gas

1. The contractor shall provide a source of natural gas for the site.

2. The site or building permanent natural gas may be used on the project after permanent connection and meter(s) is installed and the lines are tested, inspected and flushed.

3. The Contractor will be billed for all natural gas used on site unless excepted at the beginning of the work by FD&C.

G. Telephone

1. Outside the University telephone service area the entire service is to be by the local telephone company.

2. Within the University service area, service is to be ordered through the local telephone company and then arranged for service to the construction site through on campus cables through the USU Telecommunication department. The cost of the connection through USU cables will be through the local telephone company.

01500 TEMPORARY FACILITIES AND CONTROLS

01520 CONSTRUCTION FACILITIES

A. **Construction Office:** Construction office for the sole use of the Consultant and USU shall be provided by Contractor unless conditions warrant other specific arrangements with the University. Construction office shall include a table with eight (8) chairs, a plan rack, a plan table, and a two-drawer file. This office shall be maintained by the Contractor and shall have a telephone, heat and air conditioning. Prior to each progress meeting it shall be dusted.

B. **Sanitary Facilities:** The use of the new construction or adjacent building sanitary facilities will not be permitted without approval of USU FD&C prior to start of work. The contractor shall provide temporary sanitation facilities for the project.

01530 TEMPORARY WALKWAYS

A. When routing pedestrians around an area of construction, the Contractor shall provide temporary walking surfaces across existing landscaped areas. These surfaces shall be constructed of a durable material with a slip-resistant surface. The use and placement of temporary walking surfaces shall be approved in advance by FD&C. The Contractor shall restore all landscaped areas damaged by the placement and use of the walkways. The Contractor shall also restore landscape damaged by pedestrians routed over existing landscape to avoid construction.

01550 ACCESS ROUTES

A. Indicate on the Construction Drawings access routes to job site through the campus for concrete trucks, delivery trucks and other vehicles concerned with the project. Determine these routes with FD&C.

01560 TEMPORARY SAFETY FENCE

A. Open excavations outside of construction fences shall be protected by high visibility (yellow or orange) safety fences. Fences shall be a minimum of five feet (5') high

and constructed of all new or like-new materials (Conwed lightweight safety fence or equal). Fences shall be installed on straight, true lines with the fabric stretched taut. Posts (T-stakes or better) supporting the fabric shall be sized and spaced to support the fabric and associated wind loads. Fences need to be maintained by contractors if they sag or fall down.

B. Fencing for trench excavations shall barricade the trench, excavated material and material to be placed in the trench. As trenching work progresses, fencing around areas backfilled to grade and cleared of hazards may be moved to new locations requiring fencing. Materials may not be reused if not in like new condition.

C. When pedestrians are routed around construction areas additional barricades will be required to prevent damage to adjacent landscaped areas. Barricades shall be placed to route pedestrians around affected areas using existing paved surfaces. These barricades shall be constructed as described above.

01560 TEMPORARY CONSTRUCTION FENCE

A. The Contractor shall enclose construction area with a six foot (6') minimum height fence. Review with Facilities Design & Construction the location and type of fence. Fences shall be maintained true, stretched and complete throughout the duration of the project. Gates shall be locked with the Contractor's lock and appropriate University locks in a manner to allow the University emergency vehicle access at any time. University locks are obtainable from the University Police or Fire Marshal. Upon completion of the project the Contractor shall dismantle the fence and remove it from site.

01700 EXECUTION REQUIREMENTS

01770 CONTRACT CLOSE-OUT

A. General: The following requirements shall be incorporated in the Contract Documents.

1. **Substantial Completion:** A substantial completion certificate shall not be issued until the University ***may*** occupy the building. The Attorney General has clarified this as follows:

   a. That *all* Fire Marshal items are cleared and a "Certificate of Fire Clearance" is issued.

   b. That the Consultant has received balance reports from the Contractor.

   c. That *all* correction items have been substantially completed.

2. **Pre-Substantial Completion Inspection:** The Consultant will schedule a pre-substantial completion inspection. The inspection shall include all Consultants, FD&C, and other invited University representatives.

   a. All inspection reports by University representatives shall be submitted to FD&C who will provide the Consultant with copies of the reports. The Consultant shall check for conformance to the Contract Documents.

   b. The Consultant shall assemble all reports from his consultants and the University representatives and distribute copies to the Contractor and FD&C.

3. **Substantial Completion Inspection:** The substantial completion inspection will be held after completion of the items noted in the pre-substantial completion inspection report and when the building is ready for occupancy. The substantial completion inspection will be made with the State Fire Marshal, State and University officials, the Consultant, and the Contractor.

4. **Final Meter Readings:** Notify Facilities Operations to make final meter readings for USU temporary and permanent utilities.

5. **Utility Billings:** Provide proof of clearance from USU Facilities Operations that all utility bills have been paid.

6. **Insurance Termination:** Advise USU of pending insurance termination date.

7. **Training Session:** The Contractor shall provide a training session to University personnel on all mechanical, electrical, communication, etc systems. It is the Contractor's responsibility to submit to FD&C an attendance log. This attendance log shall include all University personnel present at the above training session and their signatures. The Contractor shall provide a video tape of the training session to FD&C.

8. **Deliverables:** Provide operation and maintenance manuals and warranties on all equipment. Further, provide copies of all manufacturers' brochures submitted to the Consultant as part of the shop drawing review process. Provide transmittals showing FD&C's acceptance of all extra material specified. These should be delivered to the Consultant for his review before receipt of final payment. The Consultant shall review these submittals for completeness and incorporate all changes in the as-built drawings to the originals. The Consultant shall deliver all these items to FD&C at one time. The Consultant shall not receive final payment until all the above items have been received and approved by FD&C.

9. **Final Payment:** Before the final payment the Contractor shall deliver as-built drawings to the Consultant for his review. The Consultant will incorporate all

corrections on the originals and provide USU with a mylar reproducible copy, and ACAD DWG files on compact disks.

01780 RECORD DOCUMENTS

A. **Video Record of Project:** The Contractor shall provide a videotape record of all ductwork and conduits before the installation of the ceiling grid system. Audio narration of the tape shall include the room number, identification of the duct or conduit, and its location in the room. The tape shall be delivered to FD&C after completion of all duct and conduit work.

01782 O & M MANUALS DIGITAL OPERATION & MAINTENANCE MANUAL ON CD-ROM

A. An intuitive **CD-ROM** instructional manual shall be provided to give the owners representative the information they need to care, adjust, maintain and operate all of the equipment within the building, to include but not limited to, the heating, air conditioning, ventilating, plumbing automatic temperature control systems, kitchen equipment, stage and theatrical equipment, electrical equipment and building products.

B. **CD-ROM** manual preparation shall be under the direction of an individual or organization that has demonstrated expertise in the preparation of a comprehensive and complete **CD-ROM** operation and maintenance manual. Qualifications shall be submitted for approval.

C. All **CD-ROM's** shall be authored with Adobe Acrobat. The authoring shall, but not be limited to include the following:

1. All information on the **CD-ROM** shall be printable on 8.5" x 11" or 11" x 17" plain paper.
2. Capture images using OCR technology such that the user can key word search for information.
3. Provide a hypertext alphabetical index of all equipment and building products as outlined in item 1 above. All hypertext shall be the color blue.
4. There shall be a button on the top of each page that will return the user back to the buildings main index
5. All documentation shall be converted to an unchangeable Portable Document Format (.PDF).
6. The **CD-ROM** shall start automatically when inserted in the drive under the Windows 9x, NT or 2000 system. By clicking a start button the user will be able to open the electronic manual for the building.
7. Operation and maintenance information to be supplied to the company contracted to do the **CD-ROM** by the contractors and suppliers providing the materials and equipment.

D. At the beginning or start-up of the CD-ROM there shall be a Main Index screen to direct the user to the portion of the manual desired. This index screens will consist of three (3) major groups. The groups will include:

1. Architectural or General Contractors Section
   a. Each indexed item from the paper manual will be a hypertext index link to that information on the CD.
2. Mechanical Section
   a. Each indexed item from the paper manual will be a hypertext index link to that information on the CD.
3. Electrical Section
   b. Each indexed item from the paper manual will be a hypertext index link to that information on the CD.

E. The minimum computer requirements to run the CD-ROM will be the following:

- Pentium Processor
- 32 Meg RAM
- 10x CD-ROM drive
- Sound Card
- 64 bit 2 meg video card
- Windows 95/98 or 2000
- SVGA monitor set to 800 x 600 resolution

F. Four (4) copies of the CD will be provided to the owner's representative.

One source of procurement is:
Emanuals by Scanitall
PO Box 136.
Sandy, UT 84091-0136
www.scanitall.com
Phone: 801-619-2082

01783 WARRANTEES AND BONDS

01784 RECORD DRAWINGS

A. After the Consultants have completed the corrections for "as constructed" corrections, the University is to receive one (1) mylar copy of all drawings and a digital copy in Auto Cad release 2000 or higher. The digital copies are to be on a CD. Copies are required within 120 days of substantial completion. A consultant must include the contractor's as-builts with his submittal.

B. <u>Record Calculations Requirements</u>

- Engineer's stamp w/signature and date (No electronic reproduction of Engineer's signature accepted)
- Engineering firm's project no.
- Design Criteria:
    - Seismic
    - Wind
    - Soils
    - Governing Code
        - Design Loads:
        - Roof dead and snow loads
        - Floor dead and live loads
        - All other misc. dead and live loads
            - Calcs shall be indexed and pages numbered
            - All Engineering assumptions to be clearly noted.
            - Calcs shall be legible
            - Include names of manufacturer/suppliers of ALL proprietary structural products and copies of the product technical information in calcs such as decking, hangers, joists, anchors, etc.
            - Calcs to include labeled pictures, diagrams, photos, etc. which clarify calculations.
            - Calcs to be professionally bound and shall have plastic covers on front and back.

01785 TRANSFERRING ITEMS

A. The Contractor shall transfer all deliverables through the Consultant to the University. All Contractor supplied items transferred to the University shall be accompanied by a Letter of Transmittal signed by an authorized agent and delivered to FD&C as a record copy by the Consultant. As-builts, operations and maintenance manuals, guarantees, salvaged equipment, extra or service parts or other similar type items should be handled in this way to avoid misunderstandings of what has been transferred and when it was transferred. The Consultant shall verify that the correct quantities of all maintenance stock items are transferred.

DIVISION 2 SITE CONSTRUCTION

Revised October 7, 2002
This information now becomes part of existing Division 2 dated 9/9/02

02500 UTILITY SERVICES

Tunnels. All tunnels shall meet the following design requirements.

A. Main Utility/pipe tunnels.

1. Shall have a walking space clearance of 4 feet (four) between pipes. Overall tunnel shall have an interior dimension of nine feet, nine inches (9'9") wide and ten feet (10"0") high.
2. Expansion joints shall be water tight and sealed from both sides.
3. Tunnels shall be constructed of poured in place not precast sections.
4. See attached detail of typical tunnel section.

B. Branch Tunnels.

1. Shall have a walking space clearance of 4 feet (4") wide by 10 feet high. Overall tunnel shall have an interior dimension of six feet (6') wide and eight feet (8') high.
2. Expansion joints shall be water tight and sealed from both sides. Expansion joints shall be provided at all building connections and sealed watertight.
3. See attached detail of typical tunnel section.

C. Tunnel Nodes.

1. Shall have a walking space clearance of 4 feet wide by 7 feet high. Node height shall be 12 feet 9 inches by width as necessary to accommodate piping.
2. Nodes shall have a pumping provision to remove water draining from tunnel.
3. Wall thickness and floor thickness must meet structural criteria for tunnel depth and overhead vehicle traffic use

D. Trench Drains.

1. Tunnel floor shall have a sloping 3 ½" wide x 21/2" deep trench drain located just outside the clear walking space. Floor slab shall slope to trench drain. Trench drain shall drain to Node where water shall be removed from tunnel system.

E. **Water Proofing** shall be a rolled, self-adhering membrane waterproofing system
with ½" protection board covering. Including all penetrations and node and branch connections.

F. Pipe Supports.

1. Pipe supports shall be painted structural steel, no unistrut allowed.

2. Pipe support system connection to tunnel floor shall be elevated off floor with non-shrink grout.

G. Access Hatches.

1. **Personnel access**:
   a. Floor door access hatch, type J4-H20
   b. Size 3’0”x 3’0”
   c. Location. Every 150 feet or per IBC.

2. **Combined personnel and pipe access**:
   a. Floor door type access hatch. H20 rating.
   b. Size: 3’0”x 6’0”
   c. Location. As required for pipe access.

3. **Door**:
   a. ¼” steel diamond plate, reinforced with galvanized steel stiffeners as needed.
   b. Open to 90 degrees and lock automatically in position.
   c. Withstand H20 wheel loading.
   d. Equip with key lock protected by gasketed cover plug with removable turn handle. Interchangeable lock cylinder and key shall confirm to Owners requirements.
   e. Provide inside panic door opening device.
   f. Frame: ¼” galvanized steel with integral anchor flanges. Provide 1-1/2” drain coupling in standard location.
   g. Finish: Galvanized.
   h. Provide Type 316 stainless steel hardware throughout.
   i. Provide non-corrosive drainage piping from drain coupling to rock sump.
   j. Manufacturer: The Bilco Co. or equal.

F. Ladders:

1. Ladders at access hatches shall not extend into the 4-foot minimum tunnel walkway.
2. Ladders shall be hot dip galvanized.
3. Ladder shall have top extension equal to Bilco “Ladder Up”.

G. Painting:

Paint all pipe supports and exposed steel associated with support system.

H. Tunnel ventilation. Tunnels shall be ventilated via 4’x 4’ supply and exhaust shafts located adjacent to the tunnel.

Sequence of operations.

k. Normal positions.

1. Air intake dampers: Closed

l. Exhaust Fans.

1. All tunnel exhaust fans shall operate as second stage of cooling base on space temperature sensed by associated thermostat.
2. Exhaust fans shall be interlocked with air intake dampers. Exhaust fan(s) shall not operate when associated air intake damper(s) are closed.
3. When space temperature is above initial thermostat setpoint of 75 degrees F. (adjustable) the associated exhaust fan shall start and operate.

4. When space temperature is below thermostat setpoint the associated exhaust fan shall stop, associated air intake damper shall remain open as described for Air Intake Damper sequence.

m. Air Intake Dampers.

1. All tunnel air intake dampers shall operate as first stage of cooling based on space temperature sensed by associated exhaust fan thermostat.
2. When space temperature is below initial thermostat set point of 55 degrees F. (adjustable) the associated damper(s) shall be closed.
3. When space temperature is above initial thermostat set point the associated damper(s) shall be open.

Lighting.

1. Candle power min for tunnel lighting.
2. Power connection to existing circuits in tunnel (existing tunnel is fed from Central Energy Plant).
3. Power connection to emergency power.

Piping.

1. Arrangement must accommodate four-foot walkway and access to branch tunnels.
2. See Detail attached. Condense pipe shall be stainless steel.
3. Steam pipe shall be welded.
4. Hydro testing
5. Chemical cleaning.
6. Testing.
7. Pipe insulation. Metal jacket
8. Pipe identification shall be consistent with existing tunnel.
9. Pipe system commissioning.

Electrical;

1. Panels.
2. Switches

3. Grounding
4. Emergency power
5. Lighting. Type and locations
6. Emergency lighting
7. Convenience outlets shall be out door type. Distance apart?
8. Power. Point source.

Utility Arrangement

1. Detail showing the standard USU arrangement
2. Ceiling Height maintained
3. Walkway space

DIVISION 2 SITE CONSTRUCTION

02300 EARTHWORK

02315 EXCAVATION AND FILL

A. Topsoil: Soil rich in organic matter and loamy in texture, acceptable to Facilities Planning and Construction. Minimum depth of top soil shall be 12” in lawn or turf areas and 18” in planting beds.

B. Excavation Around Trees: Excavate within drip line of trees only where approved by Facilities Planning and Construction. Tunnel under or around roots by hand, digging where trenching for utilities is required within drip line. Do not cut main lateral roots or tap roots, only cut smaller roots that interfere with installation of new work. Cut roots with sharp pruning shears. Do not allow exposed roots to dry out before permanent backfill is placed; provide earth cover, or pack with peat moss and wrap with burlap. Water and maintain in moist condition and temporarily support and protect from damage until permanently relocated and covered with earth.

02400 UTILITY TUNNELS

Tunnels. All tunnels shall meet the following design requirements.

A. Main Utility/pipe tunnels.

1. Shall have a minimum walking space clearance of four feet (4’) by seven feet (7’) high. Overall tunnel shall have an interior dimension of nine feet, nine inches (9’9”) wide and ten feet (10’) high.
2. Expansion joints shall be water tight and sealed in accordance with NRCA details.
3. Tunnels shall be constructed of poured in place not pre-cast sections.
4. See attached detail of typical tunnel section.

B. Branch Tunnels.

1. Shall have a minimum walking space clearance of four feet (4’) wide by seven feet (7’) high. Overall tunnel shall have an interior dimension of six feet (6’) wide and eight feet (9’) high.
2. Expansion joints shall be water tight and sealed in accordance with NRCA details and shall be provided at all building connections.
3. See attached detail of typical tunnel section.

C. Tunnel Nodes.

Shall have a minimum walking space clearance of four feet (4') wide by seven feet (7') high. Node height shall be 12 feet 9 inches by width as necessary to accommodate piping.

2. Nodes shall have a pumping provision to remove water draining from tunnel.

3. Wall thickness and floor thickness must meet structural criteria for tunnel depth and overhead vehicle traffic use

D. Trench Drains.

1. Tunnel floor shall have a sloping 3 ½" wide x 21/2" deep trench drain located just outside the clear walking space. Floor slab shall slope to trench drain. Trench drain shall drain to Node where water shall be removed from tunnel system.

E. Water Proofing shall be a rolled, self-adhering membrane waterproofing system with Mirafi synthetic drainage board covering including all penetrations and node and branch connections.

F. Pipe Supports.

1. Pipe supports shall be painted structural steel, no unistrut allowed.

Pipe support system connection to tunnel floor shall be elevated off floor with non-shrink grout.

G. Access Hatches.

1. **Personnel access**:
   a. Floor door access hatch, type J4-H20
   b. Size 3'0"x 3'0"
   c. Location. Every 300 feet (300')..

2. **Combined personnel and pipe access**:
   a. Floor door type access hatch. H20 rating.
   b. Size: 3'0"x 6'0"
   c. Location. As required for pipe access.

Door:

a. ¼" steel diamond plate, reinforced with galvanized steel stiffeners as needed. Open to 90 degrees and lock automatically in position.
c. Withstand H20 wheel loading.
d. Equip with key lock protected by gasketed cover plug with removable turn handle. Interchangeable lock cylinder and key shall confirm to Owners requirements.
e. Provide inside panic door opening device.
f. Frame: ¼" galvanized steel with integral anchor flanges. Provide 1-1/2" drain coupling in standard location.
g. Finish: Galvanized.

h. Provide Type 316 stainless steel hardware throughout.
i. Provide non-corrosive drainage piping from drain coupling to rock sump.
j. Manufacturer: The Bilco Co. or equal.

F. Ladders:

1. Ladders at access hatches shall not extend into the 4-foot minimum tunnel walkway.
2. Ladders shall be hot dip galvanized.
3. Ladder shall have top extension equal to Bilco "Ladder Up".

G. Painting:

Paint all pipe supports and exposed steel associated with support system.

Lighting and Power.

1. For lighting, communication and power design requirements in tunnels, refer to Division 16. Division 2 designer shall coordinate with Division 16 designer regarding location and accommodation of Division equipment.

1. .

Mechanical.

1. For piping, sewer and ventilation requirements refer to Division 15. Division 2 designer shall coordinate with Division 15 designer regarding location and accommodation of Division 15 equipment.

1.

Utility Arrangement

1. Detail showing the standard USU arrangement
2. Ceiling Height maintained
3. Walkway space

02500 UTILITY SERVICES

02530 SEWAGE AND DRAINAGE

A. Sanitary Sewage shall be discharged into the nearest sanitary sewer with a manhole at each connection to the sewer main. Sanitary sewer pipe outside buildings shall be no smaller than six inches (6"). Sanitary sewer pipe shall be one of the following types:

1. PVC gravity sewer pipe conforming to ASTM designation D343 SDR35. PVC sewer pipe must be bedded in compacted sand and covered with sand to a depth of 1 pipe diameter above the pipe.

2. **All** Manholes shall be water-tight.

3. Manholes shall be placed on sewer lines at each change in direction, change of grade, and line intersection. On long, straight runs manholes will be spaced at a distance not to exceed two hundred feet (200'). The design of the system shall ensure that liquid does not separate from solids.

4. Following installation, the sewer main, laterals and manholes shall be cleaned to remove all gravel and debris and pressure tested with 10' water column for 12 hours.

02550 DIRECT BURIED CHILLED WATER PIPING. See Division 15.

02555 DIRECT BURIED STEAM AND CONDENSATE PIPING. See Division 15.

02600 DRAINAGE AND CONTAINMENT

A. Where sumps are necessary they shall be adequately sized for a 10 year 1 hour storm. There shall be a catch basin or a clean-out box at each change in direction or change in grade. Site drainage that includes grading, curb and storm drains shall be designed to keep water away from buildings and major pedestrian traffic. Design grades to prevent drainage across pedestrian walkways. Catch basins and manholes shall be brought to finish grades and be flush with sloped surfaces. Grates on all catch basins shall have bicycle-safe openings. Surface drains from paved areas shall have oil/water separators prior to discharging into the sumps. (Biofilters may be used in lieu of oil/water separators when site conditions permit). Roof drains shall have separate sumps from surface drains.

B. Contractors shall be required to provide surface water containment site plans to the city within whose jurisdiction the construction resides in accordance with EPA rules prior to beginning excavation.

02700 PARKING LOTS

A. **Parking Lots with Stalls Perpendicular to the Drive Lane:** Design the lot with double loaded parking bays. At major pedestrian entrances and exits the consultant shall design access ways or openings in the parking to accommodate pedestrians and persons with disabilities. Provide concrete curb around entire lot and around any

islands within the lot. Provide parking for persons with disabilities as required by ADA.

B. **Standard Sizes:** Layout parking lots with nine by eighteen foot (9'x18') stalls perpendicular to the drive lane. Widths of all drive lanes will be twenty-four feet (24') minimum. Consider opportunities for snow storage in parking lot layout.

C. **Slope:** Design asphalt parking lots with no less than two percent (2%) and no more than five percent (5%) slope in any portion of the lot. In concrete parking lots provide surfaces with no less than one percent (1%) slope and no more than five percent (5%) slope in any portion of the lot. Design parking lots with uniform slopes and subtle changes in grade between water sheds.

D. **Location of Drain Inlets:** Locate storm water drainage inlets between parking bays, at the edges or corners of lots, and out of drive lanes and roadways.

E. **Landscaped Islands:** Landscaped islands are not generally required between each bay of parking stalls. However where existing trees can be legitimately saved, islands may be constructed beyond the active root zone of the tree. Exercise care to maintain existing grade around the tree.

F. **Structural Road Section:** Design pavement structural section following the recommendations given in the soils report. The minimum asphalt pavement section is three inches (3") of asphalt over four inches (4") of compacted road base over twelve inches (12") of compacted pit run gravel. The minimum concrete pavement section is five inches (5") of four thousand (4000) psi concrete over six inches (6") of compacted road base. Cold joint sealer is required for all joints in concrete pavement.

G. **Lighting:** Design lighting layout to provide a minimum light level of 0.5 foot candles at ground level. Coordinate locations of light poles with landscape designer to ensure that light fixtures do not become obscured by tree canopies.

02775 WALKWAYS

A. **Design of Walkways:** The Consultant shall design walkways to run straight and true to accommodate future pedestrian movements. Use large smooth radii where curvilinear circulation is required. Grading design shall provide for positive drainage away from walkways and to avoid excessive cross drainage. The minimum walkway width is six feet (6'). Show the location of all joints on the drawings.

B. **Transition to Adjacent Concrete:** Where new concrete walkways meet existing concrete walkways saw cut or remove the existing walkway to the nearest cold joint. Dowel and sleeve the new concrete walkway into the existing walkway with No. 4 dowels twelve inches on center (12" O.C.). Design new walkway scoring in the transition area to match the existing walkway scoring.

C. **Landscapes Along Walkways:** Select and locate plant materials that will not spread into walkways at mature growth limits.

D. **Setbacks for Site Furnishings:** All site furnishings shall be set back sufficiently to prevent impedance of traffic, snow removal, or unsafe conditions. Pavement is required and around all site furnishings located in turf areas. Avoid scattering site furnishings along walkways. The Consultant shall widen walkways to accommodate adjacent site furnishings where practical.

E. **Concrete Scoring:** Design the scoring pattern in concrete pavements to approximately squares. The Consultant shall avoid the use of narrow angles and elongated rectangles. When walkways are curvilinear scoring shall be radial to the curve. On wide walkways scoring shall not exceed a six foot(6') square module.

F. **Materials:** All walkways shall be constructed of concrete. Other paving materials for accent areas must be approved during the design of the project.

02800 SITE IMPROVEMENTS AND AMENITIES

02810 IRRIGATION SYSTEMS

A. **Modification of Existing Irrigation Systems:** Existing irrigation systems affected by construction are to be modified to accommodate the new construction. This includes but is not limited to the following items:

1. Relocation of existing heads, valves, drains, controllers, etc., or the replacement of the same as required by site conditions and the new project.

2. Relocation of existing irrigation main lines, isolation valves, and drains, or the replacement of the same.

3. Providing irrigation water for other areas of campus affected by the construction of the project through temporary mains or other methods.

4. Providing water to all existing landscaping to be protected on-site during construction.

5. All new heads, valves, controllers, etc., shall meet University irrigation equipment standards.

B. **Design of New Irrigation Systems:** All new systems shall be designed to DFCM guidelines and provide the following performance standards as a minimum:

1. Head -to-head coverage of all areas irrigated. Coverage shall be designed at 90% of manufacturer's listed radii for spray heads and 85% of manufacturer's listed radii for rotors, maximum.

2. Matched precipitation rates in all areas of coverage, or full circle and part circle rotors on different values.

3. Prevention of over spray onto buildings, parking areas and walks next to irrigated areas.

4. Complete drainage of system using only manual drain valves for mainlines and compressed air for laterals(automatic drains are acceptable for laterals).

5. Locate valve boxes at the edges of irrigated areas, adjacent to pavement when not subject to damage by vehicles. Group valve boxes side-by-side when more than one box is required in a given location. Provide ball valve to isolate each valve manifold.

6. Average mainline static pressure is 90 psi. Pressure reduction is required for smaller heads and rotors. Design the system using the products specified below. Any questions about other equipment not listed shall be directed to FD&C.

7. Flushable inline filters are required for 3" and larger submains. Upstream from filters install a master valve and flow sensor with connections to the central control system.

C. Irrigation Products: Due to maintenance requirements, specify only the following Rainbird products for uses listed:

1. For small turf, shrub and flower beds use Rainbird 1800-PRS pop-up sprays with matching precipitation nozzles. All pop-up heights shall be four inches (4") or greater. Use 6" pop-ups in shrub beds. Design pressure 30 psi maximum.

2. For medium to large turf and shrub areas use Rainbird 3500 and 5000 rotor pop-ups. Matched precipitation rates may be achieved by varying nozzle sizes for areas covered. Design pressure 45 psi maximum.

3. For large turf areas use Rainbird Falcon 6504, 7005, 8005, or Talon rotor pop-ups. Match precipitation rates by varying nozzle sizes or separating part circle and full circle heads on different control valves. Design pressure 70 psi maximum.

4. Automatic control valves shall be Rainbird PESB-(PRS-D if required) valves ranging in size from one inch (1") to two inches (2") in size as required by each irrigation circuit. Install valves in jumbo valve boxes located adjacent to sidewalks or curbs. For valves one inch (1") and smaller, two (2) valves per

jumbo box. For one and one-half inch (1-1/2”) valves and larger, one (1) valve per jumbo box. Group multiple valve boxes together.

5. Manual drain valves shall be three-quarter inch (3/4”) Mueller Orseal valves. Provide two inch (2”) Class 200 PVC sleeves to valves and cap with 6” round valve box. Automatic drain valves shall be King mainline drain valves(red).

6. a. Control wire shall be 14 Gauge to turf and shrub areas and shall be different colors. Turf area hot wires shall be red in color with one (1) spare each, hot and ground wires, run to the most distant valve. Shrub area hot wires shall be green in color with one (1) spare each, hot and ground wires, run to most distant valve. Ground wires shall be white in color with blue spare. All wire connections shall be soldered and be sealed water tight. All connection shall be located in valve boxes with an eighteen inch (18") coil for each wire.

   b. Multi-strand control wire, 18 ga., may be used with 14 ga. Ground wires, with approval from Facilities Design and Construction.

7. Irrigation controllers shall be Rainbird ESP SAT-LINK, radio ready 12-40 station controllers. The controllers shall have lightning and electrical surge protection. Controllers shall include Maxicom compatible radio set to USU frequency and antenna. Contact Facilities Design and Construction for signal test and frequencies.

D. **Irrigation System Installation:** The irrigation system shall be installed by a licensed landscape or plumbing contractor. It shall be installed to the University’s Construction Standards. Copies of these standards and details are available from FD&C. As-built drawings are required on all new system and existing system changes.

02820 FENCES AND GATES

A. **Design Standard:** The Consultant shall only use fences and gates where required for screening and security.

B. **Types Allowed:** Design screen fences of solid masonry units to match the project and surrounding materials. Design security fences of solid masonry or ornamental iron with a continuous concrete footing to provide a mow strip.

C. **Mowing Strips:** All fences and walls adjacent to turf areas require an eight inch by eight inch (8"x8") concrete mow strip at grade, each side if required. The mowing strips should be at the grade and not above it.

02870 SITE FURNISHINGS

A. **General:** Site furnishing requirements are specific to the needs of the project. However, there shall be at least one (1) trash receptacle and one (1) cigarette urn for each entrance. Also include some form of exterior seating and a screened location for a dumpster. Provide for adequate exterior safety lighting.

B. **Lights:** The Consultant shall use campus standard pole lights

B. **Trash Receptacles:** The Consultant shall use campus standard receptacles. Design pads for the receptacles that will prevent congestion at entrances.

C. **Seating:** Provide permanent seat walls on the edges of planters and accent landscapes wherever possible. Free standing benches shall be Fairweather Plaza series 5 in color approved by FD&C.

D. **Tree Grates:** Specify unpainted cast iron grates with sufficient structural framing for pedestrian and vehicular traffic. Grates shall be modularized to allow removal for maintenance and to allow for tree growth.

E. **Cigarette Urns:** Use campus standard located to prevent congestion at entrances. Urns shall be located a minimum of twenty-five feet (25') away from entrances and air intakes.

F. **Emergency Telephone:** If the project requires an emergency telephone, the Consultant shall locate the campus standard as directed by FD&C and USU Police.

G. **Bollards:** Place bollards in pairs with a six foot (6') clear opening wherever needed to prevent vehicles from driving on walkways. Bollards may be used to protect fire hydrants. Paint bollards to match campus standards.

H. **Dumpsters:** Quantity of dumpsters required shall be determined during design with FD&C and Facilities Operation. Provide a solid masonry enclosure using materials to match the project. Dumpster location shall provide sufficient maneuvering space for the collection vehicle with a minimum outside turning radius of forty feet (40'). (Vehicle is thirty feet (30') long and eight feet (8') wide.)

I. **Bicycle Racks:**

1. **Campus Standard:** Bicycle racks are required for all major projects on campus. The approved campus standard bicycle rack is a stainless steel ribbon rack.

2. **Locations:** Locate bicycle racks far enough away from pedestrian entrances to prevent congestion and safety conflicts..

3. **Determining Quantity:** Provide the amount needed based upon faculty, staff and student population located in the project. Review this quantity with FD&C.

4. **Pads:** Design pad with rack located in the center. Design adequate maneuvering space on all sides.

02900 LANDSCAPING (Planting)

A. Landscape Architect: Planting plans, specifications, and details for landscape and landscape related work will be prepared by a Landscape Architect licensed in the State of Utah. Landscape architect shall comply with DFCM guidelines and the following in preparing the landscape design.

B. Street Trees: All projects which front on a public street will have street trees integrated into the design of the remainder of the project. Use large shade trees commonly used on campus and which will not raise paving. When existing shade trees are adjacent to the project, new street trees shall maintain same alignment, spacing, species, and variety as existing.

C. Accent Landscapes: Design the landscape and sitework to take full advantage of opportunities for accent landscapes. These are classified as follows:

1. Vehicular entrances: At vehicular entrances to the project, design the landscape to enhance direction and orientation of motorists for parking and entrance to the building.

2. Pedestrian Entrances: At pedestrian entrances to the project, design the landscape with plants in scale with pedestrians. Use plants that create interest for pedestrians as they enter the building. Fruitless flowering trees, shrubs, ground covers, and perennial flowers shall be used in these locations. Annual flowers shall be encouraged in the project. Design as approved by Facilities Planning, Design and Construction.

3. Special Accent Areas: Take advantage of special accent opportunities that may become obvious in the design of this project or that may be important to the Master Plan of the University.

D. Landscapes around Parking Lots: Wherever practical, screen parking lots from public view. At the periphery of lots and in islands within parking lots use shade of trees, flowering trees, shrubs, and/or masonry walls to conceal the parking lot from pedestrians and traffic as much as possible. Surround all parking lots by shade trees spaced 2/3 of the mature canopy apart but never more than thirty (30) feet on center. Specify trees that have a uniform head, are capable of being pruned high, will not lift paving, and provide maximum shade. Design parking lots for snow removal. Do not completely surround parking lots with plants so that there will be places for snow to be piled in the winter. Where cars overhang the curb of the lot, provide low growing

plants to prevent damage to the landscape. Do not place trees and shrubs within the overhang or within five (5) feet of the curb.

E. **Xeriscapes:** It is the desire of the University to provide new and renovated landscapes that use less water and require less maintenance. In very low traffic areas and on steep slopes design the landscape and irrigation to require minimum water and maintenance. Insure that these areas are compatible in appearance with the overall landscape objectives of the project. Seek the direction and approval of such areas from Facilities Design and Construction.

F. **Conformance to Campus Landscape:** In all projects, the design of the landscape must be consistent with the landscape of the campus. See that the objectives of the Campus Master Plan are met with this project. Give particular attention to continuation of street trees, pedestrian ways, and visual focuses.

G. **Planting Design:** Strive for simplicity in landscape design on university projects. Specify plant materials that have a history of vigorous growth on the campus of Utah State University. While the campus is in USDA Hardiness Zone 4, some plants known to grow in this zone will not survive on the campus. Strong canyon winds and very low annual temperatures are the main detractors to plant hardiness. Encourage variation in plant material. The USU campus is part of the State Arboretum. The USU Arboretum committee will review all plant material specified for compliance with objectives stated above.

H **Tree Form When Planted:** Most trees on campus eventually have much activity occurring around the base of the tree, either from pedestrians or maintenance. This requires that, several years after planting, trees are pruned high; eight to ten feet from the base of the trunk to the bottom of the canopy. Specify that plants and particularly trees with a uniform canopy headed high enough to allow growth at the top and with a central branch.

I. **Design Coordination:** Coordinate all levels of landscape and site design with the Campus Landscape Architect.

K. **Nursery Stock Sizes:** Generally specify trees with a trunk diameter no greater than two (2) inches, particularly in high traffic or highly visible areas. The minimum size tree to specify shall be one and one half(1-1/2) inch trunk diameter.

L **Warranty:** Require Contractor to guarantee trees and shrubs for one year after date of installation of landscape, or one complete growing season whichever is longer against defects including death and unsatisfactory growth, except for defects resulting from neglect by the University, abuse or damage by others, or unusual phenomena or incidents that are beyond Contractor's control.

M. **Topsoil:** Provide 12" approved topsoil for all turf areas. Provide 18" of approved topsoil for all shrub and planter beds. Provide structural soil for trees planted in hardscape areas.

M. **Organic Mulch:** Specify only fine ground bark mulch with no material sizes exceeding 3/8 inches and free of foreign matter.

N. **Headers and Edgers:** Provide mowing strips surrounding all turf areas, except where adjacent to concrete flatwork at the same grades as the turf. Specify all heartwood redwood edgers with a cross section of 4x6 inches. There should be no redwood edgers around turf, etc. Concrete mowstrips may be appropriate in some instances at 8x8 inches. All lights, signs, poles, utility boxes and other structures place in turf areas must also be designed with a mowstrip.

O. **Slope:** Minimum slope in swales, design grades for drainage swales, to be no less than two (2) percent in any portion of the swale. Also, provide drainage away from buildings and walled structures at a minimum of two (2) percent in all areas. Avoid surface drainage of large landscape areas across walkways and other paved areas where pedestrians will be concentrated or where sun will not allow melting in winter months.

P. **Tree Wrapping:** Specify tree wrapping for all trees upon planting.

Q. **Tree Staking:** Require staking only for evergreen trees larger than 6 foot height. Staking of deciduous trees will not be required unless the tree is larger than 4 inches in trunk diameter, or requested by FPD&C.

R. **Turf Areas:** Specify sod only for turf areas. When placing sod in heavily shaded areas, require that sod is over seeded with Red Fescue seed after sod is established. Grasses other than Kentucky Bluegrass may be used with approval from FPD&C.

02950 RESTORATION

A. **General:** The following requirements shall be incorporated in to the Contract Documents:

1. **Landscape Repair and Restoration:**

   a. Maintain and repair all landscape material on the site, both new and existing, from any damage or any deterioration during the duration of the contract. Replace any damaged or deteriorated materials with new stock at the density and spacing that existed at the beginning of the project. The size and condition of replaced landscape materials shall be consistent with other materials used in the project and as described in this section. Where landscape has been damaged during construction and/or where any part of the landscape deteriorates due to the construction for this project, the

Contractor shall replace with new material to the extent of damage to meet the standards of quality described within this section. If damaged plants are so mature that replacement with plants of the same size is not possible, then replace plants with the largest stock available through local nurseries within the Intermountain area. (Except, if any tree is damaged to the extent that USU determines the tree will not survive or the appearance of the tree cannot be restored, the contractor shall pay to the University $125 and then for each one inch (1") diameter of trunk size an additional $100. Measurement of trunk diameter shall be taken at chest height (DBH).)

b. Sod damaged by construction shall be cut along straight lines with a sod cutter and damaged turf removed. New sod shall be laid to tightly match existing turf and follow finish grades. After placement of new sod, the Contractor shall thoroughly water in and maintain until final acceptance of the project.

c. The finished landscape in restored areas shall be consistent with a new landscape in appearance, quality of materials and workmanship. Provide FPD&C with written notice and dated photographs of any existing damage to the landscape before the commencement of work.

2. **Irrigation Repair and Restoration:**

a. Where existing irrigation systems are damaged during construction, the Contractor shall repair the damaged irrigation system. Repairs shall use new material and meet the standards of quality described for new irrigation construction. Provide FPD&C with written notice and dated photographs of any existing damage to irrigation systems before the commencement of work.

b. Where construction of this project will affect other existing irrigation systems outside the construction area the Consultant shall show the affected area on the drawings. The Contractor shall be responsible to make modifications to existing irrigation systems to maintain water coverage outside construction area. In the event that such modifications are not made, the Contractor shall be responsible to restore landscape damage resulting from neglect.

DIVISION 2 SITE CONSTRUCTION

Revised October 7, 2002
This information now becomes part of existing Division 2 dated 9/9/02

02500 UTILITY SERVICES

Tunnels. All tunnels shall meet the following design requirements.

A. Main Utility/pipe tunnels.

1. Shall have a walking space clearance of 4 feet (four) between pipes. Overall tunnel shall have an interior dimension of nine feet, nine inches (9'9") wide and ten feet (10"0") high.
2. Expansion joints shall be water tight and sealed from both sides.
3. Tunnels shall be constructed of poured in place not precast sections.
4. See attached detail of typical tunnel section.

B. Branch Tunnels.

1. Shall have a walking space clearance of 4 feet (4") wide by 10 feet high. Overall tunnel shall have an interior dimension of six feet (6') wide and eight feet (8') high.
2. Expansion joints shall be water tight and sealed from both sides. Expansion joints shall be provided at all building connections and sealed watertight.
3. See attached detail of typical tunnel section.

C. Tunnel Nodes.

1. Shall have a walking space clearance of 4 feet wide by 7 feet high. Node height shall be 12 feet 9 inches by width as necessary to accommodate piping.
2. Nodes shall have a pumping provision to remove water draining from tunnel.
3. Wall thickness and floor thickness must meet structural criteria for tunnel depth and overhead vehicle traffic use

D. Trench Drains.

1. Tunnel floor shall have a sloping 3 ½" wide x 21/2" deep trench drain located just outside the clear walking space. Floor slab shall slope to trench drain. Trench drain shall drain to Node where water shall be removed from tunnel system.

E. **Water Proofing** shall be a rolled, self-adhering membrane waterproofing system
with ½" protection board covering. Including all penetrations and node and branch connections.

F. Pipe Supports.

1. Pipe supports shall be painted structural steel, no unistrut allowed.

2. Pipe support system connection to tunnel floor shall be elevated off floor with non-shrink grout.

G. Access Hatches.

1. **Personnel access**:
   a. Floor door access hatch, type J4-H20
   b. Size 3’0”x 3’0”
   c. Location. Every 150 feet or per IBC.

2. **Combined personnel and pipe access**:
   a. Floor door type access hatch. H20 rating.
   b. Size: 3’0”x 6’0”
   c. Location. As required for pipe access.

3. **Door**:
   a. ¼” steel diamond plate, reinforced with galvanized steel stiffeners as needed.
   b. Open to 90 degrees and lock automatically in position.
   c. Withstand H20 wheel loading.
   d. Equip with key lock protected by gasketed cover plug with removable turn handle. Interchangeable lock cylinder and key shall confirm to Owners requirements.
   e. Provide inside panic door opening device.
   f. Frame: ¼” galvanized steel with integral anchor flanges. Provide 1-1/2” drain coupling in standard location.
   g. Finish: Galvanized.
   h. Provide Type 316 stainless steel hardware throughout.
   i. Provide non-corrosive drainage piping from drain coupling to rock sump.
   j. Manufacturer: The Bilco Co. or equal.

F. Ladders:

1. Ladders at access hatches shall not extend into the 4-foot minimum tunnel walkway.
2. Ladders shall be hot dip galvanized.
3. Ladder shall have top extension equal to Bilco “Ladder Up”.

G. Painting:

Paint all pipe supports and exposed steel associated with support system.

H. Tunnel ventilation. Tunnels shall be ventilated via 4’x 4’ supply and exhaust shafts located adjacent to the tunnel.

Sequence of operations.

a. Normal positions.
   1. Air intake dampers: Closed
   2. Exhaust Fans.

1. All tunnel exhaust fans shall operate as second stage of cooling base on space temperature sensed by associated thermostat.
2. Exhaust fans shall be interlocked with air intake dampers. Exhaust fan(s) shall not operate when associated air intake damper(s) are closed.
3. When space temperature is above initial thermostat setpoint of 75 degrees F. (adjustable) the associated exhaust fan shall start and operate.

4. When space temperature is below thermostat setpoint the associated exhaust fan shall stop, associated air intake damper shall remain open as described for Air Intake Damper sequence.

3. Air Intake Dampers.

1. All tunnel air intake dampers shall operate as first stage of cooling based on space temperature sensed by associated exhaust fan thermostat.
2. When space temperature is below initial thermostat set point of 55 degrees F. (adjustable) the associated damper(s) shall be closed.
3. When space temperature is above initial thermostat set point the associated damper(s) shall be open.

Lighting.

1. Candle power min for tunnel lighting.
2. Power connection to existing circuits in tunnel (existing tunnel is fed from Central Energy Plant).
3. Power connection to emergency power.

Piping.

1. Arrangement must accommodate four-foot walkway and access to branch tunnels.

4. See Detail attached. Condense pipe shall be stainless steel.
5. Steam pipe shall be welded.
6. Hydro testing
7. Chemical cleaning.
8. Testing.
9. Pipe insulation. Metal jacket
10. Pipe identification shall be consistent with existing tunnel.
11. Pipe system commissioning.

Electrical;

1. Panels.
2. Switches

3. Grounding
4. Emergency power
5. Lighting. Type and locations
6. Emergency lighting
7. Convenience outlets shall be out door type. Distance apart?
8. Power. Point source.

Utility Arrangement

1. Detail showing the standard USU arrangement
2. Ceiling Height maintained
3. Walkway space

DIVISION 3 CONCRETE

03300 CAST-IN-PLACE CONCRETE

A. All concrete exposed to freezing shall be 4000 psi strength at 28 days. Concrete on metal decking shall have reinforcing fibers to minimize plastic shrinkage cracking.

B. All exterior concrete slabs, curb and gutters shall have a water/cement ratio of 0.45 or less and be placed with a 3” maximum slump. Super plasticiser may only be added for workability at the job site after verification of a 3” slump. Minimum entrained air content shall be 6-8%.

C. Resin based curing compounds may be used. A penetrating sealer shall be applied to all flat work after it has reached the 28-day design strength.

DIVISION 4 MASONRY

04200 MASONRY UNITS

A. Products: Masonry units shall be light tan in color and two and one-quarter by three and five-eighths by seven and five eighths inches (2-1/4”x3-5/8”x7-5/8”) in size. Actual color shall be approved by Facilities Design & Construction (FD&C). Joints shall be tooled concave. Maximum variation between joints shall be 1/16”. Specifications shall indicate cold weather installation instructions.

B. Samples: Sample panels to be submitted to FD&C for approval prior to ordering masonry units.

C. Penetrations: Openings for all penetrations shall not exceed one-eighth inch (1/8”) on all sides of the penetrations. Pipes requiring a larger annular space should be installed in a sleeve of the size necessary to comply with appropriate design standard.

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D. Masonry Veneer: If light gauge steel stud framing is used as the support system for masonry veneer, the parameter for ‘out of plane deflection’ shall be L/720.

DIVISION 5 METALS

05500 METAL FABRICATION

05520 HANDRAILS

A. Provide handrails of Stainless steel with a AIS number four (4) satin finish, bright and directional polish.

05550 STAIR TREADS

A. **Treads:** Treads shall be non-slip safety type.

DIVISION 6 WOOD AND PLASTICS

A. Treatment: Any wood coming in contact with concrete or masonry shall be treated with a wood preservative. Wood curbs and nailers in connection with roofing shall also be treated with a wood preservative. Fire retardant treatment is not required for curbs, nailers, grounds, and miscellaneous backings.

B. Environmental Conditions: All wood shall be protected from the elements during storage on site. Wood shall be kiln dried and arrive on site with the moisture content not to exceed 19%. Proper ventilation to control warping shall be provided.

C. Finish Carpentry:

1. Environmental conditions: Finish carpentry shall not be installed until the building permanent HVAC is fully operational and a humidity level of 40% maximum can be maintained.

D. Architectural Wood Work: All architectural wood work shall be at least custom grade in accordance with AWI Standards.

DIVISION 7 THERMAL & MOISTURE PROTECTION

A. Standards: The design shall conform to the current National Roofing Contractor's Association roofing and waterproofing manual.

B. Drainage: Positive drainage shall always be provided on all roofs. Use interior drain pipes whenever possible to alleviate problems experienced during the winter months. If exterior drainage is necessary, steps to insure effective drainage must be taken such as; heat cable, ice and water shield on steep roofs, ice and snow guards, etc. A quality cast metal roof drain such as Zurn shall be specified. Scuppers shall not be approved. Vertical roof drain pipes shall be mounted to allow drains to settle with roof substrate. Cap all parapet walls with metal copings (preferably aluminum) using standing seam joints. Limit caulking as a water-proofing to a minimum.

C. Access: All roof surfaces shall be accessible. Mount low mounted HVAC, walking decks and patios, etc., high enough for roof membrane to be accessible. Provide a minimum of thirty by forty-eight inch (30"x48") roof hatch, access doors and ladders to all levels of the roof. Provide grab bars above roof hatches.

D. Expansion Joints: Provide expansion joints at the following locations:

1. Wherever expansion or contraction joints are provided in the structural system.

2. Where steel framing, structural steel, or decking change direction.

3. Where separate wings of "L", "T", or similar configurations exist.

4. Where there is a change in type of decking.

5. Whenever additions are connected to existing buildings.

6. At junctions where interior heating conditions change.

7. Where movement between vertical walls and the roof deck may occur.

E. Pre-Construction Conference: Hold a pre-roofing conference with all concerned parties in attendance.

07050 MEMBRANE ROOFING

A. The preferred system on campus is a four ply built-up with modified asphalt flashings and a gravel finish.

B. For re-roofing or new construction close to occupied buildings, provide cold applied bituminous roofing using modified asphalt for the waterproofing layers.

C. Elastomeric roof membranes may be used only with prior approval of FD&C.

DIVISION 7 THERMAL & MOISTURE PROTECTION

A. Standards: The design shall conform to the current National Roofing Contractor's Association roofing and waterproofing manual.

B. Drainage: Positive drainage of at least 2% (1/4"/foot) shall ~~always~~ be provided on all roofs. Use interior drain pipes whenever possible and penetrate through the building on interior walls only ~~to alleviate problems experienced during the winter months~~. If exterior drainage is necessary, steps to ensure effective drainage must be taken such as; heat cable, ice and water shield, substantial gutter, ~~on steep roofs~~ ice and snow guards, etc. A quality cast metal roof drain such as Zurn shall be specified. Scuppers shall not be approved. ~~Vertical~~ Roof drain pipes shall be located ~~mounted~~ to minimize problems associated ~~allow drains to settle~~ with roof settlement ~~substrate.~~ Cap all parapet walls with metal copings (preferably aluminum) using standing seam joints. Limit caulking as a water-proofing to a minimum.

C. Access: All roof surfaces shall be accessible. Mount ~~low mounted~~ HVAC, walking decks and patios, etc., high enough for roof membrane to be accessible (8" minimum). Provide a minimum of thirty by forty-eight inch (30"x48") roof hatch, access doors and ladders to all levels of the roof. Provide ~~grab bars above~~ roof hatches with telescoping safety rails.

D. Expansion Joints: Provide expansion joints at the following locations:

1. Wherever expansion or contraction joints are provided in the structural system.
2. Where steel framing, structural steel, or decking change direction.
3. Where separate wings of "L", "T", or similar configurations exist.
4. Where there is a change in type of decking.
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C. Elastomeric roof membranes may be used only with prior approval of FD&C.

DIVISION 8 DOORS & WINDOWS

08000 DOORS

A. General:

1. **Warranty:** Modify warranty to include replacement and refinishing of any damaged doors and during the warranty period. The warranty period shall be a ten-year minimum.

2. **Delivery:** Spreader bars used for shipping doorframes shall be removed upon receipt and replaced with plywood spreaders.

3. **Locks:** Doors shall be fitted for mortise locks. Provide for a two and three-quarter-inch (2-3/4") backset.

08400 ENTRANCE DOORS

A. Primary accessible entrance doors shall be swinging doors with radio controlled push button actuators. The doors shall have the following features:

1. A door hold-open device.

2. The door must be opened with a cylinder key.

3. Double doors shall have a positive interlock to prevent tampering with the sensor from outside the building.

4. Electrical power to the doors shall be connected to the emergency power system. Doors shall remain operable during power outages.

5. At least one main entry shall have a door operator LCN 4610 or 4620.

A. Center Mullions: Exterior double doors shall have cylinder key removable center mullions, only where needed. All other double doors shall have permanent mullions.

08500 WINDOWS (METAL)

A. Maintenance: Obtain approval from FD&C of alternate methods of window washing before selecting a window that is not readily removable for washing.

08520 ALUMINUM FRAMES

A. Aluminum window frames shall be anodized with color except where clear finish is required. Storefront aluminum doors shall be medium or wide stile, single openings.

Door hardware shall be Grade 1 and include continuous hinges (pin and barrel type, Markar 100 series or better), Push-Pad rim exit devices (Von Duprin 99 series or Detex Advantex), cast iron body closers (LCN 4000 series) mounted top jamb. Electric door operators shall be LCN 4620 series. Keyed removable mullions (KR4954) shall be used only where large objects are expected to be moved in or out of building. All other openings shall be single doors. In banks of 2 or more doors, only 1 exit device trim shall be operable, all others shall be dummy trim.

08700 HARDWARE, LOCKS & KEYS

A. General: The University has a master key system on campus. For reasons of security and convenience the number of approved locks is limited. Schlage D series, Sargent 10 Line and Arrow Q series are the approved cylindrical locks for remodels unless otherwise specified by FD&C and University Locksmith. Mortise locks shall be used on new construction and can be from Arrow, Sargent, or Schlage. All locks shall be Grade One. Any lockset, passage set, or exit device shall meet ADA specifications. Any lever is to have a full return at the end of the handle. The style shall match Schlage Sparta.

B. Locks: All locks shall be provided with construction cylinders that are Schlage Everest cylinders, zero bitted.

1. Locks shall be installed per manufacturer's instructions. All locks shall be properly adjusted for door thickness.

2. For any project, there shall be six percent (6%) extra locks left on the job for maintenance. These locks shall be as follows with one minimum of each type:

   a. Two percent (2%) - Classroom function type (key to lock and unlock).

   b. Four percent (4%) - Entry function.

3. Remodels require hardware to match existing system.

C. Extra Locks: Extra locks and keys shall be delivered to the FD&C office upon completion of the project. The Consultant shall verify quantities before delivery.

D. Additions: Where additions are built to existing buildings, the locks shall be of a matching type to be consistent with building master key.

E. Exit Devices: Exit devices must have dead latching feature. All panic locks and exit devices for exterior doors shall be of a type that cannot be left unlocked when key is withdrawn. Install with sex-bolts or through bolts as required. These devices shall meet ADA specifications. Von Duprin 99 series shall be used. Fire exit devices shall be used on fire-rated doors as required. On all pairs of fire-rated corridor doors, and a single exit door as indicated by traffic patterns, provide electro-magnetic hold-open devices linked to the fire

alarm system. On pairs of fire-rated corridor doors, use concealed vertical rod fire exit devices with approved “less bottom rod” option where security is not a concern.

F. Construction Locks: The Contractor shall be responsible for securing any doors that access the project, with Schlage Everest C123, zero bitted, cylinders.

G. Keys: Door keys and cylinders shall not be part of the contract. Consultant shall establish project estimate using budget figures for locks provided by USU FD&C.

1. Where exit devices are installed, the Contractor shall supply at least one (1) dogging or lockdown key with each exit device that is not fire rated.

2. All other keys for cabinets, lockers, panels, dogging, electrical operator, water valve and special purpose keys shall be identified and tagged. These shall be delivered to the Construction Coordinator at the time of final acceptance.

H. Door Closers: Door closers shall meet ADA specifications. Approved door closers are LCN 4000 series. Closers on building exterior doors shall be installed Top Jamb mount where possible instead of Parallel mount, which should be used as a last option. All closers shall be Grade 1. Single application closer models are preferred to non-handed models.

DIVISION 8 DOORS & WINDOWS

08000 DOORS

A. General:

1. **Delivery:** Spreader bars used for shipping doorframes shall be removed upon receipt and replaced with plywood spreaders.

2. **Locks:** Doors shall be fitted for mortise locks. Provide for a two and three-quarter-inch (2-3/4") backset.

3. **Style:** Provide lever handles, Schlage Sparta or similar.

08400 ENTRANCE DOORS

A. All exterior entrance doorways shall be provided with electrical conduit for security access control.

B. Primary accessible entrance doors shall be swinging doors with radio controlled push button actuators. The doors shall have the following features:

1. A door hold-open device.

2. The door must be able to be unlocked and locked ~~opened~~ with a cylinder key.

~~3. Double doors shall have a positive interlock to prevent tampering with the sensor from outside the building.~~

3. Electrical power to the doors shall be connected to the emergency power system. Doors shall remain operable during power outages.

4. At least one main entry shall have a door operator LCN 4610 or 4620.

C. Center Mullions: Exterior double doors shall have cylinder key removable center mullions, only where needed. All other double doors shall have permanent mullions.

08500 WINDOWS (METAL)

A. Maintenance: Obtain approval from FD&C of alternate methods of window washing before selecting a window that is not readily removable for washing.

08520 ALUMINUM FRAMES

A. Aluminum window frames shall be anodized with color except where clear finish is required. Storefront aluminum doors shall be medium or wide stile, single openings. Door hardware shall be Grade 1 and include continuous hinges (pin and barrel type, Markar 100 series or better), Push-Pad rim exit devices (Von Duprin 99 series or Detex Advantex), cast iron body closers (LCN 4000 series) mounted top jamb. Electric door operators shall be LCN 4620 series. Keyed removable mullions (KR4954) shall be used only where large objects are expected to be moved in or out of building. All other openings shall be single doors. In banks of 2 or more doors, only 1 exit device trim shall be operable, all others shall be dummy trim.

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B. Locks: All locks shall be provided with construction cylinders that are Schlage Everest cylinders, zero bitted.

1. Locks shall be installed per manufacturer's instructions. All locks shall be properly adjusted for door thickness.

2. For any project, there shall be six percent (6%) extra locks left on the job for maintenance. These locks shall be as follows with one minimum of each type:

   a. Two percent (2%) - Classroom function type (key to lock and unlock).

   b. Four percent (4%) - Entry function.

3. Remodels require hardware to match existing system.

C. Extra Locks: Extra locks and keys shall be delivered to the FD&C office upon completion of the project. The Consultant shall verify quantities before delivery.

D. Additions: Where additions are built to existing buildings, the locks shall be of a matching type to be consistent with building master key.

E. Exit Devices: Exit devices must have dead latching feature. ~~All panic locks and exit devices for exterior doors shall be of a type that cannot be left unlocked when key is withdrawn.~~ Install with sex-bolts or through bolts as required. These devices shall meet ADA specifications. Von Duprin 99 series shall be used. Fire exit devices shall be used on fire-

rated doors as required. On all pairs of fire-rated corridor doors, and a single exit door as indicated by traffic patterns, provide electro-magnetic hold-open devices linked to the fire alarm system. On pairs of fire-rated corridor doors, use concealed vertical rod fire exit devices with approved "less bottom rod" option where security is not a concern.

F. ~~**Construction Locks:** The Contractor shall be responsible for securing any doors that access the project, with Schlage Everest C123, zero bitted, cylinders~~.

F. **Keys:** Door keys and cylinders shall not be part of the contract. Consultant shall establish project estimate using budget figures for locks provided by USU FD&C.

1. Where exit devices are installed, the Contractor shall supply at least one (1) dogging or lockdown key with each exit device that is not fire rated.

2. All other keys for cabinets, lockers, panels, dogging, electrical operator, water valve and special purpose keys shall be identified and tagged. These shall be delivered to the Construction Coordinator at the time of final acceptance.

G. **Door Closers:** Door closers shall meet ADA specifications. Approved door closers are LCN 4000 series. All closers shall be mounted on the interior face of the door. Parallel arm closers are not acceptable. ~~Closers on building exterior doors shall be installed Top Jamb mount where possible instead of Parallel mount, which should be used as a last option~~. All closers shall be Grade 1. Single application closer models are preferred to non-handed models.

DIVISION 9 FINISHES

09200 PLASTER AND GYPSUM BOARD

09250 DRYWALL (GYPSUM BOARD)

A. **Expansion Joints:** Provide expansion joints on large continuous walls. Also, provide joints over door heads. Provide details of layout on interior wall elevations.

B. **Seams:** After final sanding sponge down all drywall seams.

C. **Penetrations:** Openings for all penetrations shall not exceed one-eighth inch (1/8”) on all sides of the penetrations.

09600 FLOORING

09650 RESILIENT FLOORING

A. **General:** Use vinyl composition tile (VCT) in utility spaces. Ramps shall be covered with slip-retardant tile, or other slip-resistant surface. If rubber stair treads are used, it shall be low profile and installed using epoxy adhesive. Provide attic stock as required. Stair treads shall be heavy-duty tread rubber. Nosings and flooring grade rubber shall not be acceptable.

B. **Adhesives:** Use “thin spread” adhesives that are recommended by tile manufacturer for use with their products. (Floor prep material of Portland base such as DAP 95/98. VCT and sheet vinyl – use DAP 98 only or equal.

C. **Rubber Base:** Use only dark colors in areas exposed to ultraviolet (UV) radiation, unless manufacturer will warranty for ten (10) years against deterioration. Install rubber base using one hundred twenty-foot (120’) rolls. Four foot (4’) lengths are not allowed. Use pre-molded outside corners and install them with contact cement.

D. **Sheet Vinyl:** In laboratories where cleanliness is a concern sheet vinyl of a commercial type shall be used. It shall be installed using the manufacturer’s special seam adhesive. Heat-weldable solid vinyls shall sit twenty-four (24) hours before welding, as per manufacturer’s requirements. Installation of sheet vinyls shall be by certified installers only.

09680 CARPETING

A. **General:** All carpet design, style and type must be State approved or approved by FD&C. Carpet base with bound edge shall be used in carpeted areas. Carpet will be purchased by the university and installed by the Contractor. Consultant shall allow for purchase of carpet in the overall project estimate.

B. Broadloom:

1. Use in areas where cost is a concern.

2. Use in areas where seams are undesirable (i.e. private offices, conference rooms, or large open areas with little or no built-in furniture or equipment).

3. Use on stairs which cannot be sealed concrete or ribbed rubber. Full size treads may be broadloom carpet with attached high density pad such as enhancer.

4. Typical broadloom installations are direct glue although an attached high density pad such as enhancer may be used.

5. Broadloom may only be used in remodels if the substrate is sound.

6. Where broadloom is to be installed over existing vinyl asbestos floor tile a hard/set, releasable adhesive must be used.

7. Cabinets and other permanent fixtures not to be installed on top of carpeted areas.

C. Carpet Tile:

1. Use on elevated flooring systems or in areas of high traffic such as corridors or areas with heavy wheeled use.

2. Use in areas where furniture or equipment removal for re-carpeting would be impractical.

3. Use in areas where a resilient pad is required and the room configuration does not easily accommodate broadloom.

D. Qualification of Installer: Specify a firm with not less than five (5) years of experience in the installation of commercial carpet by methods similar to those required for this project. Require adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts. They shall be completely familiar with the specified requirements and the methods needed for proper performance of the work in the section.

E. Product Data: Within forty-five (45) calendar days after award of the contract, require the Contractor to submit:

1. Data to show compliance with requirements, including test laboratory reports and manufacturer's instructions and recommendations for installation and

maintenance. Testing laboratory shall be acceptable to authorities having jurisdiction.

2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.

3. Submit eighteen by twenty-seven inch (18" X 27") samples of each type, color and pattern of carpeting material required, and six inch (6") lengths of edge guard stripping.

F. **Maintenance Stock:** Require the Contractor to deliver specified overrun and usable scrap materials to the University's designated storage space as directed, properly packaged, protected and identified. When carpet is used on stairs provide additional overrun to recover stairs one time. At least fifty percent (50%) of the overrun shall be twelve feet (12') wide. As a minimum the Contractor shall provide one twelve by fifteen foot (12' X 15') piece of every color used.

G. **Shop Drawings:** Require submittal of carpet layout drawings at the same scale as contract drawings. Show carpet seam locations, direction of pattern and nap, and location and type of edge treatment and divider stripping (if any) on the drawings. Avoid location seams in high traffic areas. The Contractor shall submit the required number of shop drawings or samples to the Consultant. Simultaneously, he shall submit an additional copy to the University for their review. Submittals are required to be approved by the University also. Upon approval of shop drawings by both University and Consultant, the University shall be provided with two (2) copies for their use.

H. **Surface Preparation:** Require Installer to verify in writing that testing of substrates for moisture content, acidity or alkalinity and other conditions under which floor covering is to be installed, and notify Contractor, Consultant and FD&C in writing of conditions detrimental to proper completion of the work. Do not proceed with installation of floor covering until unsatisfactory conditions have been corrected.

I. **Installation:** Specify compliance with manufacturer's instructions and recommendations for seam locations and directions of carpet; maintain uniformity of direction and lie of piles and install in numerical order of rolls. At doors, center seams under doors and do not place seams in traffic directions at doorways.

1. Hold a pre-installation meeting with Subcontractor, Contractor, FD&C and Facilities Operations.

2. Extend carpet under open-bottomed obstructions and under removable flanges and furnishings, and into alcoves and closets of each space. Use only manufacturer's approved pad, sealers and adhesives.

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1. Hold a pre-installation meeting with Subcontractor, Contractor, FD&C and Facilities Operations.

2. Extend carpet under open-bottomed obstructions and under removable flanges and furnishings, and into alcoves and closets of each space. Use only manufacturer's approved pad, sealers and adhesives.

3. Provide cut-outs where required, and bind cut edges properly where not concealed by protective edge guards or overlapping flanges.

4. Install carpet edge guard where edge of carpet is exposed. Anchor guards to substrate.

5. Vacuum carpet using a commercial machine with face beater element. Remove spots and replace carpet where spots cannot be removed.

6. Advise USU of protection methods and materials needed to ensure that carpeting will be without deterioration or damage at time of substantial completion.

7. Install carpet base in areas shown to be carpeted.

09900 PAINTING

A. General:

1. All painting shall require three (3) coats. The Consultant shall specify manufacturer's minimum mil thickness on all schedules.

2. Remove hardware before painting doors, windows, frames, etc.

3. Piping, walls and ceilings in mechanical equipment rooms are to be painted light durable colors.

4. All wood exposed to view must have all the machine marks removed and present a smooth surface. This includes both hardwoods and soft woods.

4. Contact FD&C for current color selection.

6. At present, USU obtains Porter brand paints for maintenance work. Compatibility with Porter color tints and product range will be required.

B. Interior:

1. All newly plastered or sheet rock walls shall be painted as follows: The first coat shall be a pigmented vinyl wall sealer. The second and third coats shall be a top quality acrylic latex or other special paint as space usage warrants.

2. Concrete or concrete block walls shall receive one (1) heavy coat of block filler, followed by two (2) coats of acrylic latex wall paint or special paint as space usage warrants.

3. All interior exposed brick shall be sealed (glazed brick with one (1) coat and unglazed brick with two (2) coats). Sealer shall be a clear acrylic penetrating type sealer.

4. All insulated utility lines shall be painted with two (2) coats acrylic latex paint.

5. Other metals such as exposed sewer lines, metal beams, building frames, windows, doors, sash, trims, and railings shall receive a first coat of metal primer followed by two (2) coats of semi-gloss acrylic latex paint. Exceptions are non-insulated hot pipes which require two (2) coats of high temperature paint. Doors, frames, and windows shall be spray painted.

6. Interior wood trim and doors shall receive one (1) coat of interior alkyd primer, followed by two (2) coats acrylic latex semi-gloss paint.

7. All wood surfaces shall be sanded between coats of paint, sealer, or urethane. Finish must be smooth and even.

8. For a natural finish on doors and casings the first coat shall be sanding sealer. For a gloss finish the second and third coats shall be gloss varnish. For a satin finish they shall be finished with satin varnish.

9. When staining, apply stain and wipe off for uniform blend. On open grain wood, put stain in wood filler before filling wood. Finish is the same as for natural finish for doors and casings.

10. New cabinets shall receive a lacquer consisting of one (1) coat of oil wiping stain, one (1) coat of lacquer sanding sealer, an two (2) coats of moisture resistant lacquer applied in that order.

11. Mechanical equipment rooms and all exposed piping within the room shall be painted as well as all exposed metal surfaces including bare piping, hangers, stands, supports, etc.

12. Fire sprinklers, smoke detectors, heat detectors, interior of electrical boxes and fusible links shall be protected from paint and over spray.

C. Exterior:

1. Exterior surfaces such as metal structural steel, water tank supports, water tanks, metal doors, metal sash, and any other metal surfaces excluding galvanized metal will be finished with one (1) coat of metal rust inhibiting primer and two (2) coats of exterior acrylic latex paint.

2. For galvanized metal surfaces use Galvite for first coat.

3. For masonry, brick, concrete, and plaster use two (2) coats masonry water sealer, TAMMS clear penetrating copolymer or equal. Apply sealer by spraying only.

4. Exterior wood requires three (3) coats of paint. The first coat shall be an exterior acrylic primer, the second and third coats to be a top quality exterior alkyd latex paint.

5. Outside wood staining shall be done using water based penetrating sealer that is either semi transparent or opaque.

D. **Extra Materials:** Require Contractor to supply one (1) quart of each color or type of paint used in sealed containers. They shall be marked by correct color, formula and location used. These containers shall be part of the attic stock and stored with the other attic stock items. The paint schedule and manufacturer shall be updated by the Contractor on the record documents returned to the Consultant for original document correction.

DIVISION 10 SPECIALTIES

10260 CORNER GUARD

A. Specify full height impact resistant corner guards in all halls, corridors and exit ways including stairways at all outside corners.

10520 FIRE HOSE, CABINETS, & EXTINGUISHERS

A. General: Require Contractor to install underground water piping and hydrants prior to completion of rough grading. On buildings over 35 feet (35') in height require Contractor to install temporary standpipes as required by the International Building Code.

B. Cabinets:

1. Locate fire hose and fire extinguisher cabinets to provide complete coverage to all areas of the building. The hose in each cabinet shall not exceed one hundred feet (100') in length.

2. Cabinets shall be recessed into the walls. They shall be approved by the University Fire Marshal. They shall have a break glass panel and be labeled 'FIRE HOSE' or 'FIRE EXTINGUISHER'.

C. Hose:

1. All fire hose connections shall be National Standard thread and iron pipe.

2. The hose used in the cabinets shall be a latex-lined type called 'dri-rack' as manufactured by Goodall Rubber Company or meet or exceed their specifications. Unlined linen hose will not be acceptable.

3. Hoses shall have a controlled water type nozzle or fog type nozzle. The nozzles shall be of a type that can turn off the water flow at the hose end.

10800 TOILET ROOM ACCESSORIES

A. Restroom:

1. Soap dispensers shall be a Colgate Palmolive No. 01944 800 mc push style ml or equal dispenser and located over the sink, not the floor.

2. Towel dispenser shall be Kimberly Clark No. 56700, Smoke Plastic, profile no-touch roll dispenser.

3. Toilet paper holders shall be Georgia Pacific, Cormatic, 3-roll No. S5C.

4. Sanitary napkin dispensers shall be designed to dispense all brands, 25 cent coin operated, wall mounted. It shall be equipped with double locks, one (1) lock for napkins and a separate one for a cash box, Bobrick Model B-354 or equal.

5. Flush mounted sanitary napkin disposal containers shall be provided (one each) for each toilet stall, Bobrick or equal.

6. Waste disposal containers shall be Rubbermaid No. 3546, or equal.

7. Book and purse shelves shall be located under mirrors or near fixtures.

8. Urinal divider screens are required.

9. One sink will have a 5/8” hose bib or hot water line under the sink.

B. **Custodial Room:** Each custodial room shall have a floor sink with hot and cold water.

DIVISION 12 FURNISHINGS

12400 FURNISHINGS AND ACCESSORIES

12490 WINDOW TREATMENTS

The Consultant shall prepare specifications for window treatments that will be bid separately from the rest of the project. The Consultant shall include window treatments in the overall project budget.

DIVISION 13 AUTOMATIC TEMPERATURE CONTROLS

13800 BUILDING AND CONTROL:

A. Two companies are approved to provide building automation and control. They are as follows:

1. Johnson Controls, Inc.
2. Utah Controls (CSI)

13850 FIRE ALARM SYSTEMS

A. General:

1. The campus standard alarm system is a Notifier addressable panel with 24 hour monitoring at the campus police office.

2. All duct smoke detectors shall be on signal loops dedicated for duct detectors.

3. University building fire alarm systems are Addressable/Intelligent systems.

5. Solid-state fire alarm equipment shall be protected with surge arrestors at each line and power connection.

6. Building fire alarm control panels shall have their battery-backup batteries capable of operating the system for seventy-two (72) hours after the removal of the normal power source. This shall be tested after the system is complete in the presence of the Fire Marshal. Battery charging system must match the batteries being used.

7. Alerting devices shall be a horn with a flashing strobe light. Sirens, bells, etc., are not acceptable. Location of alerting devices shall be two feet (2') below the ceiling but not over eight feet (8') above the finished floor. The device shall be set for a fast warble.

8. The location of the outside annunciator shall be approved by the USU Fire Marshal. Height above walking surface shall be no greater than six feet (6') to the top of the cabinet.

9. Outside alerting devices shall be located by the USU Fire Marshal. They shall be weather/water proof devices.

10. Approved fire alarm vendors for USU are Notifier and Honeywell. Contact FD&C for specific equipment that will be acceptable.

11. Raceways above accessible ceilings shall include a junction box with flexible conduit to any detector. The junction box shall be visible and accessible from the detector it serves. Junction boxes and covers shall be painted red.

12. Wiring color code is standardized. SLC, Belden #9581 (twisted shielded pair), Black +, White -: Smoke detector power Red +,Brown -: Door Holders Orange +, Slate -: Voice Blue, Blue: Non shielded SLC (detector) –Yellow +, Violet -: Horn loop Black +, White - spare Pink/Aqua

13. Risers from floor to floor shall have junction boxes at each floor in the communications room in each riser with a three-fourths inch (3/4") conduit between the J boxes. J boxes shall have a mounting pan with clamp type terminal block intercepting all circuits used on the floor. All circuits not used on the floor shall be pulled through the J box without splices. Two (2) separate terminal blocks shall be located in the “in” and “out” circuit conductors going to and from the floor such that the circuits on the floor may be bypassed to allow the remaining building to be functional.

14. Provide building control systems that detect loop grounding, provide smoke detector and horn power from both ends of the power loop with open detection.

15. All new buildings shall have pull stations in hallways and smoke/thermal detectors in the ceilings of all areas not covered by automatic sprinklers.

DIVISION 14 CONVEYING SYSTEMS

14200 ELEVATORS

A. **Codes:** All elevators shall conform to the latest edition of the following codes: American Standard Safety Code, Uniform Federal Accessibility Standards 4.10 (ADA), American Society of Mechanical Engineers (ASME) 17.1, NFPA 101 Life Safety Code, National Electrical Code, and all state and local codes that apply.

B. **General:** Elevator controllers shall utilize a non-proprietary microprocessor based logic system and comply with the codes referenced above. See below for individual elevator type control specifications

C. **Disabled (ADA):** Interior dimensions of passenger elevators shall meet the minimum ADAAG requirement. Signals shall include floor passing gong, hall lanterns (at least seventy-two inches (72") above the floor) at every level with an audible signal and all other signals in accordance with ADA. Car position indicators are required and shall comply with ADA. The door protective and reopening device (safety edge) shall be the non-mechanical type, Jannus Panna 40 or Innovation Smart Edge. All controllers shall be solid state or micro processor controlled.

D. **Size:** Elevators shall be large enough to permit transporting of automatic floor scrubbing machine throughout the building (minimum 6 X 6 foot square). Doors shall open completely to use full opening size. Provide removable full height bumper blankets for wall protection in elevators.

E. **Service Contract:** Specify a one hundred percent (100%) service contract to run for one (1) year after acceptance be furnished by the Contractor. This shall call for routine monthly inspection, emergency calls and all parts and labor required to maintain elevator in first class condition. The written contract shall be delivered to FD&C.

F. **Signaling Device Lamps:** Bulbs for position indicators and push buttons shall be standard neon or LED bulbs and easily obtainable from local distributors, or electrical houses.

G. **Lighting:** Fluorescent lighting with easily obtainable tubes from local distributors and shall meet ASME A17.1 rule 204.7 (54 lux) requirements. Emergency lighting shall also be provided per ASME 17.1. Provide power for car lighting from the building emergency lighting system.

H. **Spare Maintenance Parts:** The Consultant shall specify one (1) complete spare set of solid state or microprocessor boards be provided and include all available diagnostic equipment and manuals for the elevator. Also include two (2) spare bulbs for each type used in complete elevator system.

I. **Diagrams:** All documentation, circuit board schematics, wiring diagrams, a table of traveling cable and hoistway wire connections and their destinations, construction and as-built drawing, repair manuals, and parts list shall be included with the Operations and Maintenance Manual for the entire project and be covered in the training sessions.

J. **Communications:** Emergency communications from the car shall be a single flush mounted self dialing telephone as manufactured by Code Blue (CB 410) to match other emergency phones and the campus telephone system. See FD&C for the latest design and part numbers. The phone shall be in a standard telephone cabinet with ADA compliant door handle. It shall be positioned at the appropriate location in the car control panel in accordance with ADA requirements.

K. **Emergency Fire Service:** The latest fire service equipment required by State and ASME A17.1 shall be included. This shall also include emergency power disconnects when machine rooms and hoistways require fire sprinklers. See Appendix A14200.

L. **Fire Protection:** The shaft shall be equipped with a back draft damper thermostatically controlled and hooked up to a smoke detector with a manual override switch.

M. **Electric Elevators:** All controls and drives must be according to Appendix A14210e.

14240 Hydraulic Elevators:

1. Provide pit oil recovery and return equipment such as Nylube part no. 1800 NLS-3-FC and appropriate recovery and return piping.

DIVISION 15 MECHANICAL

15050 BASIC MECHANICAL REQUIREMENTS

A. General :

1. Hot water heating systems are preferred.

2. Contractor shall replace or repair damage done to any existing piping, valves, etc.

3. Representatives of the University shall be present when tests on Heating, Ventilating and Air Conditioning Systems are conducted.

B. *Tunnels* ***(See Division 2)***

C. Concrete Bases: All pumps, air compressors, boilers, chillers, and other equipment shall be set on a concrete base a minimum of 4 inches above the floor. Pads to have 1" beveled edge and extend 6 inches min. beyond any equipment or rails.

D. Hydronic Systems:

1. Appropriate methods of filling and draining down each hydronic system shall be provided. Extend all drains to floor drains and floor sinks. All valves air vents shall be accessible.

2. Propylene Glycol shall be used in systems where freezing can occur.

E. Central Energy Plant:

1. Steam and condensate: Medium pressure steam is distributed from the Central Heating Plant through a tunnel system.

2. Chilled water: Chilled water is distributed from the Central Cooling Plant through the tunnel system.

3. Connections: All connections to the central system shall be coordinated with Facilities Design and Construction.

BASIS OF DESIGN

A. Outside winter design temperature shall be –20 degrees F as experience indicates tabulated values are not sufficient for actual experienced temperatures.

B. Ventilation Requirements:

1. Mechanical equipment rooms shall have adequate ventilation to maintain a temperature not to exceed ninety (90°) degrees F. Include provisions to prevent freezing of equipment in winter.

2. Controls should allow for outside air to be used for cooling whenever possible. When outside air temperature exceeds seventy-five (75°) degrees F, dampers should close to minimum air requirements.

3. Provide adequate relief from the building.

4. Provide mechanical supply and return air for Electrical Switchboard and communications Rooms within buildings. Mechanical exhaust may be substituted if conditioned air form the building or other reasonably clean make-up air is available. Supply or make-up air entering elevator machine rooms shall be filtered.

5. Provide adequate mechanical exhaust ventilation for kitchens, toilet rooms, custodial closets near mechanically ventilated toilet rooms, garages, steam rooms, laboratories, animal rooms, and mechanical equipment rooms.

6. Electrical transformer rooms in the building are to have natural ventilation sized according to the National Electric Code requirements. Forced ventilation will not be accepted.

7. Mechanical rooms shall <u>not</u> be used as return air plenums.

C. Design Submittal: Submit heating and cooling load calculation sheets to USU Facilities Design and Construction (FD&C) for checking. Systems used shall fulfill the air conditioning needs of the building, but the economy of operation shall be a prime consideration in the type of system used.

D. Maintenance Considerations:

1. There shall be a minimum clearance of thirty (30”) inches or more provided around all equipment and connected piping. Code required clearance shall take precedence.

2. All valves, piping, and equipment shall be installed with clearances to permit disassembly for maintenance purposes.

3. Ample space shall be provided in all equipment rooms for removal of coils, condenser and cooler tubes, impellers and motor rotors, heat exchange tubes, etc.

4. Equipment mounted on platforms, etc., shall have permanent ladders and platform for service and maintenance.

5. Machine and Fan Rooms shall be constructed to reduce transmission of sound, vibration, odor, and water to other parts of the building.

6. Mechanical rooms shall have an outside entrance door. Provisions shall be made to allow removal and replacement of mechanical equipment. Entrances through classrooms, restrooms, etc. are not acceptable.

7. Restroom plumbing access doors shall be provided with sufficient room to access plumbing piping.

8. Sufficient room shall be provided to adequately hold the required attic stock.

15075 MECHANICAL AND PLUMBING IDENTIFICATION SYSTEMS

A. Pipe Identification:

1. All pipes are to be labeled and color coded with contents clearly identified and arrows indicating direction of flow. This applies to piping run above the ceilings and in pipe tunnels as well as pipe exposed in equipment rooms and finished areas. Pipes shall be identified at the following locations:

   a. Adjacent to each valve.

   b. At every point of entry and exit where piping passes through a wall or floor.

   c. On each riser and junction.

   d. A maximum of every fifty feet (50') on long continuous lines fully exposed to view. Less spacing if one cannot see one code from the adjacent.

   e. Adjacent to all special fittings or devices (regulating valves, etc.).

   f. Connection to equipment.

   Apply markers so they can be read from floor.

2. Labels and markers shall be of the self-sticking, all-temperature, permanent type as manufactured by W. H. Brady Co., 727 West Glendale Ave., Milwaukee, Wisconsin; or Seton Name Plate Corp., 592 Boulevard, New Haven, Connecticut.

3. Pipe color-coding shall be uniform throughout the campus and new systems shall match existing systems. Background colors shall be as follows:

   Yellow: Dangerous Materials (high pressure steam, natural gas, condensate, high pressure refrigerant, high voltage, etc.)

   Red: Fire Protection Equipment (Fire Sprinkler Water, Fire Protection Water)

   Bright Blue: Protective Materials (Filtered Water)

   Green: Safe Materials (Chilled Water, Cold Water, Instrument Air, Sanitary Sewer, etc.)

Letters of identification legend shall be two inch (2") high for pipes three inch (3") and larger, and one inch (1") high for pipes two and one-half inches (2 1/2") and under.

4. Markers shall be installed in strict accordance with manufacturer's instructions.

On chalky and loose insulation, soft, porous, fiber-filled or fiberglass coverings, a spiral wrap of pipe banding tape shall be made around the circumference of the pipe. Sufficient spiral wraps shall be made to accommodate the horizontal dimension of the pipe marker.

On bare pipes, painted pipes, and pipes insulated with a firm covering pipe banding tape matching the background color of the marker shall be used for three hundred sixty degree (360o) color coding. After applying pipe markers, wrap pipe-banding tape around pipe at each end of marker. Tape should cover one-quarter inch (1/4") to one-half inch (1/2") to one inch (1") on itself. Be sure pipe surface is dry and free of dirt or grease before applying markers or banding tape.

5. Stenciling may be used in place of the above labels and markers if finished application gives the same overall appearance, that is that stenciling is applied over a background color. If stenciling is used, letter heights background colors, banding and arrows shall be as specified above. Submit sample before proceeding with work.

6. Coordinate with FD&C.

B. Duct Identification:

1. Ductwork shall be identified at or near the fan, with stenciled signs or by engraved laminated plastic signs secured with rust proof screws. Sign shall indicate area served.

2. Identify all ducts exposed in mechanical equipment room. A sample duct identification shall be as follows: "Supply Hot Duct-Heating Auditorium Wing."

C. Equipment Identification:

1. Equipment including gauges, meters, mechanical equipment, electrical panel boards, switch boards, motor control centers, motor starters, fire alarm junction boxes, safety switches, transformers (outside main vault), high voltage feeders, etc. and all other devices shall be identified with signs made of laminated plastic with one-eighth inch (1/8") or larger engraved letters. Signs shall be securely attached by rust proof screws or some other permanent means (no adhesives).

2. Information on sign shall include name of equipment, identification on plans and schedules, rating maintenance instructions and any other important date not included on factory attached name plate.

3. Signs shall be attached to equipment so they can be easily read. Attachment shall be by screws or rivets. Glue shall not be used.

4. A sample identification sign for equipment shall be as follows:

   "Supply Fan - Auditorium F-2
   Rating: 49,850 cfm @ 3.5" s.p. (at 4775 ft. elev.)
   Maintenance: Check bearings for lubrication every 30 days
   and lubricate as required with S.A.E. 30 oil"

   "Heating Hot Water Pump
   Classroom Area
   156 gpm @ 57 ft. head"

NOTE: Avoid using only the engineers' designations as used on plans; identify equipment as to area or zone served.

"Motor Control Center MCC 2"

"Lighting Panel LZIA"

"Safety Switch Fan FZ"

D. Removable & Non-removable Ceiling Tile:

Where valves, mixing boxes, fire dampers, adjustment controls, etc. are located above ceiling tile, identification on the lay in tile tee bar shall be provided. It shall indicate the tile to be removed for access to a particular item. Generally, one-half inch (1/2") high black stick-on or stencil letters are used to label the device such as MB for mixing box, CWV for cold water valve, SV for steam valve, FD for fire damper, FAJ for fire alarm junction box, E for other electrical devices, etc. For non-accessible ceiling and ceilings without tee bars, contact USU FD&C for instructions.

E. Valve Tagging:

1. Distinguishing numbers and letters on required charts and diagrams shall designate all valves. The Contractor shall furnish and install approved brass tags for all designated items, with numbers and letters on the tags corresponding to those on the charts and diagrams.

2. Brass tags shall not be less than one and one-half inch (1-1/2") diameter with depressed black- filled numbers not less than one-half inch (1/2") high and black-filled letters not less than one-quarter inch (1/4") high. Tags shall be securely fastened to valves with approved brass "S" hooks, or brass jack chain, in a manner to permit easy reading. Do not attach to valve wheel. Brass tags shall be as manufactured by Seton Name Plate Company, New Haven, Connecticut or approved equal.

3. Each valve shall have an identifying number identifying the unit. Standard identifications may be sued for identifying type of service or fluid in pipe. The Contractor shall submit his system of identification to FD&C for approval before ordering. Any work done without this approval is done at the Contractor's own risk.

4. The Contractor shall furnish charts of all valves to FD&C in duplicate. Charts shall indicate the following items:

   a. Valve identification number
   b. Location
   c. Service or purpose
   d. Normal Position

5. One chart shall be mounted in a frame with a clear glass front, and secured on a wall in the equipment room(s), or in a location as otherwise directed by the Consultant.

6. Second chart shall be prepared for use outside the equipment room, and to be provided with an approved heavy transparent plastic closure for permanent protection. Two (2) holes to be punched at top of plastic closure to allow for affixing approximately an eight-inch (8") length of nickel-plated bead chain. Each hole shall be reinforced by means of a small brass or nickel grommet. Plastic closure shall be as manufactured by Seton Name Plant Company, New Haven, Conn. or approved equal.

7. Identify all valves. Room numbers shown shall be the actual room numbers used. Do not use architectural room numbers shown on plans.

15080 Mechanical Insulation

1. Insulate all hot and cold pipes in thicknesses as per energy code and good practice. Exposed insulation in areas subject to damage shall have protective cover.

2. Insulate all surfaces that come in contact with chilled water (piping, fittings, pump casings, air separation tanks, chiller header, etc.).

3. Insulate all main steam valves and expansion joints.

15100 BUILDING SERVICES PIPING

15105 **Piping:** All exterior piping for culinary water shall be type K copper or galvanized steel for three (3”) inch diameter and smaller, and ductile iron for four (4”) inch diameter and larger piping.

15110 **Valves:**

1. Valves shall be listed and rated for use intended.

2. All branch lines of water and steam that supply more than one outlet or unit shall be valved near the main with a union next to the outlet side of the valve.

3. For an above fifty (50) psi steam line use two hundred fifty (250) psi flanged and three hundred (300) psi screwed valves.

4. All valves two (2”) inches and larger shall be flanged.

5. A floor drain shall be provided nearby for water relief, valve exhaust, or discharge.

B. Main Building Steam Valve:

1. The building main steam valve location must be coordinated with USU FD&C.

2. The main steam valve shall be with a transducer/indicator to provide an indication at the building automation control panel if valve is open or closed.

3. Main valves shall have visual position indicators.

15120 Piping Specialties

A. Steam Meter: Vortex type steam meter shall be provided in each building. Meter shall be able to be monitored by campus automation system. If steam meter is not feasible, a condensate meter may be used upon approval of USU FD&C. Condensate meter shall be installed and operable before steam is turned into building. Meter shall be the totalizing type and shall have a maximum rating of three hundred fifty (350°) degrees F for two (2”) inches and larger. Meters smaller than two inches shall have a maximum rating of two hundred thirty (230°) degrees F. Calibration shall be for one hundred eighty-five (185°) degree water temperature.

B. Steam Pressure Reducing Stations:

1. USU campus Steam pressure is currently operating at eighty five (85) psi. Design of systems shall be for one hundred twenty five (125) psi.

2. Safety relief Discharge pipes shall be run to outside the building. Location to be approved by USU FD&C.

C. Chilled Water Meter: Provide and install a chilled water meter on all chilled water systems. Meters shall be monitored with the campus automation system. Meter shall be Onicon insertion turbine type with temperature sensors and a local display that reads out BTU’s, gallons, BTU/hr, gpm, CHW Supply Temperature, and CHW Return Temperature.

15130 Pumps

A. Pump accessories:

1. Install pressure gauges with gauge cocks and snubbers as close to pump suction and discharge as practical.

2. Provide suitable throttling valve on discharge side of all pumps, such as globe valve, butterfly valve, triple duty valve, or balancing cock.

3. Provide isolation valves on the inlet and outlet lines.

B. **Condensate Pumps** shall be steam or air pressure driven non-electric pumps (preferred where feasible). Electric pumps when necessary shall be seal-type pumps.

15180 Heating and Cooling Piping

A. Hot Water Heating Systems:

1. Design for reversed return so that the friction drop in piping is approximately the same for all radiation risers. Any deviation from the standard two-pipe reversed return system must be indicated at the time of submittal of Design Development Drawings for review, together with a system analysis to indicate reasons for change.

2. Air separators and expansion tanks shall be provided for all hot water heating systems regardless of piping arrangement. Tie air separator into piping system on suction side of circulation pump.

3. Hot water pre-heat coils shall not exceed six feet per second water velocity and coils shall be provided with circulating pumps to provide constant circulation through the coil tubes. Provide and install BTU meters.

4. Install flow metering devices, Rinco or Barco venturi meter, on the Main Heating Hot Water System(s). Meters to be monitored with the campus automation system.

5. All heat producing equipment (convectors, unit heaters, coils, etc.) should be provided with suitable air vents. No soldered joints will be allowed.

6. Provide variable frequency drives to hot water heating systems to minimize noise during periods of low demand.

C. Chilled Water Systems

1. Chilled water piping installed in the tunnel system shall be schedule 40 black steel with welded joints.

2. Chilled water piping installed in buildings shall be schedule 40 black steel with welded or grooved-end couplings.

3. Chilled water piping installed direct-buried shall be _____.
All piping shall be buried with 4 feet minimum cover.

C. Steam and condensate piping:

1. Pipe that is exposed shall be as specified in ASTM 53. Underground pipe shall conform to MSAT A106.

2. All steam piping shall be schedule 40 black steel. Condensate return pipings shall be schedule 80 black steel or schedule 10 stainless steel. Condensate return pipings outside of buildings shall be stainless steel.

3. All steam pipe and steam connections to the University main line must have the approval of USU FD&C. The connection details to the main steam line must be shown on the Design Development Drawings.

4. Ric-wil Perma-pipe insulated underground pipes is approved for underground steam line extension. Insulated piping will be approved only if steam and condensate return piping are run in separate insulated conduits. Backfill piping with sand to twelve inches (12”) below finished grade. Gilsuate insulation system shall be used.

5. Ample provision must be made for expansion of piping, using expansion loops, swing joints, offsets, etc., as may be required. Expansion joints shall be used only in vaults when expansion loops, offsets, swing joints, etc. are not practicable. When expansion joints are used, they shall have adequate internal or external guides, and shall be properly supported and anchored. Sing joints shall not be used on main runs, but only on risers off the main. Coordinate individual situations with USU FD&C at the time of design.

6. All steam mains must be properly dripped and sized. Provide drip legs ahead of all steam pressure reducing valves and steam coils to insure clean, dry steam at the valve.

7. Piping shall be run in tunnels or in crawl space large enough for workmen to make necessary repairs. Pipe shall not be buried under floors or run in split tile, unless approved by USU FD&C.

8. Sleeves through outside foundation walls shall seal watertight.

15400 PLUMBING

A. General:

1. **Access:** See USU GENERAL DESIGN and USU GENERAL DESIGN APPROACH for requirements.

2. **Pipe Bedding:** All pipe shall be set in a sand bed with six (6”) inch minimum coverage around all pipes. Other backfill shall be free of boulders more than two (2”) inches in any direction and shall be compacted and tested.

3. **Clean-outs:** In addition to those required by the plumbing code, provide clean-outs for all plumbing fixtures, toilets, wash basins, urinals, water coolers or fountains, main sewer lines, lab benches, etc.

4. **Backflow Prevention:** Provide backflow protection on all make-up water for heating systems, cooling systems, and water cooled equipment, fume hoods, hose bibs, etc.

5. **Isolation Valves:** Valve hot and cold water supplies, gas, steam, air, vacuum, condensate, etc. to isolate each floor separately.

6. **Protection and Restoration:** Provide protection of existing utilities in landscaped areas, damaged by the contractor, in the construction zone. Landscape restoration shall meet University standards as contained in Division 2 of this manual.

15440 Ejection Pumps: Buildings that require sanitary waste to be pumped shall have a sewage ejection system with duplex submersible pumps and high water alarms. ~~Sewage pumps should be submergible~~. The piping shall be flanged from pump to the main sewer connection. A forty-five (45°) degree offset where the piping exits the holding tank through the check valves and shut-off valves, then another forty-five (45°) degree offset up to the main connection. The pump control should be equipped with a hand-off-auto switch and manual test control. Controls shall be designed to alternate pump operation and provide a backup alarm. Connect a high level alarm to the building Automation system.

15460 Water Treatment:

1. Use water treatment contractor currently employed by USU. Coordinate with USU Facilities Design & Construction to obtain name of current vendor.

~~2.~~ Provide adequate water treatment for condenser water system. ~~Coordinate with USU Facilities, Design and Construction.~~

3. Coordinate all treatment methods with USU FD&C.

ALL READY REVISED (See Brenda)

4. Mechanical Contractor shall maintain adequate treated water in Heating, Chilled and Condenser Water Systems until the University accepts the building.

5.

15600 AIR CONDITIONING UNITS AND FANS:

A. General

1. Central units for air conditioning or ventilation shall be arranged so that airflow is as direct as possible. The airflow approaching filters, heaters, coils, etc., shall be as uniform as possible. Straightening vanes, deflectors, etc., shall be installed as required to provide uniform airflow. Blow through units shall be provided with diffuser plates between fan outlet and coils. Ample access space for inspection and cleaning must be provided upstream and downstream from all apparatus.

2. Use centrifugal fans generally in connection with duct systems. Select fans to operate as close to point of maximum efficiency as possible, but for ordinary systems fans should not operate at an outlet velocity greater than eighteen hundred (1800) fpm. Fans for high velocity systems shall be selected with special consideration to noise level and available means of isolation. Fans with adjustable pitch blades are not acceptable.

3. All fans shall be located to provide ample space for servicing and maintaining of the fan unit.

4. Constant speed motors driving belt connected fans shall operate at speeds not exceeding seventeen hundred fifty (1750) rpm. Motor sheaves shall be adjustable. Provide belt guards for all belt-driven equipment.

5. For variable loads a variable speed/adjustable speed (VFD/ASD) drive maybe considered, but must be justified for cost. Drives are to be specified under Division 16. Coordinate requirements with Division 16.

15620 Chillers:

1. Efficiency, part-load performance, maintenance and noise are all factors to be considered in selecting cooling units in all buildings.

2. All motors one horsepower and larger shall be power factor corrected to ninety-five (95) percent or greater. This correction factor is required for all load ranges on the chillers.

3. Coordinate with USU FD&C the selection of a refrigerant to be used for electric chillers specified for the project. The preferred choices of chillers are Trane, Carrier, or York.

4. moved.

5. Install pressure gauges on entering and leaving sides of cooler and condenser to measure pressure drop.

6. Install thermometers in piping to measure entering and leaving chilled water and condenser water.

7. Chiller control systems shall be stand-alone type to control by-pass valves, chilled water pumps, condenser water pumps and cooling tower. Chiller control requirements shall interface with USU campus automation system. A minimum list of points to be controlled shall include start, stop, enable, disable, entering chilled water temperature, leaving chilled water temperature, entering condenser water temperature and leaving condenser water temperature.

15640 Cooling Tower:

1. Cooling towers shall be roof mounted and completely screened or located underground. Screening shall be integral with the building design. Access ladders shall be attached to each cooling tower for service and maintenance. Ladders shall be welded steel construction and galvanized.

2. Provide a non-freeze hose bib inside enclosure for cleaning and washing tower.

3. Provide adequate drainage inside tower enclosure to catch all spray, overflow and tower drain.

4. Consider using ceramic cooling towers on larger sizes.

15670 Coils

1. A drip pan shall be provided under each section of every cooling coil on which moisture may collect. Pans shall extend at least twelve (12”) inches beyond coils and shall be equipped with drip pipe not less than one and one-quarter (1-1/4”) inch. Lowest pan to have indirect connection to drainage system with six (6”) inch deep-water seal (unless high pressure, then a deeper seal shall be required).

2. Provide gauge cocks on entering and leaving side of all coils so pressure drop can be measured.

3. All heating and cooling units must be designed with a slope in the coil to eliminate freezing. If necessary, use ethylene glycol. If cooling coils are to be drained to avoid freezing, they should be designed to completely drain.

15800 AIR DISTRIBUTION

15810 High Velocity Systems

1. High velocity duct systems shall be designed for a uniform friction loss of not over one (1”) inch water gauge per hundred feet of length and a maximum velocity of four thousand (4,000) fpm. Static pressure regained at branch outlets shall be considered in calculation system pressure losses.

2. The use of variable air volume systems with re-heat coils shall be used in high velocity duct systems.

3. Install adequate sound traps on entering and leaving side of fan systems.

15820 Dampers: Branch-duct fittings or take-offs must be installed in branch connection of low-pressure ductwork for adjusting air quantities. All volume adjusting devices shall be capable of being securely locked in place and accessible for adjustment after construction is completed.

15840 Variable Air Volume Systems: The use of variable air volume systems is preferred over mixing boxes in high velocity duct systems.

15850 Fresh Air Intakes:

1. Care should be used in coordinating the air intake and discharge openings of the buildings so that no intake will receive air from the discharge opening of exhaust systems, cooling towers, chimneys, emergency generators, service areas, or drain vents.

2. No piping containing water or steam is to be located in fresh air intakes. This includes waste and drain lines.

3. Avoid running untempered outside air through utility tunnels to interior fan rooms.

15860 Filters:

1. Sectional filter banks over seven (7') feet high shall be provided with steel grating catwalk and ladder for access to upper sections.

2. Provide differential pressure gauges for all large filter banks over 2,000 CFM.

3. Bag filters require a pre-filter when program requirements call for a higher efficiency of air filtration.

15900 AUTOMATIC TEMPERATURE CONTROLS

A. **General:**

1. Direct digital control rather than Pneumatic systems are preferred and shall be used whenever possible.

2. All HVAC controls must be tied into the campus central automation system.

3. Temperature of all major rooms shall be individually controlled, as much as practical. Rooms of similar use and orientation may be grouped as a zone for economical purposes.

4. The location of all controls shall be coordinated to avoid conflicts with furnishings or uses for the rooms in which controls are located.

5. Where new systems tie into or affect existing systems, old system must be completely operable after installation is complete.

6. Controls should allow for cool outside air to be used for building air conditioning requirements when available. When outside air exceeds seventy-five (75°) degrees, dampers should reset to provide minimum ventilation requirements.

7. Do not mount any control equipment on vibrating surfaces.

8. Control systems shall be as manufactured and installed by Johnson Controls or Control Systems International (CSI).

15905 Thermostats:

1. Generally the control system shall provide individual control for each room.

2. Direct digital control (DDC) is preferred, but if pneumatic must be used, a two pipe system is required.

3. Thermostats in Laboratories, Classrooms, Auditoriums, Corridors, Rest Rooms, and similar space shall have locking metal covers, concealed adjustment, thermometer and with one (1°) degree differential. Thermostats in Offices shall be the same as above except with exposed adjustments.

4. Room thermostats should be mounted forty-eight (48") inches above the floor. No thermostats shall be located on outside walls or on partitions between offices if other locations are possible.

15950 Control Air Piping :

1. In most cases control air piping shall be plenum rated Virgin high-density Polyethylene plastic of type L hard drawn copper tubing with sweat fittings.

2. Piping in concrete or masonry walls or floors shall be run in metal conduit to a point accessible in the ceiling or below the floor. No solder joints or connections are to be buried in the wall. Soft Type L copper tubing in conduit is acceptable for this work, but must be connected to hard copper by sweat fittings where tube leaves masonry wall.

15950 Control Wiring: Control wiring consisting of cable assemblies to be located in on visible locations that are accessible (such as above a lay in ceiling) may be installed provided the cable is a plenum rated cable, is not attached to electrical conduits or piping, is supported at a minimum of 3 ft maximum and follows the mechanical system.

15925 EP Control: Provide EP control for pneumatic valve operation.

15935 AUTOMATION SYSTEM:

1. Coordinate all details of this section with USU FD&C, and Facilities Operations. The layout of the user interface of the control system shall be coordinated with Facilities Operations.

2. All buildings on campus, except some on the extreme edges, are connected to the campus computerized automatic control system. All new buildings are to be designed and constructed to be controlled and monitored by this system. The University uses two temperature/automation system.

3. The central control for the automation system is a Johnson Controls Metasys and it is located in the Facilities Operations Building. This system is proprietary to Johnson Controls and equipment by other

manufacturers is generally not compatible or acceptable. When prior approved by USU FD&C a building system by Control Systems International (CSI) may be considered. Interface by CSI shall be at the Optical fiber network cable into the building. Great care must be exercised to avoid contract conflicts and cost bias from sole sources, references and requirements.

4. A complete point list is to be provided in the contract documents. It shall include, but not be limited to points for elevator emergency alarms, emergency electrical generator alarms (2 each), start stop, and transfer switch monitoring, chiller start stop and load reduction, security systems, main steam valve, and control of all motors five (5) hp and above. Provide 25 spare binary points or 15 to 20%, and a minimum of 4 or 8% ANA points, whichever is larger.

5. Automation communications trunk cable is generally part of the campus Optical Fiber backbone using multi mode 62.5 fibers. This cable exists in most locations on the campus, but must be intercepted and extended into the building.

6. Automation control panels (NCU etc.) shall have an uninterruptible power supply (UPS) external to the internal memory battery to operate the system for fifteen (15) minutes during an orderly shut down.

Utah State University
Facilities Planning Design & Construction
A/E Manual - Piping Material Standards
May 3, 2007

Chilled Water

Tunnel Installation: Schedule 40 black steel with welded joints
Building Installation: Schedule 40 black steel with welded or grooved joints
(Inaccessible locations must be welded)
Direct Bury: Pre-insulated schedule 40 black steel with welded joints
Pre-insulated schedule 40 PVC with solvent welded joints

Heating Hot Water

Tunnel Installation: Schedule 40 black steel with welded joints
Building Installation: Schedule 40 black steel with welded joints – 2-1/2" & larger
Schedule 40 black steel with threaded joints – 2" & smaller
(No grooved joints)
(Inaccessible locations must be welded)

Domestic Hot & Cold Water

Building Installation: Copper or galvanized
~~Exterior:~~ 4" & larger – ductile iron
2-1/2" to 3" – copper or galvanized
2" & smaller – copper or galvanized
Exterior Service: 2" & smaller – polyethylene w/ compression joints

Fire Protection

Building Installation: 4" & larger – schedule 10 rolled black steel
2-1/2" to 3" – Dynathread
2" & smaller – Dynathread
Exterior: 4" & larger – ductile iron
2-1/2" to 3" – copper or galvanized
2" & smaller – copper or galvanized
Dry Systems: All sizes – schedule 40 black steel

TUNNEL:
2" & smaller – copper
2½" to 3" – copper
4" & larger – stainless schedule 10 rated for 200psi welded (Exp.)

Sewer and Storm Drainage

Building Installation: Below grade – Cast iron hub & spigot
Schedule 40 PVC or ABS
Above grade - Cast iron no hub
No hub must have heavy duty S.S. lamps

Exterior: Cast iron hub & spigot
Schedule 40 PVC or ABS

UTAH STATE UNIVERSITY DESIGN STANDARDS FOR

MECHANICAL ENGINEERING - LABORATORY VENTILATION

The American National Standard for Laboratory Ventilation ANSI/AIHA Z9.5 – 2003 shall be the basis of design for Laboratory Ventilation Systems. The following exceptions and or amendments shall apply:

Add:

1.4 **Codes, Ordinances, and Industry Standards** – In accordance with the 2003 International Building Code, Section 104.11, Utah State University has approved this Laboratory Ventilation chapter as an alternative design which meets all enforceable Code (IBC, IFC, IMC, etc.) requirements. Appendix "A" of the chapter contains the full version of the alternate design.

Any laboratory ventilation system associated with a Group H Occupancy must comply with all prescriptive code requirements found in the International Code Council set of codes as adopted by the State of Utah.

Reference:

3.1.1.4 **Automatic Sash Closers:** Automatic sash closers are not required.

Add:

3.1.2 **Backflow Protection** - Whether or not non-potable water is supplied to the hood, a spill proof pressure vacuum breaker for high hazard, backflow preventer with test ports shall be provided on the supply line outside each fume hood. The backflow preventer shall be visible and easily accessible for testing. The backflow preventer shall be located 18" to 24" below ceiling on the outside of the fume hood or an adjoining wall. Require the installing contractor to test the backflow preventer and submit results to the Project Manager.

Add:

3.1.3 **Vacuum Breakers** - Vacuum breakers shall not be installed inside fume hoods.

Add:

3.1.4 **Work surface** - Existing fume hoods shall be retrofitted to include provisions for spill protection.

Reference:

3.2.3 **Auxiliary Supplied Air Hoods:** Auxiliary supplied air hoods shall not be installed.

Add:

3.1.2.4 **Existing Auxiliary Supplied Air Hoods** - Existing auxiliary supplied air hoods currently installed shall be converted to conventional or bypass hoods.

Add:

3.2.7 **Hood Manufacturer's** - Approved Manufacturer's include Hamilton, Kewaunee, Labconco or University approved equivalent.

Add:

3.2.8 **Radioisotope Hoods** - Radioisotope hoods shall be conventional hoods or bypass hoods. The University Radiation Safety Officer from Environmental Health and Safety (EHS) shall be informed of each new radioisotope hood being planned for a project, or any such hoods to be modified or upgraded to radioisotope status. RHD will review the hood application and determine if any special treatment is required, such as charcoal or HEPA filters, nonstandard face velocities, etc.

Add:

5.2.7 **Electric Heating Coils** – Electric heating coils are discouraged due to the higher energy cost. If electric heat is necessary, minimum two stages heating is required.

Add:

5.2.8 **Air Filters** - Reclaim coils in exhaust fans shall have air filters and access to service filters.

Add:

5.3.1.2.1 **Duct Material** - Duct material shall be **16 or 18 gauge Stainless Steel Series 316, welded with "MIG" or "TIG" method**. Screwed slip joint connections sealed with silicone sealant are acceptable. If it is determined that no corrosive material will ever be used in the hood, other duct material may be used, with prior approval.

Add:

5.3.1.3 **Fans in Series** - Fans **are not** to be placed in series. If the downstream fan is out of commission, there is a high risk of hazardous fumes being blown back into other fume hoods on a manifold system, or into the building due to the positive pressure in the ducting.

Add:

5.3.1.4 **Velocities** - Transport duct velocities shall be 1000-2000 FPM for gases and 3500-4500 FPM for particulates, depending on the particle size and specific gravity.

Add:

5.3.1.5 **Dampers** - Provide a single-blade volume control damper with locking quadrant in the hood duct for all fume hood systems.

Add:

5.3.1.6 **Elbows** - Use long-radius elbows to reduce resistance. Three piece stainless steel elbows are acceptable.

Add:

5.3.1.7 **Flex Duct** - Flex duct shall not be used on fume hood systems.

Reference:

5.3.6.1 Constant Suction, Redundancy and Emergency Power:

- **Manifold Exhaust, New Construction** - Manifold exhaust and makeup air systems shall be connected to an emergency power supply to ensure hood performance during power outages.
- **Manifold Exhaust, Remodel or Renovation** – Emergency power is not required.
- **Individual Exhaust Systems (single-hood/single-fan)** - Emergency power is not required.

Add:
10 **Standard Details for Mechanical Engineering - Laboratory Hoods**

DRAWING NUMBER	DESCRIPTION
MECH-FH1	Fume Hood Airfoil Detail
MECH-FH2	Flow Gage Mounting Detail
MECH-FH3	Hood Connection Detail
MECH-FH4	Duct Connection Detail
MECH-FH5	Roof Mounted Exhaust Fan Detail
MECH-FH6	Flexible Connection to Exhaust Fan Detail 1
MECH-FH7	Roof Curb Detail 2

DIVISION 16 ELECTRICAL

16050 BASIC ELECTRICAL MATERIALS , METHODS AND REQUIREMENTS

A. General:

1. All electrical design shall be in strict adherence to the latest edition of the National Electrical Code, National Electrical Safety Code (as applicable), State Fire Marshal's regulations, The Life Safety Code (as applies to Educational facilities), The Utah Occupational Safety and Health Rules and Regulations and The State Building Board's "Planning and Design Criteria to Prevent Architectural Barriers for the Aged and Physically Disabled" (as applies to electrical devices) and other codes as may apply.

B. Drawing Standards: All drawing symbols must be shown on the drawings and include a section describing the symbols and listing the specifications, manufacturer, and part number of the item. At the completion of the project the symbol list shall be updated and the listing as built with the installed manufacturer and part numbers.

C. Utility Outages: See Division 01350.

D. Instructions on Special Equipment: The Contractor shall provide on-site service and operations instructions for any electrical equipment not of standard design or configuration. Competent instructors are to be provided under the contract to train University employees who will be in charge and will operate the equipment in the care, adjustment and repair of the equipment. Instruction date is to be set before building acceptance and occupancy.

E. All electrical materials shall be as standardized according to NEMA standards where applicable and bear a UL or Factory Mutual label, or be listed where applicable.

F. Materials, fixtures, and equipment should not be specified that are known to be obsolescent or have a spare part supply life less than four years beyond completion of the facility.

G. Mechanical Equipment Over Current Protection. See Division 15050.

H. All **electrical floor mounted equipment** (except for legs) shall have a four (4") inch concrete pad to sit on when below grade, a slab on grade, in mechanical equipment rooms or where water or other liquids may exist.

16075 ELECTRICAL IDENTIFICATION

A. General:

1. All electrical equipment shall be identified.

2. Only high voltage (primary voltage) raceways in a building need be identified unless otherwise directed by Facilities Design & Construction (FD&C).

B. Identification of panel boards: The University's FD&C office will review and approve all panel designations to assure conformance to a reasonable campus ID system. The panel identification shall follow a general form as follows:

1. M - main distribution panel

2. E - emergency lighting and power panels

3. L - lighting panels i.e. 480/277 V

4. P - power panels i.e. 208/120 V

5. Combinations may be used such as:

   a. ML - main lighting panel

   b. MP - main power panel

   c. ME - main emergency panel

6. Panels are to be designated by floor level, type of panel, and a number sequence to indicate the floor. The first number is the floor, the second letter is the panel type, following numbers are sequential panel numbers for the panel type on each floor. The last letter if needed is the panel section at the location where multiple panels are fed from the same feeder.

7. 0L2B:

   a. 0 – Basement

   b. L - Lighting panel

   c. 2 - Panel #2 in basement

   d. B - second section of panel

8. Motor control centers are similar except General Designation to be MCC. the panel. Glued labels are not acceptable.

C. Conductor Identification:

1. Conductors for 208/120 Volt services shall be black, red, blue and white neutral with phase rotation black, red, blue.

2. Conductors for 480/277 or 480 Volt services shall be brown, yellow, violet and gray neutral with phase rotation brown, yellow, violet.

3. Switched legs and travelers should be the same color as the phase color. Other colors may be used for travelers and switch legs provided they are not used on other phases or voltages. In this case, the complete color code is to be placed on the as-built drawings.

4. Orange is reserved for the high leg of a grounded delta.

5. All conductors #8 and smaller shall be color-coded by insulation color. Larger than #8 color tape may be used for eight inches (8") of half lapped tape applied at all terminations and conduit entry. Where the environment temperature would preclude tape adhering permanently, USU FD&C approved paint and color may be used.

16100 WIRING METHODS

16120 CONDUCTORS AND CABLES

A. Building Distribution Conductors:

1. Conductors shall conform to the uses outlined in the NEC. Wire temperature rating for environment and equipment lug temperature is to be adhered to. Minimum wire size must be #12 AWG for power circuits and #14 AWG for control circuits.

2. All conductors are to be color coded according to the NEC and the campus standard. See Section 16075.

3. Compact conductors shall not be used to determine the size of raceways for new work. Use only round stranded conductors for calculations or from the tables.

4. Primary Voltage Cable: All primary voltage cable shall be 15,000 volt, grounded neutral. Conductors shall be sized as directed by the FD&C office. Depending upon projected future requirements, the cable may be between #2 and 500 KCM copper. Aluminum is not to be specified. An insulated, grounded conductor shall be installed with the primary voltage conductors and shall exceed fifty percent (50%) current carrying capacity of the phase conductor, but no smaller than #2 copper. See Appendix A16120 for cable specifications, and factory manufacturing tests and report.

16130 RACEWAYS AND BOXES

A. Building Distribution Raceways:

1. All electrical wiring shall be placed in raceways.

2. Raceways are generally expected to be metal rigid or EMT conduit following the recommendations of the NEC for use and protection. IMC, ENT or AC conduits are not acceptable. Other listed types shall be pre-approved by FD&C.

3. Raceways are not to be placed in concrete slabs on grade. The raceway must be eight inches (8") minimum in the grade material below the slab.

4. Raceways below slabs or buried must not be plain galvanized rigid conduit. EMT shall not be used below grade, in slabs on grade or in outside foundation walls. Continuous asphalt, plastic coatings or wraps must be used on metal conduits below grade. Schedule 40 PVC may be used below grade but not in concrete. Where a conduit penetrates or passes through structural elements (footings, walls, floors, etc.) the conduit shall be changed to rigid metal with the appropriate coating and fittings. The metal to PVC adaptation point must not be any closer than thirty-six inches (36") of exposed, coated metal raceway.

5. Minimum conduit size must be three-quarter inch (3/4") trade size. Only control wiring and fire alarm detector drop raceway may be one-half inch (1/2") with USU FD&C approval. Fixture whips may be factory wired three-eighths inch (3/8") with ground conductor.

6. Sleeves through outside walls shall have means for positively sealing watertight around conduits. Use sleeves equal to those available from O.Z. Electrical Mfg. Co. or Spring City Electrical Mfg. Co.

7. Conduits penetrating floors shall have an embedded coupling flush with the finished floor. If to remain a spare, the flush plug is to remain in the coupling.

B. Wall Boxes: The use of adjustable boxes such as “IDEAL ‘Adjust A ring’” rather than extension rings to meet the flush NEC requirements is encouraged.

C. Medium Voltage Duct System:

1. All concrete encased duct systems shall terminate in an underground manhole. Direct entry without bends will be permitted into building transformers or switching vaults. Maximum spacing of manholes shall be three hundred fifty (350) feet center to center. Any bend over fifteen degrees (15°) with a long radius shall require a manhole. Steel conduits shall not be installed at manhole or building entry. Pour the monolithic concrete encasement into the wall block out

using #4 re-bar in the corners of the encasement for a distance of 10 feet.

2. All concrete encased ducts shall have a four inch (4") wide plastic warning tape indicating “DANGER HIGH VOLTAGE” buried in the trench on top of the duct run twelve inches (12") above concrete envelope.

3. Ducts shall be six inches (6") ID, type DB or Schedule 40 PVC and shall be encased in a minimum of three inches (3") of concrete on all sides. Colored concrete is not desirable or required.

D. Medium Voltage Manholes:

1. **Size:**

   a. Minimum size cable splicing manhole shall be six foot by ten foot by seven foot six inches high (6'x10'x7'6") inside dimensions.

   b. Manholes for switch gear or where switch gear may eventually be installed shall be a minimum of twelve foot by twelve foot by seven foot six inches high (12'x12'x7'6") inside dimensions.

2. **Construction:** All manholes shall conform to ASTM standards for concrete, forms, mixing, pouring, and reinforcing bars. All manholes shall use State Highway H20 specification for roof loading considering a forty-two inch (42") diameter opening in the roof for access with ring and cover removed. Pre-cast manholes are acceptable where installation is possible and settlement is not a factor.

3. **Built-in Hardware Items:** Rings and covers shall be made of gray cast iron. A machine finished seat shall be provided to ensure a perfect joint between the frame and the cover. Covers shall be equipped with a minimum of two lifting notches on the perimeter. Covers shall be thirty inches (30") diameter minimum. The opening below the manhole ring in the manhole roof shall be forty-six inches (46") in diameter minimum. Three horizontal runs of non-corrosion Super Strut series #C300 shall be embedded in each wall of the manhole. Each strip shall have waxed cardboard filler to keep concrete from entering slot. Cable pulling irons shall be installed for each duct or future duct systems. Manholes shall be provided with a rock drain dump. Slope floor to sump. Provide a cast iron grating over sump.

4. **Ground Rod:** The Contractor shall furnish and install in each manhole, at a convenient point close to the wall and in opposite corners, two (2) three-quarter inch by ten foot long (3/4"X10') copper or copper clad steel ground rods. Rods shall be driven into the earth a minimum of eight feet (8") before the manhole floor is poured. The rod shall extend approximately six inches above the manhole floor. Installation shall be according to Article 250 of the National Electrical

Code.

5. **Manhole Ladders:** Each manhole shall be equipped with an OSHA approved ladder. The ladder may be hot dipped, galvanized steel sized to fit the manhole depth. Rungs shall be spaced twelve inches on center (12" O.C.) and shall be corrugated, knurled, dimpled, coated with skid resistant material or otherwise treated to minimize the possibility of slipping. Minimum width between side rails shall be twelve inches (12"). Side rails shall be a minimum one and one-half by nine sixteenths by three-sixteenths inch (1-1/2"x9/16"x3/16") channel size. Rungs shall be minimum five-eighths inch (5/8") diameter. The ladder shall be removable with the top hooked into a step on the roof or chimney of the manhole. The finished manhole shall have a minimum of sixteen inches (16") from the top of the ring to the first step on the ladder. Longer spacing shall require intermediate steps not exceeding twelve inches (12") spacing anchored into the chimney to meet UOSHA requirements. The angle of the ladder shall be such that a person can pass between the ladder and manhole roof easily. The manufacturer shall certify that ladder complies to all UOSHA requirements for a metal ladder in a manhole.

6. **Cable Rack Vertical Risers:** In each of the manholes, furnish and install vertical cable rack risers (six for each wall). Risers shall be hot dipped galvanized, heavy duty, Hubbard #2225 with bolt fastening holes spaced at twenty-five and one-half inches (25-1/2"). Mount racks to Super-Strut embedded in walls of manholes. On each riser described above in each manhole furnish and install a heavy-duty lock type hook, Hubbard #2233, fourteen inch (14") extension. On each hook furnish and install three white glazed porcelain insulators, Hubbard #2118.

7. **Duct Cell Plugs:** Each unused duct bank running from a manhole to a building shall be fitted with an approved cell plug fitted to make a watertight seal. Cells through which cable is installed shall be plugged with approved mastic. This is to prevent floodwaters from getting into buildings through manholes.

8. **Sleeves for Future Duct Entrances:** Unused corners of each manhole shall be provided with a sixteen inch by sixteen inch (16"x16") minimum thin wall foam filled block out for the future installation of additional duct banks.

9. **Ring and Cover:** All manholes shall have a cast iron ring and cover. The cover shall be a minimum of thirty-two inches (32") diameter with a clear opening in the ring of thirty inches (30"). The ring flange shall be a minimum of forty-nine inches (49") in diameter. The cover shall have two (2) lifting notches in the edge and a hook ring on the bottom side. Typical D&L # C1380 or C1460 (larger) or NEEHAW R1750C all with Bell System type covers without identification.

10. **Extension Rings:** Extension rings may be pre-cast concrete. The inside diameter shall be forty-eight inches (48"). Where necessary to meet UOSHA step/ladder requirements steps may be cast into the rings. Drilling into rings is not acceptable.

16140 WIRING DEVICES

A. Safety Switches and Disconnects:

1. Lockable disconnects for motors and electrical devices must be located near each motor or device but without obstructions in front. Maximum elevation should not exceed forty-eight inches (48") to the top.

2. Multiple speed motors requiring disconnect switches must have a switch in all motor leads. Single speed disconnect switches are not acceptable.

3. Circuit breakers are not acceptable as a safety disconnect.

B. Electrical Outlets:

1. At least one (1) convenience outlet shall be provided in each room. In rooms twenty feet by thirty feet (20'x30') or larger there shall be at least three (3) convenience outlets. In large assembly rooms they shall be placed not more than fifty feet (50') apart. These outlets are to be on a dedicated 120Volt branch circuit. Generally, the quantity and location shall conform to the requirements of the NEC.

2. Outlets in halls and corridors shall not be spaced more than thirty feet (30') apart and shall be circuited separately with no other load on them. Breakers and conductors must be sized for large buffing machines considering the load and length of the conductors. (120 Volt 20 Amp min.)

3. Provide adequate outlets in all machinery utility areas and tunnels to facilitate the use of electric tools.

4. There shall be an electric outlet placed at each drinking fountain, as refrigerated drinking fountains may be used in all buildings in the future even though not initially installed.

5. All receptacles shall conform to the requirements of the NEC and OSHA. As a campus standard configuration use the NEMA configuration for voltage and current capacity. For requirements on DC voltages and voltages not indicated by the NEMA configuration contact the FD&C office.

6. All 120 Volt receptacles shall be rated at 20A. Fifteen amp receptacles will not be accepted. Receptacle quality shall be by NEMA Standard WD-1 and Federal Specification WC-596__/UL. Other designations except Hospital grade will not be accepted.

7. In kitchens, laboratories and other areas:

a. Where walls must be or may be washed with water frequently, waterproof outlets shall be installed to prevent short circuits and burn-outs of outlets and fixtures.

b. Where sinks or cup sinks are installed, GFCI outlets are to be installed if the outlet is located within six feet (6') of the rim of the sink. This is in addition to locations required by the NEC.

8. Duplex receptacles should be located as required by ADA. Other special outlets may be located as dictated by the requirement and physical needs.

9. Thermal plastic cover plates are to be avoided in all locations. Use non-breakable Nylon , Lexan or stainless steel.

C. Floor boxes: Floor boxes are to be constructed with a lift cover that is flush when closed over an interior box containing receptacles for power and communications. Cord ends are to be plugged in inside the box with only a cord extending beyond the closed cover. Boxes with screw out or pop up hinged covers over flush outlets shall not be specified.

D. Switches:

1. Switches shall be provided for all switching and lighting control. **Circuit breakers shall not be used for switches**.

2. Switches ratings shall be 20 amps minimum or for the load, current and voltage of the circuit or device connected.

3. Quality of switches shall be controlled by specifying only Federal Specification WS-896/UL devices.

4. Switch locations for lights should be forty-two inches to forty-eight inches (42"-48") above the floor to the top, or as specified under ADA requirements.

5. Cover plates for wall switches shall not be thermoplastic. Use unbreakable Nylon, Lexan or Stainless Steel.

16220 MOTORS

A. All electric motors shall be made in the U.S.A.

B. All motors one (1) Hp and larger shall be power-factor corrected to correct to 96% power-factor or higher at all motor loads irrespective if individual motors or part of an equipment assembly.

C. Motors that are to be provided and installed or for future connection to a VFD (ASD) shall be rated for VFD service and shall be so indicated on the motor nameplate.

16230 EMERGENCY ENGINE GENERATOR

A. General: Generating capacity is to be determined by the emergency required and program needed loads. The capacity shall be about 150% of the connected loads unless otherwise approved by USU FD&C. The capacity to include elevators, exhaust fans, sewage pumps, sump pumps and non steam condensate pumps when applicable shall be provided. When non-emergency loads are to be connected two (2) transfer panels and distribution systems are required according to the NEC. The individual generating set shall be complete with all accessories, controls, batteries and special items noted. The engine and generator shall be a single direct-coupled unit with engine and generator controls as a part of the unit package not requiring external mounting or wiring. Transfer and transfer control shall be separate from the generating unit and suitable for remote operation. All functions of the complete unit and transfer shall be automatic. The entire system shall be manufactured, tested and shipped by one manufacturer (except as noted) to establish a single source of supply and responsibility of guarantee.

16260 STATIC POWER CONVERTERS

A. Variable Frequency Drives (Adjustable Speed Drives):

1. Testing of VFD's will be by USU FD&C.

2. Coordination: Coordination with the Mechanical Consultant regarding motors, starter control and interlocks and automation controls is necessary. Cross-references to equipment lists and common equipment designations and identification are required on the drawings.

16270 MAIN SERVICE TRANSFORMERS

A. General:

1. **In building vaults** transformers shall be liquid filled conventional type.

2. **Outside of** buildings transformers may be pad mount. See FD&C for location and screening requirements for the facility site.

3. All transformers shall be inspected by the consulting engineer and the manufacturer's representative to insure proper connections and that protective devices are installed before activating the transformers for the first time. The Contractor shall be responsible for replacing any defective or damaged transformers at no cost to the owner. Any distribution system damage shall be corrected by the Contractor at no cost to the contract or owner. New items shall

replace all defective or damaged equipment.

4. Transformers shall be sized to the expected building loads. Vault, feeder and switchboard capacities are to be increased above this size up to 150%.

5. Maximum fusing or protective breaker (VFI) in the primary shall be between one hundred fifty percent (150%) and two hundred percent (200%) of transformer full load Amps.

16270 DRY TYPE TRANSFORMERS

A. Dry type transformers may only be used to establish 120 volt one (1) phase circuits from 480/277 volt building systems where a new dual voltage system or an existing system can not justify dual voltages. The use of dry type transformers shall be approved by USU FD&C. Dry type transformers shall not be connected to the high voltage distribution system. Transformer KVA rating shall be 200% of the connected load. They shall be located in a readily accessible location (not janitor closets, air plenums or above ceilings) and must have adequate natural ventilation. Location must be such or provisions made to isolate noise from adjacent areas. Mechanical rooms, where elevated temperatures can be expected, are to be avoided. Transformers over two hundred pounds (200 lbs.) should be floor mounted and not hung from ceilings or wall mounted. Doors entering spaces for transformers must be large enough to accommodate removal and replacement.

16290 POWER MEASUREMENT AND CONTROL

A. Building Meter:

1. Under the construction contract, permanent facility electric watt hour meter(s) with demand a register shall be provided. This meter shall be in the secondary of the transformers to meter all power consumption. The meter(s) shall be located in or near the main distribution panel in an accessible space near the service entrance. For services under 200 amps, a direct connected watt hour demand meter is to be used. For services over 200 amps transformer rated meters are to be used in conjunction with metering transformers. Meters shall fall into a general class as described below for a transformer rated system.

2. **Current transformers** (CT's) shall be dual range or two (2) CT's of equivalent range. CT low range shall be fifty percent (50%) of service capacity and high range not over one hundred percent (100%). CT's are preferred to be in the switchboard ahead of all connections or at transformers. They must be readily accessible at either location without removing buss conductor, interior barriers or other obstructions. If it is necessary to locate CT's in transformer secondary compartments or in a building transformer vault, the CT support shall be approved by USU FD&C. Hanging CT's off the conductors, with ropes, wires or similar means will not be accepted. Nameplates shall be according to the ANSI

standard and shall be visible without mirrors or removing any item. A test report or tag shall be attached to the CT's to demonstrate conformance with the referenced ANSI standard and shall be removed only by USU FD&C personnel.

3. Potential transformers (PT's) are required for service voltages over 120 volts where the watt hour demand meters are not rated for 240/277 volts. The primary of these transformers shall be fused and readily accessible for fuse replacement and for testing the primary voltage. Installed location is to be the same as for CT's.

4. Watt Hour meters interior to a building:

   a. Where the environment is suitable, a USU approved Square D Power Logic Circuit Monitor is required. Three line CT's and one neutral CT are required. On 480/277 Volt systems PT's are also required. The preferred location is flush with the front door of the metering section of the main switchboard. Other locations external to the switchboard may be approved where the circumstances warrant. The mounting height shall not exceed six feet six inches (6'6") to the top of the meter with the test block located below. The RS-485 port shall be extended to a communication location where a computer network port will be available.

   b. For meters on the front face of the main switchboard metering section provide a twelve (12) pole test block, Durham Co. MP22030B with cover. At other meter location provide a meter base that includes the test block. Accessible CT ratio change blocks shall be provided in the metering section behind the hinged door or as directed by Facilities Design and Construction. Bring all three potentials to test block, even though only two phase voltage conductors and neutral may be used by the meter.

5. **Watt Hour meters external to a building:**

   a. For meters exterior to the buildings or in a low temperature environment, provide a self-contained socket and test switch; Durham Co. (Superior) type 713 test switch included in the meter socket enclosure to match campus standard. Three CT's and (for 480/277 V systems) three PT's (VT's) 288/120 V are required. Bring all three potentials to test block, even though only two phase voltage conductors and neutral may be used by the meter.

   b. Watt hour meters external to the building shall be electronic demand, three (3) element, 2.5 or 5 amp test, Class 10 or 20, three (3) phase, four (4) wire, fifteen (15) minute interval demand register.

6. For loads under 200 amps at 208/120 V, a direct inline meter may be used when approved by USU FD&C. A Schlumberger Class 200 meter with the same specifications as above is to be provided. Test switches are not required. Socket

type meter bases shall have current closing contacts.

16305 TEST OF INSTALLED NEW MEDIUM VOLTAGE CABLE AND TERMINATIONS

A. Medium Voltage Cable Testing:

1. Each primary cable conductor shall be tested after entire installation and terminations have been completed using commercial test equipment designed for Direct Current high potential and current leakage cable testing. This test equipment shall be provided by the Contractor and shall be approved by USU FD&C prior to any testing. The equipment shall have a current calibration sticker from a recognized testing laboratory. The cost of the equipment, test and the test reports shall be borne by the Contractor.

2. Tests shall be made by the Contractor in the presence of the Engineers and the University's representative. Seven (7) days advance notice shall be provided to schedule personnel.

3. The electrical tests shall include the following:

   a. **High Potential DC Tests of installed High Voltage Cables :** Each cable shall be individually tested with all other cables grounded. Each individual cable test shall be started at "0" volts then raised in 5 Kv steps. Each voltage shall remain applied for a minimum of 5 (five) minutes. Leakage current readings shall be taken at each voltage and recorded. The maximum voltage shall not exceed 45 Kv.

   b. **The leakage amp meter** in series with the ground connection shall be used to read the leakage current in the cable at one (1) minute intervals during the test. The test equipment shall have a variable voltage adjustment to permit the raising of test voltage at a slow but uniform rate from zero (0) to test value. Testing time shall be started when the voltage on the cable has attained test value. Leakage current shall be recorded and plotted against the voltage. Each cable plot shall be included in the test report.

   c. **Leakage current:** Any sudden rise in leakage current will be evaluated and the test terminated if failure is evident. If a cable fails, the fault shall be located and cable between the nearest pulling points on each side of the failure shall be withdrawn and replaced with new cable. After the replacement of the faulty cable, the test shall be repeated.

16330 MEDIUM VOLTAGE

A. Building Vaults:

1. A minimum of two **ground rods** under manholes shall be installed in all transformer vaults and building switch vaults along with a visible connection to the ground rods. The distribution grounded conductor (neutral) shall be grounded at each manhole and transformer installation, with bonds to all metal frames, equipment enclosures, equipment enclosure doors, door hardware, racks, manhole rings, supports, etc., and to a minimum of two ground rods. Where available water pipe secondary voltage grounding at the service entrance shall be used in addition to ground rods. Concrete encased electrodes are preferred.

2. Do not connect main service entrance (main switchboard ground) ground system to the transformer vault ground system with conductors or metal conduits. Transformer and high voltage switch vault ground systems connect only to the High Voltage grounded conductor (neutral). Building grounded conduits and vault grounding electrodes are to separate from the high voltage and transformer grounds.

3. Do not place sectionalizing switches in transformer vaults. A separate room is required with an oil curb between.

4. Equipment and personnel access to all vaults shall be from the outside at ground level with one interior door. Coordinate size and location of openings with the Architectural design.

5. Each vault shall have minimum lighting connected to the building emergency lighting system. Regular lighting shall provide a minimum of fifty (50) foot candles. All lights are to be switched.

6. Each vault shall have one duplex receptacle connected to the building emergency system.

B Medium Voltage Distribution

1. **General:** The University owns and maintains its own primary electrical distribution system for the campus operating at 12,470 volts 4 wire wye. All primary distribution equipment and designs shall be for 15,000 volts. This includes working space, transformer vaults, switch gear, cabling and raceway systems.

2. All medium voltage cables and switch gear shall be energized by University personnel!! The Contractor may energize and switch only when under the supervision of University personnel. Energization will be permitted only after tests are approved by the Consultant and USU FD&C. The entire Contractor-modified or installed system will be inspected by the University and approved for energization.

3. **Splices and Terminations:** Splices and non pothead type terminat**ions** shall be

performed by qualified splicers and with the kits as supplied or approved by the cable manufacturer. Pre molded splices and terminations may be specified with the approval of USU FD&C. Manufacturers include RayChem and Elasimold as generic types. FD&C personnel shall be notified in advance of any splice or termination so that they may observe each splice or termination being made.

4. **High voltage distribution isolation/sectionalizing switches** are to be provided with 600 amp deep wells and apparatus bushings (see other paragraph). Cable attachment shall be with manufactured elbows on sidewalls and straight plugs on the bottom of the tanks. Vacuum Fault Interrupters shall be provided with 400 or 200 amp bushings as required with non-load break (400 A) and load break elbows (200 A) on the cables.

C. Medium Voltage Switch Gear: All primary switch gear to match and coordinate with existing, shall be manufactured by G&W Specialties Company. Sectionalizing switches shall be RAC series or as directed. Connections to switches shall be by standardized apparatus connectors (bushing wells, bushing and cable connectors) as manufactured by Elastimold or for high current. Insulation shall be according to manufacturer's instructions (non-stress cone).

16400 LOW VOLTAGE AND DISTRIBUTION

A. Secondary Voltage: All new construction shall use 208/120 three phase four wire secondary voltage except where the size of the mechanical and lighting load warrants the use of 480/277 three (3) phase four (4) wire voltage in addition to the 208/120 V.

16440 SWITCHBOARDS, PANEL BOARDS AND CONTROL CENTERS

A. Space above switchboards, panel boards and MCC's shall be clear of all obstructions to the structure (floor) above. This includes all pipes and air ducts.

B. Main Distribution Switchboards:

1. Main switchboards are not to be located in areas of elevated temperatures or high humidity. Mechanical rooms that are cool, dry and dust-free are satisfactory, though a separate switchboard room is desirable and may be required by the NEC. When placed on slabs on grade or in areas where water or steam pipes could sweat or leak to wet the floor, the switchboard shall be placed on a four inch (4") high concrete curb. Close proximity to the transformer vault is highly desirable.

2. Bussing of the switchboard should be of sufficient capacity to accommodate the next size larger transformer bank. Main breakers should be similarly sized. Buss bracing shall be for the expected fault currents, or a minimum of 50,000 amps on any switchboard. Fault current calculations and coordination requirements shall be shown on the contract drawings and up dated on the record drawings. Blank

spaces shall be provided and shall be no less than twenty-five percent (25%) of the switchboard spaces in each frame size.

3. Feeder to switchboard may be wire in conduit or "buss way". Wires in conduit where multiple conductors per phase are required must be pre-cut such that all conductors per phase are the same identical length after connection. Current capacity of "buss ways" and size of conduit for conductors shall be such that the next size transformer bank can be accommodated.

4. Emergency power provisions shall be provided according to the requirements of the NEC and Life Safety Code. Generally, a breaker ahead of the main breaker feeding an emergency distribution panel will be required. When an emergency engine generator is not installed, include provisions for a generator and transfer panel in the circuitry and spaces.

5. Main switchboards shall be of dead front construction with the enclosure positively grounded. An interior ground buss and terminals are to be provided along with a jumper to the system neutral.

6. Circuit breakers are to be used for protective devices including main disconnect. Where fault currents warrant, current limiting devices are to be specified. Series rating of circuit breakers and buss installations is not acceptable. All breakers are to be identified and a complete index provided.

7. Main switchboards shall not be energized by the Contractor. Energization shall be by USU personnel only after a USU FD&C inspection and all deficiencies are corrected. See other related paragraphs.

C. Distribution Panel Boards:

1. Location**:** Distribution panel boards are to be located in areas not generally open to the public. Janitor rooms, utility closets for steam and water, air plenums, areas of elevated temperatures and humidity, areas of dust and locations exposed to the weather are to be avoided.

2. All panel boards must conform to the NEC, shall have a dead front and grounded enclosure. Front covers must have a hinged door that must be unlocked to open and to gain access to cover mounting devices. Front surface bolts or screws are not acceptable.

3. All loads are to be tabulated and indicated on the drawings as part of the panel schedules.

4. Series rating of circuit breakers is not acceptable.

5. In each electrical distribution panel, provide a minimum of fifty percent (50%)

spare breakers and spaces. A minimum of six (6) spare breakers and four (4) spare spaces must be provided.

6. For flush mounted or other non-accessible panels, provide one each three-quarter inch (3/4") spare conduit for each three (3) spare breakers and one (1) spare for each three (3) spaces. In addition, provide one (1) each spare one inch (1") conduit for each twenty (20) and fraction of twenty (20) panel spaces counting all possible spaces in the panel. For panels of 200 amp capacity and over provide one (1) each two inch (2") conduit for each multiple of 200 amps or fraction over 200 amps. Stub conduits into accessible attics, above accessible ceilings or in location directed.

7. All panels are to be labeled. A complete and accurate typed index is to be provided. This applies to new or remodeled areas. USU provided room numbers shall be indicated.

8. A grounding terminal buss shall be installed in all distribution panels. All raceways shall contain a NEC sized green insulated grounding conductor. A branch circuit grounding conductor shall be installed to all receptacle devices and equipment.

D. Motor Control:

1. General: All motor installations must conform to the NEC requirements for control and protection. Motor starters and overload protective devices shall be provided for all motors one-third (1/3) horsepower and larger. Plugs may be used for disconnects on motors less than one-third (1/3) horsepower only as allowed by the NEC.

2. Each MCC cubical shall have a grounding stab that makes before the line stabs. A chassis or cubical to cabinet contact ground is not acceptable.

3. Motor Type: Motors should be three (3) phase except for fractional horsepower sizes. Voltage should be specified for 200 Volt (on 208 Volt systems) and 460/480 Volt (on 480 Volt systems). 220-230-440 Volt motors are not to be specified or accepted. Where 480/277 Volt systems are provided, motors should be specified and connected for 460/480 Volts. Motors to be operated from a

   Variable Frequency Drive (VFD/ASD) shall be rated for the VFD service according to NEMA MG-1 and indicated on the nameplate.

4. Starters:

   a. Soft start (solid state) starters are preferred in most applications.

b. Starters for all motors 25Hp and larger shall be soft start, or when approved, of the stepped reduced voltage type. Up to 75Hp, single stage auto transformer voltage reduction shall be used. Over 75 Hp, two or more stages shall be provided. Variable Frequency (Adjustable Speed) Drives may be used in place of reduced voltage starters if applicable to the individual system needs. See Appendix A16260 for VFD/ASD specifications.

c. Soft start starters are preferred, but WYE-DELTA starting may be used for 25 to 100Hp Motors in place of auto transformer reduced voltages where reduced starting torque is permissible. The use of WYE-DELTA starters shall be approval by FD&C.

d. Part winding starting or resistive step starters shall not be specified or accepted.

e. Starters should be grouped into motor control centers. Individual starters except in isolated cases are to be avoided. Each starter should have a hand-off auto switch and auxiliary contacts coordinated with the building automation system. Two (2) indicator lights for each starter are to be installed to indicate motor operation; green for motor in operation and red for not in operation. An over load light may be provided, or both lights illuminated for an indication of over load conditions.

f. All control power for each starter must originate within the cubical such that the removals of the cubical or turning the cubical master switch off will remove voltage from the control circuit. Control and interlocks are to be coordinated with the automation system to maintain this requirement. Control transformers shall be accessible from the open cubical door. A location behind the starter or on the rear of the cubical is not acceptable.

g. Starters are not to be sized with the largest size heater at the running current value for the motor. Starter size must accommodate heaters one hundred thirty percent (130%) of the full running current of the motor

16500 LIGHTING

16510 INTERIOR LIGHTING

A. Interior lighting must be designed for energy conservation. Consider task lighting where appropriate. Use switching to provide light level control.

B. Switches: Provide switches for all lights except minimal night safety lights and lights on emergency lighting systems. Hall lights shall be on keyed switches. Areas such as halls and large rooms with more than one (1) exit shall have three (3) and four (4) way switching.

C. Access: All light fixtures must be readily accessible for re-lamping. Fixtures in rooms that have obstructions such as lab tables or lecture furniture must not be higher than twelve feet (12') above the floor or must have access from above for re-lamping. In clear level areas high bay lighting over twenty feet (20') must have access from above or some means of lowering the lights to twelve feet (12'). Lighting accessible from above must have the appropriate catwalks, etc. to meet the requirements of UOSH.

D. Mechanical Areas: All machine room fan plenums, utility areas pipe and air tunnels should have adequate lighting to allow work on the machinery or utilities without supplemental lights. Tunnels and fan plenums should have redundant lights so that one lamp failure will not completely darken the area. Light fixtures should not be located above equipment or on high ceilings where re-lamping would be difficult.

E. Unfinished Areas:

1. All unfinished areas are to have power capacity provided in conduits, feeders, and distribution panels to complete the area. Telephone, automation and other signal raceways, including fire alarms serving unfinished areas which can be finished, are to be complete through other finished areas.

2. Lighting in attics and service chases, etc. is to be minimal. Switches are to be located at each access using three (3) and four (4) way switching where two (2) or more accesses exist.

3. All fixtures must be easily re-lamped, particularly in attics and mechanical chases without the use of ladders, hoists or scaffolds.

F. Stairways and Entrances: Fixtures in staircases and entrances are to be located such that re-lamping does not require tall ladders, scaffolds or angles of ladders exceeding UOSH limitations. Typical maximum height is eight feet (8').

G. Lamp Types: Campus standard for interior lighting is fluorescent. Incandescent, metal halide or mercury vapor lamps are to be considered only in special applications. Other lamps may be considered only after review of the application with the FD&C office. Avoid high and low pressure sodium lamps.

H. Ballasts: All ballasts are to be electronic to match the lamps. See Appendix A16502 for approved manufacturers and specifications. Where core and coil ballasts are used, provide Class P, total harmonic distortion (THD) less than three percent (3%) , ninety-five percent (95%) or higher power factor, and sound rated ballasts. Fused or non-protected ballasts are not acceptable. All ballasts are to be of premium construction.

I. Fixtures: Fluorescent fixtures typically shall utilize T6 or T8 lamps with electronic

ballasts or when USU FD&C approved, energy efficient four foot (4') F-40/35 type lamps. Other lengths of fixtures should be considered for special applications only. Fixtures with lamps operated from ballasts in a separate fixture are not acceptable. Where “Para Cube” lenses are called for, one-half inch (1/2") cubes are to be used unless otherwise approved by USU FD&C. Spare lenses shall be provided at a rate of three percent (3%) of each type with one (1) lens minimum of each type.

J. Fixture Support: All fixtures shall meet the support requirements of the NEC and the UBC for Seismic Zone 2. Jack chain attached to all four (4) corners shall be used for seismic and life safety support. Ceiling support wires and additional stiff wire will not be accepted as a support. Do not fasten fixtures to Tee Bar ceiling grid system for support or other reasons.

K. Schedules: Fixture schedules are to be placed on the electrical drawings not in the specifications. The as-built drawings shall be corrected to indicate the actual fixture manufacturer and part number that has been installed.

16520 EXTERIOR LIGHTING

A. General: Exterior lighting must provide for adequate safety. Walk lights are to be of the campus standard with spacing to provide 0.5 foot candles minimum at pavement level. All exterior lights are to be controlled by the Building Automation, with photocell, or when necessary photocell only.

16530 EMERGENCY SYSTEMS AND LIGHTING

A. Codes: An emergency lighting system shall be provided according to the NEC, State Fire Marshal regulations, OSHA and the portions of the Life Safety Code adopted as state law.

B. Circuits: Where applicable, the main emergency lighting circuit is to be connected ahead of the main breaker on a breaker for the sole use of the emergency system. An engine generator shall automatically power the emergency circuit when a power failure occurs.

C. Power Source: Emergency engine generators shall be required on all facilities except for small facilities as otherwise approved by FD&C. Engine generators for emergency power shall be fully automatic in start and transfer capabilities. For special situations contact the FD&C office for engine generator specification modifications and requirements for adaptation to the particular application. For small buildings, a small UPS may be considered when approved by USU FD&C.

D. Egress Fixtures: All egress lighting shall be on the emergency lighting system. Use long life fluorescent lamps with two (2) or more lamps per fixture. Provide an illumination level of one foot candle at the exit door floor in classrooms and auditoriums that require darkening for audio-visual presentations by using USU

FD&C approved non incandescent down light fixtures that have minimum side light flair. Do not specify battery operated egress lights or exit signs. Do not include dual fixtures containing both general lighting and emergency lighting within the same enclosure. All emergency lighting shall be in separate fixtures from general lighting. Do not run circuits for emergency lighting fixtures through general lighting fixtures. Provide separate raceways to all emergency lighting fixtures.

E. Exit Signs: Exit signs shall be on the emergency lighting system. Exit signs shall be internally illuminated with green letters and a stencil face. Letter strokes must have uniform illumination from the rear or constructed from LED lamps behind the diffuser. Vandal resistant construction is required. Where egress fixtures are not used at an exit sign, down light intensity shall conform to the paragraph above for light intensity on the floor. Directional arrows shall be distinct and below the letters i.e. not triangles or mixed in the lettering. See FD&C for approved fixtures.

F. Raceways: Non emergency circuits shall not to be installed in emergency or other circuit raceways (standby) connected to the emergency system. Emergency fixtures shall not be used as a raceway or junction box for non emergency circuits.

G. Distribution Panel: A central emergency main distribution panel and standby system main distribution panel shall be located such that they are accessible in the electric switchboard room only to qualified personnel. Branch panels fed from a main panel are acceptable on each floor or for large spaces. Location in janitor closets, halls, offices, classrooms, laboratories, storage rooms and closets are not acceptable locations.

H. Support Spaces: Minimum emergency lighting is to be provided in electrical vaults, at the main switchboard, main communications room, elevator machine rooms, and in mechanical spaces. Both normal circuits and emergency circuits are to be provided in a redundant fashion to provide required illumination levels. Switch normal and emergency lights separately. A duplex 120 Volt outlet on the emergency system shall be provided near the main switchboard, in the transformer vault, elevator machine room, and in mechanical spaces along with a normal circuit. The main communications room requires several outlets of normal and emergency power.

I. Connections: Circuits are to be connected to the emergency panel board direct. Emergency lights are not to be switched in public spaces. In dedicated electrical mechanical and elevator spaces the emergency lights are to be switched.

J. Drawings: All emergency circuits and standby circuits shall be shown on the drawings as complete circuits. Devices with circuit numbers and no circuiting with an indication that the “circuits will be added when as-built” will not be accepted.

16700 COMMUNICATIONS

A GENERAL: Communications on the campus consists of several different systems

and backbone cables; these are: Telephone, Building Automation, Fire Alarms, Data, Instructional Television, Aggie Television, and Irrigation Control. These systems communicate across the campus on telephone cables, optical fiber cables, coaxial cables and a telephone type general communications cables located in a network of underground raceways and manholes. For new and where indicted remodels, the facility shall connect into the raceway system and backbone cables. The following divisions indicate the general requirement. Specific details for outside and interior systems are to be obtained from FD&C.

16702 OUTSIDE COMMUNICATIONS RACEWAYS

A. **Outside communications raceways** are four inches (4") schedule 40 PVC electrical conduit (grey) direct buried a minimum of thirty inches (30) with a caution marker tape twelve inches (12") above the raceways. A minimum of two (2) raceways shall enter each facility with a larger quantity as required to accommodate cables to be installed plus 50% empty raceways. Raceway cable fill for any conduit shall not exceed 50% as defined by the NEC. The quantity of campus interconnect raceways will be determined by FD&C for the particular site. See Division 16136 for manhole details. Raceways entering a facility are to terminate within a main communications room.

16703 COMMUNICATIONS CABLE TRAY

A. Nearly all facilities will require interior telephone and data communications systems. A central cable backbone is used to distribute cable throughout the facility and is generally a cable tray system above corridor ceilings with a minimum of two feet (2') clearance on one side and one foot (1') clearance above the tray. The tray shall be installed level without any bends or vertical changes, except as noted herein. Conduit is to be installed from the tray into each room where data and telephone or video systems outlets are required. The cable tray originates from the communications room/closet on each floor and runs throughout the floor to distribute the cables. All cable trays runs shall have a one-fourth inch (1/4") nylon pull rope and pulley system to facilitate cable installation. Each straight run of tray shall have an individual pull rope loop. Pull ropes shall not be installed around bends in the tray. Changes in horizontal direction are to be made with a long or medium radius bend in the tray. Square bends are not acceptable. Changes in elevation are to be made with step transitions with pull rope pulleys at the ends of the trays where the transition occurs. All conduits are to be stubbed to the edge of the tray and just above the rail. Conduits to the tray shall be accessible from the corridor directly below the conduits. All bends and vertical transitions shall be accessible form directly below the side of the tray. The normal tray size is twelve inches wide by three inches deep (12"X3"). Wider and deeper trays may be required. Narrower trays may be used for end of runs where approved by FD&C. Support trays from the side rails using manufacturer approved hangars or “UNISTRUT” under the tray with support rods to a structure above. Center tray supports are not to be used. The tray design is to be ladder type with maximum rung spacing of six inches (6"). Totally enclosed tray is permissible where

the tray must penetrate areas of inaccessibility and no conduits to the tray are to be installed. Firewall penetrations are to be sealed with fire stop bags approved for such a purpose, i.e. KB bags.

16705 TELEPHONE AND DATA INTERIOR RACEWAYS

A. Raceways interior in the facility for telephone and data to the outlets are to be a minimum of three-fourth inch (34/") EMT. Each combination of telephone/data outlet is to have a dedicated conduit from the outlet box to the cable tray or communications room/closet direct with a maximum of four (4) 90 degree bends and no junction boxes. Two outlets may be fed through a single conduit, but the conduit to the cable tray or room/closet shall be no smaller the one inch (1") EMT with the in between outlets conduit no smaller than three-fourths inch (3/4") EMT. Single telephone/data outlet boxes shall be four and eleven-sixteenths (4-11/16) inches square, two and one-eighth (2-1/8) inches minimum deep boxes with an appropriate single gang plaster or masonry ring. See telephone or data divisions for more specific details on cables, outlets etc. Riser raceways are to be a minimum of four inch (4") conduit. The quantity riser conduits and location in communications room/closets will be determined by FD&C. Raceways for other dedicated systems such as Either Net data and Video will be determined by FD&C.

16720 TELEPHONE AND INTERCOMMUNICATIONS EQUIPMENT

16722 TELEPHONE SYSTEM

A. General: The University owns and operates the telephone system on campus. For new and re-modeled facilities the complete phone system is to be installed under the facility project. This includes outside plant cables, raceways, splices and OSP cable terminations and OSP terminal blocks, interior raceways, outlet devices, cross connect fields and terminal blocks, splices and when needed PBX equipment. The telephone system will provide the instruments and do the cross connecting required by the occupying department. A project allowance for the University to install the interior telephone cables will be provided separate from the construction budget.

B. Outlets: A telephone/data raceway outlet system is to be installed into all office spaces and other spaces that may in the future require telephones. All areas of concrete or masonry wall construction must have telephone raceways even though initially for storage only. Offices are to have a minimum of two (2) outlets, preferably on opposite walls. Lecture auditoriums are to have one (1) outlet at the front of the room. Other outlets may be indicated in the design program in any room or lecture auditorium.

C. Renovations and Remodels: For renovations and remodel work where existing telephone equipment must be removed, relocated or for some reason changes made, the project will be responsible for removal and the installation of new telephone/data outlets as outlined above.

D. Interior Cables: All telephone station cables shall be CAT 5 rated. The normal telephone requires two pairs operating on a digital system, not a single pair analog system, though single pairs may be used as may be indicated. Plenum rated cable is not required unless cables are extend through a plenum such as above a corridor in the cable tray.

E. Interior Riser Cables: Riser cable pair count shall be not less than one hundred fifty percent (150%) of the telephone outlets for the area served by the communications room/closet considering two (2) pairs for each outlet. Riser cables are to originate in the main communications room and extend to the floor communications room/closet without splice. Riser cable design is to be approved by FD&C. Vertical cable support is to be installed at intervals not exceeding fifteen feet (15') using “Kellum Grips”.

F. Exterior (OSP) Cables: Exterior cables will be installed to the point in the telephone OSP cable system where sufficient pairs to the PBX are available. This may require cable from the facility to the PBX. Cable pair count shall be no less than one hundred fifty percent (150%) of the installed telephone outlets considering two (2) pairs for each outlet.

G. Intercom Systems: Intercom systems, when called for in the design program, shall be provided as a complete and working system. All conductors shall be placed in concealed raceways. Contact the Facilities Design & Construction Office for current requirements.

16800 SOUND SYSTEMS AND VIDEO

A. Typically, classrooms and auditoriums having a capacity of fifty (50) or more persons or more than one thousand (1000) square feet require a sound system. Due to the multi-function usage of sound systems on campus, compatibility must be maintained. The sound system shall be designed as an integral part of the room.

B. All wiring shall be accomplished with balanced lines that are foil shielded. All lines shall be installed in concealed raceways. Minimum wire size shall be #18 AWG. Wire groups of the same signal level may be strapped together and labeled. High (600 ohms and over) and low (below 600 ohms) signal levels should be separated by no less than two feet (2') where parallel more than one foot (1'). See Appendix A16800.

C. Complete drawing and wiring diagrams for the installation must be submitted to the FD&C office for approval before any installations.

A. The Contractor shall provide on-site instruction for operation and maintenance of all sound equipment with the installation. The date of this instruction period shall be arranged for through the FD&C office and will be set at the final inspection.

E. Classrooms programmed to have video capability shall have 110V power to the lectern and to the projector location, a 1 ½” conduit from the lectern to the projector for signal cable and a light switch close to the lectern.

16920 CLOCKS AND BELLS

A. Clocks should be installed in large public areas. Clocks in offices and small classrooms are not to be provided.

B. Clocks for the larger classrooms and laboratories, and other rooms are to be a minimum or twelve inches (12") diameter at the numbers’ outer edge and approved by FD&C. Provide an electrical outlet and clock hanger with a battery operated quartz clock of an approved manufacturer and design.

C. Clock correction or bell systems are not required.

Building Utah's Future, Preserving Utah's Heritage

The column below is the DFCM Electrical Design Requirements, Section 3.6. The version date is shown above. They are provided here as a reference for convenient coordination with the USU Electrical Design Requirements. The complete DFCM Electrical Design Requirements can be found at:

http://www.dfcm.state.ut.us/standard_docs.php

UtahState UNIVERSITY

The column below is the USU Electrical Design Requirements. The version date is shown above. The USU Electrical Design Requirements include the DFCM Electrical Design Requirements, except as modified below. AutoCAD details are embedded at the end of this document. These guidelines are updated on a continual basis. The most recent version can be obtained at:

mailto:mark.holt@usu.edu

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3.6 Electrical

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A. Emergency Electrical Requirements

A. Emergency Electrical Requirements

(1) Modify paragraph 700.12 General Requirements of the NEC to: (2) "Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, emergency lighting, emergency power, or both shall be available within the time required for the application but not to exceed 10 seconds. The supply system for emergency purposes for buildings totaling less than 5000 sf, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or more of the types of systems described in 700.12 (A) through 7001.12 (E). Unit equipment in accordance with 700.12(F) shall satisfy the applicable requirements of this article for buildings totaling less than 5000 sf. The supply system for emergency purposes for buildings totaling 5000 sf or greater, in addition to the normal services to the building and meeting the general requirements of this section, shall be the type of system described by 700.12 (B). This requirement shall not prohibit the use of the supply systems 700.12 (A), or 700.12 (C) through (F), for buildings totaling 5000 sf or greater, if these systems are required for safety purposes and if these systems are automatically connected to a Generator Set as described in 700.12 (B)." [The balance of section 700 is unchanged.]	□ Do not provide battery backup in fixtures or exit signs which are connected to a generator or central battery system.
(3) Modify paragraph 701.11 Legally Required Standby Systems of the NEC to: "Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, legally required standby power will be available within the time required for the application but not to exceed 20 seconds. The supply system for legally required standby purposes for buildings totaling less than 5000 sf, in addition to the normal services to the building shall be permitted to comprise one or more of the types of systems described in 701.11(A) through 701.11 (F). Unit equipment in accordance with 701.11(G) shall	

satisfy the applicable requirements of this article for buildings totaling less than 5000 sf. The supply system for legally required standby purposes for buildings totaling 5000 sf or greater, in addition to the normal services to the building shall be required to be the type of system described by 701.11 (B). This requirement shall not prohibit the use of the supply systems 701.11 (A), or 701.11 (C) through (G), for buildings totaling 5000 sf or greater if these systems are required for safety purposes and if these systems are automatically connected to a Generator Set as described in 701.11 (B)." [The balance of this section is unchanged.]	
(4) The Director of DFCM may authorize battery packs in suitable applications when the standard is not achievable due to the unique circumstances of a particular project or the constraints of the project budget.	
B. Lighting	B. Lighting
(1) □ Occupants within an enclosed space shall have the capability to adjust the lighting within the enclosed space.	(1) □ In conjunction with occupancy sensor, provide a means for manual on/off control. □ List fixtures in the lighting schedule by manufacturer and part number. At the completion of the project update the schedule to indicate the actual fixture installed.

(2) Light Pollution Reduction: □ Comply with Light Pollution Reduction requirements, unless otherwise directed by the DFCM's Designated Representative. (3) □ Comply with the Illuminating Engineering Society of North America (IESNA) Recommended Practice Manual: "Lighting for Exterior Environments (RP-33-99)." □ Provide exterior luminaires which are shielded. For luminaires with more than 3000 initial lamp lumens, provide Full Cutoff (IESNA Classification) luminaires. □ Interior lighting shall be positioned so that the maximum candela value does not fall outside the interior space, such as out through a window. □ Exterior lighting shall be located so that the maximum candela value of all exterior lighting shall fall within the property. □ Provide shielding for any luminaire within a distance of 2.25 times its mounting height from the property boundary so that no light from the luminaire illuminates past the property boundary.	
(4) Lighting Fixtures: □ Provide lenses that will not yellow due to exposure to sunlight or to the light sources in the fixture. When acrylic diffusers are specified, provide 100% virgin acrylic. □ Provide electronic ballasts, except that magnetic ballasts may be used in outdoor applications. Provide program start ballasts, if available for the lamp type. □ Connect equipment grounding conductor to fixture housing. □ Provide a 10% spare lamps, diffusers or glass for each light fixture type with not less than one for less than 10.	

(5) Interior Lighting: □ Provide T-8 lamps in fixtures, except for areas requiring special lighting. □ Provide independent safety-wires attached to structure at two diagonal corners of lighting fixtures in compliance with seismic requirements. □ For recessed fluorescent fixtures that are removable, locate outlet box with 3' of steel flexible conduit to the fixture to aid in removing and relocating fixture.	(5) Interior Lighting: □ Exit signs: brushed aluminum finish; Green LED. Provide one of the following exit signs: • Lithonia LES Series • Cooper/Sure-Lites CX Series □ Do not provide battery backup in fixtures or exit signs which are connected to a generator or central battery system. □ Provide ballasts with < 10% Current THD □ Lighting in building transformer vault and main electrical room shall be connected to an emergency lighting circuit.
(6) Exterior Lighting: □ Provide -10 degree F. ballasts, either constant wattage or pulse start. □ Provide break-away fuse for all phase conductors for all outside pole mounted lighting fixtures. Provide a shorting fuse insert for neutral fuse holder. Do not use common neutral multi-wire circuits for this type of lighting.	(6) Exterior Lighting: □ The following fixtures are to be used as the basis of design for site lighting projects. Contractors/bidders should submit pricing for the base fixture and for any other alternative fixtures as well as cutsheets and/or samples as necessary to evaluate the alternative fixtures. Alternative fixtures will be evaluated post bid against the base using the following criteria: 1) visual equivalency 2) light distribution 3) overall fixture quality/maintainability and 4) pricing. □ Historic/Street District Luminaire: Manufacturer: AAL; Style: UCM; Elements: Solid Rings (SR) Solid Cylinder; Hood: Straight Shade (STR); Lens: Flat Glass (FTG); Lamp/Ballast: Determined by project, but typically 150W–175 W MH; Arm: Offset Shepherds Crook (SLA 4); Pole: Smooth, round, aluminum, height = XXXXX, decorative base cover (BC8); Color: Dark Bronze (DBZ); Other: Tool removal of lens rather than thumbscrews. Banner arms for street district. □ Mall District Luminaire: Manufacturer: AAL; Style: UCM; Elements: Illuminated Rings (LUM); Hood: Straight Shade (STR); Lens: Flat Glass (FTG); Lamp/Ballast: Determined by application, but typically 150w–175w MH; Arm: Offset

	Shepherds Crook (SLA 4); Pole: Smooth, round, aluminum, height = XXXXX; Color: Verify with owner. Other: Tool removal of lens rather than thumbscrews. Banner arms. □ Art District Luminaire Basis of Selection: Manufacturer: Bega; Style: 8171MH; Lamp/Ballast: Determined by application, but typically 150w–175w MH; Pole: Smooth, round, tapered, aluminum, height = XXXXX; Color: Black □ General Campus: For areas other than one of the themed districts above, provide typical shoebox style fixture with square aluminum pole. Color: Dark Bronze. □ See pole base Detail B-6-1 in Electrical Appendix for visual requirements. Concrete strength and reinforcing to be determined by the requirements of project.
(7) Reflected Ceiling Plan Coordination: □ Coordinate the lighting fixture with the reflected ceiling plan for lay-in and surface mounted fixtures. □ Recessed lighting fixtures in acoustical tile ceiling shall be located centered on a single tile or at the intersection of four tiles.	
(8) Lighting Fixture Supports: □ Provide swivel bases for stems supporting lighting fixture which exceed 12” in length.	
(9) HID Sources: □ Provide Constant Wattage ballasts. □ For metal halide, provide Pulse Start Metal Halide lamps and ballasts. □ For indoor, provide pulse start electronic ballasts. □ For outdoor up to 200 watts, provide pulse start electronic	

ballasts. □ For outdoor above 200 watts, provide magnetic ballasts if control, noise, and flicker requirements are satisfied.	
C. Raceways to 600 V	
(1) Raceways, Fittings, and Boxes. □ Provide steel raceway, fitting, and box system for all wiring, except that plastic conduit (minimum schedule 40) may be installed underground and aluminum cable trays may be installed for communications cabling. □ For steel raceway installed in contact with soil, provide rigid or IMC PVC coated or wrapped raceways, fittings, etc. □ Provide steel raceways for penetrating structural elements (minimum 10' each side) and rigid steel conduit (PVC coated or wrapped) for bends greater than 22 degrees. □ Provide minimum ¾" raceways, except ½" may be provided for HVAC Instrumentation and Control. □ For Communications raceway, the bend must be a minimum 6 times the diameter for sizes 2" or less and 10 times the diameter for larger then 2". □ Provide flexible steel conduit (minimum ½") in short lengths where movement, vibration, misalignment or cramped quarters exist. □ Provide insulated throat or equal type plastic bushings for box connection 1" or larger. □ Provide double lock nuts and plastic bushings for IMC and rigid conduit. □ Provide liquid-tight flexible conduit with approved moisture-tight fittings for wet, humid, corrosive or oily locations. □ Provide a minimum 18" liquid-tight flexible conduit at each motor. □ Provide minimum 4/s box 1-1/2" deep with plaster rings,	(1) Raceways, Fittings, and Boxes. □ See Section K. for fire alarm specific raceway requirements.

except provide 3-1/2" deep masonry boxes for masonry. For boxes with 3 or more raceway entrances, provide minimum 2-1/8" box. For boxes with 4 or more raceway entrances, provide (2) 4-11/16" boxes (except for masonry boxes). □ Provide gang boxes for multiple gang installations. □ Provide accessible junction boxes in interior raceway runs at minimum 100 foot intervals. □ Provide minimum 12" clearance from hot water and steam lines measured from outside of insulation.	
(3) Electrical Supports. □ All raceways, boxes, and conductors shall be supported independently from all other electrical or mechanical systems, directly from building structure by a listed supporting device. □ Provide bracing parallel to trusses, beams, joist, bridging, etc. □ Provide anchors capable of supporting 4 times the weight of the unit supported, but not less than 100 lbs. □ For ceiling fixture outlet boxes, provide minimum supporting capacity of 200 lbs and a standard 3/8" stud. □ Provide outlet boxes with rigid support using metal bar hangers between studs. □ Provide concrete pads 6 inches beyond the largest dimension of the equipment. Extend equipment pad a minimum of 4" above finished floor or grade,	
(4) Steel Raceway Supports. □ Provide minimum of 2 supports per ten foot length; Support within 12 inches of bends, couplings, fittings and boxes, minimum of two straps per ten foot length. □ For 2 runs or less of ¾" to 1-1/4" raceways, provide supports	

with full straps, clamps or hangers. For individual run 1-1/2" or larger raceways, provide supports with hangers. All other raceways, support with trapeze mounting channels.	
(5) Future Raceways: □ Provide five capped spare ¾" conduits from each section of a branch panelboard into the ceiling and floor space. If the floor space is not accessible, provide an additional ¾" conduit from each section of a branch panelboard into the ceiling. □ Provide 200-lb nylon pull cord in all empty conduit, then cap raceway using a blank cover similar to adjacent wiring device covers.	
(6) Underground Raceway Identification and Installation: □ Provide direct buried conduit in an area outside a building not less 24" deep, with magnetic "yellow warning" ribbon 12" directly above and 6" below finished grade measured from the top of the conduit or duct bank.	(6) Underground Raceway Identification and Installation: □ Medium voltage and communication distribution and building feeders shall have 36" minimum cover. □ Medium voltage conduits and ducts shall be concrete encased. □ Provide minimum 1 ¼"underground raceway for site lighting circuits.
(7) Do not provide the following, unless approved by the Director: (8) □ Exposed cable wiring. (9) Other raceway systems: □ Electrical Non-metallic Tubing □ aluminum conduit □ die cast fittings □ steel cable trays.	

D. Conductors	
(1) Conductors. □ Provide minimum #12 copper conductors with 600V insulation (THW, THWN, THWN-2, XHHW, or XHHW-2) for all phase conductors; unless ambient conditions require an increased insulation rating. □ Do not parallel less than #1/0 conductors. □ Do not feed conductors through one section of panelboard to connect to an overcurrent device in another section of panelboard. □ Provide separate neutrals for all GFI circuit breakers and for the load side of feed thru GFCI outlets. □ Provide minimum 12" clearance from hotwater and steam lines measured from outside of insulation.	(1) Conductors. □ Do not use push-in type quick-wire devices or wire connectors. □ 120/208 V color code: Black, Red, Blue; + Rotation. 277/480 V color code: Brown, Yellow; Violet; + Rotation □ #8 and larger conductors may be taped with 8" of half-lapped colored tape at terminations and pull boxes.
(2) Do not provide the following, unless approved by the Director: (3) □ Exposed cable wiring. (4) □ Splices in panelboard, switchboard enclosures, or in conduit bodies. (5) Other cabling methods: □ Non-metallic sheathed cables (Romex) □ Metal Clad Cables □ aluminum conductors	
E. Grounding	E. Grounding
(1) Grounding. □ Ground all medium voltage equipment and exposed metals in	(1) Grounding. □ Grounding hardware in 15 KV manholes and building vaults

the immediate area with the neutral conductor of the primary cable and with a minimum 5/8" X 10' ground rod. □ Provide grounding electrode system at the service entrance with, at a minimum, two of the following electrodes as defined in the NEC: metal underground water pipe, concrete-encased electrode, or ground ring. In addition, bond to other available electrodes. □ Provide a separate green grounding conductor enclosed with phase conductors in all raceways on the load side of the service entrance. □ Provide grounding bushings for all service raceways and for raceways installed in concentric/eccentric knockouts. □ All grounding systems shall be interconnected and/or bonded to the grounding electrode system. □ Upgrade as necessary existing electrical systems to comply with the NEC and these requirements.	shall be silicon bronze. Burndy type HE and QQAXX-2N. See Detail E.1.1. Ground all metal parts, ladders, manhole rings, supports, etc.
F. Medium Voltage	F. Medium Voltage
(1) Medium Voltage Conductors: □ Provide copper conductors with copper tape shields and EPR insulation and 100% copper neutral in Medium Voltage Ductbanks; or, in utility tunnels or other areas without public access, provide armored cable or rigid conduit. □ Comply, as a minimum, to the installation requirements for Medium-Voltage Cable standard NECA 600-2003. □ Perform Hi-Pot test after terminations have been made, but before connections have been made to buses or apparatus. □ Perform continuity tests of all cables after entire installation and terminations have been completed. □ If a cable fails to perform, replace faulty cable and retest. □ All tests will be recorded and submitted with M & O manuals at project conclusion.	(1) Medium Voltage Conductors: □ Provide single conductor, MV-105, 133% insulation, 15KV cables □ Provide 3 days notice to USU Power of pending Hi-pot tests. Tests will be observed at USU's discretion. □ Hi-Pot test results shall be submitted to USU Power for review prior to equipment being energized. □ Provide support and racking for 15KV conductors using the following hardware: • ZSI Porce-a-Clamp • Cooper B-Line Insulclamp • B-Line B409-XX Shelf Bracket □ Provide vertical struts embedded in or attached to manhole wall extending from 12" above floor to 12" from manhole

	ceiling. Provide 3 per wall. □ Contractors who have not previously performed medium voltage work shall submit documentation of 5 years experience in performing projects of a similar nature. □ A brush or swab equal to the diameter of the conduit shall be pulled through all existing and new underground ducts prior to placing cable. □ Provide a service loop in 15KV cables by routing cables 1 time around the perimeter of the manhole. □ Two sets of feeders which loop in and out of a switch, transformer or junction shall be located in separate duct banks. □ 15KV color code: Black, Red, Blue. 8" of half-lapped colored tape at terminations and pull boxes. □ Cable shall be value selected based on the following criteria: 1) Cost 2) Warranty 3) Installation labor savings. □ Approved cable Manufacturers: • Kerite • Okonite • General Cable
(2) Medium Voltage Duct Banks. □ For interior of buildings in non-public areas, provide rigid galvanized conduit or armored cable marked with red HIGH VOLTAGE. □ For exterior applications or public areas, provide concrete encased duct-banks (red dye) with raceways in multiples of two and a minimum of one spare conduit (with polypropylene pull wire) per feeder. □ Provide rigid metal conduit for the first 10 feet of duct bank from a facility or manhole. □ Provide minimum 4" raceway.	(2) Medium Voltage Duct Banks □ Provide concrete encased PVC ducts throughout. Duct bank should penetrate manhole walls or building foundations. Reinforce duct with rebar at manhole and building penetrations. □ Provide 5" or 6" raceway for distribution grid. □ Provide at least one spare raceway in all medium voltage cable and duct runs. □ A ductbank shall contain two raceways, one for use and one spare. Where multiple sets of feeders run adjacent to one another, provide a physically separate ductbank with two raceways. □ A brush or swab equal to the diameter of the conduit shall be

	pulled through all existing and new underground ducts prior to placing cable. □ Beneath padmounted medium voltage switchgear provide a 36" deep cable well. Concrete encased duct bank shall penetrate cable well foundation wall.
(3) Medium Voltage Transformer: □ A/E shall design harmonic mitigation to reduce current total harmonic distortion (based upon full load capacity of the transformer) below 5%. □ Provide copper or aluminum windings. □ Provide transformer taps and adjust voltage output to obtain the proper value. □ Provide primary and secondary terminations at medium voltage transformers, cable, splices, etc. necessary to complete installation. □ Do not use Askarel transformers.	(3) Medium Voltage Transformer: □ Provide copper windings per DFCM Requirement H(3) □ Transformers shall be configured and located as follows in order of preference: 1) 3-single phase transformers located in basement or ground level transformer vault within building envelope. 2) 3-single phase transformers or padmount transformer located in basement level areaway adjacent to building envelope. 3) Padmount transformer located in grade level transformer yard screened with materials matching building exterior. □ Transformer shall be protected by a stand alone fault interrupter. See Section (F)(6) □ Transformers shall be filled with less flammable vegetable based insulating oil. □ Provide through tank, 200A bushing wells and inserts on all non-overhead transformers including 3-phase padmount transformers, 1-phase transformer in 3-phase banks and 1-phase transformers. Provide a feedthrough bushing insert on each 1-phase transformers connected in a 3-phase delta bank. □ Connect secondary feeders to transformer using silicon bronze hardware. Burndy type HE and QQAXX-2N.
(4) Lightning Protection: □ Provide lightning (surge) arresters for medium voltage transformers and switchgear located above ground outside.	

(5) Multi-Way Medium Voltage Switchgear:

- 15KV nominal voltage rating; 600A current rating; 12.5KA symmetrical interrupt rating
- Switchgear to be encapsulated solid dielectric.
- Provide front mounted 600A apparatus bushings. Diagonal arrangement.
- Handle/operator shall be front mounted.
- Switchgear shall be operable both manually with a handle and with a fixed motor operator & portable control.
- Provide pad lockable switch operating mechanism
- Switchgear located in vaults shall be of submersible design.
- Switch module bussing shall be field connectable and expandable to create switch arrangements from three – six ways.
- For 3, 4, and 5 way switches, provide an expanded support rack which will accept 1, 2 or 3 additional future switch modules. Verify the expected future way count with USU during design phase.
- Switchgear shall have visual indication (other than operating handle) of switch contact position.
- Width of each 3 phase switch module shall be 18” max.
- Allow 18” minimum from end of switch line-up to manhole/vault wall for manual switch handle operation. Indicate this required clearance on plans.
- Vault switchgear shall be stand mounted. 68” from floor to top of switch module. 76” from floor to top of motor operator.
- Pad mounted switchgear shall be placed on a 36” deep cable well.
- Submit shop drawings to USU for approval prior to manufacturing switch.
- Installing contractor shall provide and attach an engraved label with 1”high letters on each switch and switch way. Verify label content with USU.

	□ Approved Suppliers (Manufacturers): • G&W Electric – Trident Series
	(6) Medium Voltage Fault Interrupters □ These guidelines are for VFI's when used stand alone or as part of multi-way switchgear □ 15KV nominal voltage rating; 200A current rating; 12.5KA symmetrical interrupt rating. □ 3 Phase or 1 Phase. □ Fault interrupters to be encapsulated solid dielectric. □ Provide front mounted 200A deepwell bushings: Provide diagonal bushing arrangement when part of multi-way switch gear. Straight bushing arrangement when VFI is used stand alone. □ Handle/operator shall be front mounted □ Interrupters shall be operable both manually with a handle and fixed motor operator & portable control. □ Interrupters shall not be located in subsurface vaults. □ Interrupter shall have visual indication (other than operating handle) of switch contact position. □ Interrupters shall be wall or stand mounted. 68" from floor to top of switch module. 76" from floor to top of motor operator. □ Provide pad lockable operating mechanism □ Provide protective relay with: • Settings viewable and adjustable via the front panel. • Minimum trip range: 15 – 300A • Front panel phase & trip cause indication • Adjustable phase time delay • Selectable trip curves • External power supply input • Manual trip button □ Submit shop drawings to USU for approval prior to manufacturing switch.

	◻ Installing contractor shall provide and attach an engraved label with 1"high letters on each VFI. Verify label content with USU. ◻ Approved Suppliers (Manufacturers): • 3 Phase: G&W – Trident Series w/Type 2 Control • 1 Phase: G&W – Trident Series w/Type 1 Control
	(7) Medium Voltage Manholes ◻ Provide subsurface concrete manholes where medium voltage switchgear is to be located or where medium voltage ducts change direction or as needed as a pull point in long duct runs. ◻ Where medium voltage switchgear up to 4 ways is anticipated, provide 10'x12' or 12'x12' manholes. ◻ Where medium voltage switchgear up to 6 ways is anticipated, provide 10 x 14' manholes. ◻ Allow 18" minimum from end of switch line-up to manhole/vault wall for manual switch handle operation. Indicate this required clearance on construction plans. ◻ Locate the manhole access in the half of the manhole opposite the switch. ◻ Provide fiberglass manhole ladders.
	(8) Medium Voltage Terminations ◻ Provide 200A & 600A, 15KV separable connections at all switches and junction points. ◻ Provide voltage test points on all separable connectors/elbows ◻ All elbow terminations shall be made up so that CT style fault indicators can be placed at the cable termination. ◻ Route drain wires from elbow along cable with sufficient length that elbows can be removed individually without

	disconnecting drain.
	(9) Medium Voltage Fault Indicators □ Provide fault indicators on all terminations at multi-way switchgear and multi-point junctions. □ Provide fault indicators with the following characteristics: • Automatic current range sensing from 50 – 800A • Inrush restraint • 12 hour time delay reset • Integral fault indicator display • Battery-less operation □ Fault indicator CT to surround tape shield and tape shield braid. □ Approved Fault Indicator Manufacturers: • E.O. Schweitzer 1ARUI12Y2
	(10) Implementation □ Removal and/or re-configuration of medium voltage cable and ducts that results in the interruption of service to facilities will need to be done off hours – Saturdays, Sundays, overnight, etc. Verify outage requirements and include outage restrictions in bid documents. □ Requests for outages of medium voltage infrastructure and/or facilities requires 10 days advanced notice. □ Use the following labeling scheme for medium voltage equipment: [equipment type] [building/grid number]-[sequence] VFI (fault interrupter) 12L 1 CB (circuit breaker) 68B 2 SW (section switch) 14M 3

	T (transformer) 14 Etc. MH (man hole) Etc. Examples: VFI 68B-1, CB 50-2, MH 12M-23, SW 13L-7 , T 67-1
G. Controllers	
(1) Motor controllers: □ Provide NEMA rated magnetic motor controllers with thermal overload relays for each phase. □ Provide auxiliary contacts, HOA switches or start-stop pushbuttons as appropriate, stop and run pilot lights, and reset pushbuttons. □ Provide fused control transformer in the starter for 120 V control. □ Provide safety interlock to prevent opening enclosure with equipment or control energized.	

(2) Variable Frequency Controllers:

- Provide PWM variable frequency controllers suitable for the application, factory pre-wired with integral disconnect, input filter, and integral ventilation.
- Coordinate approved manufacturers with the Agency.
- Provide interface to HVAC or Building Automation System for control.
- For interior VFCs, size ventilation for ambient temperature of 32 degrees F. to 90 degrees F.
- Avoid exterior mounted VFCs; but, if required, provide ventilation for ambient temperatures from -30 degrees F. to 120 degrees F.
- Fault current rating shall be sized based upon the fault current analysis of the nearest upstream overcurrent device.
- Include factory startup and tune to optimize life of motor.
- Provide VFCs which operate within the following normal ranges of inputs: +/- 10% input voltage; +/- 5% input frequency; less than 7% voltage THD.
- Provide VFCs which operate through voltage sags of 0% voltage for 1 cycle and 60% voltage for 10 cycles.
- For Motors 7.5 hp and larger, provide a minimum power quality performance of 12% current THD and 3% voltage THD at filter or VFC input by providing a broadband type filter or minimum 12 pulse VFC complying with the power quality performance requirements demonstrated by standard factory published data.
- For Motors less than 7.5 hp, provide AC Line Reactor or DC Link Reactor.
- For VFC output filtering, provide output filter if drive output at motor termination exceeds pulse-withstand capability.
- Provide 95% efficiency minimum including filter and 95% power factor.
- Provide local speed control, HOA switch, remote start/stop, external safeties, run annunciation, fault annunciation, and

(2) Variable Frequency Controllers:

- Approved Suppliers (Manufacturers):
  - Energy Management Corporation (Mitsubishi)
  - Long Building Environments (Yaskawa)
  - Midgley-Huber (ABB)
  - TMS (Danfoss)
- Drives shall not be located outdoors, except when a building environment is unavailable ie: farm irrigation pumps.
- Provide externally operated input circuit breaker.
- Provide one of the enclosure types (in order of preference):
  - Located integral in new MCC's.
  - Non-ventilated, NEMA 12 style enclosure and drive (25 HP and below only)
  - Ventilated enclosure with filtered forced air cooling.
- The PQ filter shall be separated from the VFD by internal separation or with separate enclosures. If mounted in separate enclosures both the PQ filter section and the VFD shall be mounted on a common backplane/rack assembly. Filter section shall be ventilated. VFD section shall be gasketed non-ventilated or ventilated as described above, depending upon machine room space availability.
- Filters/transformers shall be factory wired.
- Do not provide a manual bypass. For systems that require minimal downtime, incorporate a redundant VFD scheme.
- Provide 3 year warranty minimum.
- Controls, indicators and keypad shall be front panel/door mounted.
- Provide UL 508 Listing on assembled drive.
- After vendor startup of the VFD, USU will conduct in-house power quality testing for those items listed in the design requirements. Reserve project budget allowance of $300 per drive for testing.
- Permanently label all internal wiring
- Control voltages to be 120V

speed reference input connection. □ For maintenance purposes, provide stable operation including starting, stopping and running with the motor completely disconnected; provide auto restart after a power failure; provide capability for starting into a rotating motor at any speed. (3) □ Provide a manual bypass of UFC as part of controller. (4) Do not provide the following components, unless approved by the Director. (5) Other Electrical Components: □ IEC motor controllers.	□ Provide fire alarm fan/VFD shutdown input. □ Doors will not require special wrenches, tools or keys to open. .
H. Electrical Distribution	
(1) Overcurrent and Ground Fault Protection: □ Set overcurrent and ground fault protection based upon Fault Current Protection and Coordination Study prepared by the A/E. (2) □ Submit study with M & O manuals.	(1) Overcurrent and Ground Fault Protection: □ When determining settings for protective devices, request settings for existing upstream medium voltage protective equipment. □ Submit Fault Current Protection and Coordination Study prepared by A/E to USU for review and approval at least 4 weeks prior to building occupancy. Submit printed version and digital model file. □ USU personnel will program and install settings into medium voltage protective devices. □ Phase Coordination Scheme (fastest to slowest): 1. Building secondary protective device. 2. Substation Recloser Fast Curve. 3. Building medium voltage protective device. 4. Substation recloser slow curve.

	5. Recloser lockout. □ Ground Fault Coordination Scheme: 1. Secondary Ground Fault Device Exists: Coordinate secondary ground fault protective device faster than medium voltage ground fault protective device. 2. No Secondary Ground Fault Device Exists and Secondary Voltage is 120V: Maximum VFI Ground Fault Setting or Blocked. Ground fault short time trip to match phase short time trip. 3. No Secondary Ground Fault Device Exists and secondary voltage is 277V: VFI ground fault settings per NEC reflected to primary side).
(3) Transformers: □ Provide transformers with copper conductors. □ Provide transformer taps of 4 taps – 2.5% above normal and 2 taps – 2.5% below normal. □ Adjust voltage output to obtain the proper value at the main disconnect.	(3) Transformers: □ Do not provide dry type transformers except as part of emergency or life safety distribution systems. □ If two system voltages are required, provide two oil filled transformers and two services.
(4) Metering: □ Provide secondary digital metering (including demand monitoring) at the main distribution panel(s) in each facility. □ For secondary digital metering for facilities greater than (5) 800 Amps include harmonic monitoring and an option for building automation monitoring or other remote monitoring. □ Indicate multiplying factor on meter face where current transformers are used.	(4) Metering: □ Provide metering at each service. □ Provide metering for temporary construction power. □ In buildings with multiple tenants, provide separated metering or sub metering as appropriate. □ Where current transformers are used, provide engraved label with 3/8”minimum high letters indicating CT ratio and multiplier. Attach label to electrical panel or meter base immediately below meter. □ Provide CT’s with 5 Amp secondary. □ CT’s shall be secured to MDP or transformer with appropriate brackets. Do not hang from secondary feeders.

	□ Provide neutral CT in 3 Phase metering schemes. □ Provide a Current Transformer Test Record for each CT which includes: Ratio; Ratio Correction Factor at 10% and 100% load; Serial Number; Date of Test. □ Provide a ¾" EMT from the MDP metering section or meter base to the building communication BDF. □ See metering Details H-4-1, H-4-2 and H-4-3. □ MDP Meters (LCD display; 5A input; Modbus/DNP; 232/485; IR; Ethernet; 10B-T; 10B-FL). Accepted Manufacturers: • Power Measurement ION 7550 • Seimens ION 9510 • Electro-Industries Nexus 1250 □ Three Phase Transformer Rated (CT) (LCD display; Form 9S; Blade Powered; 5A input; Modbus/DNP; IR; Ethernet; 10B-T). Accepted Manufacturers: • Electro-Industries Nexus 1262 • Power Measurement Ion 8600 • Itron Centron CP1SD CL20 □ Three Phase Direct Read (IR; Demand, Form 16S) Accepted Manufacturers: • Itron Centron CP1SD CL200 or CL320 □ Single Phase Direct Read (IR; Demand, Form 2S) Accepted Manufacturers: • Itron Centron C1SD CL200 or CL320
(6) Utility Metering: □ Comply with serving utility's regulations, if applicable. □ Comply with utility's metering requirements. Include cost assessed by serving utility.	
(7) Switchboards and Panelboards:	(7) Switchboards and Panelboards:

- Provide bus hardware installed on the bus for future over-current devices of not less than 25% minimum.
- Provide over-current devices in the same sequence as shown on the panel schedules or one-line diagrams.
- Coordinate that the height of the operating handle of the over-current device does not exceed 6'6" above the floor.
- Identify main over-current protection devices.

- Provide copper bus in switchboards.
- Provide dedicated main electrical room for building switchboards. Access to main electrical room shall be directly to the corridor not passing through communications rooms, mechanical rooms, office spaces, etc.
- Locate electrical rooms so that they stack vertically.
- Do not put dropped ceiling systems in electrical rooms.
- Provide 4" raised concrete pad for all floor mounted electrical equipment.
- Use the following labeling scheme for panelboards:

[building level][panel type][panel sequence][section]

0	M (Main)	1	A
1	P (120/208)	2	B
2	L (277/480)	3	C
3	E (Emergency)	4	Etc
Etc.	S (Standby)	Etc.	
	MCC (Motors)		

Examples: ML, 0P1, 2P5B, 0EL1, 1SP1, 3MCC1

(8) Panelboards: □ Provide listed panelboard construction for all branch panels and circuit breaker distribution panels. □ For 3 phase 4 wire delta systems, connect Hi-Leg to center bus. □ Provide ground bus bonded to enclosure to terminate all equipment ground conductors. □ Include insulated ground bus for insulated ground circuits. □ Key all panelboards alike and provide 3 keys.	(8) Panelboards: □ Locate electrical rooms so that they stack vertically. □ Do not provide 3 phase 4 wire delta systems □ Provide dedicated electrical rooms/closets for panelboards. Access to electrical rooms/closets shall be directly to the corridor not passing through communications rooms, mechanical rooms, office spaces, etc. Closets may be shallow so that NEC required clearance extends into the corridor. □ Provide copper bus in panelboards. □ Do not put dropped ceiling systems in electrical rooms/closets.
(9) Circuit Breakers: □ Provide one, two or three-pole over-current devices with common handle (not field modifiable). □ Provide bolted connections.	(9) Circuit Breakers:
(10) Do not use the following components, unless approved by the Director: (11) Other Electrical Components: □ load centers □ plug-in circuit breakers.	
I. Miscellaneous Electrical	
(1) Lighting Contactors: □ Provide NEMA rated lighting contactors with HOA.	

(2) Wiring Devices: □ Locate switches so as not to exceed 48" to the bottom above finished floor. □ Except for floor boxes, locate convenience outlets so that outlet is not less than 18" to the bottom and not greater than 48" to the top above finished floor. Coordinate heights with cabinetry and finishes. □ Use feed through GFCI outlets only if the outlet served is located in the same room. □ Convenience outlets (120 V) and switches (120/277V) shall be minimum 20A self-grounding with nylon faces and cover plates. □ Coordinate device colors and plates with the finishes. □ Provide industrial raised covers for surface switches and outlets. □ Arrange devices in gangs if multiple devices are located at the same location. Provide mounting strips and blank cover-plates for outlet boxes without devices. □ Do not connect more than eight (8) convenience outlets on each 20A circuit.	(2) Wiring Devices: □ Conductors shall be connected to wiring devices using threaded screws. Push in quick wire connections are not acceptable.
(3) Lightning Protection: □ If the risk analysis performed per NFPA 780 exceeds moderate risk, provide a lightning protection system. □ Minimum qualifications required: LPI-certified installer, designer, and inspector. □ Obtain a UL Master Label for the facility.	
(4) Power Quality: a. A/E shall include in the Basis of Design an evaluation of the potential harmonic risks to the electrical distribution system	(4) Power Quality: □ Size fuel tanks to provide 48 hours of continuous operation at generator full load.

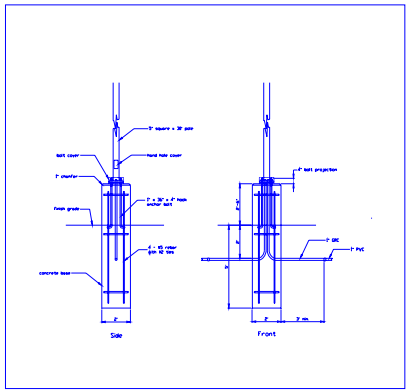
and the approach to mitigate the risks to transformers, neutral conductors, and other equipment. b. Design TVSS for the main service of each facility with services greater than 200 A. Include a second level of TVSS for panelboards serving primarily computer or other electronic equipment. c. Specify harmonic testing of each transformer (voltage and current THD) after the facility is occupied to determine effectiveness of the Power Quality approach. d. Hazardous Classifications: Coordinate with Fire Marshall hazardous classifications and requirements, including class, division, and group requirements. e. Generator Fuel Tank Size: Size fuel tank to comply with Code requirements and facility needs. Allowance shall be made in the capacity so that there is adequate fuel to comply with these requirements when the tank indicates that it needs to be refilled. Provide a minimum tank capacity for 24 hour continuous operation.	□ Provide skid mounted fuel tanks □ Fuel tanks shall be constructed of steel. □ Generators shall be located 1) within the building envelope on the basement or ground level or 2) a sub-surface areaway adjacent to the building. □ Locate generator exhaust outlet where it is not adjacent to building openings or HVAC intakes. □ Approved generator manufacturers: • Kohler • Caterpiller • Onan
	(5) Codes □ All electrical design shall be in accordance with the latest edition of the following codes: • National Electrical Code • Utah State Fire Marshall's Regulations • Life Safety Code • Utah OSHA Regulations

J. Structured Cabling	J. Structured Cabling
(1) Test all structured cablings systems to demonstrate compliance with TIA/EIA standards for the category of system selected. Include warranty and the test results in the Project Resource Manual.	□ Provide dedicated main communication room (BDF). Access to BDF shall be directly to the corridor not passing through communications rooms, mechanical rooms, office spaces, etc. □ Provide dedicated communication rooms throughout building (IDF). Access to IDF's shall be directly to the corridor not passing through electrical rooms, mechanical rooms, office spaces, etc. □ Locate BDF and IDF's so that they stack vertically. □ Where available, power outlets located in communications rooms shall be connected to the back-up generator.
K. Fire Alarm	
(1) □ Provide addressable fire alarm systems. □ Install class "A" looped systems or as approved by Fire Marshal.	(1) □ Concealed raceway, boxes and conduits that are part of fire alarm systems shall be red in color. Where raceway is exposed, paint to match adjacent wall or ceiling and label raceway every 20' with red "FIRE ALARM" label. Label to be the following or similar by approval: Seton (www.seton.com), 3" x 1 ½" red vinyl, 5/8" white Helvetica bold text on 2 lines (See Detail K.1.1). □ Door holders to be Firelite FM Series □ Provide Notifier FDU-80 Annunciators □ Provide battery backup capacity for 48 hr x 15 minute alarm test. □ Include battery capacity calculations on review & construction drawings. □ Fire Alarm Central Panel (FACP) alarm reporting shall be via dry telephone pairs (no dial tone) to the USU Master Fire Alarm Panel (FAMP). Do not provide fire alarm dialers. Run ¾" EMT and 2 conductor cable from fire panel (FACP) to building main telephone distribution closet (BDF).

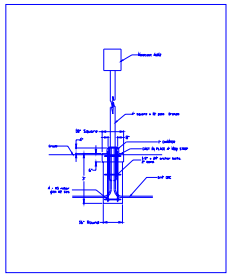
	Coordinate final connection to BDF and FAMP with USU. □ Provide NFPA 72 Style D initiating circuits, Style Z notification circuits and Style 6 or 7 signaling line circuits (State Fire Marshal Requirement 3.3.3.3.1) □ The fan shut down relay(s) in the air handling equipment shall be normally energized, and connected through and controlled by a normally closed contact in the fire alarm panel, or a normally closed contact of a remote relay under supervision by the main panel. The relays will transfer on alarm, and shall not restore until the panel is reset (State Fire Marshal Requirement 3.3.3.4.1) □ Provide readily visible remote indicating lights for concealed duct detectors (NFPA 72). □ Provide digital and printed record drawings which shows: location of all devices, relays, damper control modules, fan shutdown relays; conduit routing; device connection order; device address, etc. □ Provide digital and printed copies of panel programming information. □ Provide manual pull stations at each ground level exit □ Approved fire alarm system vendors: • Notifier
(2) Do not use the following components, unless approved by the Director. Other Fire Alarm Components: □ Zoned Fire Alarm panels □ ionization smoke detectors.	
L. Misc. Systems	L. Miscellaneous Systems
(1) Determine requirements for other systems such as security, cctv,	

etc.	
	(2) Security □ Provide addressable security systems. □ Security Alarm Panel (SAP) reporting shall be via dry telephone pairs (no dial tone) to the USU Master Fire Alarm Panel (FAMP). Do not provide alarm dialers. Run ¾" EMT and 2 conductor cable from security panel (SAP) to building main telephone distribution closet (BDF). Coordinate final connection to BDF and SAP with USU. □ Provide short isolation modules at the beginning of each branch of a "star" configured wiring layout. □ Approved security system vendors: • Ademco Vista
	(3) CCTV
	(4) Access Control □ Provide Access Control Systems by TAC □
	(5) Clocks □ Provide battery powered clocks □ Clocks to be radio transmitter synchronized. □ Approved Vendors:

	• Primex
	M. Other
	(2)



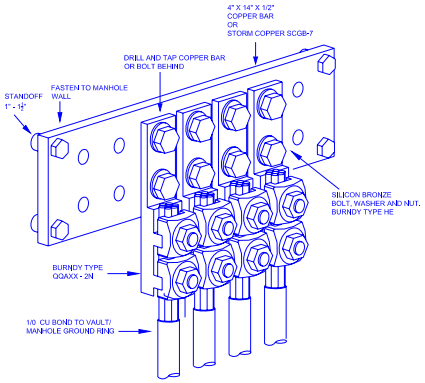
30' Fixture Detail



10' Fixture Detail

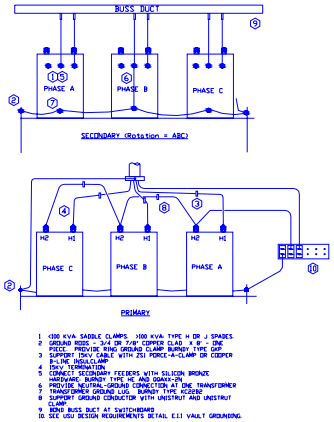
Detail B.6.1 - Light Pole Base

Detail B-6-1 Lighting Pole Base.dwg



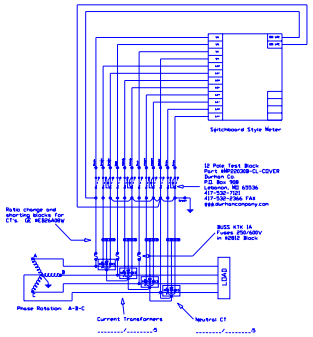
Detail E.1.1 – Manhole/Vault Grounding

Detail E-1-1 Manhole-Vault Grounding.dwg



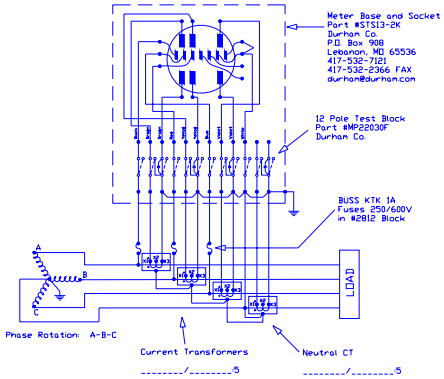
Detail F.3.1 – Vault Transformer Connection

Detail F-3-1 Vault Transformer Connection.dwg



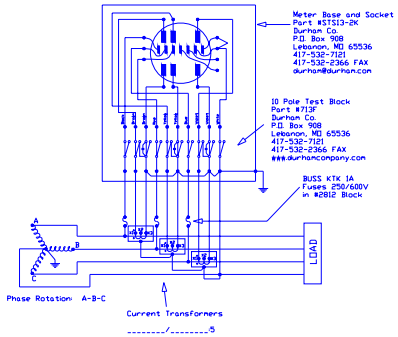
Detail H.4.1 – MDP Metering

Detail H-4-1 MDP Metering.dwg



Detail H.4.2 – Socket Meter (neutral CT)

Detail H-4-2 Socket Meter with Neutral CT.dwg



Detail H.4.3 – Socket Meter (no neutral CT)

Detail H-4-3 Socket Meter without Neutral CT.dwg

Detail K.1.1 – Fire Alarm Exposed Conduit Label

Detail K.1.1 Fire
Alarm Exposed Condu

REVISION LOG

3/10/08: Eliminate Generac
1/22/08: Change Notifire LCD-80 to FDU-80
1/07/08: indicated fixed motor operators on 15KV switches rather than the option for fixed motor operators.
12/7/07: Fixed phase reversal error in meter details
11/19/07: Clarified single phase direct read and three phase transformer rated meters
10/16/07: VFD cabinet clarification: NEMA 12 only on 25HP and below
7/9/07: Inserted details in Word 2007 compatible way
6/11/07: Vault Transformer Connection Detail
6/5/07: Clarify 15KV switch height.
4/24/07: Site Lighting fixture bidding details
4/17/07: Provide Notifier LCD-80 Annunciators
4/9/07: Added Pre-Fab man hole grounding bar
3/19/07: Updated metering test block part numbers
3/9/07: Fire Alarm raceway labels
3/8/07: Motor operators – fixed and/or portable.
3/5/07: Temporary/construction metering
3/5/07: Exposed Fire Alarm raceway labeling requirements
2/23/07: Medium Voltage Equipment Labeling
2/23/07: Elbow termination drain
2/21/07: Provide fiberglass manhole ladders
2/21/07: Fire Alarm system record drawing information.
2/21/07: Socket Meter additional feature descriptions.
2/21/07: Add Onan as approved generator provider.
2/9/07: VFD enclosure details.
1/23/07: Added Manhole Grounding Detail.
1/23/07: Added transformer secondary connection hardware info.
1/22/07: Added CT Test Record Requirements.

FORTHCOMING:

- Manhole/building MV duct penetration detail.
- Transformer and switch grounding details

- Transformer and switch well detail
- manhole details (embedded racking, duct penetration, etc)
- MV cable racking detail
- Insert EOS Fault indicator termination detail or installation text
- ABC clockwise rotation. Adjust secondary conductors as needed.
- Outage requests. 10 day notice. See old sections 1350
- Communications Section
- Provide breakers. Fuses limited to motor starters
- transformer secondary connections to be Burndy type _____

Appendix E

The Technical Requirements are located on the following pages.

Technical Requirements

Bingham Entrepreneurship and Energy Research Center

Uintah Basin Campus - Utah State University

DFCM No.08273770
October 16, 2008

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SECTION 011000 - SUMMARY

1.1 SUMMARY

A. Work Covered by the Contract Documents:

1. Project Identification: Bingham Entrepreneurship and Energy Center, Utah State University. DFCM Project No.: 08273770.

a. Project Location: Utah State University Uintah Basin Campus - Vernal, Utah.

2. Owner: State of Utah, Division of Facilities Construction and Management (DFCM).
3. DFCM Project Coordinator: Vic Middleton.
4. The Work consists of a new 2-story teaching/research building, and associated sitework.

B. Contract: Single Design/Build contract.

C. Use of Site: Limited to areas indicated.

D. Use of Existing Buildings:

1. Entry of existing adjacent buildings not affected by this work is not allowed.

E. Owner's Occupancy Requirements: Partial.

1. Owner occupancy of completed areas of construction.

F. Additional Requirements:

1. Comply with additional requirements, including requirements contained in the RFP, DFCM's "Design Manual" (current edition), USU's "Design Criteria" (current edition), and program, that may not be included in these Technical Requirements. In case of conflicts, the Design-Builder shall obtain written clarification from the Owner prior to submitting the GMP. Where discrepancies or multiple interpretations occur, the most stringent (which is generally recognized as the most costly) shall be enforced

G. Special Requirements:

1. The design/build team will be responsible for complete certification of the Project through the Leadership in Energy and Environmental Design (LEED®) rating system of the U.S. Green Building Council (USGBC). Refer to Division 01 Section "Sustainable Design Requirements (LEED®).

END OF SECTION 011000

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

1.1 SUMMARY

A. Minor Changes in the Work: AIA Document G710, “Architect’s Supplemental Instructions”.

B. Proposal Requests: Owner's form.

C. Change Orders: Owner's form.

D. Construction Change Directives: Owner's form.

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

1.1 SUMMARY

A. Schedule of Values:

1. Format: Line items based on Project Manual table of contents, coordinated with Design/Builder's Construction Schedule. Owner’s form.

B. Applications for Payment:

1. Payment Application Times: Indicated in the Agreement.
2. Payment Application Forms: Owner's form.
3. Special requirements for Initial Application for Payment, Application for Payment at Substantial Completion, and Final Payment Application.

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

1.1 COORDINATION DRAWINGS

A. Prepare coordination drawings where space is limited or if required to integrate products.

1.2 REQUESTS FOR INFORMATION (RFIs)

A. RFI Forms: Owner's form.

B. RFI Log: Maintain a tabular log of RFIs.

1.3 PROJECT MEETINGS

A. Schedule and conduct meetings.

B. Preconstruction conference.

C. Preinstallation Conferences: Before each construction activity that requires coordination with other construction.

D. Progress Meetings: At weekly intervals, coordinated with preparation of payment requests.

E. Coordination Meetings: As required, in addition to specific meetings held for other purposes.

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

1.1 SUMMARY

A. Design/Builder's Construction Schedule.

B. Daily construction reports.

C. Material location reports.

D. Field condition reports.

E. Special reports.

1.2 QUALITY ASSURANCE

A. Scheduling Specialist: Experienced in CPM scheduling and reporting.

1.3 DESIGN/BUILDER'S CONSTRUCTION SCHEDULE

A. Comply with Owner's requirements.

B. Schedule Type: CPM.

C. Submit updated schedule with each application for payment.

1.4 REPORTS

A. Daily Construction Reports: Submit at monthly intervals.

B. Material Location Reports: At monthly intervals, a comprehensive list of materials delivered to and stored at Project site.

C. Field Condition Reports: On discovery of a difference between field conditions and the Contract Documents, submitted with a request for information.

D. Special Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

1.1 SUMMARY

A. Preconstruction and periodic construction photographs.

1.2 PRODUCTS

A. Photographic Media: Digital images, in uncompressed TIFF format.

B. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties and buildings, including existing items to remain during construction, from different vantage points.

C. Periodic Construction Photographs: Take minimum 20 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.

D. Video Recordings: Submit in digital video disc format acceptable to Owner.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

1.1 SUMMARY

A. Action Submittals: Information that requires Architect's responsive action.

B. Informational Submittals: Information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.2 PROCEDURES

A. Action Submittals:

1. Action Submittals:

a. Product Data.
b. Shop Drawings.
c. Samples.
d. Product schedule or list.
e. Construction Schedule.
f. Submittals Schedule.
g. Application for Payment.
h. Schedule of Values.
i. Subcontract list.

B. Informational Submittals:

1. Informational Submittals:

a. Coordination Drawings.
b. Construction Schedule.
c. Qualification data.
d. Welding certificates.
e. Installer certificates.
f. Manufacturer certificates.
g. Product certificates.
h. Material certificates.
i. Material test reports.
j. Product test reports.
k. Research/evaluation reports.
l. Schedule of tests and inspections.
m. Preconstruction test reports.
n. Compatibility test reports.
o. Field test reports.
p. Maintenance data.
q. Design data.

r. Manufacturer's instructions.
s. Manufacturer's field reports.
t. Insurance certificates and bonds.
u. Construction photographs.
v. Material Safety Data Sheets.

C. Delegated-design submittals.

D. Contractor’s Review:

1. Submittals: Marked with Contractor’s approval stamp before submitting to Architect.

E. Architect's Action:

1. Action Submittals: Stamped with an action stamp and returned.
2. Informational Submittals: Reviewed but not returned, or rejected if it does not comply with requirements.
3. Submittals Not Required: May not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

1.1 SUMMARY

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements.

1.2 QUALITY ASSURANCE

A. Qualifications:

1. Installer.
2. Manufacturer.
3. Fabricator.
4. Professional engineer.
5. Specialists.
6. Testing agency.
7. Factory-authorized service representative.

B. Preconstruction testing.

C. Mockups: For each form of construction and finish required, using materials indicated for the completed Work. Mockups establish the standard by which the Work will be judged.

1. Disposition: May become part of the Work.

1.3 QUALITY CONTROL

A. Owner Responsibilities: Owner will engage a qualified testing agency to perform quality-control services indicated as Owner's responsibility.

B. Tests and inspections not explicitly indicated as Owner’s responsibility are the Design/Builder’s responsibility.

1. Where services are the Design/Builder's responsibility, engage a qualified testing agency to perform these quality-control services.

C. Manufacturer's field services.

D. Associated Services: Access to the Work, taking and storing samples, and delivery of samples to testing agency.

E. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

F. Test and inspection log.

G. Repair and Protection: Design/Builder's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

1.1 SUMMARY

A. Temporary Facilities:

1. Common-Use Field Office: Prefabricated or mobile units, including meeting room.
2. Storage and fabrication sheds.

B. Temporary Utilities:

1. Sewers and drainage.
2. Electric Power Service: Pay electric power service use charges, for electricity used by all entities engaged in construction activities at Project site.
3. Water Service: Pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site.
4. Sewer and Storm Sewer Service: Pay sewer and storm sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.
5. Sanitary Facilities: Toilets, wash facilities, and drinking water.
6. Heating and cooling facilities.
7. Ventilation and humidity control.
8. Lighting, including exterior-yard site lighting.
9. Telephone Service: At each field office and superintendent's cell phone.
10. Electronic communication service including electronic mail and fax.

C. Support Facilities:

1. Temporary Roads and Paved Areas: Located within construction limits.
2. Traffic controls.
3. Parking: Design/Builder provided. Coordinate with Owner.
4. Dewatering facilities and drains.
5. Project identification and temporary signs.
6. Waste disposal facilities, including a waste management plan for recycling waste materials.
7. Lifts and hoists.
8. Temporary use of permanent stairs.

D. Security and Protection Facilities:

1. Environmental protection.
2. Temporary erosion and sedimentation control.
3. Stormwater control.
4. Tree and plant protection.
5. Site Enclosure Fence: Chain link.
6. Security enclosure and lockup.
7. Barricades, warning signs, and lights.

8. Temporary enclosures.
9. Temporary Partitions: Dustproof, gypsum wallboard over one side of studs.
10. Temporary Fire Protection: Fire extinguishers and temporary standpipes and hoses.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

1.1 SUMMARY

A. Product delivery, storage, and handling.

B. Requirements for products used on Project.

C. Construction guarantees and warranties.

D. Product substitutions.

1.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft.

B. Storage: Secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces.

1.3 PRODUCT REQUIREMENTS

A. Product Requirements: Comply with Owner’s requirements and design criteria.

1.4 CONSTRUCTION GUARANTEES AND WARRANTIES

A. Guarantees and Warranties: Comply with Owner’s requirements and design criteria.

1.5 PRODUCT SUBSTITUTIONS

A. Conditions:

1. Offers Owner a substantial advantage in cost, time, energy conservation after deducting additional responsibilities Owner must assume.
2. Does not require extensive revisions to the Contract Documents.
3. Consistent with the Contract Documents and will produce indicated results.
4. Fully documented and properly submitted.
5. Will not adversely affect Design/Builder's Construction Schedule.
6. Has received necessary approvals of authorities having jurisdiction.
7. Compatible with other portions of the Work.
8. Provides specified warranty.

END OF SECTION 016000

SECTION 017300 - EXECUTION

1.1 SUMMARY

A. Construction layout.

B. General installation of products.

C. Coordination of Owner-installed products.

D. Progress cleaning.

E. Starting and adjusting.

F. Protection of installed construction.

G. Correction of the Work.

1.2 EXECUTION

A. Existing Conditions: Investigate and verify existence and location of site improvements, utilities, and other construction affecting the Work.

B. Construction Layout: Work laid out by land surveyor registered in Utah, using accepted surveying practices; record log maintained.

C. Installation: Manufacturer's written instructions for installing products.

D. Owner-Installed Products: Design/Builder coordinates the Work with work performed by Owner's construction forces.

E. Progress Cleaning: Project site and work areas cleaned daily. Burying or burning waste materials on-site not permitted.

1. Landfill receipts for hazardous waste disposal.

F. Starting and Adjusting: Equipment and operating components started, adjusted, and tested to confirm proper operation. Malfunctioning units replaced with new units.

G. Protection of Installed Construction: Maintained until time of Substantial Completion.

H. Correction of the Work: Defective construction repaired or replaced.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

1.1 SUMMARY

A. Cutting and patching required by the following:

1. Installation of other materials.
2. Finishing.
3. Alterations.
4. Tests and inspections.

1.2 QUALITY ASSURANCE

A. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching.

1.3 EXECUTION

A. Temporary support of Work being cut.

B. Existing Utility Services: Services/systems bypassed before cutting to prevent interruption to occupied adjacent buildings.

C. Cutting: Using hand or small power tools.

D. Patching: With seams that are as invisible as possible.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.1 SUMMARY

A. Recycling nonhazardous demolition and construction waste.

B. Disposing of nonhazardous demolition and construction waste.

1.2 PERFORMANCE GOALS

A. Recycle Goals: Recycle rate of 75 percent minimum in accordance with the DFCM High Performance Building Rating System/LEED® NC.

1.3 WASTE MANAGEMENT PLAN

A. Types and quantities of demolition site-clearing and construction waste.

B. Type of waste and whether it will be recycled, or disposed of in landfill or incinerator.

C. Net additional cost or net savings resulting from waste management plan.

1.4 RECYCLING WASTE

A. Recycling Incentives: Revenues and other incentives for recycling will accrue to Design/Builder.

1.5 WASTE DISPOSAL

A. General: Except for items or materials to be recycled, or otherwise reused, remove waste materials from Project site.

1. Burning: Do not burn waste materials.
2. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

1.1 SUMMARY

A. Inspection procedures.

B. Warranties.

C. Final cleaning.

1.2 PROCEDURES

A. Substantial Completion: Before inspection:

1. Comply with Owner's requirements for Substantial Completion.

   a. Substantial Completion Form: Owner's form.

2. List of incomplete items (punch list).
3. Owner advised of insurance changeover.
4. Warranties submitted.
5. Releases, occupancy permits, and operating certificates obtained.
6. Project Record Documents submitted.
7. Spare parts and extra materials delivered.
8. Final changeover of locks performed.
9. Startup testing completed.
10. Test/adjust/balance records submitted.
11. Temporary facilities removed.
12. Owner advised of utility changeover.
13. Final cleaning performed.
14. Touchup performed.

B. Final Completion: Before final inspection:

1. Comply with Owner's requirements for Final Completion.
2. Final Application for Payment submitted.
3. List of incomplete items (punch list) endorsed by Architect as completed.
4. Evidence of continuing insurance coverage, if any, submitted.
5. Owner's personnel instructed in operation, adjustment, and maintenance of equipment and systems, including demonstration and training videotapes submitted.

C. Warranties:

1. Organized and bound in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, with paper dividers.

D. Final Cleaning: Each surface or unit cleaned to condition expected in an average commercial building cleaning and maintenance program.

1. Clean ducts, blowers, and coils for units operated without filters during construction.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

1.1 SUMMARY

A. Emergency, operation, and maintenance manuals.

1.2 PRODUCTS

A. Manuals: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, minimum four copies.

B. Emergency Manuals: Types of emergencies, emergency instructions, and emergency procedures.

C. Operation Manuals: System and equipment descriptions, operating procedures, wiring diagrams, control diagrams and sequence of operation, and piped system diagrams.

D. Product Maintenance Manuals: Source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds.

E. System and Equipment Maintenance Manuals: Source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

1.1 SUMMARY

A. Record Documents: Comply with Owner's requirements.

B. Record modifications including addenda, change orders, and other modifications.

1.2 SUBMITTALS

A. Record Documents: One set submitted to Owner at completion of project.

1.3 PRODUCTS

A. Record Documents: Marked weekly to record changes and selections make during construction.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

1.1 SUMMARY

A. Demonstration and training in operation and maintenance of operation of systems and equipment.

B. Demonstration and training videotapes.

1.2 INSTRUCTION PROGRAM

A. Program Structure: Training modules for each system and equipment not part of a system, including the following:

1. Basis of system design, operational requirements, and criteria.
2. Documentation.
3. Emergencies.
4. Operations.
5. Adjustments.
6. Troubleshooting.
7. Maintenance.
8. Repairs.

B. Facilitator to prepare instruction program and training modules.

END OF SECTION 017900

SECTION 018112 - SUSTAINABLE DESIGN REQUIREMENTS (HIGH-PERFORMANCE BUILDING RATING SYSTEM)

1.1 SUMMARY

A. Comply with requirements of DFCM High-Performance Building Rating System (HPBRS).

B. Refer to Division 01 Section “Sustainable Design Requirements (LEED®) for LEED® registration and certification requirements.

1.2 SUBMITTALS

A. Action Plans:

1. Waste management.
2. Mold prevention during construction.
3. Construction indoor-air-quality management.
4. List of materials with recycled content.
5. List of low emitting materials.

B. Progress Reports: With each Application for Payment, comparing construction and purchasing with action plans.

C. Documentation Submittals: Product data, receipts, certification letters, chain-of-custody certificates, and other documentation needed to show compliance with requirements.

1.3 WASTE MANAGEMENT

A. Ensure that construction waste, demolition, and land clearing waste are recycled, composed, and salvaged.

1.4 MOLD PREVENTION DURING CONSTRUCTION

A. Ensure porous type building materials, such as wood, insulation, paper, and fabric is kept dry to prevent the growth of mold and bacteria.

1.5 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

A. Management Plan: Ensure that VOC, dust, oils, and odors have been contained and removed before occupancy.

1. Replace filtration media prior to Owner occupancy.

END OF SECTION 018112

SECTION 018113 - SUSTAINABLE DESIGN REQUIREMENTS (LEED®)

1.1 SUMMARY

A. The Design/Builder will be responsible for a complete LEED® Certification of the Project through the Leadership in Energy and Environmental Design (LEED®) rating system of the U.S. Green Building Council (USGBC), and includes registration, design, construction and post construction phase services, certification, and all registration and certification costs and fees. The Project shall comply with the USGBC LEED® prerequisites and credits needed for Project to obtain a minimum LEED® “Silver” certification based on LEED-NC, Version 2.2, or newer version if available and required by Owner prior to submittal of the GMP.

1. Credit Requirements: A minimum of 3 points is required for Credit EA.1. Remaining credits are to be chosen by the Design/Builder to reach the number of credits required to achieve the indicated certification level. The final list of credits proposed by the Design/Builder is to be approved by the Owner prior to submittal of the GMP.

1.2 QUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED-Accredited Professional.

END OF SECTION 018113

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

1.1 SUMMARY

A. Commissioning Requirements: DFCM High-Performance Building Rating System (HPBRS), and LEED®.

B. Commissioning Team:

1. Members representing Design/Builder, including Project superintendent and subcontractors, installers, suppliers, specialists, and Architect and engineering design professionals.
2. Members representing Owner, including Commissioning Agent, facility user and operation and maintenance personnel.

C. Owner's Responsibilities:

1. Provide Project Requirements and Basis of Design documentation.
2. Assign operation and maintenance personnel and schedule them for commissioning activities.

D. Design/Builder's Responsibilities: Assign personnel and schedule them for commissioning activities.

E. Commissioning Agent's Responsibilities:

1. Organize and lead commissioning team.
2. Provide commissioning plan.
3. Convene commissioning team meetings.
4. Provide Project-specific checklists and test procedures.
5. Verify the execution of commissioning process activities using random sampling.
6. Prepare and maintain Issues Log.
7. Prepare and maintain completed construction checklist log.
8. Witness systems, assemblies, equipment, and component startup.
9. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

END OF SECTION 019113

SECTION 033000 - CAST-IN-PLACE CONCRETE

1.1 SUMMARY

A. Cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Slabs over metal deck.

1.2 QUALITY ASSURANCE

A. Quality Standard: ACI 301.

1.3 MATERIALS

A. Form-facing materials.

1. Smooth-Formed Finished Concrete: Class 1 medium density overlay (MDO) panels, mill-release agent treated and edges sealed.
2. Rough-Formed Finished Concrete: Plywood, metal, or other approved material.

B. Steel Reinforcement:

1. Reinforcing Bars: Deformed, ASTM A615 grade 60 typical, ASTM A706 at concrete shear wall jambs.
2. Welded Wire Reinforcement: Plain.

C. Concrete Materials:

1. Portland Cement: ASTM C 150, Type I/II, gray, supplemented with fly ash, 10% maximum.
2. Silica fume.
3. Aggregate: ASTM C33 Normal weight typical. Expanded shale lightweight at slabs over metal deck.
4. Water.
5. Admixtures: Air entraining; Water reducing; Retarding; Water reducing and retarding, High range, water reducing, High range, water reducing and retarding, Plasticizing and retarding. Admixtures shall comply with ASTM C260 for air entrained concrete.

D. Vapor Retarders: Class A engineered film.

E. Curing Materials: Clear, waterborne, chemical curing compound that does not interfere with bonding of finish floor materials.

F. Floor and Slab Treatments At Exposed Concrete Floors: Penetrating liquid curing, sealing, and hardening floor treatment.

G. Related Materials: Expansion- and isolation-joint-filler strips, reglets, dovetail anchor slots.

H. Repair Materials: Underlayment and overlayment.

1.4 CONCRETE MIXTURES

A. Minimum compressive Strength (28 Days):

1. Footings: 3000 psi.
2. Foundation Walls: 4000 psi.
3. Slabs-on-Grade: 4000 psi.
4. Suspended Slabs:

a. Normal weight concrete over metal deck: 3000 psi (20.7 MPa).

B. Mixing: Ready mixed.

1.5 INSTALLATION

A. Formed-Surface Finish: Rough-formed at unexposed surfaces. Smooth-formed at exposed surfaces.

B. Floor and Slab Finishes:

1. Scratch: Surfaces to receive concrete floor topping and mortar setting beds for bonded cementitious floor finishes.
2. Float: Surfaces to receive trowel finish, and surfaces to be covered with fluid-applied or sheet waterproofing, and built-up or membrane roofing.
3. Trowel: Surfaces exposed to view, and surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, and thin film-finish coating systems.
4. Trowel and Fine Broom: Surfaces to be covered with ceramic or quarry tile installed by thickset method.
5. Medium Broom: Exterior concrete platforms, steps, and ramps.

1.6 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

B. Inspections: By Owner-engaged special inspector.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

1.1 SUMMARY

A. Masonry Construction:

1. Single-wythe masonry.
2. Cavity walls.

a. Brick anchored to concrete masonry units.
b. Brick anchored to cold-formed metal framing and sheathing

1.2 PERFORMANCE REQUIREMENTS

A. Net-Area Compressive Strengths (f'_m) of Structural Unit Masonry: 1500 or 2000 psi.

B. Determine net-area compressive strength (f'_m) of masonry by unit-strength method.

1.3 QUALITY ASSURANCE

A. Mockups of typical wall areas.

1.4 MATERIALS

A. Concrete Masonry Units (CMUs):

1. Concrete Masonry Units: Lightweight Grade N, Type 1, minimum unit strength of 1900 psi or better for f'_m = 1500 psi, or 2800 psi or better for f'_m = 2000 psi.

B. Brick: Face brick ASTM C 216, SW, FBX.

1. Color and Texture: Face brick of equivalent color, color range, and texture of face brick on existing adjacent buildings, as approved by Owner.

a. Existing Adjacent Buildings: Ironstone; Interstate Brick.

2. Size: 3-5/8 inches wide by 3-5/8 inches high by 15-5/8 inches long.

C. Reinforcing Steel: ASTM A615 grade 60, uncoated steel bars.

D. Masonry Joint Reinforcement:

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.

E. Ties and Anchors: Galvanized steel.

1. Ladder type joint reinforcing.
2. Adjustable Masonry-Veneer Anchors: Screw attached slip-in and seismic with continuous single wire joint reinforcement of minimum wire size W1.7.

F. Embedded Flashing:

1. Concealed (Flexible) Flashing: Copper laminated, 5 oz/sq. ft minimum.

a. Used with stainless-steel drip edges and flashing terminations.

G. Weep/Vents: Cellular plastic.

H. Cavity drainage material.

I. Reinforcing bar positioners.

J. Masonry-Cell Insulation: Loose-granular perlite.

K. Cavity-Wall Insulation: Extruded-polystyrene board.

L. Mortar:

1. Color: Natural color.

1.5 INSTALLATION

A. Bond Pattern: Running bond.

1.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner engaged.

END OF SECTION 042000

SECTION 047313 - CALCIUM SILICATE MANUFACTURED STONE MASONRY

1.1 SUMMARY

A. Manufactured Stone Masonry Units.

B. Cavity walls:

1. Anchored to unit masonry.
2. Anchored to cold-formed metal framing and sheathing.

1.2 QUALITY ASSURANCE

A. Mockups of typical wall areas.

1.3 MATERIALS

A. Stone:

1. Type: Through-color calcium silicate building stone, pressure formed and containing no portland cement.
2. Color and Texture: Stone of equivalent color, color range, texture, pattern, and face size of stone on existing adjacent buildings, as approved by Owner. Note: stone type on adjacent buildings is not a calcium silicate manufactured stone, and is not allowed on this project.
3. Thickness for Anchored Stone Masonry: 3-5/8 inches.
4. Compressive Strength: Minimum 6,800 psi, when tested to ASTM C170.
5. Absorption: Maximum 10.5 percent, when tested to ASTM C97.
6. Density: Minimum 120 lbs/cu. ft., when tested to ASTM C97.
7. Modulus of Rupture: Minimum 750 psi, when tested to ASTM C99.

B. Veneer Anchors: Hot-dip galvanized steel.

C. Embedded Flashing:

1. Concealed Flashing: Copper laminated.

a. Used with stainless-steel flashing terminations/drip edges.

D. Weep/Vents: Cellular plastic.

E. Cavity drainage material.

F. Cavity-Wall Insulation: Extruded-polystyrene board.

G. Mortar:

1. Mortar for Anchored Stone Masonry: Natural color.

1.4 INSTALLATION

1. Pattern and Joints: Pattern and joints equivalent to existing adjacent buildings, as approved by Owner.

B. Anchored Stone Masonry:

1. Anchors: Adjustable seismic veneer anchors.
2. Space Between Anchored Stone Masonry and Backup Construction: Air space with cavity-wall insulation.

END OF SECTION 044713

SECTION 051200 - STRUCTURAL STEEL FRAMING

1.1 SUMMARY

A. Structural-steel framing.

1.2 QUALITY ASSURANCE

A. Fabricator Qualifications: State of Utah (DFCM) Approved Structural Steel Fabricator/Manufacturer.

B. Quality Standard: AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design and Load and Resistance Factor Design Specification for Structural Steel Buildings."

1.3 MATERIALS

A. Structural-Steel Shapes:

1. W-shapes: ASTM A992, Fy = 50 ksi.
2. Channels, angles, M-shapes, S-shapes, plate and bar: ASTM A36, Fy = 36 ksi.
3. Cold-formed hollow structural sections: ASTM A500, Grade B.
4. Steel pipe: ASTM A53 Grade B.

B. Bolts, Nuts, and Washers: ASTM A325..

C. Anchor Rods: ASTM F1554, Grade 36 with ASTM A563 heavy hex nuts and ASTM F436 hardened washers .

D. Connectors: Headed Stud Anchors, ASTM A108, with dimensions complying with AISC specifications.

E. Primer: Fabricator's standard, nonasphaltic.

F. Grout: Nonmetallic, shrinkage resistant.

1.4 FABRICATION

A. Shop Connections: Pretensioned high-strength bolts at seismic critical connections, snug-tightened high-strength bolts at all other connections and welded connections.

B. Surface Preparation: SSPC-SP 3.

C. Galvanizing: Hot dip.

1.5 INSTALLATION

A. Field Connections: Pretensioned high-strength bolts at seismic critical connections, snug-tightened high-strength bolts at all other connections and welded connections.

1.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner engaged.

END OF SECTION 051200

SECTION 052100 - STEEL JOIST FRAMING

1.1 SUMMARY

A. Open-web K-series steel joists for roof framing.

B. KCS-type, open-web K-series steel joists for roof framing.

C. K-series steel joist substitutes for roof framing.

D. LH-series long-span steel joists for roof framing.

E. Special joists for roof framing, designed by manufacturer.

F. Joist accessories, including permanent bridging.

1.2 MATERIALS

A. Bolts: High-strength carbon steel.

1. Finish: Plain, uncoated.

B. Primer: SSPC-Paint 15.

C. Open-Web K-Series Steel Joists: With top-chord extensions or extended ends as needed.

1.3 INSTALLATION

A. Connections: Welded or Bolted.

1.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage testing agency to inspect field welds and bolted connections.

END OF SECTION 052100

SECTION 053100 - STEEL DECKING

1.1 SUMMARY

A. Roof deck.

B. Composite floor deck.

1.2 QUALITY ASSURANCE

A. Steel floor and roof deck shall comply with the latest requirements of the Steel Deck Institute (SDI).

B. FMG Listing: Steel roof deck.

1.3 MATERIALS

A. Roof Deck: Galvanized steel sheet. Use double coated white primer at areas with exposed structure.

1. Profile Depth: 1-1/2 inches.

B. Composite Floor Deck: Galvanized steel sheet.

1. Profile Depth: 3 inches.

C. Accessories: Flexible closure strips, pour stops, girder fillers, column closures, end closures, Z-closures, and cover plates, recessed sump pans, and flat sump plates.

1.4 INSTALLATION

A. Roof Deck: Welded.

B. Floor Deck: Welded.

1.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner engaged.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

1.1 SUMMARY

A. Exterior non-load-bearing wall framing.

1.2 QUALITY ASSURANCE

A. Design Standard: AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1.3 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, metallic coated.

B. Exterior Non-Load-Bearing Wall Framing: Standard C-shaped, punched steel studs and U-shaped, unpunched track.

1. Minimum Steel Thickness: 0.0538 inch.
2. Connection to structure shall accommodate vertical deflection with vertical deflection clips.

C. Masonry Veneer Support: Studs used at brick veneer wall systems to have maximum out of plane deflection of L/600.

D. Framing Accessories: Supplementary framing, bracing, bridging, solid blocking, web stiffeners, stud kickers and girts.

E. Insulation for inaccessible voids.

1.4 INSTALLATION

A. Fasten framing by welding or screw fastening.

1. Exterior Non-Load-Bearing Wall Stud Spacing: 16 inches.

1.5 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

1.1 SUMMARY

A. Miscellaneous metal framing and supports.

B. Loose metal plates and shapes.

C. Anchor bolts.

D. Miscellaneous fabricated metal items.

1.2 PRODUCTS

A. Materials: Steel plates, shapes, and bars. Steel tubing and pipe.

B. Exterior Locations: Galvanize metal fabrications at exterior locations.

C. Miscellaneous Framing and Supports:

1. Steel framing and supports for items including; operable partitions, overhead doors, countertops, mechanical and electrical equipment, applications where framing and supports are not specified in other Sections.
2. Elevator supports including hoist beams.

D. Loose steel lintels.

E. Shelf angles.

F. Loose bearing and leveling plates.

G. Steel weld plates and angles not specified in other Sections, for casting into concrete.

H. Structural-Steel Door Frames:

1. Galvanize exterior locations.
2. Prime interior locations with zinc-rich primer.

I. Miscellaneous Steel Trim: Loading-dock edge angles.

J. Metal Ladders Including Elevator Pit Ladders: Steel.

1. Galvanize exterior interior locations.
2. Prime interior locations with zinc-rich primer.

K. Metal Bollards: Schedule 40 galvanized steel pipe.

L. Pipe guards.

M. Metal Floor Plate and Supports: Steel.

END OF SECTION 055000

SECTION 055100 - METAL STAIRS

1.1 SUMMARY

A. Preassembled steel stairs with concrete-filled treads.

B. Steel pipe railings attached to metal stairs.

1.2 QUALITY ASSURANCE

A. Stair Standard: NAAMM AMP 510.

1. Preassembled Stairs: Commercial class.

1.3 MATERIALS

A. Metals:

1. Steel plates, shapes, and bars.
2. Steel pipe.

END OF SECTION 055100

SECTION 055213 - PIPE AND TUBE RAILINGS

1.1 SUMMARY

A. Aluminum pipe railings (exterior locations).

B. Steel pipe railings (interior locations).

1.2 FABRICATION

A. Connections: Welded.

1.3 FINISHES

A. Aluminum (exterior): Powder-coat finish.

B. Steel (interior): Ungalvanized, primed with universal shop primer. Field painted.

END OF SECTION 055213

SECTION 055300 - METAL GRATINGS

1.1 SUMMARY

A. Metal bar gratings.

1.2 QUALITY ASSURANCE

A. Contractor to engineer gratings to withstand design loads.

1.3 MATERIALS

A. Heavy-Duty Steel Bar Gratings: Welded, rectangular bars.

1. Traffic Surface: Plain.
2. Finish: Galvanized.

B. Grating Frames and Supports:

1. Metal Gratings: Same metal as grating.

END OF SECTION 055300

SECTION 057500 - DECORATIVE FORMED METAL

1.1 SUMMARY

A. Ornamental Formed-Metal Items Include:

1. Closures and trim.
2. Filler panels between dissimilar construction.

1.2 MATERIALS

A. Closures and Trim: Steel sheet interior, metallic-coated steel sheet exterior.

B. Filler Panels: Steel sheet interior, metallic-coated steel sheet exterior.

1.3 FINISHES

A. Steel Sheet: Baked enamel finish.

B. Metallic-Coated Steel Sheet: High-performance organic finish.

END OF SECTION 057500

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

1.1 SUMMARY

A. Wood blocking and nailers.

B. Plywood backing panels.

1.2 MATERIALS

A. Fire-Retardant-Treated Materials:

1. Interior Type A, unless otherwise indicated.
2. Application: Items include:

a. Rooftop equipment bases and support curbs.
b. Blocking and nailers.
c. Plywood backing panels.

B. Dimension Lumber Framing:

1. Maximum Moisture Content: 19 percent.
2. Blocking and Nailers: Construction or No. 2 grade lumber complying with WWPA or WCLIB for western woods.

C. Plywood backing panels for telephone and electrical equipment.

END OF SECTION 061053

SECTION 061600 - SHEATHING

1.1 SUMMARY

A. Wall sheathing.

B. Building wrap.

1.2 MATERIALS

A. Wall Sheathing:

1. Paper-Surfaced Gypsum: Type X, 5/8 inch thick.

B. Miscellaneous Materials:

1. Fasteners.
2. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
3. Building Wrap Tape.

1.3 INSTALLATION

A. Gypsum Sheathing:

1. Screw to cold-formed metal framing.

B. Building Wrap: Comply with manufacturer's written instructions.

END OF SECTION 061600

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

1.1 SUMMARY

A. Interior standing and running trim.

B. Plastic-laminate cabinets.

C. Plastic-laminate countertops.

D. Flush wood paneling.

E. Utility shelving.

1.2 QUALITY ASSURANCE

A. Quality Standard: AWI.

1.3 MATERIALS

A. Composite Wood Products: Made without urea formaldehyde.

B. Interior Standing and Running Trim:

1. Grade: Custom.
2. Wood Species and Cut: Red oak, plain sawn, or equivalent as approved by Owner.

C. Cabinet Hardware:

1. Hinges: Frameless, concealed.
2. Pulls: Wire.
3. Locks: Door and drawer where required.

D. Plastic-Laminate Cabinets:

1. Grade: Custom.
2. AWI Type of Cabinet Construction: Flush overlay.
3. Cabinet Interior: Thermoset decorative panels.

E. Plastic-Laminate Countertops:

1. Grade: Custom.
2. Edge Treatment: Plastic laminate.

F. Flush Hardwood Veneer Paneling:

1. Grade: Custom.
2. Wood Species and Cut: Red oak, rift cut, or equivalent as approved by Owner.
3. Veneer Matching: Slip match veneer leaves and balance match within panel face, or equivalent as approved by Owner.

G. Utility Shelving: Custom grade. Thermoset decorative panels.

END OF SECTION 064023

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

1.1 SUMMARY

A. Modified Bituminous Waterproofing Membrane Applications.

1.2 WARRANTY

A. Watertightness: Five years.

B. Installer's Warranty: Five years.

1.3 MATERIALS

A. Modified Bituminous Sheet: Minimum 60 mils thick, self-adhering.

B. Protection Course: Unfaced, extruded-polystyrene board insulation.

1.4 INSTALLATION

A. Modified Bituminous Sheet: One-ply application.

B. Installation: Install watertight with overlapping seams.

C. Repair and Protection: Protect membrane and repair any damage. Protect membrane from damage prior to and during backfilling, coverup, etc.

END OF SECTION 071326

SECTION 071700 - BENTONITE WATERPROOFING

1.1 QUALITY ASSURANCE

A. Mockups of bentonite waterproofing.

1.2 WARRANTY

A. Materials and Workmanship: Five years.

B. Installer's Warranty: Two years.

1.3 MATERIALS

A. Geotextile/Bentonite Waterproofing: Bentonite granules between two layers of fabric.

B. Installation Accessories: Granular bentonite, bentonite mastic, granular bentonite tubes, termination bar, cement grout patching material, sealants.

END OF SECTION 071700

SECTION 072100 - THERMAL INSULATION

1.1 SUMMARY

A. Applications:

1. Perimeter insulation under slabs-on-grade.
2. Perimeter wall insulation (supporting backfill).
3. Concealed building insulation.
4. Vapor retarders.

1.2 MATERIALS

A. Insulation:

1. Extruded-Polystyrene Board: Type IV, 1.60 lb/cu. ft..
2. Unfaced Glass-Fiber Blanket: Type I.

B. Vapor Retarders: Fire-retardant reinforced polyethylene engineered film.

END OF SECTION 072100

SECTION 072416 - DIRECT-APPLIED EXTERIOR FINISH SYSTEM (DEFS)

1.1 SUMMARY

A. Direct-Applied Exterior Finish System (DEFS) applied over glass-mat gypsum board (exterior soffits).

1.2 QUALITY ASSURANCE

A. Mockups for each form of construction and finish.

1.3 MATERIALS

A. Glass-Mat Gypsum Board: 5/8 inch thick.

B. Reinforcing Mesh: Standard.

C. Primer: Manufacturer's standard.

D. Base-Coat Materials: Factory-blended polymer-emulsion adhesive and portland cement dry mix to which only water is added.

E. Finish-Coat Materials: Standard acrylic-based coating.

F. Trim Accessories: PVC.

G. Elastomeric Sealants: Multicomponent, nonsag urethane.

1.4 INSTALLATION

A. Finish Coat: Applied over reinforced base coat. Primer if recommended by manufacturer.

END OF SECTION 072416

SECTION 074213 - METAL WALL PANELS

1.1 SUMMARY

A. Factory-formed and field-assembled concealed-fastener, metal wall panels.

1.2 PERFORMANCE REQUIREMENTS

A. Air Infiltration: ASTM E 283.

B. Water Penetration under Static Pressure: ASTM E 331.

C. Water Penetration under Dynamic Pressure: AAMA 501.1.

D. Structural Performance: Metal wall panel assemblies capable of withstanding the effects of project loads and stresses, based on testing according to ASTM E 1592.

1.3 QUALITY ASSURANCE

A. Mockups for each form of construction.

1.4 WARRANTY

A. Materials and Workmanship: Two years.

B. Finishes: 20 years.

1.5 PRODUCTS

A. Concealed-Fastener, Metal Wall Panels:

1. Profile and Color: Equivalent to profile (horizontal curved corrugations), and color (metallic silver) on existing adjacent buildings.

    a. Profile and Color on Adjacent Buildings: S-16, Silversmith; Metecno Morin.

2. Material: Metallic-coated steel sheet.
3. Thickness: 24 gauge minimum.
4. Exterior Finish: 2-coat high-performance organic coating.

B. Accessories: Fasteners, flashing, and trim.

END OF SECTION 074213

SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

1.1 SUMMARY

A. Mechanically fastened membrane roofing system.

B. Roof insulation.

C. Comply with Owner’s Roofing Requirements.

1.2 PERFORMANCE REQUIREMENTS

A. Roofing System Design: Uplift pressures calculated according to ASCE 7.

B. FMG Listing: Class 1A- 90.

C. Cool Roof Performance: ENERGY STAR - low slope**.**

1.3 QUALITY ASSURANCE

A. Exterior Fire-Test Exposure: Class A.

B. Comply with Owner’s requirements for low slope roofing manufactures.

C. Comply with Owner’s list of approved manufacturers and installers.

1.4 WARRANTY

A. Manufacturer's Materials and Workmanship Warranty: 20 years.

1. Warranty form: Owner’s standard.

B. Installer's Warranty: 5 years.

1. Warranty form: Owner’s standard.

1.5 MATERIALS

A. TPO Membrane Roofing: ASTM D 6878-03, internally fabric or scrim reinforced, uniform, flexible TPO sheet.

1. Thickness: 60 mils (57 mils minimum) polymer thickness, not overall thickness, with minimum 20 mils above the reinforcing.
2. Color: White.

B. Sheet Flashing: Same as TPO sheet membrane.

C. Low VOC adhesives and sealants.

D. Roof Insulation: Polyisocyanurate board, minimum R-30.

E. Walkways: Pads as recommended by manufacturer.

1.6 INSTALLATION

A. Roof Insulation: Mechanically fastened.

B. Roofing Membrane: Mechanically fastened.

1. Attachment Method for Mechanically Fastened: In splice.

1.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner engaged.

END OF SECTION 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

1.1 PERFORMANCE REQUIREMENTS

A. Roof Edge Flashing and Copings: Capable of resisting forces according to FMG Loss Prevention Data Sheet 1-49.

1.2 QUALITY ASSURANCE

A. Quality Standard(s): SMACNA's "Architectural Sheet Metal Manual".

1.3 WARRANTY

A. Fluoropolymer Finishes: 20 years.

1.4 MATERIALS

A. Sheet Metals:

1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet with smooth, flat surface.

a. Coil-Coated Finish: Two-coat fluoropolymer. Color to match existing adjacent buildings.
b. Galvanized finish at equipment support curbs.

1.5 PRODUCTS

A. Manufactured Flashing and Trim:

1. Reglets and Counterflashing: Metallic-coated steel sheet with coil coated finish.

a. Types: Surface-mounted, masonry.
b. Accessories: Flexible-flashing retainer, counterflashing wind-restraint clips.

B. Formed Low-Slope Roof Fabrications: Including copings, roof expansion-joint covers, counterflashing, flashing receivers, roof-penetration flashing, and roof-drain flashing.

C. Miscellaneous Formed Fabrications: Including equipment support flashing.

END OF SECTION 076200

SECTION 078413 - PENETRATION FIRESTOPPING

1.1 SUMMARY

A. Through-penetration firestop systems for penetrations through fire-resistance-rated assemblies.

1.2 PERFORMANCE REQUIREMENTS

A. Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:

1. F-Rated Systems: F-ratings equaling or exceeding fire-resistance rating of constructions penetrated.
2. T-Rated Systems: For penetrations located outside wall cavities and outside fire-resistance-rated shaft enclosures.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Tested per ASTM E 814 by UL and listed in the UL “Fire Resistance Directory”.

1.4 MATERIALS

A. Fill Materials: Provide fill materials complying with performance and quality assurance requirements.

B. Accessories: Permanent forming/damming/backing materials, temporary forming materials, substrate primers, collars, and steel sleeves as needed to comply with performance and quality assurance requirements.

1.5 INSTALLATION

A. Identification: Preprinted metal or plastic labels, permanently attached.

1.6 FIELD QUALITY CONTROL

A. Inspection of Installed Firestop Systems: By Owner-engaged agency.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

1.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Joints in or between Fire-Resistance-Rated Construction: ASTM E 1966 or UL 2079.

B. Joints at Exterior Curtain-Wall/Floor Intersections: ASTM E 119 or ASTM E 2307.

1.2 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Tested by UL.

1.3 MATERIALS

A. Materials: Fill materials, forming materials, and other components complying with performance and quality assurance requirements.

1.4 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION 078446

SECTION 079200 - JOINT SEALANTS

1.1 SUMMARY

A. Exterior Joints in Vertical Surfaces and Horizontal Nontraffic Surfaces include:

1. Construction joints in cast-in-place concrete.
2. Control and expansion joints in unit masonry and stone masonry.
3. Perimeter joints around frames of doors, windows, and louvers.
4. Control and expansion joints in ceilings and other overhead surfaces.

B. Exterior Joints in Horizontal Traffic Surfaces include:

1. Isolation and contraction joints in cast-in-place concrete slabs.

C. Interior Joints in Vertical Surfaces and Horizontal Nontraffic Surfaces include:

1. Control and expansion joints on exposed interior surfaces of exterior walls.
2. Perimeter joints of exterior openings.
3. Vertical joints on exposed surfaces of interior unit masonry, concrete, walls, and partitions.
4. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
5. Joints between plumbing fixtures and adjoining walls, floors, and counters.

D. Interior Joints in Horizontal Traffic Surfaces include:

1. Isolation joints in cast-in-place concrete slabs.
2. Control and expansion joints in tile flooring.

1.2 QUALITY ASSURANCE

A. Preconstruction compatibility, adhesion, and stain testing.

B. Product testing.

C. Preconstruction field-adhesion and stain testing.

D. Stain Test: ASTM C 1248.

E. Suitability for Contact with Food: Comply with 21 CFR 177.2600, where applicable.

1.3 WARRANTY

A. Installer: Two years.

B. Manufacturer: Two years.

1.4 MATERIALS

A. Elastomeric Joint Sealants: Liquid applied, chemically curing; ASTM C 920, applied to joints listed above.

1. Nonsag urethane sealants.
2. Pourable urethane sealants.
3. Mildew-resistant acid-curing silicone sealants.

B. Latex Joint Sealants: ASTM C 834, Type P, Grade NF.

C. Acoustical Joint Sealants: Latex.

D. Joint-Sealant Backing: Cylindrical.

END OF SECTION 079200

SECTION 079500 - EXPANSION CONTROL

1.1 SUMMARY

A. Architectural joint systems for building interiors and exteriors.

1.2 ARCHITECTURAL JOINT SYSTEMS, GENERAL

A. Size and Movement Characteristics:

1. Type of Movement: Thermal and seismic.

1.3 ARCHITECTURAL JOINT SYSTEMS FOR BUILDING INTERIORS

A. Floor-to-Floor and Floor-to-Wall Joint Systems:

1. Exposed Metal: Aluminum.
2. Fire-Resistance Rating: As required.

B. Wall-to-Wall, Wall Corner, Wall-to-Ceiling, and Ceiling-to-Ceiling Joint Systems:

1. Exposed Metal: Aluminum.
2. Fire-Resistance Rating: As required.

C. Moisture Barrier: Manufacturer's standard.

1.4 ARCHITECTURAL JOINT SYSTEMS FOR BUILDING EXTERIORS

A. Exterior Wall and Soffit Joint Systems:

1. Exposed Metal: Aluminum.

a. Aluminum Finish: High-performance organic.

2. Fire-Resistance Rating: As required.

B. Secondary Seal: Manufacturer’s standard.

END OF SECTION 079500

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

1.1 SUMMARY

A. Standard hollow metal doors and frames.

1.2 QUALITY ASSURANCE

A. Standard Hollow Metal Quality Standard: ANSI/SDI A250.8.

B. Fire-Rated Doors and Frames: Positive-pressure testing.

1.3 PRODUCTS

A. Standard Hollow Metal Doors:

1. Design: Flush panel.
2. Exterior Doors: Metallic-coated steel sheet faces.

a. Level 2 and Physical Performance Level B (Heavy Duty).
b. Model: 1 (Full Flush).
c. Thermal-Rating: U-value 0.125 minimum**.**

3. Interior Doors: Cold-rolled steel sheet faces.

a. Level 2 and Physical Performance Level B (Heavy Duty).
b. Model: 1 (Full Flush).

B. Standard Hollow Metal Frames:

1. Exterior Frames: Metallic-coated steel sheet; full profile welded.

a. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.

2. Interior Frames: Cold-rolled steel sheet; full profile welded.

a. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.
b. Frames for Wood Doors: 0.053-inch- thick steel sheet.
c. Frames for Borrowed Lights: 0.053-inch- thick steel sheet.

C. Accessories:

1. Moldings and stops for glazed lites.
2. Louvers: Steel.

D. Finishes: Factory priming for field painting.

1.4 INSTALLATION

A. Metal-Stud Partitions: Frames filled with insulation.

B. Masonry Walls: Frames filled with grout.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

1.1 QUALITY ASSURANCE

A. Quality Standard: WDMA.

B. Fire-Rated Wood Doors: Positive pressure testing.

1.2 WARRANTY

A. Materials and Workmanship: Includes repair or replacement, and installation and finishing that may be required due to repair or replacement of defective doors.

1. Solid-Core Interior Doors: Life of installation.

1.3 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A Performance Grade:

1. Heavy Duty.

B. Low-Emitting Materials: Made with adhesives and composite wood products that do not contain urea formaldehyde.

1.4 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium (Grade A faces).
2. Species and Cut: Red oak, plain sliced (flat sliced) or equivalent as approved by Owner.
3. Match between Veneer Leaves: Book match.
4. Assembly of Veneer Leaves on Door Faces: Balance match.
5. Special Matching:

a. Pair and set match.

6. Core: Particleboard. Structural composite lumber at doors with exit devices.
7. Construction: Five or seven plies, bonded.

B. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection ratings.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile.

C. Blocking: Provide blocking as required to eliminate through bolting hardware.

1.5 LOUVERS AND LIGHT FRAMES

A. Louvers: Steel with baked enamel or powder coated finish.

1. Fire-Door Louvers: Fusible links.

B. Light-Opening Frames:

1. Wood beads.
2. Wood-veneered beads for fire doors.

1.6 FABRICATION

A. Fabrication:

1. Factory fit doors to frames.
2. Factory machine doors for hardware.
3. Factory glaze doors.

1.7 FINISHING

A. Factory Finishing: All doors.

B. Transparent Factory Finishes:

1. Grade: Premium.
2. Finish: Catalyzed polyurethane.
3. Color: As approved by Owner.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

1.1 SUMMARY

A. Access doors and frames for walls and ceilings.

1.2 QUALITY ASSURANCE

A. Fire-Rated Vertical Access Doors and Frames: NFPA 252 or UL 10B.

B. Fire-Rated Horizontal Access Doors and Frames: ASTM E 119 or UL 263.

1.3 PRODUCTS

A. Access Doors and Frames for Walls and Ceilings:

1. Type:

a. Flush access doors and trimless frames.

2. Material: Steel.
3. Where required, fire-rated, insulated, flush access doors and trimless frames.

a. Fire-Resistance Rating: As required for fire-rated assembly being penetrated.

4. Latch: Cam latch operated by screwdriver with interior release. Ring turn at fire-rated doors.
5. Lock: Cylinder where required for security.

B. Finishes:

1. Steel: Primed finish.

END OF SECTION 083113

SECTION 083323 - OVERHEAD COILING DOORS

1.1 SUMMARY

A. Manually and electric-motor-operated overhead coiling doors:

1. Insulated service doors (motor operated).
2. Counter doors (manually operated).

1.2 PERFORMANCE REQUIREMENTS

A. Wind and Seismic Loads: Comply with project requirements.

1.3 COMPONENTS

A. Door Curtain: Galvanized steel (service doors), stainless steel (counter doors).

1. Slats: Flush.
2. Insulation (service doors): Polystyrene or polyurethane foam.
3. Endlocks and windlocks.
4. Curtain jamb guides.

B. Hood: Same material as door curtain.

C. Integral Frame, Hood, and Fascia for Counter Doors: Stainless steel.

D. Seals: Weather.

E. Manual Door Operation: Crank-hoist operator.

F. Electric Door Operation: Operator type as recommended by manufacturer with remote-control station.

1. Obstruction Detection Device: Self monitoring external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

G. Finishes:

1. Galvanized Steel: Baked enamel or power coated finish.
2. Stainless Steel: Satin, directional polish finish.

END OF SECTION 083323

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

1.1 SUMMARY

A. Exterior and interior storefront framing.

B. Exterior and interior manual-swing entrance doors and door-frame units.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Contractor to design aluminum-framed systems.

B. Structural Performance:

1. Wind Loads: Comply with project requirements.
2. Seismic Loads: Comply with project requirements.

C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to L/175.
2. Deflection Parallel to Glazing Plane: Limited to L/360 or 1/8 inch, whichever is smaller.

1.3 WARRANTY

A. Materials and Workmanship: Two years.

B. Finish: Two years.

1.4 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer.

B. Steel reinforcement where required.

1.5 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.

B. Brackets and reinforcements.

C. Fasteners and accessories.

D. Concrete and masonry inserts.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing.

F. Framing system gaskets and sealants.

1.6 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing gaskets.

C. Spacers and setting blocks.

1.7 ENTRANCE DOOR SYSTEMS

A. Entrance Doors:

1. Door Construction: 1-3/4-inch overall thickness.
2. Door Design: Medium stile.
3. Glazing stops and gaskets.

B. Entrance Door Hardware: As indicated.

1.8 ALUMINUM FINISHES

A. Aluminum Finishes: Class 1 clear anodic.

1.9 DOOR HARDWARE SETS

A. Manufacturer’s standard commercial quality (BHMA Grade 1) hardware including:

1. Continuous gear hinges.
2. Thresholds.
3. Push/pull devices.
4. Stops.
5. Weather stripping.
6. Weather sweeps.
7. Removable mullions.
8. Silencers.

B. Hardware specified in Division 8 Section “Door Hardware” includes:

1. Cylinders.
2. Closers.
3. Exit devices.

END OF SECTION 084113

SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

1.1 SUMMARY

A. Conventionally glazed aluminum curtain walls.

1.2 PERFORMANCE REQUIREMENTS

A. Wind Loads: Comply with project requirements.

B. Seismic Loads: Comply with project requirements.

C. Periodic Maintenance-Equipment Loads: Comply with project requirements.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to L/175.
2. Deflection Parallel to Glazing Plane: Limited to L/360 or 1/8 inch, whichever is smaller.

1.3 QUALITY ASSURANCE

A. Contractor to engineer glazed aluminum curtain-wall systems to comply with performance requirements.

1.4 WARRANTY

A. Materials and Workmanship: Two years.

B. Finish Warranty: Two years.

1.5 COMPONENTS

A. Framing Systems: Aluminum, with steel reinforcement where required.

1. Construction: Thermally broken.

B. Glazing Systems:

1. Glazing: Specified in Division 08 Section "Glazing."
2. Gaskets: Retained mechanically with gaskets on four sides.
3. Spacers and setting blocks.

C. Brackets and reinforcements.

D. Fasteners and accessories.

E. Concrete and masonry inserts.

F. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing.

G. Framing system gaskets and sealants.

1.6 ALUMINUM FINISHES

A. Aluminum Finishes: Class 1 clear anodic.

END OF SECTION 084413

SECTION 087100 - DOOR HARDWARE

1.1 SUMMARY

A. Commercial door hardware for swinging doors.

B. Electrified door hardware.

C. Comply with Owner's requirements.

1.2 WARRANTY

A. Materials and Workmanship: Three years.

1.3 PRODUCTS

A. Standard: BHMA Grade 1.

B. Hardware includes:

1. Hinges.
2. Electric Hinges.
3. Mortise Locks.
4. Auxiliary Locks and Latches.
5. Flush Bolts.
6. Exit Devices.
7. Cylinders.
8. Removable Cores (including construction cores).
9. Keys.
10. Key Cabinets.
11. Operating Trim.
12. Closers.
13. Protective Trim Units.
14. Stops and Holders.
15. Door Gasketing.
16. Astragals.
17. Thresholds.
18. Removable mullions (other than aluminum entrance doors).
19. Silencers.
20. Coordinators.
21. Finishes.

C. Hardware Finish: Satin chrome.

D. Hardware Keying: Key hardware in accordance with Owner's instructions.

1.4 GENERAL DOOR HARDWARE (CONFIRM EXACT HARDWARE REQUIRMENTS WITH OWNER)

A. Exterior Aluminum Entrance Doors (Pair)

1. Exit devices
2. Cylinders.
3. Closers.
4. Balance by aluminum entrance door section.

B. Interior Aluminum Entrance Doors (Pair)

1. Closers.
2. Balance by aluminum entrance door section.

C. Classroom, Lab, Conference Room Doors (In-swinging)

1. Hinges.
2. Classroom lock
3. Closer.
4. Kickplate.
5. Stop.
6. Silencers.

D. Classroom, Lab, Conference Room Doors (Out-swingng)

1. Hinges.
2. Exit device.
3. Closer.
4. Kickplate.
5. Stop.
6. Silencers.

E. Office Doors

1. Hinges.
2. Office lock.
3. Stop.
4. Silencers.

F. Storage Room Doors

1. Hinges.
2. Storeroom lock.
3. Stop.
4. Silencers.

G. Restroom Doors

1. Hinges.
2. Push/Pull.
3. Closer.
4. Kickplate.
5. Stop.
6. Seals.

H. Unisex Restroom Doors

1. Hinges.
2. Privacy lock
3. Closer.
4. Kickplate.
5. Stop.
6. Seals.

I. Provide electric access control hardware at locations where required by Owner.

END OF SECTION 087100

SECTION 087113 - AUTOMATIC DOOR OPERATORS

1.1 SUMMARY

A. Low-energy, power-open door operators.

1.2 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

B. UL Standard: Comply with UL 325.

1.3 WARRANTY

A. Special Warranty: Failure in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

1.4 LOW-ENERGY, POWER-OPEN DOOR OPERATORS

A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated

B. Standard: Comply with BHMA A156.19.

C. Operation: Power opening and spring closing.

D. Operating System: Electromechanical.

E. Microprocessor Control Unit: Solid-state controls.

F. Mounting: Surface.

G. Wall Push-Plate Switch: Manufacturer's standard semiflush, wall-mounted or frame-mounted, wireless door control switch.

H. Cover Finish: Clear anodized.

I. Locations: Use at locations as required by Owner.

END OF SECTION 087113

SECTION 088000 - GLAZING

1.1 SUMMARY

A. Glazing required for the following:

1. Doors.
2. Glazed entrances.
3. Interior borrowed lites.
4. Storefront framing.
5. Curtainwall framing.

1.2 WARRANTY

A. Deterioration of Coated Glass: Not less than 10 years.

B. Deterioration of Laminated Glass: Not less than five years.

C. Deterioration of Insulating Glass: Not less than 10 years.

1.3 MATERIALS

A. Glass Products:

1. Annealed Float Glass: Clear and tinted.
2. Heat-Treated Float Glass: Clear and tinted. Heat strengthened and fully tempered.
3. Coated Float Glass: Pyrolytically coated (low-E).
4. Laminated Glass: With polyvinyl-butyral sheet interlayer.
5. Insulating Glass: Manufacturer's standard dual-seal units.

B. Glazing Tapes: Expanded-cellular type.

1.4 GLASS UNITS

A. Monolithic Float-Glass Units (interior openings):

1. Clear. Safety glazing (fully tempered or laminated) at hazardous locations.

a. Thickness: 1/4 inch minimum.

B. Insulating-Glass Units (exterior openings):

1. Tinted, with low-E coating. Annealed or heat-strengthened as required. Safety glazing (fully tempered or laminated) at hazardous locations.

a. Lite thickness: 1/4 inch minimum.
b. Overall Thickness: 1 inch.
c. Color/Performance: Glass of equivalent color (green) and performance characteristics of glass on existing adjacent buildings, as approved by Owner.

   1) Glass at Existing Adjacent Buildings: Solexia/Solarban 70 XL; PPG.

d. Spandrels: Insulating spandrel matching vision glass.

1.5 FIRE-PROTECTION-RATED GLAZING

A. Provide fire-rated glazing product at fire-rated glazed openings. Wired glass not allowed.

END OF SECTION 088000

SECTION 089000 - LOUVERS AND VENTS

1.1 PERFORMANCE REQUIREMENTS

A. Wind and Seismic Loads: Comply with project requirements.

1.2 PRODUCTS

A. Fixed, Extruded-Aluminum Louvers:

1. Horizontal, Drainable-Blade Louver: 4 inches deep minimum with exposed mullions.

B. Louver Screens:

1. Provided at each exterior louver.
2. Screening Type: Bird screening.

C. Blank-Off Panels: Insulated.

D. Finishes:

1. Aluminum: Clear anodized.

END OF SECTION 089000

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

1.1 SUMMARY

A. Non-load-bearing steel framing members for interior framing and suspension systems.

1.2 MATERIALS

A. Framing Members General: Comply with ASTM C 754.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal.
2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot-dip galvanized.

B. Suspension Systems:

1. Wire hangers.
2. Grid suspension systems for ceilings.

C. Steel Framing for Framed Assemblies:

1. Studs and runners.
2. Slip-Type Head Joints:

   a. Single long-leg runner.
   b. Double runner.
   c. Deflection track.

3. Hat-shaped, rigid furring channels.
4. Resilient furring channels.
5. Z-shaped furring.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

1.1 SUMMARY

A. Interior gypsum board.

1.2 QUALITY ASSURANCE

A. Mockups for the following:

1. Levels of gypsum board finish for use in exposed locations.

1.3 MATERIALS

A. Interior Gypsum Board:

1. Type X.

B. Minimum Thickness: 5/8 inch.

C. Trim Accessories:

1. Interior.

D. Auxiliary Materials:

1. Steel drill screws: ASTM C 1002, ASTM C 954
2. Sound attenuation blankets: ASTM C 665, Type I.

1.4 INSTALLATION

A. Gypsum Board Finish Levels:

1. Level 1: Ceiling plenum areas, concealed areas
2. Level 4: Surfaces to receive wall coverings.
3. Level 5: Painted surfaces.

END OF SECTION 092900

SECTION 093000 - TILING

1.1 SUMMARY

A. Ceramic mosaic, paver, glazed wall tile, and quarry tile

B. Stone thresholds installed as part of tile installations.

C. Metal edge strips installed as part of tile installations.

1.2 QUALITY ASSURANCE

A. Mockups for each form of construction.

1.3 TILE PRODUCTS

A. Unglazed ceramic mosaic tile.

1. Size: 2 by 2 inches.
2. Price Group: 2

B. Polished and unpolished paver tile.

1. Size: 12 by 12 inches.

C. Glazed wall tile.

1. Size: 6 by 6 inches
2. Price Group: 2 (field), 4 (accent).

D. Tile Trim and Shapes: Coved base, bullnose cap, bullnose external corner, stair treads.

1.4 ACCESSORY MATERIALS

A. Thresholds: Granite.

B. Waterproof/Crack Isolation Membrane: Chlorinated polyethylene sheet.

C. Metal Edge Strips: Stainless steel.

D. Grout Sealer.

1.5 FLOOR TILE INSTALLATION SCHEDULE

A. Interior Floors on Concrete Slabs on Grade: F125A; Thinset mortar over crack isolation membrane.

1. Tile Types: Unglazed ceramic mosaic, glazed and unglazed paver tile, quarry tile.
2. Mortar: Latex- portland cement mortar bond coat.
3. Grout: Polymer-modified sanded grout.

B. Interior Floors on Suspended Concrete: F122; Thinset mortar over waterproof/crack isolation membrane.

1. Tile Types: Unglazed ceramic mosaic.
2. Mortar: Latex- portland cement mortar bond coat.
3. Grout: Polymer-modified sanded grout.

C. Interior Steel Stairs: S151; Cement mortar bed over steel stairs.

1. Tile Types: Unglazed paver tile.
2. Mortar: Latex- portland cement bond coat.
3. Grout: Polymer-modified sanded grout.

1.6 WALL TILE INSTALLATION SCHEDULE

A. Interior Walls over Metal Studs: Cementitious backer units.

1. Tile Type: Glazed wall tile.
2. Mortar: Latex- portland cement mortar bond coat.
3. Grout: Polymer-modified unsanded grout.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

1.1 SUMMARY

A. Acoustical panels and exposed suspension systems.

1.2 QUALITY ASSURANCE

A. Acoustical Panel Quality Standard: ASTM E 1264.

B. Metal Suspension System Quality Standard: ASTM C 635.

C. Metal Suspension System Installation Standard: ASTM C636.

D. Metal Suspension System Seismic Standards: IBC and ASCE 7.

1.3 MATERIALS

A. Acoustical Ceiling Panels:

1. Type and Form: Type IV, mineral-fiber base with membrane overlay; Form 2, acoustically transparent.
2. Size: 24 by 24 inch, and 24 by 48 inch.
3. Edge: Recessed.

B. Metal Suspension Systems:

1. Wire hangers, braces, and ties.
2. Seismic perimeter stabilizer bars, struts, and clips.
3. Wide-Face, Capped, Double-Web Steel: Heavy duty.

C. Metal Edge Moldings and Trim: Roll-formed sheet metal.

D. Acoustical sealants.

1.4 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency to test acoustical panel ceiling hanger fasteners.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

1.1 PRODUCTS

A. Resilient Base:

1. Material Requirement: Rubber.
2. Style: Cove.
3. Minimum Thickness: 0.125 inch.
4. Height: 4 inches.
5. Outside Corners: Job formed.
6. Inside Corners: Job formed.

B. Resilient Molding Accessory: Rubber.

1. Carpet edge.
2. Reducer strip for resilient floor covering.

C. Installation Materials:

1. Trowelable leveling and patching compounds.
2. Adhesives.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

1.1 PRODUCTS

A. Vinyl Composition Floor Tile:

1. Class: Through pattern.
2. Wearing Surface: Smooth.
3. Thickness: 0.125 inch.
4. Size: 12 by 12 inches.

B. Installation Materials:

1. Trowelable leveling and patching compounds.
2. Adhesives.

END OF SECTION 096519

SECTION 096536 - STATIC-CONTROL RESILIENT FLOOR COVERINGS

1.1 SUMMARY

A. This Section includes the following:

1. Static-dissipative solid vinyl floor tile.

1.2 PRODUCTS

A. Static-Dissipative Resilient Floor Coverings:

1. Solid Vinyl Floor Tile: 12 by 12 inches.
2. Static-Control Properties:

a. Electrical Resistance: Test per ASTM F 150 and ESD-S7.1.

1) Surface to Ground for Test Specimens: Average greater than 1 megohm and less than or equal to 1000 megohms.

b. Static Decay: 5000 to 0 V in less than 0.5 seconds when tested per FED-STD-101C.

1.3 INSTALLATION

A. Manufacturer's representative to oversee installation.

END OF SECTION 096536

SECTION 096811 - ENTRY WALK-OFF TILE

1.1 MATERIALS

A. Entry Walk-Off Tile:

1. Face Weight: 28 oz/sq. yd. minimum.
2. Pile Thickness: 0.15 inches minimum.
3. Density: 5400 minimum.
4. Size: 50 by 50 cm, or 24 by 24 inches.
5. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

1.2 INSTALLATION

A. Installation Method: Glue down with releasable adhesive.

END OF SECTION 096813

SECTION 096813 - TILE CARPETING (STATE CARPET CONTRACT)

1.1 MATERIALS

A. Carpet Tile:

1. Fiber Content: 100 percent nylon 6, 6.
2. Pile Characteristic: Textured-loop.
3. Density: 5400 minimum.
4. Pile Thickness: 0.119 inch minimum.
5. Surface Pile Weight: 18 oz./sq. yd. minimum
6. Size: 50 by 50 cm, or 24 by 24 inches.
7. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

1.2 INSTALLATION

A. Installation Method: Glue down with releasable adhesive.

END OF SECTION 096813

SECTION 099113 - EXTERIOR PAINTING

1.1 SUMMARY

A. Surface preparation and the application of paint systems on exterior substrates.

1.2 QUALITY ASSURANCE

A. Quality Standards: "MPI Approved Products List" and "MPI Architectural Painting Specification Manual."

1.3 EXTERIOR PAINTING SCHEDULE

A. Galvanized-Metal Substrates:

1. Water-Based Light Industrial Coating (over a water-based primer): MPI EXT 5.3J.

B. Other Substrates: Water-based light industrial coating systems complying with MPI Exterior Systems.

C. MPI Paint System Grade: Premium.

D. System Gloss Level: 5 (semi-gloss).

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

1.1 SUMMARY

A. Surface preparation and the application of paint systems on interior substrates.

1.2 QUALITY ASSURANCE

A. Quality Standards: "MPI Approved Products List" and "MPI Architectural Painting Specification Manual."

1.3 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Traffic Surfaces:

1. Stained Concrete: MPI INT 3.2E. Equivalent to stain system used in adjacent existing buildings.
2. Water-Based Clear Sealer System: MPI INT 3.2G.

B. CMU Substrates:

1. Acrylic Latex System: MPI INT 4.2A.

C. Steel Substrates:

1. Acrylic Latex System: MPI INT 5.2Q.

D. Galvanized-Metal Substrates:

1. Acrylic Latex System: MPI INT 5.3J.

E. Gypsum Board Substrates:

1. Acrylic Latex System: MPI INT 9.2A.

F. Other Substrates: Acrylic latex systems complying with MPI Interior Systems.

G. MPI Paint System Grade: Premium.

H. System Gloss Level: 5 (semi-gloss).

END OF SECTION 099123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

1.1 SUMMARY

A. Surface preparation and application of wood finishes on interior substrates.

1.2 QUALITY ASSURANCE

A. Quality Standards: "MPI Approved Products List" and "MPI Architectural Painting Specification Manual."

B. Mockups for each color and finish.

1.3 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Finish Carpentry Substrates:

1. Waterborne Clear Acrylic Over Stain System: MPI INT 6.3W.

B. Exposed Wood Panel-Product Substrates:

1. Waterborne Clear Acrylic Over Stain System: MPI INT 6.4U.

C. MPI Paint System Grade: Premium.

D. System Gloss Level: 5 (semi-gloss).

END OF SECTION 099300

SECTION 101100 - VISUAL DISPLAY SURFACES

1.1 SUMMARY

A. Visual Display Surfaces:

1. Markerboards.
2. Tackboards.

1.2 WARRANTY

A. Materials and Workmanship for Porcelain-Enamel Face Sheets: Life of building.

1.3 MATERIALS

A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel.

B. Markerboard Assemblies: Porcelain enamel.

C. Tackboard Assemblies: Vinyl-fabric faced cork.

D. Support System for Visual Display Boards: As recommended by manufacturer.

E. Markerboard Accessories:

1. Aluminum frames.
2. Trim: Factory-applied aluminum.
3. Chalktray: Solid type.
4. Map rail with display rail, map hooks, clips, paper holder.

F. Aluminum Finishes: Class II, clear anodic.

1.4 FABRICATION

A. Visual Display Boards: Factory assembled.

END OF SECTION 101100

SECTION 101300 - DIRECTORIES

1.1 MESSAGE-STRIP DIRECTORIES

A. Nonilluminated, Message-Strip Directories:

1. Frame: Reveal and nonsectional cover.

a. Perimeter Frame: Extruded aluminum.
b. Aluminum Finish: Clear anodic.

2. Header panel.
3. Changeable Message Strips: Applied copy.
4. Graphics panel.
5. Mounting: Semirecessed.

END OF SECTION 101300

SECTION 101400 - SIGNAGE

1.1 SUMMARY

A. Dimensional characters.

B. Panel signs.

1.2 PRODUCTS

A. Dimensional Characters:

1. Cast Characters: Aluminum with concealed stud mounting.

a. Size, letter style, and content: As required by Owner.

B. Panel Signs:

1. Interior Panel Signs:

a. Material: Acrylic sheet.
b. Raised copy: Machine-cut acrylic characters.
c. Panel Sign Frames: PVC or metal.
d. Changeable Message Inserts: Transparent covers with paper inserts printed by Campus.
e. Braille: Grade 2.

1.3 FINISHES

A. Aluminum: Class I, clear anodized.

B. Acrylic Sheet: Copy and background colors that are UV and water resistant.

1.4 INSTALLATION

A. Wall-Mounted Panel Signs: Two-face tape.

END OF SECTION 101400

SECTION 101426 - POST AND PANEL SIGNAGE

1.1 SUMMARY

A. Exterior post and panel signs.

1.2 PRODUCTS

A. Panel Signs:

1. Message Panel Sign Materials: Aluminum sheet.

a. Corner Condition: Rounded.
b. Color: Comply with Owner's requirements.
c. Thickness: 0.080 inch.

B. Posts: Fabricated for direct-burial in concrete mounting.

1. Aluminum: Square with baked-enamel finish.

1.3 FINISHES

A. Aluminum: Baked enamel.

1.4 INSTALLATION

A. Posts: Embedded in concrete.

END OF SECTION 101426

SECTION 102113 - TOILET COMPARTMENTS

1.1 SUMMARY

A. Steel baked enamel units as follows:

1. Toilet Enclosures: Floor-mounted overhead braced.
2. Urinal Screens: Wall hung.

1.2 COMPONENTS

A. Brackets (Fittings):

1. Stirrup Type: Chrome-plated, nonferrous, cast zinc alloy (zamac).

B. Hardware and Accessories: Chrome-plated, nonferrous, cast zinc alloy (zamac) or clear anodized aluminum.

END OF SECTION 102113

SECTION 102226 - OPERABLE PARTITIONS

1.1 SUMMARY

A. Section Includes:

1. Manually operated, paired acoustical panel partitions.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.3 QUALITY ASSURANCE

A. Flame-Spread Index: 25 or less.

1.4 MATERIALS

A. Frame: Steel.

B. Face/Liner Sheets: Steel sheet.

1.5 OPERABLE ACOUSTICAL PANELS

A. Panel Width: Standard widths.

B. STC: Not less than 50.

C. Panel Weight: 8 lb/sq. ft. maximum.

D. Panel Thickness: Not less than 3 inches.

E. Hardware: Concealed hinges.

F. Finish Facing: Vinyl-coated fabric wall covering.

END OF SECTION 102226

SECTION 102600 - IMPACT-RESISTANT WALL-PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Corner guards

1.2 QUALITY ASSURANCE

A. Impact Strength: 25.4 ft-lbf/in. of width when tested according to ASTM D 256, Test Method A.

1.3 MATERIALS

A. Stainless-Steel Plate: Type 304, minimum 0.0625 inch.

B. Fasteners: Nonmagnetic stainless-steel fasteners compatible with items being fastened.

1.4 CORNER GUARDS

A. Stainless-Steel Corner Guards: Satin-finish, 0.0625-inch minimum, stainless-steel sheet corner guards.

1. Wing Size: 3-1/2 by 3-1/2 inches.
2. Height: Full.
3. Mounting Method: Countersunk screws with mounting holes 8 inches o.c.
4. Corner Radius: 1/8 inch.

1.5 STAINLESS-STEEL FINISHES

A. Bright, Directional Polish: No. 4 finish.

1.6 FABRICATION

A. Finishing: De-burred and smooth with no sharp edges.

END OF SECTION 102613

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

1.1 SUMMARY

A. Public-Use Washroom Accessories:

1. Toilet tissue dispenser: Comply with Owner's requirements.
2. Paper towel dispenser: Comply with Owner's requirements.
3. Liquid-soap dispenser: Comply with Owner's requirements.
4. Waste receptacle: Comply with Owner's requirements.
5. Sanitary napkin and tampon dispenser: Comply with Owner's requirements.
6. Grab bars. Stainless steel.
7. Sanitary-napkin disposal unit. Comply with Owner's requirements.
8. Shelf unit (large enough to support a fully loaded student backpack). Stainless steel.
9. Framed mirror unit (stainless steel frame).

B. Childcare Accessories:

1. Diaper-changing station: HDPE.

C. Underlavatory guards.

D. Custodial Accessories:

1. Mop and broom holder with integral shelf. Stainless steel.

1.2 WARRANTY

A. Silver Spoilage for Mirrors: 15 years.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

1.1 PRODUCTS

A. Fire Protection Cabinet:

1. Type: For fire extinguisher.
2. Construction: Nonrated. Fire rated where required.
3. Mounting: Semirecessed with rolled edge.
4. Door Style: Fully glazed panel with frame.
5. Door Glazing: Acrylic sheet.
6. Accessories: Door locks with safety release.
7. Finish: Steel, baked enamel or powder coated.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

1.1 QUALITY ASSURANCE

A. Fire Extinguishers: NFPA 10.

1.2 PRODUCTS

A. Portable, Hand-Carried Fire Extinguishers:

1. Multipurpose dry-chemical type, steel container.

a. Rating: Minimum 4A-60BC, 10 lb.
b. Finish: Baked enamel.

END OF SECTION 104416

SECTION 107500 - FLAGPOLES

1.1 PERFORMANCE REQUIREMENTS

A. Wind Loads: Comply with project requirements.

B. Engineering design of flagpole by manufacturer.

1.2 PRODUCTS

A. Flagpoles:

1. Exposed Height: 30 feet.
2. Aluminum Flagpoles: Cone tapered, with clear anodic finish.

B. Mounting Type:

1. Foundation tube.

C. Fittings:

1. Finial: Ball.
2. Halyard: Internal.

END OF SECTION 107500

SECTION 111300 - LOADING DOCK EQUIPMENT

1.1 SUMMARY

A. Loading Dock Equipment:

1. Dock lifts.

1.2 PRODUCTS

A. Dock Lifts: MH 29.1.

1. Rated Capacity: 5000 lb.
2. Platform Surface: Nonskid, safety-tread deck plate.
3. Platform Size: 6 ft. by 8 ft.
4. Platform Guarding: Beveled toe guards.
5. Handrails: Removable.
6. Bridge Material: Nonskid, safety-tread steel plate.
7. Bridge Location: Ends.
8. Vertical Travel: 60 inches.
9. Travel Speed: 12 fpm.
10. Operation: Hydraulic.
11. Mounting: Pit.
12. Finish: Factory painted.

END OF SECTION 111300

SECTION 115213 - PROJECTION SCREENS

1.1 PRODUCTS

A. Electrically Operated Front-Projection Screens:

1. Surface: Matte-white viewing surface.
2. Mounting: Suspended screens without ceiling closure.
3. Size of Viewing Surface: 84 by 108 inches.

END OF SECTION 115213

SECTION 115216 - AUDIO VISUAL EQUIPMENT MOUNTS

1.1 PRODUCTS

A. Ceiling Video Projector Mounts and Wall TV/VCR Mounts:

1. Mounting: Fixed, structure mounted mounts.
2. Material: Steel
3. Finish: Manufacturer's standard powder coat finish.
4. Mounting Accessories: Manufacturer's standard anchors, fasteners, framing, and bracing necessary for a complete installation.
5. Comply with Owner's requirements.

END OF SECTION 115216

SECTION 115313 - LABORATORY FUME HOODS

1.1 SUMMARY

A. Bench-top laboratory fume hoods.

B. Fume hood base cabinets with countertops.

C. Laboratory cup sinks in fume hoods.

D. Cold water, laboratory gas, air, vacuum, and electrical service fittings in fume hoods.

E. Piping and wiring within fume hoods.

1.2 PERFORMANCE REQUIREMENTS

A. Containment: Tested according to ASHRAE 110.

1. Average Face Velocity: 100 fpm plus or minus 10 percent with sashes fully open.
2. As-Manufactured (AM) Rating: AM 0.05.

B. Seismic Performance: Provide fume hood anchorages capable of withstanding the effects of earthquake motions.

1.3 QUALITY ASSURANCE

A. Source Limitations: Laboratory fume hoods obtained through same source and from same manufacturer as laboratory casework.

B. Product Standard: SEFA 1.2.

1.4 PRODUCTS

A. Fume Hoods:

1. Type: Constant volume with bypass.
2. Exterior: Steel with chemical-resistant finish.
3. Interior Lining: Glass-fiber-reinforced polyester.
4. Lights: Fluorescent.
5. Base Cabinets: Metal.
6. Countertops: Phenolic composite.
7. Cup Sinks: Epoxy.

B. Accessories:

1. Airflow indicator.
2. Airflow alarm.
3. Sash alarm.

1.5 FIELD QUALITY CONTROL

A. Hoods field tested according to fume hood standard.

END OF SECTION 115313

SECTION 122113 - HORIZONTAL LOUVER BLINDS

1.1 SUMMARY

A. Horizontal louver blinds with aluminum slats.

1.2 PRODUCTS

A. Horizontal Louver Blinds, Aluminum Slats:

1. Nominal Slat Width: 1 inch.
2. Tilt Control: Manual with wand.
3. Lift Operation: Manual with cord.
4. Valance.

1.3 INSTALLATION

A. Mounting: Method as required for specific condition.

END OF SECTION 122113

SECTION 123552 - METAL LABORATORY CASEWORK

1.1 SUMMARY

A. Metal laboratory flammable liquid storage cabinets.

1.2 QUALITY ASSURANCE

A. Product Standard: SEFA 8, "Laboratory Furniture--Casework, Shelving and Tables--Recommended Practices."

B. Flammable Liquid Storage Cabinets: NFPA 30.

1.3 CABINETS

A. Cabinets must be conspicuously labeled in red letters on contrasting background **“FLAMMABLE-KEEP FIRE AWAY”.**

B. Doors shall be well fitted, self-closing and equipped with a spring actuated latch.

C. The bottom must be liquid tight to a height of at least two inches (2”).

D. Metal cabinets shall be constructed of steel having a thickness of not less than 0.044 inch (18 gauge). The cabinet, including door, shall be double walled with one and one-half inch (1-1/2”) airspace between the walls. Joints must be riveted or welded and be tight fitting.

END OF SECTION 123552

SECTION 123553 - WOOD LABORATORY CASEWORK

1.1 SUMMARY

A. Wood laboratory casework.

B. Utility-space framing and utility-space closure panels.

C. Laboratory countertops.

D. Shelves.

E. Laboratory sinks and troughs.

F. Accessories.

G. Water, and laboratory service fittings.

H. Comply with Owner's requirements.

1.2 QUALITY ASSURANCE

A. Product Standard: SEFA 8, "Laboratory Furniture--Casework, Shelving and Tables--Recommended Practices."

B. Flammable Liquid Storage Cabinets: NFPA 30.

1.3 MATERIALS

A. Cabinets:

1. Exposed Wood Species and Veneer Cut: Red oak, plain sliced/sawn, or equivalent as approved by Owner.
2. Wood-Faced Door and Drawer Design: Flush overlay.
3. Chemical-resistant finish.

B. Cabinet Doors:

1. Wood Plastic-laminate faced.
2. Glazed where required by Owner.

    a. Clear tempered or laminated safety glass.

C. Cabinet Hardware:

1. Pulls: Solid metal.

2. Drawer Slides: Heavy duty.
3. Label Holders: Where required by Owner.
4. Drawer and Door Locks: Where required by Owner.
5. Shelf Supports: Mortise-type standards and shelf rests.

D. Countertops:

1. Epoxy: 1-inch- thick solid epoxy.

a. Configuration: Flat with integral coved backsplash.

E. Shelves:

1. Plastic laminate, 3/4 inch thick. Chemical resistant.

F. Sinks, Cup Sinks, Troughs: Epoxy.

G. Accessories (where required by Owner):

1. Reagent shelves.
2. Adjustable wall shelf supports.
3. Upright rod assembly and metal crossbar.
4. Burette rods.
5. Greenlaw arm assembly.
6. Lattice assembly.
7. Pegboards.

H. Water and Laboratory Service Fittings: Chromium plated except where corrosion-resistant finish is required by Owner.

1.4 SERVICE-FITTING SCHEDULE

A. Water Service Fittings: Type as required by Owner.

B. Laboratory Service Fittings: Air, gas (fuel gas), vacuum.

1. Type: As required by Owner.

END OF SECTION 123553

SECTION 129300 - SITE FURNISHINGS

1.1 SUMMARY

A. Benches.

B. Bicycle racks.

C. Trash/ash receptacles.

D. Site furniture design and finish to be equivalent to furniture at existing adjacent buildings, as approved by Owner.

1.2 MATERIALS

A. Steel:

1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Pipe: ASTM A 53, or ASTM A 135.
3. Sheet: ASTM A 1011/A 1011M.
4. Perforated Metal: Manufacturer's standard perforation pattern.

B. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials; commercial quality, tamperproof.

1.3 PRODUCTS

A. Benches:

1. Supports: Steel.
2. Seat: Wood.
3. Style: Backless.
4. Configuration: Straight.
5. Mounting: Embedded.

B. Bicycle Racks:

1. Steel pipe.
2. Style: Circular (2-bike capacity).
3. Mounting: Embedded.

C. Trash/Ash Receptacles:

1. Steel Facing Surrounds: Perforated-steel sheet.
2. Style: Round cylinder with secured dome top/sand pan.
3. Capacity: 32 gal inner container.

4. Mounting: Surface.

D. Ornamental Bollards:

1. Style: 6-inch diameter steel with cast aluminum top and solar powered light.
2. Mounting: Embedded.

E. Finishes:

1. Steel: Powder coated.

1.4 FABRICATION

A. Connections: Welded.

END OF SECTION 129300

SECTION 142400 - HYDRAULIC ELEVATORS

1.1 SUMMARY

A. Hydraulic passenger and service elevators.

1.2 WARRANTY

A. Elevator Work: One year.

1.3 MAINTENANCE SERVICE

A. Full Maintenance Service: One year.

1.4 COMPONENTS

A. Pump Units: Submersible pump, suspended inside tank.

1. Motor: Variable-voltage variable-frequency control.

B. Signal Equipment:

1. Car Control Stations: Semirecessed or recessed type, one per car.
2. Emergency communication system.
3. Firefighters' two-way telephone communication service.

C. Elevator Description:

1. Type: Passenger Elevator.
2. Cylinder Type: Holeless, telescoping, beside the car.
3. Rated Load: 3500 lb.
4. Rated Speed: 125 fpm.
5. Operation System: Single elevator.
6. Auxiliary Operations:

a. Battery-powered lowering.

7. Car Enclosure:

a. Front Walls (Return Panels): Stainless steel.
b. Side and Rear Wall Panels: Plastic laminate.
c. Doors: Stainless steel.
d. Ceiling: Luminous ceiling.
e. Handrails: Stainless steel.
f. Floor: Prepared to receive carpet.

8. Hoistway Entrances:

a. Width: 42 inches.
b. Height: 84 inches.
c. Type: Single-speed center opening.
d. Frames: Stainless steel.
e. Doors: Stainless steel.

9. Hall Fixtures: Stainless steel.

D. Elevator Description:

1. Type: Service Elevator.
2. Cylinder Type: Holeless, telescoping, beside the car.
3. Rated Load: 5000 lb.
4. Rated Speed: 125 fpm.
5. Operation System: Single elevator.
6. Auxiliary Operations:

a. Battery-powered lowering.

7. Car Enclosure:

a. Side and Rear Wall Panels: Plastic laminate.
b. Doors: Stainless steel.
c. Ceiling: Luminous ceiling.
d. Handrails: Stainless steel.
e. Floor: Prepared to receive resilient flooring.

8. Hoistway Entrances:

a. Width: 48 inches.
b. Height: 84 inches.
c. Type: Two-speed side sliding.
d. Frames: Stainless steel.
e. Doors: Stainless steel.

9. Hall Fixtures: Stainless steel.

END OF SECTION 142400

SECTION 211313 – FIRE SUPPRESSION SPRINKLER SYSTEMS

1.1 SUMMARY

A. Fire protection throughout building.

1.2 QUALITY ASSURANCE

A. Quality Standards:

1. NFPA
2. Local Fire Marshall
3. State of Utah Fire Marshall
4. IFC (International Fire Code), 2006
5. IBC (International Building Code), 2006
6. Underwriters Laboratories "Fire Protection Equipment Directory," 2006
7. Factory Mutual Systems "Approval Guide," 2006

1.3 PRODUCTS

A. Building

1. Provide individual floor control assembly, including zone check assembly, at each floor.
2. Pipe: Schedule 40 (minimum).
3. All pipe and fittings of domestic manufacture.

END OF SECTION 211313

SECTION 220000 – GENERAL PLUMBING REQUIREMENTS

1.1 SUMMARY

A. This section includes requirements common to more than one section of Division 22.

1.2 QUALITY ASSURANCE

A. CODES AND PERMITS, AUTHORITIES HAVING JURISDICTION:

1. Perform the mechanical work in strict accordance with the applicable provisions of the various codes.

2. Reference Standards:

International Building Code (2006 Edition)
International Mechanical Code (2006 Edition)
International Plumbing Code (2006 Edition)
International Fire Code (2006 Edition)
International Energy Compliance Code (2006 Edition)
National Electric Code
American Welding Society
Local Fuel Utility Regulations
American Gas Association
ASME Codes for Pressure Vessels and Piping
ANSI B31.1 Piping
NEMA Standards
National Sanitation Foundation (NSF) Labels
MSS Compliance
ANSI Compliance
UL and FM Compliance

1.3 PRODUCTS

A. Plumbing System, complete.

END OF SECTION 230000

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

1.1 PERFORMANCE REQUIREMENTS

A. Pipe hangers and equipment supports designed by Contractor.

B. Seismic-restraint hangers and supports designed by Contractor.

1.2 SUBMITTALS

A. Shop Drawings: Signed and sealed by a professional engineer].

1.3 QUALITY ASSURANCE

A. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. ASME Boiler and Pressure Vessel Code.

1.4 COMPONENTS

A. Metal Pipe Hangers and Supports: Carbon steel.

B. Trapeze pipe hangers.

C. Fiberglass pipe hangers.

D. Metal Framing Systems: MFMA manufacturer.

E. Fiberglass strut systems.

F. Thermal-hanger shield inserts.

G. Fastener Systems: Powder-actuated fasteners and mechanical-expansion anchors.

H. Pipe positioning systems.

I. Equipment supports.

END OF SECTION 220529

SECTION 220548 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

1.1 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: E.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: III.

   a. Component Importance Factor: 1.5.
   b. Component Response Modification Factor: 3.5.
   c. Component Amplification Factor: 2.5.

3. Design Spectral Response Acceleration at Short Periods (0.2 Second): .
4. Design Spectral Response Acceleration at 1-Second Period: .

1.2 COMPONENTS

A. Vibration Isolators:

1. Isolator Pads: Neoprene.
2. Mounts: Double-deflection type.
3. Restrained Mounts: All directional mountings with seismic restraint; cast-ductile-iron housing.
4. Spring Isolators: Freestanding, laterally stable, open-spring type.
5. Restrained Spring Isolators: Freestanding, steel, open-spring type with seismic restraint.
6. Housed Spring Mounts: Ductile-iron or steel housing, with integral, vertically adjustable seismic snubbers.
7. Elastomeric Hangers: Double-deflection type.
8. Spring Hangers: Combination coil-spring and elastomeric-insert hangers with spring and insert in compression.
9. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hangers with spring and insert in compression and with vertical-limit stop.
10. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor.
11. Resilient pipe guides.

B. Vibration Isolation Equipment Bases:

1. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.
2. Inertia Base: Factory-fabricated, welded, structural-steel bases and rails ready for field-applied, cast-in-place concrete.

C. Seismic-Restraint Devices:

1. Snubbers: Welded structural-steel shapes and replaceable resilient isolation washers and bushings.
2. Channel Support System: MFMA-3 slotted steel channels.
3. Restraint Cables: Galvanized-steel cables.
4. Anchor Bolts: Mechanical type, seismic rated.
5. Resilient Isolation Washers and Bushings: Molded neoprene.

1.3 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 220548

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

1.1 PRODUCTS

A. Equipment Labels: Plastic.

B. Warning Signs and Labels: 1/8 inch thick with fasteners.

C. Pipe Labels: Self-adhesive.

D. Stencils: Brass.

E. Valve Tags: Brass, 0.032-inch minimum thickness.

F. Warning Tags: 3 by 5-1/4 inches minimum; brass grommet and wire fasteners.

END OF SECTION 220553

SECTION 220640 – PLUMBING FIXTURES

1.1 SUMMARY

A. Plumbing Fixtures.

1.2 QUALITY ASSURANCE

A. Quality Standards:

1. ANSI Standards.
2. ADA: Americans with Disability Act.
3. International Plumbing Code.
4. See also, Section 220000, 1.2, Quality Assurance.

1.3 PRODUCTS

A. <u>FIXTURES</u>:

1. <u>Water Closets</u>:

a. Flush Valve Type-Wall Mounted, 1.6 gal./flush, siphon jet, vitreous china, elongated bowl

1) ADA Compliant Fixture: Mounted so top of seat is 18” above finished floor.

b. Flush Valve Floor Mounted, 1.6 gal./flush, siphon jet, vitreous china, elongated bowl, ADA Compliant.

c. Seat - (White) high impact plastic, open front, check hinge.
d. Carrier: Floor mounted carrier with auxiliary foot at wall to provide additional reinforcing.

2. <u>Urinals</u>:

a. Wall mounted, vitreous china, washdown type.
b. Flush Valve - (1 gal./flush)

3. <u>Lavatories:</u>

a. Fixture: Counter mounted, vitreous china
b. Fixture: Wall mounted, vitreous china
c. Faucet: Battery operated sensor type with thermostatic mixing valve for singe tepid water supply.

4. <u>Sinks:</u>

a. Fixture: Counter mounted, stainless steel, single bowl
b. Fixture: Counter mounted, stainless steel, double bowl

c. Fixture: Counter mounted, stainless steel, single bowl, ADA Compliant
d. Fixture: Counter mounted, stainless steel, cup sink
e. Fixture: 6'-0" stainless steel self supporting trough style
f. Fixture: Sink
g. Fixture: Free standing single compartment, stainless steel sink.
h. Fixture: Free standing double compartment, stainless steel sink.
i. Fixture: Quenching tank, wall mounted with drain and hose bibb for fill.
j. Faucet: Manual operated type, gooseneck spout faucet, two lever handle style, deck mounted (or backsplash mounted for free standing sinks).

5. Mop Sink: (Floor mounted)

   a. Fixture: Floor mounted, enameled cast iron.
   b. Faucet: Wall-mounted mixing faucet wall vacuum breaker.

6. Electric Water Cooler:

   a. ADA Compliant Fixture:

      1) Self-contained, wall-hung, single level mounted at height noted on architectural drawings, self-contained, front and side pressure operators with cast brass bubbler, air cooled, 7.8 gal. per hour capacity (minimum), with 90º ambient air, water entering at 80º and leaving at 50º, stainless steel top, cabinet of stainless steel. Five year warranty, 120 volt, 60 cycles, 1 phase power.

   b. ADA Compliant Fixture:

      1) Self-contained, wall-hung, bi-level mounted at height noted on architectural drawings, self-contained, front and side pressure operators with cast brass bubbler, air cooled, 7.8 gal. per hour capacity (minimum), with 90º ambient air, water entering at 80º and leaving at 50º, stainless steel top, cabinet of stainless steel. Five year warranty, 120 volt, 60 cycles, 1 phase power.

7. Clothes Washer Box:

   a. Fixture: Flush mounted, steel box with ball type hose connection fittings and 2" drain outlet.

8. Shower Valve:

   a. Fixture: Single lever type, thermostatic or pressure balancing type valve, ADA compliant with fixed shower head and hand held hose, diverter valve.

9. Laboratory Turrets:

   a. Fixture: Natural gas turret, double outlet, 45 degree style.
   b. Fixture: Compressed air turret, double outlet, 45 degree style.
   c. Fixture: Vacuum turret, double outlet, 45 degree style.

10. Emergency Fixtures:

    a. Fixture: Combination shower/eyewash unit
    b. Fixture: Hand held eye wash, counter mounted.

11. Mixing Valve:

    a. Fixture: Thermostatic mixing valve for emergency fixtures, rated for 20 gpm.

12. Compressed Air:

    a. Fixture: ½" quick disconnect fitting with ball type shut-off valve upstream of connection point.

13. Dilution Tank:

    a. Fixture: Acid neutralization tank, under counter type.

14. Hose Bibb:

    a. Fixture: Chrome plated brass, removable key, vacuum breaker

15. Non-Freeze Wall Hydrant:

    a. Fixture: Bronze box type with removable key.

16. Supplies with Stops: Chrome plated cast brass angle stop. Stops shall be ball type quarter turn style.

17. P-Trap: 17 gauge, tubular brass, chrome plated.

18. Cleanouts:

    a. Finished Walls
    b. Finished Floors

19. Gas Fired Water Heaters:

    a. Gas-Fired high efficiency water heater, seamless glass lined steel tank construction.

    b. Generate and store at 140ºF, provide central tempering valve, circulated to fixtures at 105ºF.

END OF SECTION 220640

SECTION 221100 – WATER DISTRIBUTION PIPING AND EQUIPMENT

1.1 SUMMARY

A. Water distribution piping system, including, potable cold, hot, and recirculating hot water piping.

1.2 QUALITY ASSURANCE

A. Quality Standards: Comply with applicable sections, follow recommended practices.

1. State Boiler and Pressure Vessel Regulations
2. ASME Codes for Boilers and Pressure Vessels
3. International Plumbing Code
4. International Mechanical Code
5. International Building Code
6. ASHRAE/ASPE Handbooks
7. HI Compliance: Design, manufacture, and install plumbing pumps in accordance with HI “Hydraulic Institute Standards”.
8. UL Compliance: Design, manufacture, and install plumbing pumps in accordance with UL 778 “Motor Operated Water Pumps”.
9. UL and NEMA Compliance: Provide electric motors and components which are listed and labeled by Underwriters Laboratories and comply with NEMA standards.
10. See also, Section 220000, 1.2, Quality Assurance.

B. Provide plumbing isolation valves to isolate each floor and each restroom per floor.

1.3 PRODUCTS

A. Domestic Water Pipe Within Building: (except below slab)

1. Copper tubing. Conform to ASTM B88, Type L, hard temper, copper tube; ANSI B16.22 streamlined pattern wrought-copper fittings, with soldered joints using 95-5 tin antimony solder or non-lead bearing solders such at "Silvabrite."

B. DOMESTIC WATER EXPANSION TANKS:

1. Expansion Tanks: Factory built unit pressurized diaphragm type, ASME stamped for 125 psig working pressure. Steel tank with neoprene diaphragm and polypropylene liner for nonmetallic isolation of water from steel. Fit tank with air charging valve and threaded water connection. NSF approved.

1.4 DOMESTIC WATER CIRCULATING PUMPS:

A. Equipment: In-line, single stage, close coupled, mechanical seal, open type lubricable ball bearings, bronze body, bronze impeller and bronze or stainless steel fitted for domestic water service. Alternative all stainless steel construction. 1750 rpm motor.

END OF SECTION 221100

SECTION 221116 - DOMESTIC WATER PIPING

1.1 UNDER-BUILDING-SLAB, DOMESTIC WATER PIPING

A. Pipe NPS 2 and Smaller:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper solder-joint fittings; and brazed joints.

1.2 ABOVEGROUND DOMESTIC WATER PIPING

A. Pipe NPS 2 and Smaller:
1. Hard copper tube, ASTM B 88, Type L; cast- or wrought- copper solder-joint fittings; and brazed joints.

B. Pipe NPS 2-1/2 to NPS 4:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought- copper solder-joint fittings; and brazed joints.

C. Pipe NPS 5 to NPS 8:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought- copper solder-joint fittings; and brazed joints.

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

1.1 QUALITY ASSURANCE

A. Plastic Piping Components: NSF 14.

B. Drinking Water System Components: NSF 61.

1.2 PRODUCTS

A. Vacuum Breakers:
   1. Pressure vacuum breakers.
   2. Laboratory-faucet vacuum breakers.
   3. Spill-resistant vacuum breakers.

B. Backflow Preventers:

   1. Reduced-Pressure-Principle Backflow Preventers:

      a. Body: Bronze for NPS 2and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved forNPS 2-1/2 and larger.
      b. End Connections: Threaded for NPS 2 and smaller; flanged forNPS 2-1/2 and larger.
      c. Configuration: Horizontal, straight through.

C. Water Pressure-Reducing Valves:

   1. Water Regulators:

      a. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved forNPS 2-1/2 and NPS 3.
      b. Valves for Booster Heater Water Supply: Include integral bypass.
      c. End Connections: Threaded for NPS 2 and smaller; flanged forNPS 2-1/2 and NPS 3.

D. Balancing Valves:

   1. Copper-Alloy Calibrated Balancing Valves: Ball valve.
   2. Cast-iron calibrated balancing valves.
   3. Accessories: Meter kit.
   4. Memory-stop balancing valves.

E. Hose Bibbs:

   1. Vacuum Breaker: Integral.

2. Finish for Service Areas: Chrome or nickel plated.
3. Operation for Service Areas: Operating key.
4. Operation for Finished Rooms: Wheel handle.
5. Include integral wall flange with each chrome- or nickel-plated hose bibb.

F. Wall Hydrants:

1. Nonfreeze Wall Hydrants:

a. Outlet: Exposed.
b. Finish: Chrome plated .

G. Drain Valves: Ball-valve type.

H. Water Hammer Arresters: Metal bellows.

I. Air Vents: Bolted construction.

J. Trap-Seal Primer Valves: Drainage type.

1.3 MANUFACTURED UNITS

A. Trap-Seal Primer Systems:

1. Cabinet: Surface- mounting steel box with stainless-steel cover.

END OF SECTION 221119

SECTION 221316 – SANITARY WASTE AND VENT PIPING

1.1 SUMMARY

A. Sanitary Waste and Vent Piping.

1.2 QUALITY ASSURANCE

A. Quality Standards:

1. State Boiler and Pressure Vessel Regulations
2. ASME Codes for Boilers and Pressure Vessels
3. International Plumbing Code
4. International Mechanical Code
5. International Building Code
6. ASHRAE/ASPE Handbooks
7. UL and NEMA Compliance: Provide electric motors and components which are listed and labeled by Underwriters Laboratories and comply with NEMA standards.
8. See also, Section 220000, 1.2, Quality Assurance.

1.3 PRODUCTS

A. Sanitary Soil Drain, Waste and Vent Piping:

1. Service weight hub and spigot cast iron pipe and fittings with Ty-Seal joints.

2. Service weight "No-Hub" cast iron pipe and fittings with neoprene gaskets and stainless steel screw bands (above ground only).

3. Schedule 40 galvanized steel pipe with drainage pattern cast iron screwed fittings (above ground only).

END OF SECTION 221316

SECTION 221413 – STORM DRAINAGE PIPING/ROOF DRAINS

1.1 SUMMARY

A. Storm Drainage Piping.

1.2 QUALITY ASSURANCE

A. Quality Standards:

1. State Boiler and Pressure Vessel Regulations
2. ASME Codes for Boilers and Pressure Vessels
3. International Plumbing Code
4. International Mechanical Code
5. International Building Code
6. ASHRAE/ASPE Handbooks
7. See also, Section 220000, 1.2, Quality Assurance.

1.3 PRODUCTS

A. Building Storm Drainage Systems:

1. Roof Drains.

a. Cast iron body aluminum or cast iron dome with locking screws, bearing pan, sump receiver, extension piece, under deck clamp. No plastic roof drains will be acceptable.

2. Secondary Roof Drain:

a. Cast iron body, aluminum or cast iron dome with locking screws, bearing pan, sump receiver, extension piece, under deck clamp mounted on roof such that rim is 2” higher than the primary drain. No plastic drains will be acceptable.

3. Downspout Nozzle:

a. Downspout nozzle, bronze body, threaded inlet and decorative face of wall flange and outlet nozzle, stainless steel screen.

B. Storm Drainage Piping (Non Pressure Rated to 25 Ft. Hd.): (Below Grade)

1. Piping: To conform to the requirements of CISPI Standard 301, ASTM A-888 or ASTM A-74 and shall be cast iron soil pipe and fittings.

2. Joints for Hub and Spigot Pipe: Hub and Spigot pipe and fittings joints shall be installed with compression gaskets conforming to the

requirements of ASTM Standard C-564.

C. Storm Drainage Piping (Non Pressure Rated to 25 Ft. Hd.): (Above Grade Only)

1. Piping: To conform to the requirements of CISPI Standard 301, ASTM A-888 or ASTM A-74 and shall be cast iron soil pipe and fittings.

2. Joints for Hub and Spigot Pipe: Hub and Spigot pipe and fittings joints shall be installed with compression gaskets conforming to the requirements of ASTM Standard C-564.

3. Cleanouts as for waste piping.

D. Storm Drainage Piping: (Pressure rated above 25 feet of head)

1. Class 50 ductile iron with gasketed grooved joint connections (ANSI/AWWA Standard C-606), aboveground, gasketed bell and spigot joints above or below ground.

2. Schedule 40, A-53, galvanized steel pipe, with galvanized malleable steel or pressure rated cast iron fittings with threaded joints, or with gasketed grooved joint connections, aboveground only.

3. Pressure rated cleanouts at changes in direction and every 50 feet.

END OF SECTION 221413

SECTION 221513 - GENERAL-SERVICE COMPRESSED-AIR PIPING

1.1 SUMMARY

A. Piping and related specialties for systems operating at 200 psig or less.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Per SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.3 QUALITY ASSURANCE

A. Quality Standard for High-Pressure Compressed-Air Piping: ASME B31.1.

B. Quality Standard for Low-Pressure Compressed-Air Piping: ASME B31.9.

C. Quality Standard for Brazing: ASME Boiler and Pressure Vessel Code: Section IX or AWS B2.2.

D. Quality Standard for Welding: ASME Boiler and Pressure Vessel Code: Section IX.

1.4 PRODUCTS

A. Dielectric Fittings:

1. Dielectric Unions: 250-psig minimum working pressure at 180 deg F.
2. Dielectric Flanges: 150- or 300-psig minimum working pressure.
3. Dielectric-flange kits.

B. Flexible Pipe Connectors: Stainless steel.

C. Sleeves: Galvanized-steel sheet.

D. Escutcheons:

1. One Piece: Stamped steel.
2. Split Plate: Stamped steel with hinge, set screw or spring clips, and chrome-plated finish.
3. One-Piece Floor Plate: Cast iron.
4. Split-Casting Floor Plate: Cast brass with concealed hinge and set screw.

E. Specialties:

1. Safety valves.

2. Air-Main Pressure Regulators: Pilot operated, 250-psig inlet pressure.
3. Air-Line Pressure Regulators: Diaphragm or pilot operated, 200-psig minimum inlet pressure.
4. Branch and Equipment Air-Line Pressure Regulators: Diaphragm operated, stainless steel, 200-psig minimum inlet pressure.
5. Coalescing filters.
6. Mechanical filters.
7. Air-line lubricators.

F. Quick Couplings: Automatic shutoff.

1.5 PIPING APPLICATIONS

A. Piping between Air Compressors and Receivers:

1. NPS 2 and Smaller: Steel pipe with threaded joints.
2. NPS 2-1/2 to NPS 4: Steel pipe with threaded joints.

B. Low-Pressure Distribution Piping:

1. NPS 2 and Smaller: Steel pipe with threaded joints.
2. NPS 2-1/2 to NPS 4: Steel pipe with threaded joints.

C. High-Pressure Distribution Piping:

1. NPS 2 and Smaller: Steel pipe with threaded joints .
2. NPS 2-1/2 to NPS 6: Steel pipe with welded joints

D. Drain Piping: Copper tube with brazed or soldered joints.

END OF SECTION 221513

SECTION 223100 - DOMESTIC WATER SOFTENERS

1.1 SUMMARY

A. Commercial water softeners.

1.2 WARRANTY

A. Materials and Workmanship:

1. Household Water Softener, Warranty Period: Five years.
2. Commercial Water Softener, Warranty Period:

   a. Mineral Tanks: Five years.
   b. Brine Tanks: Five years.
   c. Controls: Five years.
   d. Underdrain Systems: Three years.

1.3 HOUSEHOLD WATER SOFTENERS

A. Description: Factory-assembled, fully-automatic, pressure-type water softener.

B. Configuration: Unit with one mineral tank and one brine tank.

C. Mineral Tank: Steel or FRP, with coating or liner suitable for potable-water service and 125-psig minimum pressure rating.

1.4 COMMERCIAL WATER SOFTENERS

A. Description: Factory-assembled, pressure-type water softener.

B. Configuration: Twin unit with two mineral tanks and one brine tank.

C. Mineral Tanks: FRP, pressure-vessel quality.

1. Construction: Comply with ASME Boiler and Pressure Vessel Code: Section X, "Fiber-Reinforced Plastic Pressure Vessels."
2. Pressure Rating: 125 psig minimum.
3. Wetted Components: Suitable for water temperatures from 40 to at least 120 deg F.

D. Controls: Fully automatic; factory mounted on unit and factory wired.

E. Brine Tank: Combination measuring and wet-salt storing system.

1. Tank and Cover Material: Fiberglass or molded PE.
2. Size: Large enough for at least four regenerations at full salting.

END OF SECTION 223100

SECTION 223400 - FUEL-FIRED DOMESTIC WATER HEATERS

1.1 SUMMARY

A. Gas water heaters.

1.2 QUALITY ASSURANCE

A. Quality Standard for Performance Efficiency: ASHRAE/IESNA 90.1 and ASHRAE 90.2.

1.3 WARRANTY

A. Materials and Workmanship:

1. Commercial, Gas Water Heaters: Five years.

1.4 PRODUCTS

A. Commercial, High-Efficiency, Gas Water Heaters: ANSI Z21.10.3/CSA 4.3.

1. Description: Manufacturer's proprietary design to provide at least 88 percent combustion efficiency.
2. Storage Tank Construction: ASME-code steel with 150-psig minimum working-pressure rating.
3. Interior Finish: Comply with NSF 61.
4. Lining: Glass complying with NSF 61.
5. Burner or Heat Exchanger: For natural-gas fuel.
6. Temperature Control: Adjustable thermostat.
7. Safety Controls: Automatic, high-temperature-limit and low-water cutoff.
8. Energy management system interface.

B. Compression Tanks:

1. Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm.
2. Interior Finish: Comply with NSF 61.
3. Air-charging valve.
4. Working-Pressure Rating: 150 psig.

C. Water Heater Accessories:

1. Gas Shutoff Valves: Manually operated.

2. Gas Pressure Regulators: Appliance type.
3. Gas Automatic Valves: Appliance, electrically operated.
4. Combination temperature and pressure relief valves.
5. Pressure relief valves.
6. Water heater stand and drain pan units.
7. Water heater stands.
8. Water heater mounting brackets.
9. Drain pans.
10. Piping Manifold Kits: Manufacturer's factory-fabricated.
11. Piping-Type Heat Traps: Field-fabricated piping.

1.5 SOURCE QUALITY CONTROL

A. Water Heater Storage Tanks, Specified to Be ASME-Code Construction: Tested and inspected according to ASME Boiler and Pressure Vessel Code.

END OF SECTION 223400

SECTION 224500 - EMERGENCY PLUMBING FIXTURES

1.1 QUALITY ASSURANCE

A. Quality Standard: ANSI Z358.1.

1.2 MANUFACTURED UNITS

A. Combination Units: Freestanding shower with eyewash.

B. Water-Tempering Equipment: Hot and cold water.

1.3 SOURCE QUALITY CONTROL

A. Independent testing agency performance certification according to ANSI Z358.1 for plumbed fixtures.

END OF SECTION 224500

SECTION 226113 - COMPRESSED-AIR PIPING FOR LABORATORY FACILITIES

1.1 SUMMARY

A. Compressed-air piping for the following:

1. Nonmedical laboratories.

1.2 QUALITY ASSURANCE

A. Quality Standards: NFPA 99 for healthcare facilities.

1.3 MATERIALS

A. Piping:

1. Laboratory Air Piping: Type L, copper medical gas tube; wrought-copper fittings; brazed joints.

B. Valves:

1. Ball Valves: Three-piece body, brass or bronze.
2. Check Valves: In-line pattern, bronze.
3. Zone Valves: Three-piece body, full-port ball valves with gage.
4. Zone Valve Boxes: Formed steel, recessed mounting.
5. Safety Valves: ASME constructed, bronze.
6. Pressure Regulators: Bronze; spring-loaded, diaphragm-operated relieving type.
7. Automatic Drain Valves: Stainless steel.

1.4 FIELD QUALITY CONTROL

A. Owner-engaged agency.

END OF SECTION 226113

SECTION 226119 - COMPRESSED-AIR EQUIPMENT FOR LABORATORY FACILITIES

1.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design compressed-air equipment mounting.

B. Seismic Performance: Compressed-air equipment shall withstand the effects of earthquake motions.

1.2 QUALITY ASSURANCE

A. Quality Standards:

1. Receiver Tanks: ASME Boiler and Pressure Vessel Code.
2. Medical Compressed-Air Equipment and Accessories: NFPA 99.
3. Medical and Dental Equipment: UL 544.

B. Testing Agency Qualifications: An independent testing agency that is an NRTL.

1.3 MANUFACTURED UNITS

A. Control Panels: Automatic control station with load control and protection functions.

B. Packaged, Oil-Free Reciprocating Air Compressors:

1. Air Compressor(s): Two stage.
2. Mounting: Freestanding.
3. Receiver: Vertical steel tank.
4. Automatic control switches to alternate lead-lag air compressors for duplex air compressors.

1.4 INSTALLATION

A. Vibration Isolation: Equipment installed with restrained-spring isolators.

END OF SECTION 226119

SECTION 226213 - VACUUM PIPING FOR LABORATORY FACILITIES

1.1 SUMMARY

A. Vacuum piping for the following systems:

1. Laboratory low vacuum.
2. Laboratory high vacuum.

1.2 QUALITY ASSURANCE

A. Quality Standards: NFPA 99 for healthcare facilities.

1.3 MATERIALS

A. Piping:

1. Nonhealthcare Laboratory Low Vacuum Piping: Type L, copper medical gas tube; wrought-copper fittings; brazed joints.

B. Valves:

1. Ball Valves for Copper Tubing: Three-piece body, brass or bronze, ball and bronze check.
2. Ball Valves for PVC Piping: Three-piece body, brass or bronze, ball and bronze check.
3. Zone Valves: Three-piece body, full-port ball valves with gage.
4. Zone Valve Boxes: Formed steel, recessed mounting.
5. Safety Valves: ASME construction, bronze.
6. Automatic Drain Valves: Stainless steel.

1.4 FIELD QUALITY CONTROL

A. Contractor-engaged agency.

END OF SECTION 226213

SECTION 226219 - VACUUM EQUIPMENT FOR LABORATORY FACILITIES

1.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Vacuum equipment mounting.

B. Seismic Performance: Vacuum equipment shall withstand the effects of earthquake motions.

1.2 QUALITY ASSURANCE

A. Quality Standards:

1. Receiver Tanks: ASME Boiler and Pressure Vessel Code.
2. Medical Vacuum Equipment and Accessories: NFPA 99.
3. Medical Vacuum Equipment: UL 544.

B. Testing Agency Qualifications: An independent testing agency that is an NRTL.

1.3 MANUFACTURED UNITS

A. Control Panel: Automatic control station with load control and protection functions.

B. Packaged, Oil-Free, Rotary, Sliding-Vane Vacuum Pumps:

1. Vacuum Pump(s): Two.
2. Mounting: Freestanding.
3. Receiver: Vertical steel tank.
4. Automatic control switches to alternate lead-lag vacuum pumps for duplex vacuum pumps.

1.4 INSTALLATION

A. Vibration Isolation: Equipment installed with restrained-spring isolators.

END OF SECTION 226219

SECTION 226600 - CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES

1.1 PRODUCTS

A. Single-Wall Pipe and Fittings:
   1. PP drainage piping.

B. Double-Containment Pipe and Fittings:
   1. PP drainage piping.

C. Piping Specialties:
   1. PP corrosion-resistant traps.
   2. PP floor drains.

D. Neutralization Tanks:

   1. Tank: Plastic.
   2. Limestone.
   3. Collection Tanks: Ceramic.

E. Sleeves: PVC-pipe sleeves.

F. Sleeve seals.

G. Escutcheons:

   1. One-piece, deep-pattern escutcheons.
   2. Split-Plate, Stamped-Steel Escutcheons: With concealed hinge, set screw or spring clips, and chrome-plated finish.
   3. One-Piece, Floor-Plate Escutcheons: Cast iron.
   4. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.

END OF SECTION 226600

SECTION 226700 - PROCESSED WATER SYSTEMS FOR LABORATORY FACILITIES

1.1 SUMMARY

A. This Section includes deionized and distilled-water piping.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working-Pressure Ratings:
   1. Deionized and Distilled-Water Piping: 100 psig, unless otherwise indicated.

1.3 MATERIALS

A. Deionized and Distilled-Water Piping:

   1. Pipes and Fittings:

      a. NPS 1 and Smaller: Schedule 40 PP Schedule 40 PVDF.
      b. NPS 1-1/4 to NPS 2: Schedule 40 PVDF.
      c. NPS 2-1/2 to NPS 4: Schedule 40 PVDF.

   2. Valves:
      a. PVDF Pipe and Fittings: PVDF wetted-surfaces diaphragm or plastic lined.

END OF SECTION 226700

SECTION 230100 – OPERATION AND MAINTENANCE MANUALS

1.1 SUMMARY

A. Operation and Maintenance Manuals.

1.2 QUALITY ASSURANCE

A. The contractor shall obtain and compile data regarding equipment operation and maintenance.

1.3 PRODUCTS

A. Furnish four sets of bound operation and maintenance manuals. Manuals shall contain descriptive drawings and data which identify equipment installed at the project and detail the procedures and parts required to maintain and repair the equipment. Copies of approved submittals shall be included for all equipment.

END OF SECTION 230100

SECTION 230500 – GENERAL MECHANICAL REQUIREMENTS

1.1 SUMMARY

A. General requirements pertaining to the new Bingham Entrepreneurship and energy research center
B. This section includes requirements common to more than one section of Division 23.

1.2 QUALITY ASSURANCE

A. CODES AND PERMITS, AUTHORITIES HAVING JURISDICTION:

1. Perform the mechanical work in strict accordance with the applicable provisions of the various codes.

2. Reference Standards:

International Building Code (2006 Edition)
International Mechanical Code (2006 Edition)
International Plumbing Code (2006 Edition)
International Fire Code (2006 Edition)
International Energy Compliance Code (2006 Edition)
National Electric Code
American Welding Society
SMACNA Duct Design Standards
Locally Enforced NFPA Codes
Local Fuel Utility Regulations
Local Power Utility Regulations
American Gas Association
ASME Codes for Pressure Vessels and Piping
ANSI B31.1 Piping
NEMA Standards
National Sanitation Foundation (NSF) Labels
MSS Compliance
ANSI Compliance
UL and FM Compliance

1.3 PRODUCTS

A. Mechanical System, complete.

END OF SECTION 230500

SECTION 230513 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

1.1 SUMMARY

A. Basic Requirements for Motors.

1.2 QUALITY ASSURANCE

A. Provide electrical components and materials which are UL labeled.

B. References:

NEMA Standards MG 1: Motors and Generators.
NEMA Standards ICS 2: Industrial Control Devices, Controllers, and Assemblies.
NEMA Standards 250: Enclosures for Electrical Equipment.
NEMA Standards KS 1: Enclosed Switches.
Comply with National Electrical Code (NFPA 70).
See also, Section 230500, 1.2, Quality Assurance

1.3 PRODUCTS

A. Motors:

1. Motor sizes large enough so that the driven load will not require the motor to operate in the service factor range.

2. Service Factor 1.15 for poly-phase motors and 1.35 for single phase motors, 1.0 for TEFC motors.

3. Temperature Rating: Minimum rate for 40ºC environment with maximum 90ºC temperature rise for continuous duty at full load (Class H insulation for altitude, Class B leads allowed).

4. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, design “B”, except “C” where required for high starting torque.

5. Noise Rating: “Quiet”.

6. All motors one HP and above shall be high efficiency with efficiency ratings consistent with NEMA Standard MG 1-12, 55A, Efficiency Level of Energy Efficient Polyphase Squirrel-Cage Induction Motors. Values are found in Table 12-6C of the NEMA Standard. Motors used with Variable Frequency Drives shall be compatible and designed for use with Variable Frequency Drives. Any “explosion proof” motor for classified areas, scheduled for use with VFD’s, shall be listed for invertor duty applications.

B. Provide V-belt drives or cogged drives of fabric and rubber construction. Design drives for 150 percent or more of the specified motor nameplate rating. Bush all drives.

END OF SECTION 230513

SECTION 230519 – THERMOMETERS AND PRESSURE GAUGES

1.1 SUMMARY

A. Meters and Gauges.

1.2 QUALITY ASSURANCE

1. Firms regularly engaged in the manufacture of thermometers and/or pressure gauges.

a. All temperature and pressure wells to be stainless steel, brass will not be acceptable.

1.3 PRODUCTS

A. Thermometers: Glass, die cast aluminum case finished in baked epoxy enamel or extruded brass, adjustable joint with locking device, separable union type socket, 9” long, 1% scale range accuracy.

1. Hot water(s): 30º-240ºF with 2ºF scale divisions.
2. Chilled water(s): 0-120ºF scale divisions.

B. Pressure Gauges: 1% accuracy, ASME B40.1 grade A, phosphor bronze bourdon type, drawn steel or brass case, glass lens, 4-1/2 diameter.

1. Range:

a. Vacuum: 30” Hg – 15 psi – 30 psi, as needed.
b. Water: 0 – 100 psi – 160 psi, as needed.

C. Temperature/Pressure Gauge Connector Plugs:

1. General: Provide temperature gauge connector plugs pressure rated for 500 psi and 200 degrees F (93 degrees C). Construct of stainless steel, equip with ½” NPS fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8” O.D. probe assembly from dial type insertion thermometer. Equip orifice with gasketed screw cap and chain. Provide extension, length to insulation thickness, for insulated piping.

END OF SECTION 230519

SECTION 230523 - VALVES

1.1 SUMMARY

A. General duty valves for piping systems.

1.2 QUALITY ASSURANCE

A. Firms regularly engaged in the manufacture of valves.

B. MSS Compliance: Mark valves in accordance with MSS-25 "Standard Marking System for Valves, Fittings, Flanges and Unions".

C. ANSI Compliance: For face-to-face and end-to-end dimensions of flanged- or welded-end valve bodies, comply with ANSI B16.10 "Face-to-Face and End-to-End Dimensions of Ferrous Valves".

D. UL and FM Compliance: Provide valves used in fire protection piping, which are UL-listed and FM approved.

1.3 PRODUCTS

A. Hot water heating and chilled water.

1. Ball Valves:

a. Steel or copper piping, 3” and Smaller: 125 psig WOG @ 220ºF, bronze construction, threaded or soldered ends, bubble tight Teflon seat at 100 psig under water, hard, chrome plated brass or stainless steel full ported ball. Operate with flow in either direction. Suitable for throttling and tight shut-off.

1) For grooved joint steel pipe in 6” and larger sizes, convert to flanged pipe, use indicated ball or butterfly valves.

2. Butterfly Valves:

a. For piping 4" and larger. Install with weld neck flanges, double tapped lug, single-flange ductile iron body, 316 SS disc, stainless steel shaft with extended neck for insulated pipe, EPDM seat and O-rings, indicating worm gear operator, 175 psig bubble tight pressure rating (250 where required).

B. Domestic cold water domestic hot water, and domestic hot water return.

1. Ball Valves: Same as 1.3.A.1.a, except ball valves shall have stainless steel balls only.
2. Butterfly Valves: Same as 1.3.A.1.b.

C. Circuit Balancing valves

1. Cast brass body, chrome plated ball, PTFE seat, brass trim, integral venturi and high/low pressure taps, positive shut-off valve, memory stop and locking tamper proof setting. Do not use gate valves or butterfly valves as balancing valves. Provide schedule showing pressure drop and flow rate of each valve. Armstrong CBV, Bell and Gossett Circuit Setter Plus, or Flowset Accusetter

END OF SECTION 230523

SECTION 230524 – CHEMICAL WATER TREATMENT

1.1 SUMMARY

A. Types of chemical treatment specified in this section include the following:

1. Shot Feeders.
2. Heating Water System
3. Chilled Water System.
4. Tower Water Treatment System.
5. Final Treatment.

1.2 QUALITY ASSURANCE

A. Refer to Section 230500, 1.2.

1.3 PRODUCTS

A. Shot Feeders: 5 gal capacity, 150 psi pressure rating.

B. Heating Water, heat recovery, and Chilled Water System Cleaning And Treatment:

Provide valved bypass lines as needed to allow recirculation. Provide valve connections needed to fill, vent and drain system. Provide temporary pump to circulate building systems during treatment process.

Use a treatment schedule similar to the following, but to be verified compatible with system materials.

1. Fill, circulate, drain system, clean strainers. Use clean water.

2. Fill, introduce sodium triphosphate or suitable degreaser, take the water to operating temperature, circulate for minimum of 24 hours, drain, refill and circulate for 5 additional hours, drain again.

3. Fill system with water, ready for final treatment.

4. Fill, introduce oxygen scavenger/inhibitor such as sodium borate-nitrite with phenopthalien, circulate.

5. Maintain inhibitor/scavenger and glycol concentrations for entire first year. Perform monthly testing, replace if lost

6. For one year, water treatment company to supply chemicals and appropriate on-site service.

C. GLYCOL MAKE-UP UNIT: Provide glycol and glycol make-up units for heating

water system and heat recovery systems complete with the following:

1. 35% glycol by volume for entire heating and heat recovery water systems. Inhibited propylene glycol as manufactured by Dow Chemical Dowfrost HD or Union Carbide.

2. Polyethylene feed tank mounted on a steel frame with accommodations for mounting a pump underneath. Tank shall have a hinged lid and all interconnecting piping to pump including strainer.

3. Level switch to deactivate pump and activate alarm on low level.

4. Control panel to house switching device for pump, audible alarm, HOA switch for pump, lights to indicate power and low level, pushbutton for alarm silence. Enclosure shall be NEMA 12. Control panel shall be mounted on the tank stand.

5. Rotary gear pump of bronze construction. Capacity shall be as scheduled on the drawings.

6. ½" bronze, solenoid valve mounted in the feed line from the pump to the system. The valve shall be activated the same time as the pump.

7. Pressure switch set at such a psig (adjustable) to activate the pump and solenoid valve. Pump shall be deactivated at adjustable psig. Pressure sensing shall be made in the main chilled water line on the discharge side of the pump.

8. ½" bronze, relief valve mounted on the system side of the solenoid valve and piped back to the tank.

D. TOWER WATER CLEANING AND TREATMENT

1. General: Provide a complete system to serve the evaporative type water cooling system including equipment, installation chemicals and service for the first (one) year of operation.

2. Provide valved bypass lines as needed to allow recirculation. Provide valve connections needed to fill, vent and drain system. Use a treatment schedule similar to the following, but to be verified compatible with system materials.

3. Fill, circulate, drain system, clean strainers. Use clean soft water.

4. Fill, introduce sodium triphosphate or suitable degreaser, take the water to operating temperature, circulate for minimum of 5 hours, drain, flush.

5. Fill system with water, ready for final treatment.

6. Reconnect existing tower water treatment into new system.

7. Final treatment as follows:

8. Chemicals: Comply with University Standards

9. Polymeric and antifoulant Condenser Water Treatment

10. Biocide (Glutaraldehyde)

11. Biocide (Isothiazolinone) (Chlorine may not be used as a biocide.)

12. Provide required controller, metering pumps, sample and injector quills including piping and valving. The controller shall be mounted at a height appropriate for convenient visual inspection. The pumps shall be mounted at a height to easily accommodate pumping the chemical treatment from a 30 gallon shipping container. Provide stainless steel support shelf for metering pumps.

END OF SECTION 230524

SECTION 230529 – SUPPORTS AND ANCHORS

1.1 SUMMARY

A. Mechanical supporting devices.

1.2 QUALITY ASSURANCE

A. Code Compliance: Comply with applicable building, mechanical and plumbing codes pertaining to product materials and installation of supports and anchors. UL and FM Compliance: Provide products which are UL-listed and FM approved. MSS Standard Compliance:

1. Provide pipe hangers and supports of which materials, design, and manufacture comply with MSS SP-58.

2. Select and apply pipe hangers and supports, complying with MSS SP-69.

3. Fabricate and install pipe hangers and supports, complying with MSS SP-89.

4. Terminology used in this section is defined in MSS SP-90.

5. Arrange supports and anchors to allow easy access to valves, actuators, and points requiring preventative maintenance.

6. See also, Section 230500, 1.2, Quality Assurance.

1.3 PRODUCTS

A. Provide supports and anchors as required for the mechanical systems including but not limited to the following:

1. Horizontal-Piping Hangers and Supports.
2. Vertical-Piping Clamps.
3. Hanger-Rod Attachments.
4. Building Attachments.
5. Saddles and Shields.
6. Miscellaneous Materials.
7. Anchors.
8. Equipment Supports.

B. High Humidity Areas: Use cadmium plated or galvanized steel material.

END OF SECTION 230529

SECTION 230548 – SEISMIC AND VIBRATION CONTROL

1.1 SUMMARY

A. Furnish and install complete seismic restraint and vibration control systems for all work of Divisions 21, 22, and 23.

1.2 QUALITY ASSURANCE

A. Codes and Standards: (Latest adopted edition).

1. International Building Code
2. NFPA Bulleting 90A.
3. UL Standard 181.
4. Guidelines for seismic restraint of Mechanical Systems and Plumbing Piping Systems. Published by the Sheet Metal Industry Fund of Los Angeles, California, and the Plumbing and Piping Industry Council, Inc. Los Angeles, California.

1.3 PRODUCTS

A. Engage the services of an independent seismic and vibration subcontractor which has the technology, experience, computer capabilities and manufactured products to prepare the required computations, shop drawings and special devices to meet the minimum requirements described herein.

END OF SECTION 230548

SECTION 230553 – SYSTEM IDENTIFICATION

1.1 SUMMARY

A. Label all plumbing, heating, air conditioning, automatic temperature control equipment (excluding thermostats), and distribution systems. Also label electrical switches and starters for mechanical equipment.

1.2 PRODUCTS

A. Equipment:

1. Black face formica with white engraved lettering 3/16” high or larger.

Include the following information on equipment nameplate where applicable:

Identification name
Identification number
Capacity specified
Actual capacity
Area on zone served

Note operating conditions, including head or static pressure, RPM, motor horsepower at design conditions, area or zone served, name of lubricant, frequency of lubricant.

B. Valves:

1. Aluminum or brass embossed 3/4” tags.

Provide valve tags which include the following minimum information:

Normal Position
Duty

Identify tag number shall follow existing valve tag schedule:

Make a schedule of all tagged valves, include in O&M Manuals

Connect valve tags to valve stems with brass chain

C. Piping:

1. Mechanical/Fan Rooms and Exposed Systems

a. Completely Painted per Owner’s Coding Scheme
b. Flow Direction Arrow

2. Concealed Systems

   a. Identifying Legend in accordance with Owner's Coding Scheme
   b. Flow Direction Arrow

D. PANEL IDENTIFICATION:

1. All panel devices on panel faces shall have engraved plastic labels.

2. All internal panel components shall have engraved plastic labels. Fasten label beneath each device.

3. All panel wiring and tubing shall be numerically or alphabetically coded.

END OF SECTION 230553

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

1.1 SUMMARY

A. Air and hydronic system balance.

1.2 QUALITY ASSURANCE

A. NEBB Certified
B. Independent firm

1.3 PRODUCTS

A. Air System Balance:

1. Before any adjustments are made, check the systems for such items as dirty filters, duct leakage, filter leakage, damper leakage, equipment vibrations, correct damper operations, etc. Adjust all fan systems, major duct sections, registers, diffusers, etc., to deliver design air quantities within +5%. Individual air outlets, when three or more serve a space may have a tolerance of 10 percent from the average. Design static pressure is estimated based on filters being approximately 50% loaded with dirt. Pressure drop across filters during balancing shall be simulated to that condition. After balancing is completed check motor amperage with the filters clean.

B. Hydronic System Balance

1. Using system flow meters, pressure gauges, and/or contact pyrometer, adjust the quantity of fluid handled by each pump and supplied to each coil, piece of radiation, heat exchanger, etc., to meet design requirements. Use proportional balance techniques to minimize system pressure requirements.

C. Report

1. Include final report in Project Operation and Maintenance Manuals.

END OF SECTION 230593

SECTION 230700 – MECHANICAL INSULATION

1.1 SUMMARY

A. Mechanical insulation shall be provided as required by the current International Energy Compliance Code, and by requirements of this section. Use no asbestos in this work.

1.2 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

1.3 PRODUCTS

A. Plumbing Piping:

1. Cold Piping: Fiberglass, 1" thickness

a. Potable cold water
b. Roof drain

2. Hot Piping: Fiberglass, 1" thick for sizes up to and including 6", 1-1/2" thick for sizes over 6".

B. Chilled Water, Indirect Cooling Water:

1. Fiberglass 1" thick for sizes up to and including 4", 1-1/2" thick for pipe sizes over 4".

C. Heating Water:

1. Fiberglass, 1" thick for pipe sizes up to and including 1", 1-1/2" thick for pipe sizes 1-1/4" through 4", 2" thick for pipe sizes over 5".

D. Refrigeration Piping:

1. Preformed Unicellular Insulation.
2. Chamfered angels and vapor tight seams.

E. Ductwork System Insulation:

1. Fiberglasss
2. Rigid flexible wrap
3. Remove sharp edges.

F. Equipment Insulation:

1. Fiberglass
2. Cellular

G. Insulation Jacket:

1. All service with self-sealing lap.
2. Exposed and/or painted: PVC, 0.030” thickness or aluminum.

H. Fire and smoke hazard for a complete insulation system shall not exceed:

1. Flame spread – 25
2. Fuel contribution – 50
3. Smoke development – 50

I. Saddles and Shields

1. Protection saddles and shields for all insulated piping.

J. Manufacturers:

END OF SECTION 230700

SECTION 230800 - COMMISSIONING OF HVAC

1.1 SUMMARY

A. Requirements for commissioning HVAC&R systems, assemblies, and equipment.

B. Allowances for labor, instrumentation, tools, and equipment costs for technicians for performance of commissioning testing.

C. Unit prices for adjusting allowances.

D. Contractor's Responsibilities:

1. Perform commissioning tests at the direction of the CxA.
2. Attend construction phase controls coordination meeting.
3. Attend testing, adjusting, and balancing review and coordination meeting.
4. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection.
5. Provide information to CxA for final commissioning documentation.
6. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data.

E. CxA's Responsibilities:

1. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components.
2. Direct commissioning testing.
3. Verify testing, adjusting, and balancing of Work are complete.
4. Provide test data, inspection reports, and certificates in Systems Manual.

F. Commissioning Documentation:

1. Submittals delivery and review plan.
2. Identification of installed systems, assemblies, equipment, and components.
3. Construction checklists.
4. Certificate of completion.
5. Certificate of readiness.
6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.

G. Submittals:

1. Certificates of readiness.
2. Certificates of completion.

1.2 EXECUTION

A. Testing Preparation: Certification and verification that systems, subsystems, and equipment are ready for testing.

B. Testing and Balance Verification:

1. CxA witnesses testing and balance Work.
2. Verification of final testing and balance report.

C. Scope of Testing:

1. Provide testing technicians, instrumentation, and tools.
2. Entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space.
3. All modes of operation.
4. Assist in preparation of testing procedures.
5. Simulation of conditions when required.
6. Boiler testing and acceptance procedures.
7. HVAC&R instrumentation and control system testing.
8. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment.
9. Energy supply system testing.
10. Refrigeration system testing.
11. HVAC&R distribution system testing.
12. Vibration and sound tests.

END OF SECTION 230800

SECTION 230900 - INSTRUMENTATION AND CONTROL FOR HVAC

1.1 SUMMARY

A. Control equipment for HVAC systems and components.

1.2 QUALITY ASSURANCE

A. Quality Standard: Comply with ASHRAE 135 for DDC system components.

1.3 CONTROL SYSTEM

A. System to control mechanical systems including the following:
   1. Building clock control system.
   2. Building lighting control system.

1.4 COMPONENTS

A. DDC Equipment:

   1. Operator Workstation: One microcomputer(s) with printer.
   2. Printer: Color, ink-jet type.
   3. Application Software: With dynamic color graphic displays, alarm and event processing, automatic restart, and data collection.
   4. Diagnostic Terminal Unit: Portable notebook-style microcomputer.
   5. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.
   6. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
   7. Hardwired I/O interface.
   8. Power supplies.
   9. Power line filtering.

B. Unitary Controllers: Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.

C. Alarm Panels: Unitized cabinet with suitable brackets for wall or floor mounting. Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.

D. Analog Controllers:

1. 6- or 10-stage-type step controllers.
2. Remote-bulb or bimetal rod-and-tube-type, electric outdoor-reset controllers.
3. Wheatstone-bridge-amplifier-type electronic controllers.
4. Solid-state fan-speed controllers.
5. Single- or multiple-input receiver controllers.

E. Time Clocks: Solid-state, programmable time control with separate programs.

F. Electronic Sensors: Wall, immersion, or duct mounting.

1. Thermistor temperature sensors and transmitters.
2. RTDs and transmitters.
3. Humidity sensors.
4. Pressure transmitters/transducers.

G. Status Sensors:

1. Status inputs for fans.
2. Status inputs for pumps.
3. Status inputs for electric motors.
4. Voltage transmitters (100- to 600-V ac).
5. Power monitors.
6. Current switches.
7. Electronic valve/damper position indicators.
8. Water-flow switches.

H. Gas Detection Equipment:

1. Carbon monoxide detectors.
2. Carbon dioxide sensor and transmitters.

I. Duct airflow station.

J. Thermostats:
1. Electric, solid-state, microcomputer-based room thermostats.

K. Actuators:
1. Electronic actuators.

L. Control Valves:

1. Globe Valves: Bronze body for NPS 2 and smaller; iron body for NPS 2-1/2 and larger.
2. Butterfly Valves: Cast-iron or ductile-iron body.
3. Terminal Unit Control Valves: Bronze body.
4. Self-Contained Control Valves: Bronze body.

M. Dampers: AMCA-rated, opposed-blade design, for standard-pressure and low-leak applications.

END OF SECTION 230900

SECTION 231123 – NATURAL GAS PIPING

1.1 SUMMARY

A. Natural Gas Piping

1.2 QUALITY ASSURANCE

A. Codes and Standards:

1. NFPA Compliance: Fabricate and install natural gas systems in accordance with NFPA 54 "National Fuel Gas Code".
2. Utility Compliance: Fabricate and install natural gas systems in accordance with Questar Gas regulations and recommended practice.
3. IMC Compliance: Fabricate and install natural gas systems in accordance with IAPMO "International Mechanical Code - 2006".
4. See also, Section 230500, 1.2, Quality Assurance

1.3 PRODUCTS

A. Building Distribution Piping:

1. Pipe Size 2" and Smaller: Black steel pipe; Schedule 40; malleable-iron threaded fittings (exposed), welded fittings and joints (concealed).
2. Pipe Size 2-1/2" and Larger: Black steel pipe; Schedule 40; wrought-steel buttwelding fittings, weld all joints.
3. Provide valving to isolate:

a. The entire building from the main system.
b. Each floor of the building.
c. Each piece of equipment separately.

END OF SECTION 231123

SECTION 232113 – HYDRONIC PIPING

1.1 SUMMARY

A. Heating Water Systems.
B. Chilled Water Systems.
C. Tower Water Systems.

1.2 QUALITY ASSURANCE

A. Standards: Comply with applicable sections, follow recommended practices.

1. State Boiler and Pressure Vessels Regulations
2. ASME Codes for Boilers and Pressure Vessels
3. International Building Code/International Mechanical Code
4. ASHRAE Handbooks
5. See also, Section 230500, 1.2, Quality Assurance.

1.3 PRODUCTS

A. Piping and Fittings:

1. Schedule 40 black steel, and forged steel welding fittings. Contractor option to use a grooved joint system accommodating for additional support and insulation work.

B. Expansion Tanks:

1. Factory built unit, pressurized diaphragm type, ASME certified and stamped for 125 psig working pressure. Tank shall contain a flexible neoprene diaphragm to separate the air charge from the water system. Furnish with air charging valve and threaded water connection. Charge tanks to local static water pressure.

C. AIR SEPARATOR:

1. Coalescing type air eliminator and dirt separator. Pipe size is not a factor and all units should be selected at the point of peak efficiency per the manufacturer's recommendations. All combination units shall be fabricated steel, rated for 150 psig working pressure with entering velocities not to exceed 4 feet per second at specified GPM.

END OF SECTION 232113

SECTION 232123 - PUMPS

1.1 SUMMARY

A. Types of pumps specified in this section include the following:

1. Base mounted, flexible coupled, horizontal end and double suction.
2. In-line circulating pumps.

1.2 QUALITY ASSURANCE

Codes and Standards: Comply with applicable sections, follow recommended practices.

A. HI Compliance: Design, manufacture, and install HVAC pumps in accordance with HI "Hydraulic Institute Standards".

B. UL Compliance: Design, manufacture, and install HVAC pumps in accordance with UL 778 "Motor Operated Water Pumps".

C. UL and NEMA Compliance: Provide electric motors and components which are listed and labeled by Underwriters Laboratories and comply with NEMA standards.

D. International Plumbing and International Mechanical Codes.

E. International Building Code.

F. ASHRAE Handbook(s).

G. See also, Section 230500, 1.2, Quality Assurance.

1.3 PRODUCTS

A. Horizontal End Suction Pump:

1. Single stage, flexible coupled, cast iron casing, renewable bronze, casing wearing rings, open type lubricable ball bearings, seal flush connection, drain plug, flanged connections, bronze impeller.

2. Seal: Carbon rotating against a stationary ceramic seat. Flexible coupling with guard.

3. In-Line Circulators: Single stage, direct connected, with resiliently mounted motor for in-line mounting, cast iron casing, flanged connections, bronze impeller, oil lubricated bronze sleeve bearings, alloy shaft with bronze sleeve and integral thrust collar, flexible coupling. All pumps requiring a coupling shall have a spare coupling.

B. IN-LINE PUMPS

1. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 175 psig maximum working pressure.

2. Casing: Cast iron, with flanged pump connections.

3. Impeller: cast bronze, keyed to shaft.

4. Bearings: Two, oil lubricated bronze sleeves.

5. Shaft: Alloy with bronze sleeve, integral thrust collar.

6. Seal: Carbon rotating against a stationary ceramic seat, 225 degrees F maximum continuous operating temperature. Furnish spare mechanical seal for pump.

7. Drive: Flexible coupling.

8. Motor: T frame, dripproof motor with lubricable ball bearings, zerk grease fittings, relief plugs, 1750 rpm.

END OF SECTION 232123

SECTION 232300 – REFRIGERANT PIPING

1.1 SUMMARY

A. Refrigeration piping systems and equipment for split air conditioning systems.

1.2 QUALITY ASSURANCE:

A. Standards:

1. International Building Code
2. International Plumbing Code
3. International Mechanical Code
4. Local Codes and Ordinances
5. State Pressure Vessel Regulations
6. EPA Requirements.
7. See also, Section 230500, 1.2, Quality Assurance.

1.3 PRODUCTS

A. Pipe: "ACR" Type L, hard drawing, degreased, sealed at mill copper tubing, ASTM B88-62, cleaned and sealed at the mill. Pre-charged refrigerant lines shall not be used.

B. Fittings: Long radius, wrought copper type equal to Mueller Streamline, ASA B16.22.1963.

1.4 VALVES, SPECIALTIES, ETC:

A. Filter-Dryer: On lines smaller than 3/4" O.D. filter-dryer shall be a sealed type using male flare fittings. Size shall be full line size. Filter-dryer shall be Sporlan, Mueller or Alco.

B. Sight Glass: Shall be a combination moisture and liquid indicator with protection cap. Sight glass shall be Alco, Mueller, Sporlan or Henry. Size shall be full line size.

C. Flexible Connection: Corrugated bronze hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for system working pressure.

D. Solenoid Valve:

1. Valve: ARI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly with flared, solder, or threaded ends; for system working pressure. Stem shall permit manual operation in case of coil failure.

2. Coil Assembly: UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box 24 volt, confirm and coordinate with DDC controls.

E. REFRIGERANT AND LUBRICATING OIL:

END OF SECTION 232300

SECTION 233100 - DUCTWORK

1.1 SUMMARY

A. Types of ductwork required for the project include the following:

1. Round
2. Rectangular
3. Oval
4. Spiral
5. Factory
6. Underground
7. Factory duct
8. Welding exhaust

1.2 QUALITY ASSURANCE:

A. Codes and Standards:

1. SMACNA Standards: Comply with SMACNA "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.

2. ASHRAE Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1 "Duct Construction", for fabrication and installation of metal ductwork.

3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air-Conditioning and Ventilating Systems" and NFPA 90B "Standard for the Installation of Warm Air Heating and Air-Conditioning Systems".

4. International Building Code/International Mechanical Code: Comply with all sections pertaining to mechanical work.

5. Field Reference Manual: Have available for reference at project field office, copy of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".

6. See also, Section 230500, 1.2, Quality Assurance.

1.3 PRODUCTS

A. Ductwork - General:

1. Standards: All duct fabrications shall comply with standards and techniques detailed by SMACNA "Duct Construction Manuals" for the appropriate pressure class, and with the ASHRAE Handbook,.

2. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality, with G 90 zinc coating in accordance with ASTM A 525; mill phosphatized for exposed locations.

B. Low Pressure Ductwork:

1. SMACNA 2” Pressure Class.

C. Medium Pressure Ductwork:

1. SMACNA 6” Pressure Class.

D. Underground Ductwork:

1. Shall be constructed of fiberglass reinforced plastic.

E. Factory Duct:

1. Extent of Work: Provide factory duct with a maximum length of 1’-0” at connections to air terminal units, at runouts to grilles and diffusers, at points of round to round flexible connections and at other locations indicated or required.

2. Factory Duct Noncorrosive Environments: Woven fiberglass fabric impregnated with vinyl or neoprene clamped in a continual helix of aluminum or cold rolled steel. U.L. listed for Class 1 duct, compliant with NFPA 90A and 90B, pressure rated to 12” w.g., insulated.

F. Miscellaneous Ductwork Materials:

1. Acoustical Lining: Acoustical lining in ducts shall be 1" thick, 1-1/2 pound density, coated, flexible glass fiber type with no sharp protrusions.

G. Seal ductwork to SMACNA seal Class A.

END OF SECTION 233100

SECTION 233300 - DUCTWORK ACCESSORIES

PART I - GENERAL

1.1 SUMMARY:

A. Types of ductwork accessories required for project include the following:

1. Dampers.

a. Low pressure balance dampers.

2. Fire and smoke dampers.
3. Turning vanes.
4. Flexible connections.
5. Sound Traps.

1.2 QUALITY ASSURANCE

A. Codes and Standards:

1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".

2. Industry Standards: Comply with ASHRAE recommendations pertaining to construction of ductwork accessories, except as otherwise indicated.

3. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers".

4. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of ductwork accessories.

5. See also, Section 230000, 1.2, Quality Assurance.

1.3 PRODUCTS

A. DAMPERS:

1. Balance dampers.

a. Flat blade with locking quadrant.

2. Control dampers

a. For outside air and other damper systems. Low leakage type with spring loaded side seals, inflatable butyl or neoprene fabric edge seals, bronze or Teflon bearings, reinforced galvanized steel blades. Parallel action. Air leakage not to exceed 10 CFM per square foot at 4” upstream static pressure.

B. COMBINATION FIRE/SMOKE DAMPERS:

1. Galvanized hat-shaped steel channel frame, steel airfoil shaped double skin construction blades, silicone rubber blade edge seals, flexible compression jamb seals. Stainless steel bearings, fusible link UL 555S, leakage Class I. Damper and operator are to be qualified for 350°F temperature categories. Damper and operator to be normally closed. U.L. Label on all dampers required. Use electronic actuator.

2. Furnish fire/smoke dampers with factory installed position switches for wiring open and closed signals to HVAC monitoring system.

C. TURNING VANES:

1. Provide single thickness radius turning vanes in wall elbows.

D. FLEX CONNECTIONS:

1. Provide flex connections on the discharge and intake of all vibrating equipment.

E. SOUND TRAPS

1. Material: Steel shell, perforated steel partitions, packed mineral or fiberglass filter material.

END OF SECTION 233300

SECTION 233416 – CENTRIFUGAL FANS

1.1 SUMMARY

A. Centrifugal Fans

1.2 QUALITY ASSURANCE

A. Codes and Standards:

1. AMCA Compliance: Provide centrifugal fans bearing the AMCA Certified Ratings Seal. Sound rate centrifugal fans in accordance with AMCA 300 “Test Code for Sound Rating Air Moving Devices”.

2. ASHRAE Compliance: Test and rate centrifugal fans in accordance with ASHRAE 51 (AMCA 210) “Laboratory Methods of Testing Fans for Rating”.

3. UL Compliance: Provide centrifugal fan electrical components which have been listed and labeled by UL.

4. International Building Code/International Mechanical Code: Comply with all sections pertaining to mechanical work.

5. See also, Section 230000, 1.2, Quality Assurance.

1.03 PRODUCTS

A. Centrifugal Fans:

1. Non-overloading double width, double inlet type with backward inclined air foil blades all steel construction. Die-formed wheels with blades continuously welded flange, cast iron hubs, inlet bells with inlet guides.

2. Fan shafts shall be ground and polished medium open-hearth steel positively locked to the wheel and bearings. Bearings shall be heavy duty, self-aligning, foot-mounted, ball and roller pillow block type with a C10 life of 150,000 hours at maximum operating conditions. Bearings shall be supported on structural steel bases.

3. The entire rotating assembly shall be designed so that the critical speed shall be at least 25% greater than the fan design speed. All fans shall be statically and dynamically balanced in the factory and given final testing with the motor and drive in place.

4. Centrifugal fans wheel imbalance shall not be greater than 0.1" per second when measured on the bearings supports.

5. The drive shall be V-belt with variable pitch sheaves or fixed pitch where a Variable Frequency Drive is used on the motor. Provide removable belt guards. Motors shall match variable frequency drive supplied.

6. The fan bases shall be all steel concrete filled and carry both fan and motor. The fan shall be braced angularly. The fan and frame shall be prime coated and finished in baked enamel.

7. Provide a scroll access door and inlet guards.

8. Size and arrangement as shown on the drawings.

END OF SECTION 233416

SECTION 233423 - POWER VENTILATORS

PART 1 - GENERAL

1.1 SUMMARY:

A. Types of power and gravity ventilators specified in this section include the following:

1. Power ventilators.

a. Relief Air Propeller Fans.
b. Roof Mounted Relief air fan.
c. Ventilation Air Propeller Fans.
d. Centrifugal Curb Mounted Exhaust Fans.
e. Roof Mounted Exhaust Fans.
f. Ceiling Exhaust Fans.

1.2 QUALITY ASSURANCE:

A. Codes and Standards:

1. AMCA Compliance: Provide power ventilators which have been tested and rated in accordance with AMCA standards, and bear AMCA Certified Rating Seal.

2. UL Compliance: Provide power ventilators which are listed by UL and have UL label affixed.

3. NEMA Compliance: Provide motors and electrical accessories complying with NEMA standards.

4. See also, Section 230500, 1.2, Quality Assurance.

1.3 PRODUCTS

A. PANEL TYPE FANS: (Propeller Fans) (Relief and Ventilation)

1. Extent of Work: Furnish and install required panel (propeller) type wall fans, complete with fan, drive, motor, inlet/discharge bell, protective guard, dampers with actuators where required, louvers, bird screens.

2. Fans Steel Blade: Direct or belt driven with heavy duty stamped steel propellers riveted to a formed steel spider. Frame and venturi of reinforced steel construction with bolted assembly for future removal and repair. Fit with lubricable ball or thrust type roller bearings with a 150,000 hour rated service life. Provide a V-belt drive rated for 165% of motor nameplate

horsepower, variable pitch through 5 hp. Mount motor on an adjustable base.

3. Fans Cast Aluminum Blade: Direct or belt driven with heavy duty cast aluminum propeller blades locked into a cast aluminum hub in an adjustable and replaceable configuration. Frame and venturi of reinforced steel construction, with bolted assembly for future removal and repair. Fit with lubricable ball or thrust type roller bearings with 150,000 hour rated service life. Provide a V-belt drive rated for 165% of motor nameplate horsepower, variable pitch through 5 hp. Mount motor on an adjustable base.

4. Accessories: Damper and louver with bird screen assemblies as required. Protective guards in a removable configuration as required.

B. ROOF MOUNTED RELIEF AIR FANS:

1. General: Weatherproof dome type, beltdrive, size and capacity as scheduled on drawings. AMCA rated and labeled.

2. Heavy gauge spun aluminum housing, heavy gauge base, fan curb.

3. Aluminum alloy centrifugal non overloading fan wheel, backward inclined type, statically and dynamically balanced.

4. Heavy duty, self aligning ball bearings, grease lubricated, with zerk fittings.

5. Adjustable pulleys.

6. Motor and shaft mounted on vibration isolators. Motor and components completely out of air stream. Fresh air for motor cooling shall be drawn into the motor compartment from an area free of discharge containments.

7. Accessories: Bird screen, insulated sound curb to raise fan 12" above roof.

C. ROOF MOUNTED EXHAUST AIR FANS:

1. General: Weatherproof top horizontal type belt drive, explosion/spark proof, size and capacity as scheduled on drawings. AMCA rated and labeled.

2. Heavy gauge spun aluminum housing, heavy gauge base, hinged fan curb to allow access.

3. Aluminum alloy centrifugal non overloading fan wheel, backward inclined type, statically and dynamically balanced.

4. Heavy duty, self aligning ball bearings, grease lubricated, with zerk fittings.

5. Adjustable pulleys.

6. Motor and shaft mounted on vibration isolators. Motor and components completely out of air stream.

7. Furnish with motorized damper. Damper to open when fan runs. Damper motor to be out of the airstream.

END OF SECTION 233423

SECTION 233600 – AIR TERMINAL UNITS

1.1 SUMMARY

A. Air Control Valves.

1.2 QUALITY ASSURANCE:

A. Codes and Standards:

1. ARI Compliance: Provide air terminals which have been tested and rated in accordance with ARI 880 "Industry Standard for Air Terminals" and bear ARI certification seal.

2. NFPA Compliance: Construct air terminals using acoustical and thermal insulations complying with NFPA 90A "Air Conditioning and Ventilating Systems".

3. International Building Code/International Mechanical Code: Comply with all sections pertaining to mechanical work.

4. See also, Section 230000, 1.2, Quality Assurance.

1.3 PRODUCTS

A. SINGLE DUCT VARIABLE VOLUME COOLING WITH HW HEATING (VAVR):

1. General: Provide factory-fabricated and tested air terminal as indicated, selected with performance characteristics which match or exceed those indicated on the schedule. Vendor/Contractor to verify count and arrangement.

2. Construction: Factory fabricate VAV damper and heating coil into a single cabinet. Cabinet shall be of 22 gauge or heavier galvanized steel with a 1" thick acoustical lining. VAV damper shall be of air-tight, quarter turn design with shaft supported in sintered bronze or nylon bearings. Design with extension plenum, with access door ahead of coil for coil inspection and cleaning.

   Position terminal units to provide a minimum clear access of 30” x 30” to points requiring service/maintenance.

3. Controls: Direct digital control setup with direct interface with DDC system. Include a:

   a. Pressure independent digital electronic controller.
   b. VAV damper control, normally closed, (NC).
   c. Cross flow pressure sensor or heated wire anemometer velocity sensor for each box.

4. Heating Coils: Rows as required, max 8 FPI.

    a. Fins: Corrugated plate sheet aluminum.

    b. Tubes: Copper tube, expand tube into fins.

    c. Headers: Seamless Type K or L copper tube headers and return bends, brazed connections.

    d. Casings: Construct of 16 gauge continuous coated galvanized steel with fins recessed into channels to minimize air bypass.

    e. Testing: Air tested under water to 175 psig.

    f. The successful supplier shall include as part of the submittal, computer generated capacity data for each coil. Certify coil capacities, pressure drops, and selection procedures in accordance with ARI 410.

END OF SECTION 233600

SECTION 233723 – AIR OUTLETS AND INLETS

1.1 SUMMARY

A. Types of outlets and inlets required for project include the following:

1. Ceiling air diffusers and grilles.
2. Wall registers and grilles.
3. Louvers.
4. Exhaust roof caps.

1.2 QUALITY ASSURANCE

A. Codes and Standards:

1. ARI Compliance: Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".

2. ASHRAE Compliance: Test and rate air outlets and inlets in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".

3. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".

4. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.

5. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

6. See also, Section 230000, 1.2, Quality Assurance.

1.3 PRODUCTS

A. Grilles and Diffusers:

1. Ceiling Supply Diffuser: Square face, round neck, four-way deflection, with adjustable tabs for directional air flow control, anti-smudge design, removable inner core, all steel construction, appropriate mounting frame, white baked enamel finish, sponge rubber gasket.

2. Ceiling Supply Diffuser: Square face, one, two three or four way blow as required. Square neck, opposed blade volume damper, anti-smudge border, all steel, white baked on enamel.

3. Sidewall Supply Register: Adjustable, double deflection blades, 3/4"maximum blade spacing, integral volume damper in addition to duct

damper, appropriate mounting frame, sponge rubber gasket, anodized aluminum finish.

4. Slot Diffuser: 3/4" slot, adjustable vanes for varying volume and direction of throw. All aluminum extruded construction.

5. Slot Diffuser: Extruded aluminum, 1" slot, curved to match curvature of ceiling. Curve to be verified with architectural drawings and in the field. Alternate air flow direction out of diffuser every 24". Plenums shall be minimum 24 gauge galvanized steel and line inside with black matte fiberglass insulation.

6. Perforated Return Register: Concealed hinge frame, opposed blade volume control damper, sponge rubber gasket, white baked-on enamel, color as selected by architect.

7. Sidewall Return Register: Heavy duty steel construction, horizontal blades with 1/2" spacing, integral opposed blade damper, appropriate mounting frame, sponge rubber gasket, baked enamel finish, color selected by Architect.

8. Eggcrate Exhaust Register: All aluminum construction with opposed blade volume control damper, 2" square core, appropriate mounting frame, sponge rubber gaskets, clear lacquer on satin aluminum finish, 90% minimum free area, size as shown on drawing.

B. Louvers:

1. Material: Blades shall be on 3-1/2" centers with integral downspouts. Stationary louvers shall pass 1000 fpm free area velocity with less than 0.2" static pressure drop and shall carry less than .03 ounces of water per square foot when tested in accordance with AMCA Standard 500. Install bird/insect screens on interior face of louver.

END OF SECTION 233723

SECTION 234100 - AIR FILTERS

PART 1 - GENERAL

1.1 SUMMARY:

A. Types of air cleaning equipment specified in this section include the following:

1. Filter Holding Systems.

   a. Side Servicing Housings.
   b. Type B Frame for built up filter banks.

2. Air Filters.

   a. Replaceable (throwaway).
   b. Extended surface self-supporting.

3. Filter Gages.

B. Filter sections of packaged air handling units are work of this section.

1.2 QUALITY ASSURANCE:

A. Codes and Standards:

1. UL Compliance: Comply with UL Standards pertaining to safety performance of air filter units.

2. ASHRAE Compliance: Comply with provisions of ASHRAE Standard 52 for method of testing, and for recording and calculating air flow rates.

3. ARI Compliance: Comply with provisions of ARI Standard 850 pertaining to test and performance of air filter units.

4. See also, Section 230500, 1.2, Quality Assurance.

1.3 PRODUCTS

A. AIR FILTERS:

1. Holding Frames: Suitable for filters specified.

   a. Furnished with package air handling systems.
   b. Field fabricated for built-up system - 16 gauge galvanized steel minimum.
   c. Filter bank sizes as shown on drawings.

2. Type 1: Replaceable flat media. For termination heating coil (MERV 5).

    a. Flat panel non-woven cotton fabric in a cardboard holding frame, 1" thick. .26" s.p. initial pressure drop, to change out at 0.50", 20% average efficiency on 85% average arrestance on ASHRAE Test 52-76.

3. Type 2: Replaceable pleated media type filters.

    a. Pleated, medium efficiency in a cardboard holding frame, 2" or 4" thick as scheduled, 0.32" s.p. maximum initial pressure drop at 500 feet/minute, to change out at 0.50". U.L. Class 2, 30-35% efficiency (MERV 8), 90-95% arrestance per ASHRAE Standard 52-76.

4. Type 3: Replaceable rigid cell 80-85% efficiency (MERV 13).

    a. Waterproof glass media, folded, separated and supported, reinforced steel enclosure, capable of withstanding a 10" pressure differential. 0.2" s.p. maximum static pressure drop at 250 fpm, to change out at 1.0".

5. Filter Gauges:

    a. Inclined tube manometer, oil filled type equivalent to Dwyer 250-AF. 0-1" range for flat filters, 0-3" range for high efficiency rigid or lag filters, other gauges to match filter range, or use Magnehelic gauges similar range.

    b. Furnish with mounting bracket, pressure tips, tubing vent/zero valves.

6. Startup Set:

    a. Install a set of Type 2 filters immediately upon fabrication of any filter bank. Install scheduled set of Type 2 and Type3 filters in each air handling system at completion of construction at the time of testing and balancing.

END OF SECTION 234100

SECTION 235200 – GAS FIRED HEATING WATER BOILERS

1.1 SUMMARY

A. Types of boilers specified in this section include the following:

1. Complete factory assembled natural gas fired boilers

1.2 QUALITY ASSURANCE

A. Codes and Standards:

1. Boiler shall be CSD-1 and Factory Mutual certified and have IBR approved ratings.

2. Bearing ASME stamp for 60 psi working pressure.

3. UL listed and so labeled burner and controls.

4. Local Boiler Code

1.3 PRODUCTS

A. Water Tube Boilers:

1. Pressure Vessel:
   a. Boiler:
      i. All welded steel construction.

      ii. Designed and constructed with adequately sized upper drums, water legs and tube headers to provide proper thermal internal water circulation.
   b. Tubes:
      i. 1" (38 mm) OD, 13 gauge (2.4 mm) minimum steel.

      ii. Flexible serpentine bend, four pass design, not subject to thermal shock damage.
   c. Access:
      i. Individual tubes, removable and replaceable without requiring welding or rolling.

      ii. Removal or replacement of tubes shall be accomplished without entry into combustion chamber or major disassembly of jacket.

   d. Furnished with adequate number of tappings and inspection openings to facilitate internal boiler inspection and cleaning.

2. The boiler shall be properly insulated and completed with a heavy gauge, rust resistant, zinc-coated steel casing, finished with suitable heat resisting paint. The boiler shall have an air cooled outer jacket. The flue collector shall be completely insulated. The flue collector access door shall be easily removable and reinstalled and the entire tube area shall be easily accessible for fireside cleaning.

3. Gas Burner:
   a. Forced draft, flame retention gas burner.
   b. Complete with integral motor and blower for supplying sufficient combustion air with normal vent conditions.
   c. Modulating Gas Burner with IRI gas train. Minimum turn down 2:1.

4. Controls and Trim:
   a. Combination thermostat and pressure gauge
   b. Water temperature control - operator
   c. High level limit safety control
   d. Low water cut-off (probe type)
   e. ASME safety relief valve
   f. Automatic gas valve operator
   g. Auxiliary safety shut-off gas valve
   h. Pilot solenoid valve
   i. Pilot ignition assembly
   j. Ignition transformer
   k. Main manual gas shut-off valve
   l. Pilot cock
   m. Pilot and main gas pressure regulators for 4 oz. main line gas service.
   n. Air safety switch
   o. Electronic combustion safety control with UV scanner.
   p. Honeywell boiler controller with sub-base, purge card, amplifier, relay module and keyboard display.

5. Boiler Alarm Points, i.e. high level limit safety, low water cut-off, flame fail, low gas pressure, and high gas pressure shall be factory wired to an alarm relay and terminated at labeled terminal strip in the boiler control panel for remote monitoring of a common boiler alarm.

END OF SECTION 235200

SECTION 235700 - HEAT EXCHANGERS FOR HVAC

1.1 SUMMARY

A. Shell-and-tube heat exchangers.

1.2 QUALITY ASSURANCE

A. Quality Standard: ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

1.3 PRODUCTS

A. Shell-and-Tube Exchangers:

1. Configuration: U-tube with removable bundle.
2. Shell Material: Steel.
3. Head Material: Cast iron.
4. Tube Material: Seamless copper.
5. Tubesheet Material: Steel.
6. Baffle Material: Steel.
7. Piping Connections:

   a. Shell: Flanged inlet and threaded outlet fluid connections, threaded drain, and vent connections.
   b. Head: Flanged inlet and outlet fluid connections.

8. Support Saddles: Fabricated of material similar to shell. Foot mount with provision for anchoring to support.

END OF SECTION 235700

SECTION 236400 – WATER CHILLER

1.1 SUMMARY

A. Chiller: Manufacturer to design, fabricate, test and deliver electric driven, vapor compression refrigeration machine with configuration and capacities as specified.

1.2 QUALITY ASSURANCE

A. ARI Compliance: Test and rate chiller in general accordance with ARI Standard 550-2003, except without condenser water temperature relief. Chillers shall also bear ARI certification label.

B. ASHRAE Compliance: Construct and assemble chiller in accordance with ASHRAE Standard 15, Safety Code for Mechanical Refrigeration. Provide Energy Efficiency Ratio (EER) for helical chillers not less than prescribed by ASHRAE Standard 90A. See bidding format for additional requirements (Chiller Evaluation Form).

C. National Electric Code (NEC) Compliance: Comply with applicable NEC requirements pertaining to electrical power and control wiring for construction of chiller.

D. ANSI Compliance: Comply with ANSI B9.1 safety code requirements pertaining to unit construction of chiller.

E. ASME Compliance: Construct and test liquid chiller in accordance with ASME Boiler and Pressure Vessel Code, Section 8. Stamp units with ASME mark when units have been successfully built and tested in accordance with ASME Code.

F. Pressure test and ASME stamp vessels and tube bundles for refrigerant working side pressure of not less than 15 psig (R-123), 150 psig (R-134a), 300 psig (R-22), and water side pressure of not less than 150 psig (1,034 kPa).

G. Conform to UL 1995 for Safety for Heating and Cooling equipment.

H. Unit shall conform to SAE-14S1738.

1.3 PRODUCTS

A. CHILLER:

1. General: Furnished, installed and warranted by Contractor. Packaged rotary screw compressor liquid chiller including evaporator, compressor and motor, thermal expansion valve, control panel, water-cooled condenser, refrigerant piping, and all auxiliaries needed for safe, controlled automatic operation of the chiller.

2. Material:

a. Evaporator: Shell and tube design with refrigerant in the tubes and water in the shell. Tubes shall be 0.028” enhanced bore seamless copper roller expanded into tubes sheets. Tubes shall be individually replaceable and externally finned. Flanged water side connections. Provide vent and drain connections and bulb wells for temperature controller and low temperature cutout. The evaporator shall have a design working pressure of 150 psig (water side) and 235 psig (refrigerant side). The refrigerant side shall be constructed and tested in accordance with the ASME pressure vessel code, action VIII, Division 1. The waterside is exempt per Paragraph U-1, (c) (6) of the ASME code, section VIII, Division 1.

b. Condenser: Cleanable through-tube type with steel shell, 0.035” copper tubes, with smooth bore, external fins, roller expanded into sheets, individually replaceable, roller removable water heads, and integral subcooling. The shell will be constructed and tested in accordance with section Vll, division 1 of the ASME pressure-vessel code. The condenser is equipped with relief valves and will hold the full refrigerant charge for pumpdown.

c. Compressor Continuous function, microprocessor controlled, 3-way proportional Capacity Control Valve for a stable, smooth, and precise match of compressor capacity to cooling load to 10% of chiller capacity. Automatic spring return of capacity control valve. Internal discharge check. Suction gas cooled, high efficiency, accessible hermetic motor with APT2000 type magnet wire and redundant overload protection using both thermistor and current overload protection. Suction gas screen and serviceable, 0.5 micron full flow oil filter within the compressor housing. Cast iron compressor housing. Entire compressor, from suction to discharge has a Design Working Pressure of 450psig (31 bar). 350W compressor body cartridge heater. Each compressor will be mounted on isolator pads to reduce transmission of vibration to the rest of the unit.

d. Lubrication: Provide unit with an oil separator on the discharge of the compressor. Provide oil charging valve, crankcase oil level sight glass, oil filter and magnetic plug or strainer. Provide with a full charge of refrigerant and oil.

e. Insulation: Provide 3/4" closed-cell insulation (K = 0.25) on all low temperature surfaces.

3. Control Panel: The chiller shall be controlled by a stand-alone direct digital control (DDC) system. The controller shall provide chiller capacity control in response to the leaving chilled water temperature.

4. Starter: Provide a unit-mounted NEMA 1 enclosure with the following:

    a. Power controls for wye-delta start.
    b. Control power transformer or terminal block for 115V control voltage.
    c. Compressor starter relays.
    d. Non-recycling compressor overload device.
    e. Unit mounted disconnect switch.
    f. Three-phase solid-state overload protection.

5. Accessories: Provide the following accessories:

    a. Solid-state chilled water temperature sensor.
    b. Load limit thermostat.
    c. Suction, discharge, and oil pressure gauges.
    d. Compressor back seating seal-cap suction and discharge service valves.
    e. Vibration isolators with seismic snubbers.
    f. Manual pump down switch.
    g. Sound isolation enclosure.
    h. Unit mounted disconnect switch(es).
    i. Flow Switches for Chilled Water and Condensing Water.
    j. Panel mounted factory wired control transformer.

END OF SECTION 236400

SECTION 236500 – COOLING TOWER

1.1 SUMMARY

A. The towers shall be of the induced draft, propeller fan, crossflow type.

1.2 QUALITY ASSURANCE

A. UL and NEMA Compliance: Provide electric motors and electrical components required as part of factory-fabricated cooling towers and equipment, which have been listed and labeled by UL and comply with NEMA standards.

B. The tower shall include all design and material modifications necessary to meet the fire rating requirements of Factory Mutual. The product shall be listed in the FM Approval Guide, latest edition.

C. The thermal rating of the cooling tower shall be certified by the Cooling Technology Institute.

1.3 PRODUCTS

A. Cooling Tower

1. Construction: Structural components of the tower, including the cold water basin, framework, mechanical equipment supports, casing, hot water basin, fan deck, and fan cylinder shall be fabricated of heavy-gauge steel, protected against corrosion by G-210 galvanizing. All components subjected to factory welding shall be hot dip galvanized after completion of fabrication to a zinc thickness equivalent of G-210. Cold galvanizing is not acceptable. The exterior of the unit shall be coated with zinc chromatized aluminum paint. Provide a vibration switch mount switch per factory recommendations. Wire to fan control circuit.

2. Motor: Motor shall be of the scheduled horsepower, TEFC, 1.15 service factor, and specially insulated for cooling tower duty. Electrical characteristics shall be single-winding, voltage as scheduled. Mount on an adjustable base to be accessible from outside the unit. Provide a swing-away protective weather cover.

3. Mechanical Equipment: Fan shall be propeller type, incorporating heavy-duty, cast aluminum blades. The fan drive shall be a multi-groove belt type, specifically designed for cooling tower service. The mechanical equipment shall be structurally supported independent of the casing, and shall be installed and adjusted to proper fan tip clearance at the factory. If mechanical equipment is field installed, a factory-trained technician shall be provided to supervise installation at site. With the exception of the motor itself, the mechanical equipment system shall be warranted against any failure caused by defects in materials and workmanship for a period of 5 (five) years from date of tower shipment. This warranty shall

cover the fans, speed reducers, couplings or belts, and the mechanical equipment supports.

4. Fill, louvers and drift eliminators: Fill shall be inert fire resistant PVC of cross-fluted design. Flame speed rate of 25 or less per ASEM E84 tunnel test. Fill shall be suspended from hot dip galvanized structural tubing supported from the upper tower structure, and shall be elevated above the floor of the cold water basin to facilitate cleaning. Air inlet faces of the tower shall be free of water splash-out. Guaranteed drift losses shall not exceed 0.002% of the design gpm. Louvers shall be inert PVC, mounted in an easily removable frame and create at least two changes in air direction. The eliminators shall be inert PVC and change air direction three times. Provide bird screen and fan guard.

5. The spray header and branches shall be schedule 40 PVC with steel 6" connection. Piping is to be removable. Water is distributed by precision molded ABS spray nozzles with 3/8" x 1" orifice.

6. Cold water basin and accessories: The cold water basin shall be completed and sealed at the factory. Tower shall be provided with a side outlet sump connection, located on the tower bottom. Sump connections shall have 8" dia. Opening and bolt circle to accept 125 lb. Flange connection. Suction connection shall include a protective screen and anti-cavitation device. A 3" diameter galvanized standpipe overflow shall be provided in the tower. Overflow shall be removable to permit flush-out cleaning of the basin. All basin accessories shall be easily accessible through large hinged access doors at each end of the tower.

7. In the side of the tower basin provide a 1-1/2" npt couplings factory installed and sealed. Provide float type water makeup assembly.

8. Basin electric immersion heater assembly, complete with thermostat, low water cut-off, low voltage control transformer and electric relay contractors mounted in a waterproof NEMA 4 enclosure. The heaters shall consist of one or more stainless steel electric immersion heaters installed in threaded couplings provided in the side of the basin. A control probe shall be located in the basin to monitor water level and temperature.

END OF SECTION 236500

SECTION 237200 - AIR-TO-AIR ENERGY RECOVERY EQUIPMENT

1.1 QUALITY ASSURANCE

A. Quality Standard: ASHRAE 62.1, UL 1812, UL 1815, and UL 1995.

1.2 PRODUCTS

A. Heat Wheels: Steel casing with integral purge section, aluminum rotor with silica-gel desiccant coating, and motor drive.

1. Controls: Factory mounted.
2. Filters: Extended surface, disposable panel.

B. Heat-Pipe Heat Exchangers: Copper tubes and aluminum fins.

1. Refrigerant: ASHRAE 15, Group 1..
2. Coating: Thermoplastic vinyl.
3. Control: Face and bypass.

END OF SECTION 237200

SECTION 237323 – CUSTOM INDOOR CENTRAL-STATION AIR HANDLING UNITS

1.1 SUMMARY

A. Custom Air Handling Units

1.2 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of packaged air-handling units with characteristics, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years

B. Codes and Standards:

1. AMCA Compliance: Test and rate air handling units in accordance with AMCA standards.
2. ARI Compliance: Test and rate air handling units in accordance with ARI 430 "Standard for Central-Station Air Handling Units", display certification symbol on units of certified models.
3. ASHRAE Compliance: Construct and install refrigerant coils in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration".
4. NFPA Compliance: Provide air handling unit internal insulation having flame spread rating not over 25 and smoke developed rating no higher than 50; and complying with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
5. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of air handling units.
6. International Building Code/International Mechanical Code: Comply with all sections pertaining to mechanical work.
7. See also, Section 230500, 1.2, Quality Assurance.

1.3 PRODUCTS

A. General: Provide factory-fabricated and factory tested air handling units as indicated, of sizes and capacities as scheduled, and as specified herein.

1. Air Handling Systems:

a. Each system shall be factory-assembled by a single manufacturer, except for those items requiring field installation such as temperature control components.

Each system shall be mounted on a common channel frame.

Each system shall be prime coated inside and out prior to any insulating and finished with a baked-on enamel finish.

Provide access doors to service all internal components. Where unit sizes are large enough, access doors shall be of a size capable of allowing a man to pass through. Each door shall have a minimum of 2 or more heavyduty hinges and 2 or more quickopening latches.

Doors shall be operable without the aid of any tools. Each door shall seal air tight with a continuous sponge rubber or inflatable neoprene gasket.

B. Equipment:

1. Plenum section(s): That portion of the unit which houses fans, filters, mixing sections, etc., or a blank section. These sections shall be double wall, fully lined with 2" thick 11/2 lb density fiberglass insulation. The fiberglass shall be glued and fastened to the cabinet wall with stick clips. Provide hinged access doors with quick-release handles and neoprene gaskets to all internal components. Do not use sheet metal screws for panel fasteners. The entire unit shall be prime coated inside and out prior to insulation, then finished in a baked-on enamel finish. Mount all sections on common channel iron frame. Cabinets shall be constructed of not lighter than 16 gauge steel.

2. Fan section: AF Centrifugal DWDI Shall be of medium pressure design and construction. Each fan shall be statically and dynamically balanced, double width, double inlet with fan wheels as noted. The motor and drive shall be mounted internal to the unit with the fan on a common spring isolated frame. Provide factory-installed seismic restraints at each corner of the isolated fan and motor frame (4 required per fan). The spring-type vibration isolators shall have a minimum of 1-1/2" deflection under operating condition. Provide a flex connection between the fan discharge and the cabinet supply collar. Provide extension tubes with zerk fittings to all bearings. Access doors shall be located on both sides of the unit. The supply fan section shall have the capacity to supply the scheduled cfm at the scheduled static pressure. The fan/motor combination shall come up to speed in 10 seconds or less. Refer also to Section 233416 – Centrifugal fans.

3. Filter section: Shall house Type 2, 2" filters in slide-in angle arrangement holding frame. Access doors on both sides of section. Provide two sets of filters: one for construction use; the second set for owner use. See Section 234100.

4. Cooling coil: See Section 238219.

5. Heating coil: See Section 238219.

6. Mixing damper section: Shall be the section which houses the outside air damper and return air damper. High efficiency, high quality, low leakage type, with neoprene blade seals and edge seals. Return air dampers shall be of the same high quality. The dampers shall have a linear type operation. Dampers shall rotate in nylon rustproof type bushings. All dampers shall be parallel blade unless noted otherwise. The dampers shall be factory installed.

7. Minimum outside air damper: Furnish and install on integral air monitor/damper that shall control the minimum amount of outside air as recommended by ASHRAE Standard 62. The integral damper/monitor assembly shall incorporate an air straightener vane to ensure proper airflow readings.

8. Each air monitor/damper shall include a modulating motor and an application specific controller designed for this application furnished by the damper manufacturer. The controller shall be capable of direct communication between the unit and the Campus Direct Digital Control (DDC) System. Each integral air monitor/damper shall be calibrated in an AMCA registered laboratory and a certification chart shall accompany the air monitor/damper.

C. COIL DRAIN PANS:

1. Coil Drain Pans: Provide stainless steel, IAQ compliant, coil drain pans. Set coil into pans to catch all drips. Extend drain outlet to outside cabinet.

END OF SECTION 237323

SECTION 237613 – AIR WASHER

1.1 SUMMARY

A. Air Washer

1.2 QUALITY ASSURANCE

Codes and Standards: Comply with applicable sections, follow recommended practices.

1.3 PRODUCTS

A. Casing:
   1. Assembly: 14 Gauge Galvanized steel, reinforced and braced with galvanized steel angles, cadmium plated cap screws. Furnish with gasket and flange pipe penetrations, inspection panels, access doors, and other openings in casing.

B. Drain Tank:
   1. Tank: Welded 10 gauge. 304 stainless steel.
   2. Connections: adjustable float valve assembly with brass rod and float; drain and overflow with removable copper suction screen.
   3. Fabrication: Lap and weld corners watertight. Weld fittings and piping supports to tank.

C. Piping: Stainless Steel water distribution piping with balance valve and bleed off line extended to overflow drain.

D. Pumps:
   1. Spray Pump:
      a. Type: Horizontal shaft, Single stage,
      b. Case: Cast iron with gage ports, drain plug, flanged suction and discharge.
      c. Impeller: Bronze, fully enclosed, keyed to motor shaft extension.
      d. Shaft: Stainless steel.
      e. Seal: Carbon rotating against stationary ceramic seat.

E. Evaporative Media:

   1. Units shall use evaporative media which consists of specially corrugated cellulose material, impregnated with insoluble anti-rot salts and rigidifying saturants.

   2. Media shall be 12" with an evaporative cooling efficiency of at least 90 percent at 500 feet per minute face velocity with no entrainment of pad water into the air handling section.

END OF SECTION 237613

SECTION 238126 – SPLIT DX AC UNIT

1.1 SUMMARY

A. Types of split AC Units specified in this section include the following:

1. Wall Mounted indoor evaporator / fan unit, Roof mounted outdoor condensing unit.

1.2 QUALITY ASSURANCE

Codes and Standards: Comply with applicable sections, follow recommended practices.

1.3 PRODUCTS

A. Split A/C Outdoor Condensing Units: Outdoor mounted, air cooled unit with hermetic or rotary compressor, air cooled coil and propeller type cooling fan.

1. Cabinet: Cabinet shall be constructed of galvanized steel and finished with a baked enamel painting process. Unit access panels shall be removable and shall provide full access to all internal components.

2. Fans: Outdoor fans shall be direct-drive propeller type with totally enclosed single phase motors with class B insulation and permanently lubricated sleeve bearings. Motor shall be protected by internal thermal overload protection.

3. Compressor: Compressor shall be fully hermetic or scroll type compressor equipped with a complete oil system, operating oil charge and motor. Motor shall be equipped with internal overloads which protect the compressor from over temperature and over current. Scroll type compressors shall also be equipped with high discharge gas temperature protection.

4. Outdoor Coil: Coil shall be constructed of seamless copper tubes mechanically bonded to aluminum fins.
5. Refrigeration Circuit: Refrigerant circuit components shall include brass service valves and port connections, schrader type fittings with brass caps, accumulator, pressure relief, and a full charge of refrigerant.

6. Safeties: The condensing unit shall contain the following safety circuitry and components.

a. Time delay restart to prevent short cycling.
b. Auto restart on power failure.
c. High and low pressure switches.
d. High pressure relief.
e. Outdoor fan failure protection.

B. Split A/C indoor Fan Unit: Indoor wall mounted direct expansion unit with forward curved fan, cooling coil and micro-processor based controls in one cabinet.

1. Cabinet: Cabinet components including supply and discharge grilles shall be fabricated from high impact polystyrene. Cabinet shall be thermally and acoustically insulated to improve performance.

2. Fans: Fans shall be fabricated of high impact polystyrene and shall be forward curved i design for quiet operation. Fan motor shall be open drip proof permanently lubricated ball bearing type with inherent overload protection. Fan motors shall be 3 speed.

3. Coil: Coil shall be constructed of aluminum fins seamlessly bonded to copper tubes with galvanized steel tube sheets. A full length drip pan shall be provided.

4. Controls: Controls shall be microprocessor based and shall control space temperature, determine optimal fan speed, and run self diagnostics. The unit shall provide the following minimum control functions.

    a. Automatic reset function after power failure.
    b. 24-hour timer cycle for system auto start/stop.
    c. High discharge air temperature shutdown shall be provided.
    d. Indoor coil freeze protection.
    e. Wireless infrared remote control.
    f. Automatic air sweep control to provide equal air distribution to all areas.

C. Dehumidification mode shall be provided.
    a. Fan only operation.
    b. A time delay shall prevent compressor short cycling.

END OF SECTION 238126

SECTION 238216 - AIR COILS

PART 1 - GENERAL

1.1 SUMMARY:

A. Types of terminal units required for project include the following:

1. Heating coils.
2. Chilled water coils.

1.2 QUALITY ASSURANCE:

A. Codes and Standards:

1. ARI Compliance: Provide coil ratings in accordance with ARI Standard 410 "Forced-Circulation Air-Cooling and Air-Heating Coils".

2. ASHRAE Compliance: Test coils in accordance with ASHRAE Standard 33 "Methods of Testing Forced Circulation Air Cooling and Heating Coils".

1.3 PRODUCTS

A. HEATING AND COOLING COILS:

1. General: Provide coils of size and in location indicated, and of capacities and having performance data as scheduled. Certify coil capacities, pressure drops, and selection procedures in accordance with ARI 410.

2. Fins: Corrugated plate sheet aluminum, maximum fins per inch as scheduled, 0.01" sheet thickness minimum.

3. Tubes: Copper tube, 5/8" diameter, 0.035" tube, 0.049" bend wall thickness, expand tube into fins.

4. Headers: Seamless Type K or L copper tube headers, vented with intermediate row (headers fully drainable for chilled water coils) and return bends, brazed connections, threaded steel pipe connections. Add ball type drain and vent valves to each header in field. Chilled water coils shall be fully drainable with drain valve on each intermediate heater.

5. Casings: Construct of 16-ga continuous coated galvanized steel with fins recessed into channels to minimize air bypass.

6. Testing: Air tested under water to 175 psig.

7. Coil Types: Provide the following coil types as indicated, and as scheduled. 8 fins/inch maximum.

a. Heating Coils: Two rows minimum for heating media above 120°F, 4 rows minimum for heating media below 120°F unless otherwise noted. Maximum air pressure drop 0.25" for 2 row, 0.50" for 4-6 row, maximum water pressure drop 7 feet. 600 fpm maximum air velocity, 7 fpm maximum water velocity.

b. Cooling Coils: Eight rows minimum unless otherwise noted, 0.75" maximum air pressure drop, 15 feet maximum water pressure drop, 550 fpm maximum air velocity, 7 fpm maximum water velocity.

B. COIL DRAIN PANS: (Field Fabricated Systems)

1. Coil Drain Pans: Provide drain pans as suggested by detail on the drawings, lower pan of concrete sump with 304 or 316 stainless steel liner upper pans of 16 gauge galvanized steel, upper pan sections to drain to lower pan, lower pan at least 6" deep, sloped to drain, hold coil high enough to create a 6" trap off of the lower drain pan(s). Set coil into pans to catch all drips. Brace stacked coils for seismic restraint.

END OF SECTION 238216

SECTION 238239 – HW UNIT HEATERS

1.1 SUMMARY

A. Types of Unit Heater specified in this section include the following:

1. Building Heating Water, Horizontal mount.

1.2 QUALITY ASSURANCE

Codes and Standards: Comply with applicable sections, follow recommended practices.

1.3 PRODUCTS

A. Unit Heater (Hydronic)
1. Casings -
a. Have horizontal louvers and 18 ga back panels.
b. Phosphatized and painted with baked gray enamel.
2. Louver Fan Diffuser - Four-direction air control.
3. Fan - Aluminum blades
4. Coils - 0.031 inch thick wall suitable for 200 psig water pressure.
5. Fan motor.
6. Fan Guard.

END OF SECTION 238239

SECTION 250000 - AUTOMATION

1.1 SUMMARY

A. Building automation/control system.

1.2 QUALITY ASSURANCE:

A. CODES AND STANDARDS:

1. Electrical Standards: Provide electrical products which have been tested, listed and labeled by UL and comply with NEMA standards.
2. NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electric control systems.
3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.
4. Comply with NEPA 70, "National Electric Code" for all electrical installation.

1.3 PRODUCTS

A. Direct Digital Control System:

1. Integrate mechanical and electrical systems.
2. Provide microprocessor to microprocessor communication between DDC and:

a. Variable frequency drives (VFD's)
b. Air handlers
c. Electrical Distribution
d. Lighting
e. Emergency generator(s)
f. UPS systems
g. Variable air volume boxes with re-heat.
h. Computer Room Air Conditioning Equipment.
i. Minimum Outside Air Dampers.

3. Provide 15% reserve capacity for additional points.
4. Provide written sequence of operation on drawings for all systems controlled by DDC System.
5. Provide carbon dioxide (CO_2) monitoring system for demand controlled ventilation in accordance with ASHRAE fundamentals.

B. Control Cabinets: Furnish stamped steel with hinged door and locking latch control cabinets to protect and conceal all control devices.

C. Dampers:

1. Control dampers for outside air and other damper systems. Low leakage air foil type with spring loaded side seals, inflatable butyl or neoprene

fabric edge seals, bronze or Teflon bearings, reinforced galvanized steel blades. Parallel action. Air leakage not to exceed 1- CFM per square foot at 4” upstream static pressure.

END OF SECTION 25000

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

1.1 SUMMARY

A. Electrical equipment coordination, sleeves and sleeve seals for raceways and cables, and common electrical installation requirements.

1.2 MATERIALS

A. Sleeves for Raceways and Cables:
   1. Steel pipe sleeves.
   2. Cast-iron pipe sleeves.
   3. Sleeves for rectangular openings.

B. Sleeve Seals: Modular sealing devices with EPDM sealing elements, plastic, pressure plates, and carbon or -steel connecting bolts and nuts.

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

1.1 SUMMARY

A. Building wires, cables, connectors, splices, and terminations for wiring systems rated 600 V and less; and sleeves and sleeve seals for cables.

B. See Division 26 Section "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.

1.2 QUALITY ASSURANCE

A. Quality Standard: NFPA 70.

1.3 MATERIALS

A. Conductors and Cables:
   1. Conductors: Copper.
   2. Conductor Insulation: Types XHHW-2, THHN-THWN-2.

B. Connectors and Splices: Factory fabricated.

C. Sleeves for Raceways and Cables:
   1. Steel pipe sleeves.
   2. Cast-iron pipe sleeves.
   3. Sleeves for rectangular openings.

D. Sleeve Seals: EPDM sealing elements, plastic pressure plates, and carbon-steel connecting bolts and nuts.

1.4 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper, stranded for all sizes.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

1.5 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

B. Feeders: Type THHN-THWN-2, single conductors in raceway.

C. Branch Circuits: Type THHN-THWN-2, single conductors in raceway.

D. Branch Circuits Installed below Computer Room Raised Flooring: Type THHN-THWN-2, single conductors in liquid-tight flexible metal conduit.

E. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

F. Voltage Drop: Conductors shall be sized to limit voltage drop to 5% maximum at the furthest load from the panel with a 15 Amp load for 20 Amp circuits. For other circuits, the test load shall be the full load of the equipment served.

G. Class 1 Control Circuits: Type THHN-THWN, in raceway.

H. Class 2 Control Circuits: Type THHN-THWN, in raceway.

1.6 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1.1 SUMMARY

A. Methods and materials for grounding electrical systems and equipment.

1.2 QUALITY ASSURANCE

A. Quality Standard for Grounding Materials and Equipment: UL 467.

1.3 PRODUCTS

A. Insulated Conductors: Copper or tinned-copper wire and cable.

B. Bare Copper Conductors:
   1. Solid conductors.
   2. Stranded conductors.
   3. Tinned conductors.
   4. Stranded bonding conductors.
   5. Copper tape braided bonding jumpers.
   6. Tinned-copper braided bonding jumpers.

C. Connectors: Bolted and exothermic-welded type.

D. Grounding Electrodes:
   1. Ground Rods: Copper-clad steel.

1.4 GROUNDING APPLICATIONS

A. Conductors: Solid for No. 8 AWG and smaller; stranded for No. 6 AWG and larger.

B. Underground Grounding Conductors: Bare tinned-copper conductor, No. 4/0 AWG minimum.

C. Isolated grounding conductors.

D. Grounding bus.

E. Conductor Terminations and Connections: Bolted and welded.

F. Underground distribution systems.

G. Insulated equipment grounding conductors with circuit conductors in all raceways.

H. Signal and communication equipment.

I. Service and central equipment locations and wiring closets.

J. Terminal cabinets.

K. Metal poles supporting outdoor lighting fixtures.

1.5 FIELD QUALITY CONTROL

A. Ground Resistance Testing: By Contractor.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1.1 PERFORMANCE REQUIREMENTS

A. Rated Strength: Minimum structural safety factor of five times the applied force.

1.2 PRODUCTS

A. Support, Anchorage, and Attachment Components:
   1. Steel slotted support systems with metallic coatings.
   2. Raceway and cable supports.
   3. Steel and malleable-iron conduit and cable hangers, clamps, and associated accessories.
   4. Support for non-armored conductors and cables in vertical conduit risers.
   5. Structural steel for fabricated supports and restraints.
   6. Mounting, Anchoring, and Attachment Components:
      a. Powder-actuated fasteners.
      b. Mechanical-expansion anchors.
      c. Concrete inserts.
      d. Clamps for attachment to steel structural elements.
      e. All steel, springhead toggle bolts.
      f. Threaded hanger rods.

B. Fabricated Metal Equipment Support Assemblies: Welded or bolted steel shapes.

C. Concrete Bases: 3000-psi, 28-day compressive-strength concrete.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

1.1 SUMMARY

A. Raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 MATERIALS

A. Metal Conduit and Tubing:
   1. Conduit: Rigid steel and PVC-coated steel.
   2. IMC and PVC-coated IMC.
   3. EMT.
   4. FMC: Zinc-coated steel.
   5. LFMC.

B. Nonmetallic Conduit and Tubing: RNC.

C. Metal Wireways: Sheet metal, NEMA Type 1 or 3R to suit location.
   1. Wireway Covers: Hinged or Flanged-and-gasketed type.

D. Surface Raceways: Metal, galvanized steel.

E. Boxes, Enclosures, and Cabinets:
   1. Outlet and Device Boxes: Sheet metal and Cast metal to suit location.
   2. Floor Boxes: Cast metal or Sheet metal to suit location.
   3. Pull and Junction Boxes: Sheet and Cast metal to suit location.
   4. Hinged-Cover Enclosures: Metal.
   5. Cabinets: Galvanized steel.

F. Handholes and Boxes for Exterior Underground Wiring: Polymer concrete, prototype tested for compliance with SCTE 77.

G. Sleeves for Raceways: Cast-iron pipe with integral waterstop.

H. Sleeve Seals: EPDM sealing element.

1.3 INSTALLATION

A. Raceway Applications:
   1. Outdoors:
      a. Exposed: Rigid steel.
      b. Concealed, Aboveground: Rigid steel.
      c. Underground: RNC, Type EPC-40-PVC, concrete encased if indicated.
      d. Connection to Vibrating Equipment: LFMC.
      e. Boxes and Enclosures, Aboveground: NEMA Type 3R.

f. Underground Handholes and Boxes: SCTE tier 15 structural load rating.

2. Indoors:
   a. Exposed: EMT.
   b. Exposed and Subject to Severe Damage: Rigid steel or IMC.
   c. Concealed: EMT.
   d. Connection to Vibrating Equipment: FMC, except LFMC in damp or wet locations.
   e. Damp or Wet Locations: Rigid steel or IMC.
   f. Raceways for Distribution of Optical Fiber or Communications Cable: EMT.
   g. Boxes and Enclosures: NEMA Type 1, except Type 4 in damp or wet locations.

END OF SECTION 260533

SECTION 260536 - CABLE TRAYS FOR ELECTRICAL SYSTEMS

1.1 QUALITY ASSURANCE

A. Quality Standard: NEMA VE 1.

1.2 MATERIALS

A. Cable Trays, Fittings, and Accessories: Wire basket type.

B. Cable Tray Accessories:
   1. Cable tray supports and connectors.

1.3 SOURCE QUALITY CONTROL

A. Tested according to NEMA VE 1.

END OF SECTION 260536

SECTION 260548 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

1.1 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:
   1. Site Class as Defined in the IBC: Verify with Structural drawings and specifications.
   2. Assigned Seismic Use Group or Building Category as Defined in the IBC: Verify with Structural drawings and specifications.
      a. Component Importance Factor: Verify with Structural drawings and specifications.
      b. Component Response Modification Factor: Verify with Structural drawings and specifications.
      c. Component Amplification Factor: Verify with Structural drawings and specifications.
   3. Design Spectral Response Acceleration at Short Periods (0.2 Second): Verify with Structural drawings and specifications.
   4. Design Spectral Response Acceleration at 1.0-Second Period: Verify with Structural drawings and specifications.

B. Delegated-Design Submittal: For seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
      a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other Division 26 Sections for equipment mounted outdoors.
   2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
   3. Field-fabricated supports.
   4. Seismic-Restraint Details:
      a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
      b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
      c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.

1.2 PRODUCTS

A. Vibration Isolators:
   1. Neoprene pads.
   2. Spring isolators.
   3. Restrained spring isolators.

B. Seismic-Restraint Devices:
   1. Channel support systems.
   2. Galvanized Stainless-steel restraint cables.
   3. Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped hanger rod stiffeners.
   4. Bushings for floor-mounted equipment anchors.
   5. Bushing assemblies for wall-mounted equipment anchorage.
   6. Resilient isolation washers and bushings.
   7. Mechanical anchors.
   8. Adhesive anchors.

C. Factory Finishes: Standard.

1.3 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 260548

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

1.1 SUMMARY

A. Electrical Identification Materials and Devices:
   1. Identification for raceway.
   2. Identification for conductors and communication and control cable.
   3. Underground-line warning tape.
   4. Warning labels and signs.
   5. Instruction signs.
   6. Equipment identification labels.
   7. Miscellaneous identification products.
   8. Circuit Breakers: All circuit breakers shall be labeled as to area served. Include room number and wall or specific equipment reference.

1.2 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

1.3 PRODUCTS

A. Raceway Identification (600V and less): Pretensioned, wraparound plastic sleeves and underground-line warning tape.

B. Raceway Identification (over 1000v): Painted orange.

C. Fire Alarm Raceway: Painted red.

D. Conductor and Cable Identification: Colored adhesive tape or aluminum, wraparound marker bands and brass or aluminum tags.

E. Equipment Labels: Engraved plastic and stenciled legend.

F. Warning Signs: Baked enamel and metal backed butyrate.

G. Instruction Signs: Engraved, laminated acrylic or melamine plastic.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

1.1 PRODUCTS

A. Relay Panels: Electronic, zero-switching solid-state programmable units, with integral 120/277V programmable relays and manual override switches.

B. Time Switches: Electronic, zero-switching solid-state programmable units, with channels necessary to perform required control.

C. Outdoor Photoelectric Switches: Solid state, with dry contacts, 15-second time delay, and metal-oxide varistor surge protection.

D. Indoor Photoelectric Switches: Ceiling-mounting and Skylight units; solid-state, light-level sensor with separate relay mounted on luminaire.

E. Indoor Occupancy Sensors: Dual-technology type, solid-state units with separate, externally mounted relay unit.

F. Lighting Contactors: Electrically operated and mechanically held, with fusible switch.

G. Emergency Shunt Relay: Normally closed, electrically held, arranged for wiring in parallel with manual or automatic switching contacts.

H. Control Cables:
   1. Power Cables: Not smaller than No. 12 AWG.
   2. Classes 2 and 3 Control Cables: Stranded-copper conductors, not smaller than No. 18 AWG.
   3. Class 1 Control Cables: Stranded-copper conductors, not smaller than No. 14 AWG.

END OF SECTION 260923

SECTION 260943 - NETWORK LIGHTING CONTROLS

1.1 SUMMARY

A. Manually operated lighting controls with relays and control module.

B. Manually operated, digital lighting controls with external signal source, relays and control module.

1.2 QUALITY ASSURANCE

A. Quality Standard: 47 CFR, Subparts A and B, Class A; and IEC 60929, Annex E.

1.3 WARRANTY

A. Materials and Workmanship: Two years.

B. Costs of Replacement Parts that Failed in Service Due to Transient Voltage Surges: Eight years.

C. Cost to Repair or Replace Electrically Held Relays: 10 years.

D. Software Upgrades: Materials, workmanship, and programming for two years.

1.4 SOFTWARE SERVICE AGREEMENT

A. Software technical support and upgrade services for two years.

1.5 PRODUCTS

A. Expandability: Capable of increasing capacity by 25 percent of current capacity.

B. Performance Requirements: Manual operation, internal timing and control unit, or an external source signals relays through programmable control module.

C. Control Module: Microprocessor-based, solid-state, 365-day timing and control unit; pilot-duty, relay-type output circuits; integral keypad and alphanumeric LCD or LED display.

D. Features:
   1. Interoperability: Compatible with BMS.
   2. Nonvolatile system memory.
   3. Lighting control software.
   4. Automatic time adjustment.

5. Astronomic control.
6. Demand control.
7. On-off confirmation signal.
8. Remote communication capability.
9. Local override capability.
10. Automatic control of local override.
11. Automatic battery backup.
12. Programmed time signal.
13. Daylight balancing dimming control.
14. Daylight compensating switch control.
15. Bilevel controls.
16. Flick warning.
17. Diagnostics.
18. Local data-entry devices: PCs, PDAs, hand-held IR devices, and wired or wireless Ethernet hubs.

E. Power Distribution Components: Modular relay panel and line-voltage surge suppression.

F. Manual Switches: Momentary contact, low-voltage push buttons and maintained contact, full- or low-voltage switches, with integral pilot light; finish plates and legends.

G. Conductors and Cables:
1. No. 12 AWG power wiring to supply side of Class 2 power source.
2. Classes 2 and 3 Control Cable: Multiconductor cable with copper conductors.
3. Class 1 Control Cable: Multiconductor cable with copper conductors.
4. Digital and Multiplexed Signal Wire: Unshielded, Category 6 twisted-pair cable.

1.6 INSTALLATION

A. Wiring Method: In raceways.

B. Field-mounting transient voltage suppressors for lighting control devices installed in Category A locations that do not have integral line-voltage surge protection.

C. Software installation and user-variable programming.

END OF SECTION 260943

SECTION 262200 - LOW-VOLTAGE TRANSFORMERS

1.1 SUMMARY

A. Dry-type, distribution transformers rated 600 V and less, with capacities up to 1000 kVA.

1.2 QUALITY ASSURANCE

A. Quality Standard: IEEE C57.12.91.

1.3 PRODUCTS

A. General Transformer Requirements:
   1. Factory assembled and tested; air cooled.
   2. Cores: Grain-oriented, non-aging silicon steel.
   3. Coils: Copper, continuous windings without splices except for taps.

B. Distribution Transformers: NEMA ST 20.
   1. Core: One leg per phase.
   2. Enclosure:
      a. Ventilated.
      b. NEMA 250, Type 2.
   3. Custom Finish: Gray.
   4. Taps for Transformers Smaller Than 3 kVA: One 5 percent tap above normal full capacity.
   5. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity.
   6. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.
   7. Insulation Class: 220 deg C, with maximum 115 deg C rise above 40 deg C.
   8. Features:
      a. Energy efficient for transformers larger than 15 kVA.
      b. K-factor rating.
      c. Harmonic mitigating.
      d. Electrostatic shielding.
      e. Wall brackets.
      f. Low sound level.

1.4 SOURCE QUALITY CONTROL

A. Transformers: Tested and inspected according to IEEE C57.12.91.

1.5 FIELD QUALITY CONTROL

A. Testing: By Contractor.

B. Test Procedure:
   1. Visual and mechanical inspections and electrical tests.

END OF SECTION 262200

SECTION 262413 - SWITCHBOARDS

1.1 QUALITY ASSURANCE

A. Quality Standards: NEMA PB 2, NFPA 70, and UL 891.

1.2 PRODUCTS

A. Manufactured Units:
   1. Front-connected, front-accessible switchboards.
      a. Main Devices: Fixed, individually mounted.
      b. Branch Devices: Panel mounted.
      c. Sections front and rear aligned.
   2. Nominal System Voltage: 480Y/277 V and 208Y/120 V.
   3. Main-Bus Continuous: See drawings.
   4. Constructed to withstand seismic forces.
   5. Indoor Enclosures: Steel, NEMA 250, Type 1.
      a. Finish: Standard gray color.
   6. Outdoor Enclosures: Type 3R.
      a. Finish: Standard color; undersurfaces treated with corrosion-resistant undercoating.
      b. Enclosure: Flat roof; bolt-on rear covers for each section, with provisions for padlocking.
      c. Doors: 30 inches; opening outwards; with panic hardware and provisions for padlocking.
   7. Customer metering compartment.
   8. Bus transition and incoming pull sections.
   9. Hinged front panels.
   10. Pull box on top of switchboard.
   11. Buses and Connections: Three phase, four wire; copper or tin-plated aluminum.
   12. Future device provisions.

B. Disconnecting and Overcurrent Protective Devices:
   1. Molded-case circuit breaker (MCCB), with interrupting capacity to meet available fault currents.
      a. Thermal-magnetic circuit breakers.
      b. Adjustable instantaneous-trip circuit breakers.
      c. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and field-adjustable settings.
      d. Accessories:
         1) Lugs: Mechanical style.
         2) Ground-Fault Protection: Integrally mounted.
         3) Shunt trip.
         4) Auxiliary Contacts: Two SPDT switches.
   2.
   3. Fused Switch: NEMA KS1, Type HD.

C. Instrumentation:
   1. Instrument Transformers:
      a. Potential transformers.
      b. Current transformers.
      c. Control-power transformers.
      d. Current transformers for neutral and ground-fault current sensing.
   2. Multifunction digital-metering monitor.
   3. Ammeters, voltmeters, and power-factor meters.
   4. Instrument switches.

D. Control Power: 120-V ac.

E. Accessories:
   1. Accessory set including tools.
   2. Portable test set.
   3. Spare-fuse cabinet.

F. Identification:
   1.
   2. Service equipment label.

1.3 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 262413

SECTION 262416 - PANELBOARDS

1.1 QUALITY ASSURANCE

A. Quality Standards: NEMA PB 1 and NFPA 70.

1.2 PRODUCTS

A. General Requirements for Panelboards:
   1. Constructed to withstand seismic forces.
   2. Enclosures: Flush and surface mounted.
      a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
      b. Outdoor Locations: NEMA 250, Type 3R.
      c. Kitchen or Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
      d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
      e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5.
      f. Front: Hinged cover.
      g. Optional Enclosure Features: Skirt for surface-mounted panelboards.
      h. Directory card.
   3. Incoming Mains Location: Top and bottom.
   4. Phase, Neutral, and Ground Buses: Copper or Aluminum.
      a. Optional Buses: Equipment ground, isolated ground and extra-capacity neutral.
   5. Conductor Connectors: Mechanical-type main and neutral lugs.
      a. Optional Features: Mechanical-type feed-through lugs, sub-feed lugs and extra-capacity neutral lugs.
   6. Service equipment label for panelboards incorporating one or more main service disconnecting and overcurrent protective devices.
   7. Panelboard Short-Circuit Current Rating: Fully or Series rated to interrupt symmetrical short-circuit current available at terminals.

B. Distribution Panelboards:
   1. Mains: Circuit breaker or Fused switch Lugs only.
   2. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.
   3. Fused switches.
   4. Contactors in Main Bus: NEMA ICS 2, Class A, with control-power transformer control-power source.

C. Lighting and Appliance Branch-Circuit Panelboards:
   1. Mains: Circuit breaker, fusible switch or lugs only.
   2. Branch Overcurrent Protective Devices: Bolt-on circuit-breaker or fusible switch type.
   3. Contactors in Main Bus: NEMA ICS 2, Class A, with control-power transformer 120-V 24-V control-power source.

D. Disconnecting and Overcurrent Protective Devices:
   1. Molded-Case Circuit Breaker: Interrupting capacity to meet available fault currents.
      a. Circuit Breakers: Thermal-magnetic, adjustable instantaneous-tri,p electronic-trip, current-limiting ,GFC and I GFEP types.
      b. Features and Accessories:
         1) Lugs: Mechanical style.
         2) Appropriate for Application: Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
         3) Ground-Fault Protection: Integrally mounted relay and trip unit.
         4) Shunt Trip: 120-V trip coil.
         5) Auxiliary Contacts: Two SPDT switches.
         6) Handle padlocking devices and clamps.
   2. Fused Switch: NEMA KS 1, Type HD.
      a. Auxiliary contacts.

E. Accessories:
   1. Accessory set including tools.
   2. Portable test set.

1.3 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 262416

SECTION 262419 - MOTOR-CONTROL CENTERS

1.1 SUMMARY

A. Motor-control centers for use on ac circuits rated 600 V and less.

1.2 PRODUCTS

A. Motor-Control Centers:
   1. Wiring: NEMA ICS 3, Class I, Type B.
   2. Enclosures: NEMA 250, Type 1 for indoor and Type 3R for outdoor locations.
   3. Buses: Plated copper or aluminum with full-size neutral bus and equipment ground bus.
   4. Functional Features: Modular compartmental arrangement.
      a. Controller units with fusible or non-fusible disconnecting means.
      b. Individually mounted overcurrent protective devices.
      c. Transient voltage surge suppressors.
      d. Spaces and blank units.
      e. Spare units.

B. Across-the-Line Controllers: NEMA ICS 2, Class A.
   1. Manual Controller: General purpose.
   2. Magnetic Controller: Full voltage, nonreversing.
      a. Control Circuit: 120 V, integral control power transformer, with a control power source, plus 100 percent spare capacity.
      b. Overload Relay: Dip switch selectable with Class II ground fault protection.

C. Reduced-Voltage Controllers: NEMA ICS 2.
   1. Star delta.
   2. Part winding.
   3. Autotransformer reduced voltage.
   4. Solid state, reduced voltage.

D. Multispeed Controllers: NEMA ICS 2.
   1. Matched to motor type, application, and number of speeds.

E. Feeder Overcurrent Protection: Fusible switch.

F. Accessories:
   1. Push-button stations, pilot lights, and selector switches.
   2. Control relays.
   3. Phase-failure and undervoltage relays.
   4. Spare-fuse cabinet.

1.3 FIELD QUALITY CONTROL

A. Testing: By Contractor-engaged agency.

B. Test Procedure: NETA ATS.

END OF SECTION 262419

SECTION 262726 - WIRING DEVICES

1.1 PRODUCTS

A. Receptacles: Duplex, 125 V, 20 A.
   1. Straight Blade.
   2. GFCI: Non-feed through.
   3. Isolated Ground.
   4. Hazardous (classified) location receptacles.
   5. Twist-locking type with isolated-ground terminal.

B. Pendant cord-connector devices with external cable grip.

C. Cord and plug sets.

D. Snap Switches: 120/277 V, 20 A.
   1. Pilot light switches.
   2. Key-operated switches.
   3. Single-pole, double-throw, momentary contact, center-off switches.
   4. Key-operated, single-pole, double-throw, momentary contact, center-off switches.

E. Occupancy Sensors:
   1. Wall-Switch Sensors: Adaptive-technology type with adjustable time delay.
   2. Wall-Switch Sensors: Dual-technology type with adjustable time delay.
   3. Ceiling Sensors: Dual-technology type with adjustable time delay.

F. Wall Plates:
   1. Material for Finished Spaces: Selected from a full range of standard and custom metal finishes and materials.
   2. Material for Unfinished Spaces: Galvanized steel.
   3. Material for Damp and Wet Locations: Cast aluminum.

G. Floorboxes: Modular, flush-type or flap-type, single-service, dual-service, and three-service units suitable for wiring method used as required.
   1. Type: Flush.
   2. Service Plate: Rectangular, brass.
   3. Voice and Data Communication Outlet: As per program.

H. Poke-Through Assemblies: Below-floor junction box with multichanneled, through-floor raceway/firestop and detachable floor service outlet assembly.
   1. Service Outlet Assembly: Flush type.
   2. Size: 3 inch or 4 inch.

I. Multioutlet Assemblies: Metal raceways.

J. Finishes:
   1. Connected to Normal Power System: As selected by Architect.

2. Connected to Emergency Power System: As selected by Architect.
3. Isolated-Ground Receptacles: As specified above, with orange triangle on face.

END OF SECTION 262726

SECTION 262813 - FUSES

1.1 SUMMARY

A. Cartridge fuses rated 600 V and less for use in switches panelboards switchboards controllers and motor-control centers.

B. Spare-fuse cabinets.

1.2 QUALITY ASSURANCE

A. Quality Standard: NEMA FU 1.

1.3 PRODUCTS

A. Cartridge Fuses: Nonrenewable.

B. Spare-Fuse Cabinet: Wall-mounted steel unit with fuse pullers for each size of fuse.

1.4 INSTALLATION

A. Fuse Applications:
1.
2. Feeders: Class L, time delay or RK1, time delay.
3. Motor Branch Circuits: Class RK5, time delay.
4. Other Branch Circuits: Class J, time delay.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

1.1 SUMMARY

A. Individually mounted, enclosed switches and circuit breakers used for the following:
   1. Fusible switches.
   2. Nonfusible switches.
   3. Molded-case circuit breakers.
   4. Elevator disconnect switches.
   5. Enclosures.

1.2 PRODUCTS

A. Fusible and Nonfusible Switches:
   1. Fusible Switch, 1200 A and Smaller: NEMA KS 1, Type HD.
   2. Nonfusible Switch, 1200 A and Smaller: NEMA KS 1, Type HD.
   3. Accessories:
      a. Equipment ground kit.
      b. Neutral kit.
      c. Auxiliary contact kit.

B. Enclosed Circuit Breakers and Switches:
   1. Molded-Case Circuit Breakers: NEMA AB 1; thermal-magnetic adjustable instantaneous-trip electronic-trip current-limiting integrally fused and GFCI types.
   2. Molded-case switches.
   3. Mechanical lug style.
   4. Shunt trip set at 55 percent of rated voltage.
   5. Auxiliary Switch: Two SPDT switches.

C. Elevator Disconnect Switches:
   1.
   2. Shunt trip fusible switch with auxiliary contacts and control relays for interface to the elevator controller and fire alarm system.

D. Enclosures: NEMA AB 1 and NEMA KS 1.
   1. Outdoor Locations: Type 3R.
   2. Kitchen Areas: Type 4X.
   3. Other Wet or Damp Indoor Locations: Type 4.
   4. Hazardous Areas: Type 7C.

1.3 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 262816

SECTION 262923 - VARIABLE-FREQUENCY MOTOR CONTROLLERS

1.1 SUMMARY

A. Solid-state, PWM, VFCs for speed control of three-phase, squirrel-cage induction motors.

1.2 PRODUCTS

A. Variable Frequency Controllers: NEMA ICS 2, IGBT, PWM, VFC for 3-phase, premium-efficiency induction motors.
   1. Rating: VFC shall be rated at a minimum of 110% of motor load.
   2. Output Rating: 6 to 66 Hz.
   3. Input AC Voltage: 380 to 500 V.
   4. Input Frequency: 50 to 60 Hz, plus or minus 6 percent.
   5. Minimum Efficiency: 96 percent at 60 Hz, full load.
   6. Minimum Displacement Primary-Side Power Factor: 96 percent.
   7. Overload Capability: 10 percent for 60 seconds; 100 percent for 3 seconds.
   8. Starting Torque: 100 percent.
   9. Speed Regulation: Plus or minus 1 percent.
   10. Isolated control interface allows controller to follow control signal over an 11:1 speed range.
   11. Multiple-motor capability.
   12. Automatic reset/restart.
   13. Power-interruption protection.
   14. Torque boost.
   15. Motor temperature compensation at slow speeds.
   16. Input line conditioning.
      a. For motors 20HP and less: DC choke and AC line reactor.
      b. For Motors > 25HP: Harmonic filtering to limit input current THD to <15%, measured at the input terminals to the VFC.
      c. Disconnect capacitive filters when motor is off.
   17. VFC output filtering.
   18. Door-mounted LED status lights.
   19. Panel-mounted operator station.
   20. Meters or digital indicating devices.
   21. Control signal interface (Coordinate with BMS).
      a. Electric input signal interface.
      b. Pneumatic input signal interface.
      c. Remote signal inputs.
      d. Output signal interface.
      e. Remote indication interface.
   22. Communications: Factory installed interface module for communication with energy management system.
   23. Integral disconnecting means.

B. Accessories:
   1. Push-button stations, pilot lights, and selector switches.
   2. Stop and lockout push-button station.
   3. Control relays for time delay.
   4. Standard displays.
   5. Historical logging information and displays.
   6. Current-sensing, phase-failure relays for bypass controller.

1.3 FIELD QUALITY CONTROL

A. Testing: By Contractor-engaged agency.

END OF SECTION 262923

SECTION 263213 - ENGINE GENERATORS

1.1 SUMMARY

A. Packaged diesel-engine generator sets.

1.2 QUALITY ASSURANCE

A. Quality Standard: NEMA MG 1 and NFPA 37.

B. Emergency Power Supply System: NFPA 110, Level 1.

C. Safety Standard: ASME B15.1.

1.3 PROJECT CONDITIONS

A. Environmental Conditions: Minus 15 to 40 deg C and 4500 feet altitude.

1.4 WARRANTY

A. Materials and Workmanship: Two years.

1.5 ENGINE-GENERATOR SET

A. Output Connections: Three-phase, four wire.

B. Performance: Suitable for loads involving sensitive electronic equipment, adjustable frequency drives, or uninterruptible power supply systems.

C. Fuel: Fuel oil, Grade DF-2

D. Governor: Adjustable isochronous, with speed sensing.

E. Engine Cooling System: Integral radiator.

F. Fuel Oil Storage:
   1. Base-Mounted Fuel Oil Tank: Capacity for 24 hours' operation.

G. Engine Exhaust System: Critical-type muffler.

H. Combustion-Air Intake: Standard-duty, engine-mounted air cleaner with replaceable dry-filter element.

I. Starting System: Electric motor, 24 V, with battery and battery charger.

J. Control and Monitoring: Automatic starting; with control devices grouped on panel mounted on generator.
   1.
   2. Common remote audible alarm.
   3. Remote alarm annunciator.
   4. Remote emergency-stop switch.

K. Generator Overcurrent and Fault Protection:
   1. Generator Circuit Breaker: Molded-case, electronic-trip type.
   2. Microprocessor-based generator protector.
   3. Ground-fault indication.

L. Generator: Directly connected to engine shaft, with dripproof enclosure and solid-state voltage regulator.

M. Outdoor Generator-Set Enclosure: Vandal-resistant, sound-attenuated weatherproof steel housing.

1.6 SOURCE QUALITY CONTROL

A. Testing: Prototype at factory.

1.7 INSTALLATION

A. Mounting: On concrete base with restrained-spring vibration isolators.

1.8 FIELD QUALITY CONTROL

A. Testing: By Contractor-engaged agency.

END OF SECTION 263213

SECTION 263600 - TRANSFER SWITCHES

1.1 SUMMARY

A. Transfer switches rated 600 V and less.

1.2 QUALITY ASSURANCE

A. Quality Standards: NEMA ICS 1, NFPA 70, NFPA 110, and UL 1008.

1.3 PRODUCTS

A. General:
1. Solid-state controls.
2. Resistant to damage by voltage transients.
3. Solenoid or electric-motor operated.
4. Designed for continuous-duty, repetitive transfer of full-rated current.
5. Neutral switched for four-pole switches.
6. Neutral terminals for single-phase, three-wire or three-phase, four-wire systems without neutral switching.
7. Oversize neutrals.
8. Heaters for switches exposed to outdoor temperatures and humidity.
9. Battery charger for generator starting batteries.
10. Annunciation, control, and programming interface components.
11. Enclosures: NEMA 250, Type 1.

B. Automatic Transfer Switches: NFPA 110, Level 1.
1. Type: Double throw.
2. Manual Switch Operation: Under load.
3. Signal-before-transfer contacts.
4. Digital communication interface.
5. Control Features: Automatic open transition.
6. Features:
a. Undervoltage sensing for each phase of normal source.
b. Time delay for override of normal-source sensing.
c. Voltage/frequency lockout relay.
d. Time delay for retransfer to normal source.
e. Test switch.
f. Switch-position pilot lights.
g. Source-available indicating lights.
h. Unassigned auxiliary contacts.
i. Transfer override switch.
j. Engine starting contacts.
k. Engine Shutdown Contacts: Time delay adjustable.
l. Engine-generator exerciser with programmable-time switch.

1.4 FIELD QUALITY CONTROL

A. Testing: By Manufacturer's service representative.

END OF SECTION 263600

SECTION 264113 - LIGHTNING PROTECTION FOR STRUCTURES

1.1 SUMMARY

A. Lightning protection for structures.

1.2 QUALITY ASSURANCE

A. Installer: Certified by UL or LPI as a Master Installer/Designer.

B. Quality Standards: UL 96 and NFPA 780.

1.3 COMPONENTS

A. Roof-Mounting Air Terminals: NFPA 780, Class I, copper.

B. Ground Rods: Copper-clad steel.

1.4 INSTALLATION

A. Installation Standards: UL 96A and NFPA 780.

B. Conductors to Be Concealed:
   1. System conductors.
   2. Down conductors.
   3. Interior conductors.
   4. Conductors within normal view of exterior locations at grade.

C. Ground loop.

D. Lightning protection components bonded with intermediate-level interconnection loop conductors at 60-foot intervals.

1.5 FIELD QUALITY CONTROL

A. Inspection: UL Master Label.

END OF SECTION 264113

SECTION 264313 - TRANSIENT-VOLTAGE SUPPRESSION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

1.1 SUMMARY

A. Transient voltage surge suppressors for low-voltage power equipment.

1.2 QUALITY ASSURANCE

A. Quality Standards: IEEE C62.41, IEEE C62.45, NEMA LS 1, UL 1283, and UL 1449.

1.3 PRODUCTS

A. Transient Voltage Suppression Devices: Integrally mounted, bolt-on, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking suppression and filtering modules, short-circuit current rating matching or exceeding the switchboard short-circuit rating.
   1. Peak Single-Impulse Surge Current Rating: As noted below.
   2. Withstand Capabilities: 12,000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.
   3. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277 and 208Y/120-V, three-phase, four-wire circuits shall be as follows:
      a. Line to Neutral: 800 V for 480Y/277, 400 V for 208Y/120.
      b. Line to Ground: 800 V for 480Y/277, 400 V for 208Y/120.
      c. Neutral to Ground: 800 V for 480Y/277, 400 V for 208Y/120.
   4. Event Counter.

B. Service Entrance Suppressors: Modular type.
   1. Peak Single-Impulse Surge Current Rating: 240 kA per phase.
   2. Circuits: Grounded wye.

C. Panelboard Suppressors: Modular type.
   1. Peak Single-Impulse Surge Current Rating: 80 kA per phase.
   2. Circuits: Grounded wye.

D. Plug-in Surge Suppressors: Non-modular, plug-in type, with at least four receptacles.
   1. Close-coupled direct plug-in 15-foot line cord.
   2. Peak Single-Impulse Surge Current Rating: 33 kA per phase.

1.4 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 264313

SECTION 265100 - INTERIOR LIGHTING

1.1 SUMMARY

A. Interior lighting fixtures (including fixtures mounted on exterior of building), lamps, and ballasts.

B. Exit signs.

C. Lighting fixture supports.

1.2 QUALITY ASSURANCE

A. Quality Standard for Fixtures in Hazardous Locations: FMG.

B. Quality Standard for Exit Signs: UL 924.

C. Mockups.

1.3 WARRANTY

A. Emergency Fluorescent Ballasts: Seven years.

B. Electronic Ballasts: Five years.

C. T5 and T8 Fluorescent Lamps: One year(s).

1.4 PRODUCTS

A. Ballasts for Linear Fluorescent Lamps:
   1. Electronic Ballasts:
      a.
      b. Type: Programmed start.
      c. Sound Rating: A.
      d. Total harmonic distortion rating of less than 20 percent.
      e. Transient Voltage Protection: Category A or better.
      f. Lamp Current Crest Factor: 1.7 or less.
      g. BF: 0.71.
      h. Power Factor: 0.98 or higher.
      i. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.
   2. Electronic Programmed-Start Ballasts for T5 and T5HO Lamps:
      a. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
      b. Automatic lamp starting after lamp replacement.

c. Sound Rating: A.
d. Total Harmonic Distortion Rating: Less than 20 percent.
e. Transient Voltage Protection: IEEE C62.41, Category A or better.
f. Operating Frequency: 20 kHz or higher.
g. Lamp Current Crest Factor: 1.7 or less.
h. BF: 0.95 or higher, unless otherwise indicated.
i. Power Factor: 0.98 or higher.

3. Single ballasts for multiple lighting fixtures.
4. Ballasts for Low-Temperature Environments:
   a. Temperatures 0 Deg F and Higher: Electronic.
5. Ballasts for Bi-Level Controlled Lighting Fixtures: Electronic type.
   a. High-Level Operation: 100 percent of rated lamp lumens.
   b. Low-Level Operation: 30 percent of rated lamp lumens.

B. Ballasts for Compact Fluorescent Lamps: Electronic.

C. Ballasts for High-Intensity-Discharge Lamps:
1. Electromagnetic Type for Metal-Halide Lamps: Constant-wattage autotransformer or regulating high-power-factor, low-noise type.
2. Electronic type for metal-halide lamps.
3. Auxiliary instant-on quartz system.

D. Exit Signs: Internally lighted.
1. 70,000-hour light-emitting diodes.

E. Fluorescent Lamps:
1.
2. Low-mercury lamps.
3. T8 rapid-start, low-mercury lamps, rated 32 W maximum, 3100 initial lumens and 29,000 hours average lamp life.
4. T5 rapid-start, low-mercury lamps, rated 28 W maximum.
5. T5HO rapid-start, low-mercury lamps, rated 54 W maximum.
6. Compact Fluorescent Lamps: T4 double tube, low mercury, rated 13, 18, 26, 32, 42 or 55 W.

F. High-Intensity-Discharge Lamps:
1. Pulse-start, metal-halide lamps.
2. Ceramic, pulse-start, metal-halide lamps.

G. Lighting fixture support components.

END OF SECTION 265100

SECTION 265600 - EXTERIOR LIGHTING

1.1 SUMMARY

A. Exterior luminaires with lamps and ballasts, poles and accessories, and luminaire lowering devices.

B. Section does not include exterior luminaires mounted on exterior of building.

1.2 PERFORMANCE REQUIREMENTS

A. Live Load: Single load of 500 lbf.

B. Ice Load: 3 lbf/sq. ft..

C. Wind Load:
1. Wind speed for poles 50 feet or less in height is 110 mph.

1.3 QUALITY ASSURANCE

A. Quality Standard: AASHTO LTS-4, IEEE C2.

1.4 WARRANTY

A. Materials and Workmanship for Luminaires: Five Insert number years.
1. Metal Corrosion: Five years.
2. Color Retention: Five years.

B. Materials and Workmanship for Lamps: Lamps and fuses that fail within 12 Insert number months.

C. Finish, Materials, and Workmanship for Poles: Three Insert number.

1.5 PRODUCTS

A. Luminaire Finishes:
1.
2. Steel Luminaires: Factory painted, polyurethane enamel.
3. Aluminum Luminaires: Natural satin Class I, clear anodic Class I, color anodic finish.

B. Fluorescent Ballasts and Lamps: Suitable for low-temperature environments. Low-mercury-type lamps.

C. High-Intensity-Discharge Lamp Ballasts: Constant-wattage autotransformer or regulating high-power-factor type and suitable for low-temperature starting.

D. High-Intensity-Discharge Lamps: Pulse-start, metal-halide Ceramic, pulse-start, metal-halide lamps.

E. Steel Poles: Round, tapered Round, straight Square, tapered Square, straight.
   1.
   2. Brackets for luminaires.
   3. Pole-top tenons.
   4. Grounding and bonding lugs.
   5. Cable support grip.
   6. Finish: Factory painted.

F. Aluminum Poles: Seamless, extruded structural tube.
   1. Pole-top tenons.
   2. Grounding and bonding lugs.
   3. Brackets for luminaires.
   4. Finish: Factory painted.

END OF SECTION 265600

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

1.1 SUMMARY

A. System Description: Noncoded, UL-certified addressable system with automatic sensitivity control of certain smoke detectors; multiplexed signal transmission, dedicated to fire-alarm service only.

1.2 QUALITY ASSURANCE

A. Quality Standard: NFPA 72.

B. Installer Qualifications: Certified by NICET as fire-alarm Level II technician.

1.3 SYSTEMS OPERATIONAL DESCRIPTION

A. Signal initiation from:
1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Verified automatic alarm operation of smoke detectors.
6. Automatic sprinkler system water flow.
7. Heat detectors in elevator shaft and pit.
8. Fire-extinguishing system operation.
9. Fire standpipe system water flow.

B. Signal initiates the following actions:
1. Continuously operate alarm notification appliances.
2. Identify alarm at the fire-alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Activate voice/alarm communication system.
7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
8. Activate smoke-control system (smoke management) at firefighter smoke-control system panel.
9. Activate stairwell and elevator shaft pressurization systems.
10. Close smoke dampers in air ducts of designated air conditioning duct systems.
11. Recall elevators to recall floors.
12. Activate emergency lighting control.
13. Activate emergency shutoffs for gas and fuel supplies.
14. Record events in the system memory.
15. Record events by the system printer.

C. Supervisory signal initiation by:
   1. Valve supervisory switch.
   2. Low-air-pressure switch of a dry-pipe sprinkler system.
   3. Elevator shunt-trip supervision.

D. Trouble signal initiation by:
   1. Open circuits, shorts, and grounds, in designated circuits.
   2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
   3. Loss of primary power at fire-alarm control unit.
   4. Ground or a single break in fire-alarm control unit internal circuits.
   5. Abnormal ac voltage at the fire-alarm control unit.
   6. Break in standby battery circuitry.
   7. Failure of battery charging.
   8. Abnormal position of any switch at the fire-alarm control unit or annunciator.
   9. Fire-pump power failure, including a dead-phase or phase-reversal condition.
   10. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system.

E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer.

1.4 PRODUCTS
   1.

B. Fire-Alarm Control Unit: Modular, power-limited design with electronic modules, addressable initiation devices.
   1. Alphanumeric liquid-crystal display with 2 line(s) of 80 characters and system controls and keypad.
   2. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class A.
      a. Initiating Device Circuits: Comply with NFPA 72.
      b. Notification Appliance Circuits: Style Z.
      c. Signaling Line Circuits: Comply with NFPA 72.

C. Manual Fire-Alarm Boxes: Double action.

D. System Smoke Detectors: Base mounted, self-restoring, with integral visual-indicating light and remote controllability from fire-alarm control unit.

E. Heat Detectors: Combination type.

F. Notification Appliances:
   1. Horns: Electric-vibrating-polarized type, 24-V dc.
   2. Visual Alarm Devices: Xenon strobe lights.
   3. Voice/Tone Speakers: Flush mounted.

G. Magnetic Door Holders: Wall- or floor-mounted units; 24-V ac or dc.

H. Remote Annunciator: Alphanumeric display same as fire-alarm control unit.

I. Addressable Interface Device: Microelectronic monitor module with integral relay to initiate elevator recall and shut down power.

J. Digital Alarm Communicator Transmitter: For transmission of fire-alarm, supervisory, and trouble signals to a remote alarm receiving station or another remote location by means of telephone lines.

1.5 FIELD QUALITY CONTROL

A. Testing: By Contractor.

END OF SECTION 283111

SECTION 311000 - SITE CLEARING

1.1 SUMMARY

A. Protecting existing vegetation to remain.

B. Removing existing vegetation.

C. Clearing and grubbing obstructions and vegetation including removing roots and debris.

D. Stripping and stockpiling topsoil and stockpiling surplus topsoil.

E. Providing temporary erosion and sedimentation control measures.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

1.1 SUMMARY

A. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses and exterior plants.

B. Dewatering to protect excavated subgrades.

C. Excavating and backfilling or filling for buildings and structures, including footings and foundations, underground tanks, basins, and mechanical or electrical utility structures.

D. Excavating and backfilling for utility trenches.

E. Excavation: Unclassified.

F. Grading.

G. Subsurface drainage backfill for walls.

H. Subbase course for concrete walks and pavements.

I. Subbase and base course for hot-mix asphalt pavement.

J. Drainage course for cast-in-place concrete slabs-on-grade.

1.2 MATERIALS

A. Soil Materials:

1. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GM, GP-GM, GW-GM, SM, SW. Maximum percentage passing #200 Sieve: 15%.
2. Unsatisfactory Soils: ASTM D 2487 soil classification groups SC, SP, GP, CL, CH, PT, OH, OL, ML, MH.
3. Backfill and Fill: Satisfactory soil materials.
4. Subbase and Base Course: Natural or crushed gravel, crushed stone, and natural or crushed sand.
5. Engineered Fill: Natural or crushed gravel, crushed stone, and natural or crushed sand.
6. Bedding Course: Natural or crushed gravel, crushed stone, and natural or crushed sand.
7. Drainage Course: Crushed stone, or crushed or uncrushed gravel.

B. Geotextiles: Subsurface drainage geotextile.

C. Geogrid: Subsurface stabilization grid.

D. Warning Tape: Detectable polyethylene film.

1.3 EXCAVATION

A. Explosives: Not permitted.

B. Disposal of Surplus and Waste Materials: Off Owner's property.

1.4 FIELD QUALITY CONTROL

A. Geotechnical Testing Agency: Owner engaged.

END OF SECTION 312000

SECTION 312319 - DEWATERING

1.1 PERFORMANCE REQUIREMENTS

A. Contractor to design dewatering system.

1.2 PROJECT CONDITIONS

A. Geotechnical report is available.

B. Contractor to engage a surveyor or engineer to survey adjacent existing structures and site improvements before and regularly during dewatering.

C. Adhere to Storm Water Pollution Prevention Plan or equivalent for treatment of all nuisance water.

1.3 INSTALLATION

A. Maintain water level 24 inches below surface of excavation.

END OF SECTION 312319

SECTION 313219 - GEOGRIDS

1.1 SUMMARY

A. Roadway and roadway embankment applications.

1.2 PROJECT CONDITIONS

A. Geotechnical report is available.

1.3 QUALITY ASSURANCE

A. Pre-Construction Conference.

1.4 MATERIALS

A. Synthetic fiber net at least 85-percent by weight of polypropylene, polyethylene, or polyester.

B. Resistant to chemical attack, rot and mildew.

C. No tears or defects that will adversely alter properties of product.

1.5 INSTALLATION

A. Install in accordance to manufacturer recommendation.

B. Granular fill material placed, spread and compacted.

C. Testing Agency: Owner will engage agency.

END OF SECTION 313219

SECTION 316336 - DRILLED RAMMED AGGREGATE PIERS

1.1 SUMMARY

A. Rammed aggregate piers under foundations and floor slabs.

1.2 PROJECT CONDITIONS

A. Geotechnical report is available.

B. Contractor to engage a surveyor or engineer to perform surveys, layouts, and measurements for rammed aggregate piers.

1.3 QUALITY ASSURANCE

A. Load Bearing Tests: Minimum one full-scale site load-bearing capacity test.

1.4 MATERIALS

A. Steel Casings: Steel pipe where required for collapsible soil conditions.

B. Pier Base Aggregate: Compacted 2-inch to 4-inch granular material.

C. Pier Shaft Aggregate: Compacted 1-inch to 1.5-inch granular roadbase material.

1.5 INSTALLATION

A. Excavation: Unclassified drilling. Disposal of excavated materials.

B. Compaction: Aggregate lifts compacted by tamper equipment.

1.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage agency.

END OF SECTION 316336

SECTION 321216 - ASPHALT PAVING

1.1 SUMMARY

A. Hot-mix asphalt paving.

B. Pavement-marking paint.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Per UDOT and the DFCM Design Requirements section of the Design Manual dated May 15, 2006.

1.3 MATERIALS

A. Asphalt Materials:

1. Asphalt Binder: AASHTO M 320.
2. Asphalt Cement: ASTM D3381; viscosity AC 10 for moderate climates.
3. Prime Coat: Medium-curing cutback asphalt.
4. Tack Coat: Emulsified asphalt or cationic emulsified asphalt.

B. Auxiliary Materials:

1. Pavement-Marking Paint: State of Utah #780.
2. Wheel Stops: Precast concrete with galvanized-steel dowels.

C. Asphalt Mixes:

1. Untreated Base Course: 1-inch gradation complying with DFCM requirements.

Untreated Base Course	
Size	**% by Weight Paving Sieve**
1”	100
½ “	70 to 100
#4	41 to 68
#16	21 to 41
#50	10 to 27
#200	4 to 13

2. Surface Course (asphalt): 1/2-inch gradation complying with DFCM requirements.

Surface Course (asphalt)	
Size	**% by Weight Paving Sieve**
½ “	100
3/8 “	70 to 100
#4	50 to 78
#16	30 to 48
#50	18 to 31
#200	7 to 13

1.4 INSTALLATION

A. Hot-Mix Asphalt Paving:

1. Proof-roll subgrade at locations receiving full-depth asphalt pavement.
2. Base Course: 8 inches complying with DFCM requirements.
3. Surface Course: 3 inches (parking), or 4 inches (roadways), as recommended in geotechnical report, and complying with DFCM requirements.

1.5 FIELD QUALITY CONTROL

A. Testing: By owner.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

1.1 SUMMARY

A. Curbs and gutters.

B. Walkways.

1.2 QUALITY ASSURANCE

A. Design mixture for concrete.

B. Quality Standard: ACI 301, "Specification for Structural Concrete."

1.3 MATERIALS

A. Reinforcement:

1. Reinforcing Bars and Tie Bars: Deformed steel.

B. Concrete:

1. Portland Cement: ASTM C 150.
2. Aggregate: Normal-weight aggregate.
3. Admixture: Air entraining.
4. Compressive Strength: 4000 psi at 28 days for non-traffic loaded concrete, 5000 psi at 28 days for traffic loaded concrete pavement.

C. Membrane-Forming Curing Compound: ASTM C309, Type I, liquid membrane.

D. Related Materials:

1. Expansion- and Isolation-Joint-Filler Strips: Cellulosic fiber.

1.4 FINISHING

A. Finishes: Medium-textured broom finish.

1.5 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

1.1 SUMMARY

A. Expansion and contraction joints within cement concrete pavement.

B. Joints between cement concrete and asphalt pavement.

1.2 QUALITY ASSURANCE

A. Preconstruction compatibility and adhesion testing.

B. Product testing.

1.3 MATERIALS

A. Cold-Applied Joint Sealants:

1. Type SL Silicone Sealant for Concrete and Asphalt: Multi-component, self-leveling formulation.

B. Joint-Sealant Backer Materials: Round backer rods.

END OF SECTION 321373

SECTION 323119 - DECORATIVE METAL FENCES AND GATES

1.1 QUALITY ASSURANCE

A. Electrical Components: NFPA 70.

B. Gate Operators: UL 325.

1.2 DECORATIVE METALLIC-COATED STEEL TUBULAR PICKET FENCES

A. ASTM F 2408 for light industrial (commercial) application (class).

B. Picket Spacing: 4 inches nominal (4-inch sphere unable to pass through).

1. Terminate tops of pickets at top rail for flush top appearance.

C. Finish: Powder coating.

1. Color: Black.

1.3 GATES

A. Swing Gate: Metallic coated steel framing and pickets matching fence.

B. Horizontal-Slide Gate: Aluminum framing with metallic coated steel pickets matching fence.

C. Finish: Powder coating.

1. Color: Black.

D. Gate Operators: Medium duty, commercial/industrial.

1. Remote control.

a. Card Readers: Comply with Owner's requirements.
b. Provide 10 programmable digital radio control units.

2. Features Include: Vehicle detector, obstruction detection, digital microprocessor control, system integration, automatic closing timer, open override circuit, reversal time delay, maximum run timer.

E. Accessories: Instructional, safety, and warning labels and signs.

1.4 INSTALLATION

A. Post Setting: In concrete.

END OF SECTION 323119

SECTION 328400 – IRRIGATION SYSTEM

1.1 SUMMARY

A. Piping, valves, sprinklers, specialties, controls, and wiring for automatic-control irrigation system in full compliance with published DFCM Landscape & Irrigation, current edition.

1.2 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Minimum Working Pressures:

1. Irrigation Main Piping: 200 psig.
2. Circuit Piping: 150 psig.
3. Drain lines piping:

1.3 MATERIALS

A. Control -valve boxes: Plastic

B. Piping Specialties: Water regulators, water hammer arresters, flow controls, flow monitors, and pressure gages.

C. Sprinkler heads.

D. Sprinkler Specialties: Nozzle pressure regulation, strainers, filters, emitters and surface drip tubing and fittings.

E. Automatic-Control System: 24-volt ac; with interior control enclosure, transformer controller stations for automatic control valves, timing device, and wiring.

1.4 ABOVEGROUND IRRIGATION MAIN PIPING

A. Pipe NPS 4 and Smaller:

1. Schedule 40 and Schedule 80, PVC pipe; socket-type PVC fittings; and solvent-cemented joints.

B. Pipe NPS 5 and Larger:

1. Schedule 40 and Schedule 80, PVC pipe and socket fittings; and solvent-cemented joints.

1.5 UNDERGROUND IRRIGATION MAIN PIPING

A. Pipe NPS 4 and Smaller:

1. Schedule 40 and Schedule 80, PVC pipe and socket fittings, and solvent-cemented joints.

B. Pipe NPS 5 and Larger:

1. Schedule 40 and Schedule 80, PVC pipe and socket fittings; and solvent-cemented joints.

1.6 CIRCUIT PIPING

A. Pipe NPS 2 and Smaller:

1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.

B. Pipe NPS 2-1/2 TO NPS 4:

1. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.

1.7 DRAIN PIPING

A. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.

1.8 ABOVEGROUND, SHUTOFF-DUTY VALVES

A. NPS 2 and Smaller:

1. Bronze ball valve.

B. NPS 2-1/2 and Larger:

1. Bronze ball valve.

1.9 THROTTLING-DUTY VALVES

A. NPS 2 and Smaller:

1. Plastic automatic control valve.

B. NPS 2-1/2 and NPS 3:

1. Bronze or Plastic automatic control valve.

1.10 MANUFACTURED UNITS

A. Automatic Control Valves: Bronze and Plastic.

B. Exposed and Pop-up rotary drive sprinklers: Plastic.

C. Exposed and Pop-up impact drive sprinklers: Plastic.

D. Pop-up spray sprinklers: Plastic.

END OF SECTION 328400

SECTION 329200 - TURF AND GRASSES

1.1 SUMMARY

A. Sodded turf in full compliance with published DFCM Landscape & Irrigation Guidelines, current edition.

B. Meadow grasses and wildflowers.

C. Turf renovation.

D. Erosion-control materials.

1.2 QUALITY ASSURANCE

A. Top soil analysis of existing and imported top soil intended to be used on this project.

B. Sod growers certificates of sod seed content of turf to be used on this project.

C. Installer's Personnel Certifications: Certified Landscape Technician, CLT-Exterior.

1.3 MAINTENANCE SERVICE

A. Turf: 30 days from date of Substantial Completion.

B. Meadows: 40 days from date of Substantial Completion.

1.4 MATERIALS

A. Seed: Drought tolerant fescue blend.

B. Turfgrass Sod: Drought tolerant fescue blend. Kentucky Blue Grass while considering Campus Design Standards.

C. Wildflower Seed: To be in compliance with campus design standards.

D. Native Grass Seed: Use as last resort for consideration of budget limitations.

E. Wildflower and Native Grass Seed: To be in compliance with campus design standards.

F. Planting Soils: Import all topsoils using ASTM D 5268 standards, and verify with experienced testing agencies.

G. Mulches: Shredded bark and fines Soil-Pep.

H. Pesticides.

I. Erosion-Control Materials: Blankets Fiber mesh or Mats.

1.5 INSTALLATION

A. Turf Installed within 24 hours of cutting

B. Top soil depth for new lawns: 4” deep rich soil

C. Planting Soil Depth for Newly Graded Subgrades: 6 inches.

D. Surface Soil Enrichment Depth for Unchanged Subgrades: 6 inches.

E. Seeding Method: Hydroseed.

F. Protect seeded areas with straw mulch compost mulch peat mulch.

END OF SECTION 329200

SECTION 329300 – EXTERIOR PLANTS

1.1 SUMMARY

A. Comply fully with published DFCM Landscape & Irrigation Guidelines, current edition

1. All evergreen and deciduous plants.
2. Lawn edging and borders.

1.2 QUALITY ASSURANCE

A. Installer's Personnel Certifications: Certified Landscape Technician, CLT-Exterior.

B. Nursery Growers tags and certificates on every tree and shrub used on this project.

C. Soil analysis of each unamended soil type.

1.3 WARRANTY

A. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months from date of substantial completion.

B. Ground Covers, Biennials, Perennials, and Other Plants: 90 days from date of substantial completion.

C. Annuals: Three months.

1.4 MAINTENANCE SERVICE

A. Trees and Shrubs: Until acceptance

B. Ground Cover and Other Plants: Until acceptance

1.5 MATERIALS

A. Shade and Flowering Trees: Nursery-grown and complying with ANSI Z60.1.

1. Shade trees: Balled and Burlapped
2. Small trees: Balled and Burlapped

B. Deciduous shrubs: ANSI Z60.1, nursery grown; container grown.

C. Evergreen shrubs: ANSI Z60.1, nursery grown; balled and burlapped and container grown.

D. Annuals and Biennials: Healthy and acclimated to outdoor conditions.

E. Planting Soils: Import all topsoils using ASTM D 5268 standards, and verify with experienced testing agencies. Imported or manufactured topsoil off site amended to 2% minimum organic material.

F. Mulches: Shredded bark, and fines.

G. Weed-Control Barriers: Composite fabric.

H. Pesticides: Registered and approved by EPA pre-emergent and post-emergent herbicide(s).

I. Landscape Edgings: Steel Aluminum, concrete mow-strips.

J. Root barrier.

K. Planter drainage gravel and filter fabric.

1.6 INSTALLATION

A. Planting Soil Depth: 12" deep rich soil.

B. Mechanized tree spade planting of designated trees.

C. Pruning.

D. Ground Cover and Plant Planting: Space ground cover and plants other than trees, shrubs, and vines 18 inches apart per plan in even rows with triangular spacing.

E. Mulching:

1. Trees and Tree-like Shrubs in Turf Areas: Organic mulch ring of 3-inch thickness with 36-inch radius.
2. Planting Areas: 3-inch average thickness of organic mulch over whole surface of planting area.

END OF SECTION 329300

SECTION 331113 - FACILITY WATER DISTRIBUTION PIPING

1.1 SUMMARY

A. Combined water service and fire-service mains outside the building.

1.2 SUBMITTALS

A. Coordination Drawings and Materials.

1.3 QUALITY ASSURANCE

A. Quality Standard for Electrical Components, Devices, and Accessories: NFPA 70.

B. Quality Standard for Materials, Installations, Tests, Flushing, and Valve and Hydrant Supervision for Fire-Service-Main Piping: NFPA 24.

C. Quality Standard for Plastic Potable-Water-Service Piping: NSF 14. Include marking "NSF-pw" on piping.

D. Quality Standard for Water-Service Piping and Specialties for Domestic Water: NSF 61.

E. Quality Standard for Fire-Service-Main Products: FMG's "Approval Guide." UL's "Fire Protection Equipment Directory."

1.4 MATERIALS

A. Underground Combined Water-Service and Fire-Service-Main Piping:
   1. PVC, AWWA Class 200 pipe listed for fire-protection service.

B. Corrosion-Protection Piping Encasement: Not required.

1.5 MANUFACTURED UNITS

A. Gate Valves:

   1. Cast Iron: Nonrising stem,.
   2. UL/FMG, Cast Iron: Nonrising stem.
   3. Bronze: MSS, nonrising stem.

B. Water Meters: Meet local authority’s requirements.

C. Water Meter Boxes: Polymer-concrete body.

D. Concrete Vaults: Not required.

E. Fire Hydrants:

1. Dry barrel, AWWA Standard C 502. Per local authority's standards

END OF SECTION 331113

SECTION 331116 - IRRIGATION WATER DISTRIBUTION PIPING

1.1 SUMMARY

A. Pressurized irrigation mains outside the building.

1.2 SUBMITTALS

A. Coordination Drawings.

1.3 MATERIALS

A. Underground Main Piping:

1. PVC: Stamped with certified NFS

B. Corrosion-Protection Piping Encasement: Not required.

1.4 MANUFACTURED UNITS

A. Gate Valves:

1. Cast Iron: Nonrising stem,.
2. UL/FMG, Cast Iron: Nonrising stem.
3. Bronze: MSS, nonrising stem.

B. Concrete Vaults: Precast, reinforced-concrete vault.

END OF SECTION 331116

SECTION 331313 - FACILITY SANITARY SEWERS

1.1 SUMMARY

A. Gravity-flow, nonpressure sanitary sewerage outside the building.

1.2 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water.

1.3 COMPONENTS

A. Cleanouts: PVC

B. Manholes: Standard precast concrete.

1. Resilient pipe connectors.
2. Reinforced-concrete grade rings.
3. Protective coating.
4. Manhole frames and covers.
5. Manhole cover inserts.

1.4 INSTALLATION

A. Gravity-Flow, Nonpressure Sewer Piping Applications:

1. NPS 3 : PVC sewer pipe.
2. NPS 4 : PVC sewer pipe.
3. NPS 5 and NPS 6 : PVC sewer pipe.
4. NPS 8 and NPS 10 : PVC sewer pipe.
5. NPS 12 and NPS 15 : PVC sewer pipe.
6. NPS 18 to NPS 24 : PVC sewer pipe.

END OF SECTION 331313

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

1.1 SUMMARY

A. Gravity-flow, nonpressure storm drainage outside the building.

1.2 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, RCP, Drainage-Piping

1.3 COMPONENTS

A. Cleanouts: PVC.

B. Manholes: Standard precast concrete.

1. Resilient pipe connectors.
2. Reinforced-concrete grade rings.
3. Protective coating.
4. Manhole frames and covers.

C. Polymer-Concrete, Channel Drainage Systems: Sloped-invert type.

1. Drainage Specialties: Large catch basins small catch basins oil interceptors and sediment interceptors.

D. Catch Basins: Standard precast concrete.

1. Frames and grates.

E. Stormwater Inlets: Curb gutter and combination type.

F. Pipe Outlets: riprap basins filter stone and energy dissipaters.

G. Stormwater Disposal Systems: Pipe and retention **b**asin type.

1.4 INSTALLATION

A. Gravity-Flow, Nonpressure Sewer Piping Applications:
1. NPS 4 to NPS 6: HDPE pipe.
2. NPS 8 to NPS 12: Reinforced-concrete sewer pipe.
3. NPS 15 Reinforced-concrete sewer pipe.
4. NPS 18 to NPS 36 Reinforced-concrete sewer pipe.

END OF SECTION 334100

SECTION 334600 - SUBDRAINAGE

1.1 SUMMARY

A. This Section includes subdrainage systems for the following:

1. Foundations.

1.2 MATERIALS

A. Perforated-Wall Pipes and Fittings:

1. PE corrugated pipe and fittings for coupled joints.

B. Solid-Wall Pipes and Fittings:

1. PE corrugated pipe and fittings for coupled joints.

1.3 PRODUCTS

A. Drainage Panels: Molded-sheet panels.

END OF SECTION 334600

SECTION 334650 - UNDERGROUND STORMWATER RETENTION AND PERCOLATION SYSTEM

1.1 SUMMARY

1. This Section includes storm water retention and percolation system for all site runoff

1.2 MATERIALS

A. Arch shaped thermo-plastic Chambers :

1. Arch shaped thermo-plastic Chambers meeting ASTM F 2418 (ie. “Stormchamber” or “LandSaver” or approved equal).

B. Solid-Wall Pipes and Fittings:

1. PE corrugated pipe and fittings for coupled joints.

C. Non-woven geo-textile filter fabric:

1. Non-woven geo-textile filter fabric meeting AASHTO M288 Class 1and 2.

D. Crushed drain rock surrounding chanbers :

1. Clean crushed angular stone ¾-2” meeting AASHTO M43.

1.3 INSTALLATION

A. Install per manufacturers recommendations.

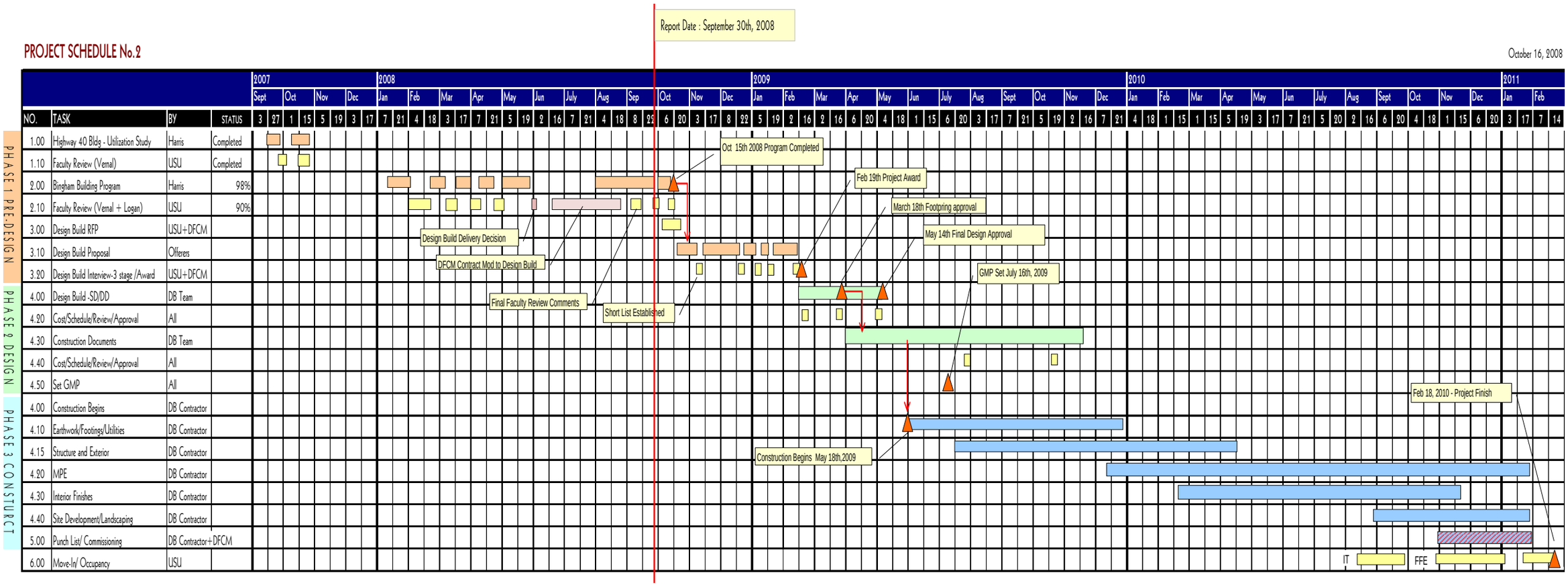
END OF SECTION 334650

Appendix F

Proposed Project Schedule on following page.

PROJECT SCHEDULE No.2

October 16, 2008



Note:

This is a preliminary planning schedule only. The actual project schedule will be modified by the successful bidder to meet constructability and design schedules.

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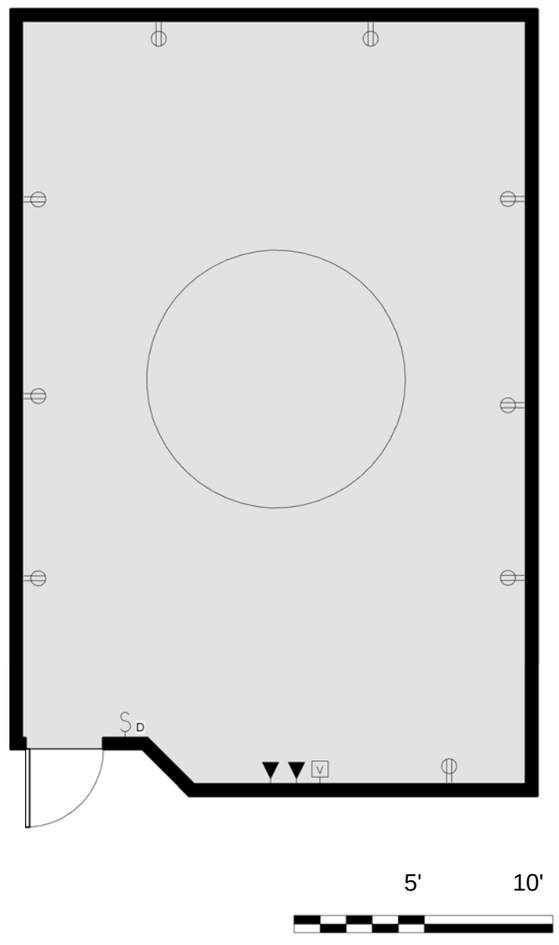
Appendix G

Folder G contains the individual jpg. diagrammatic images, also show in PDF and Revit file formats. These drawings are provided as a tool to assist the design build teams. It is the responsibility of the design build team to assure to the accuracy, scale, content and appropriateness of each drawing.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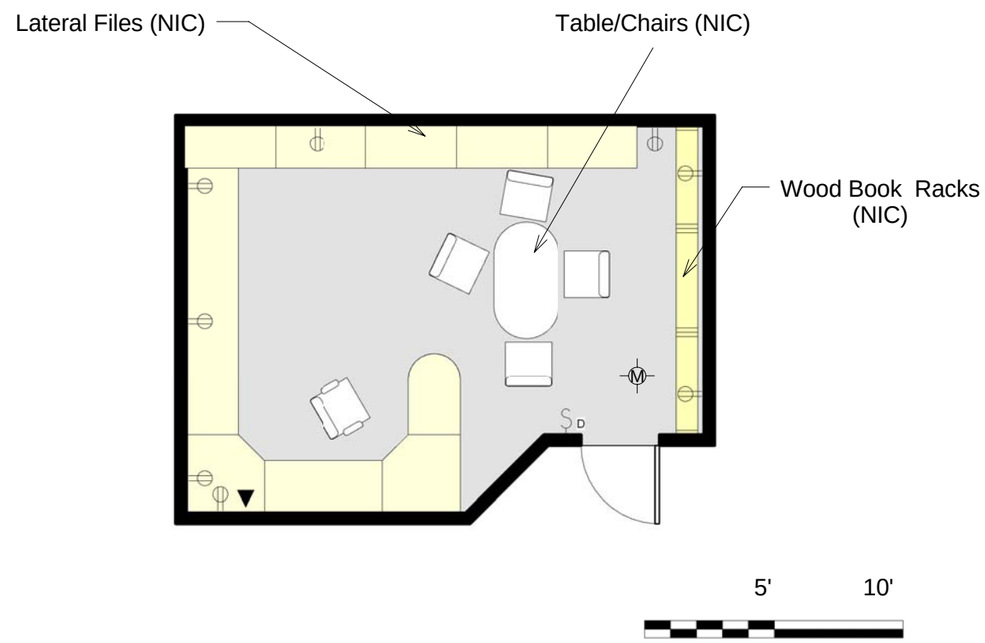
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Wood Book Racks
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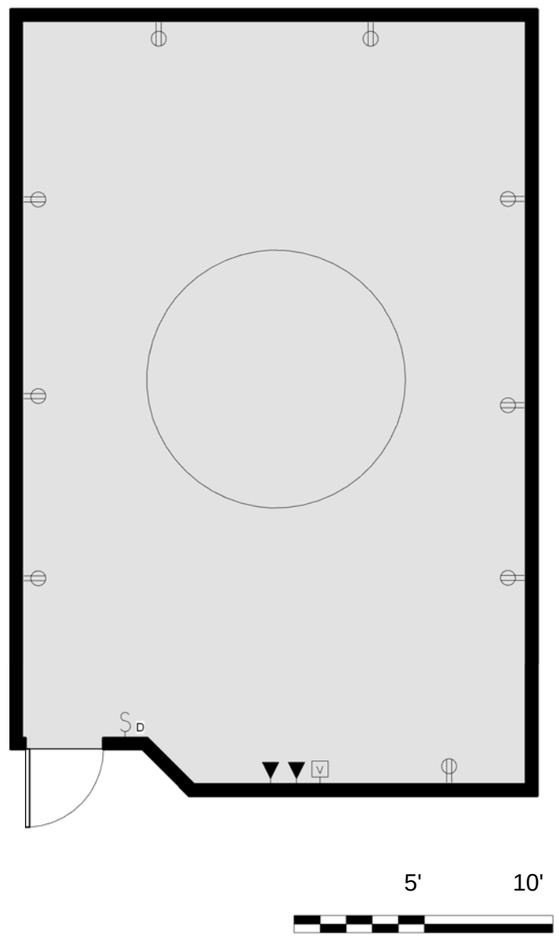
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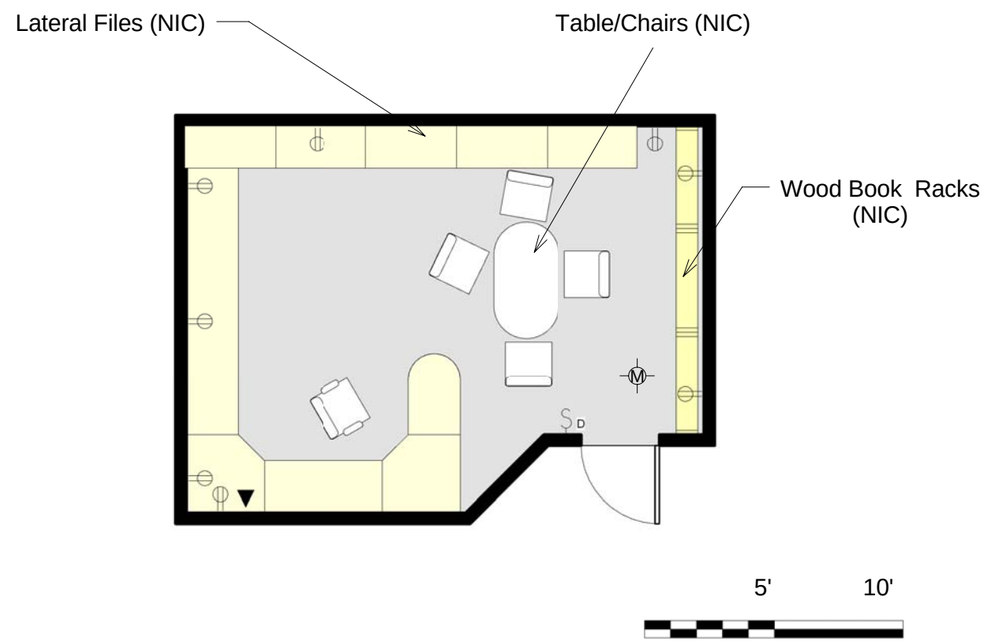
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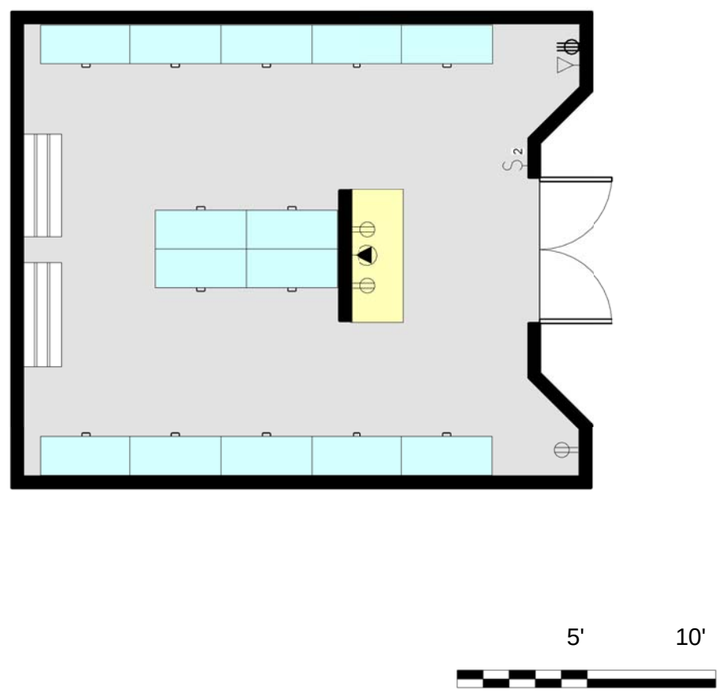

1 Bio Equipment Room
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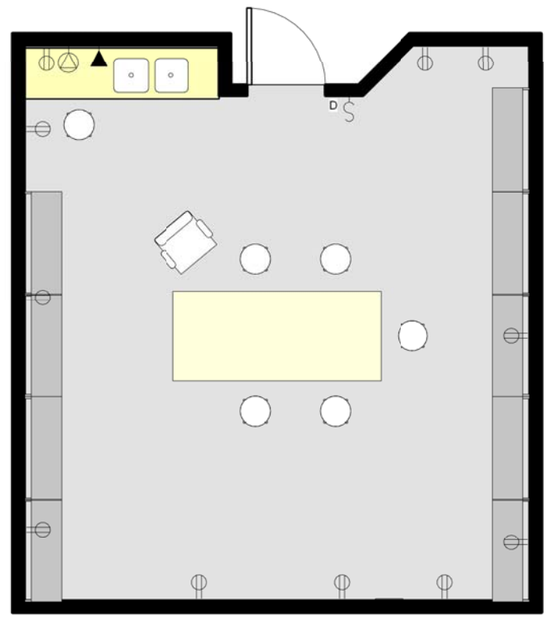
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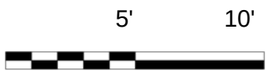
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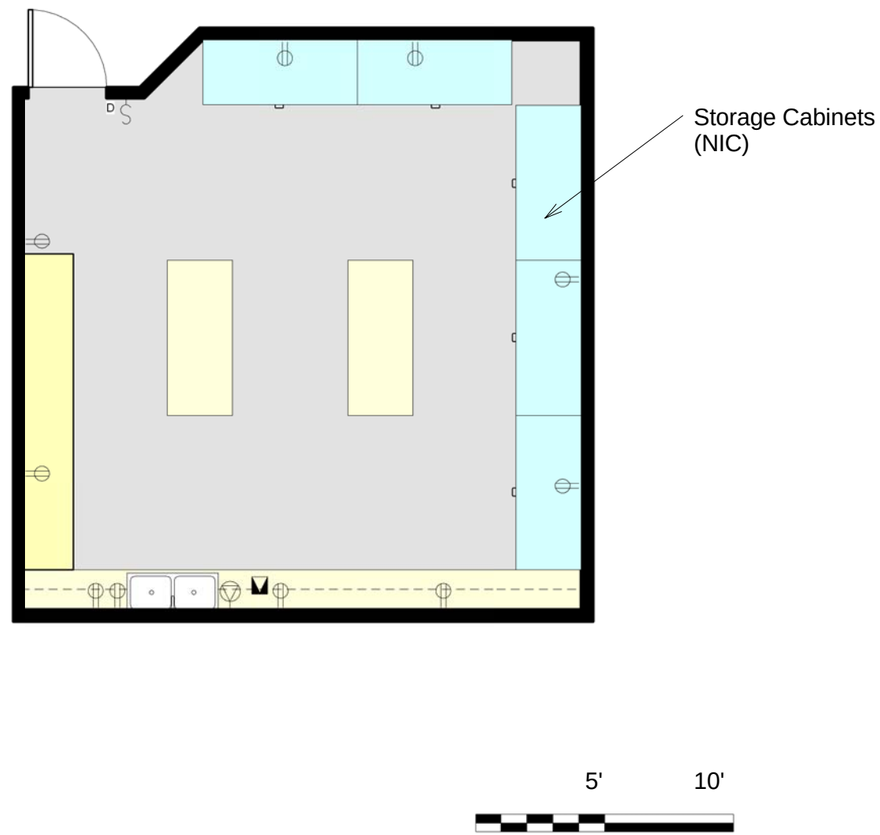
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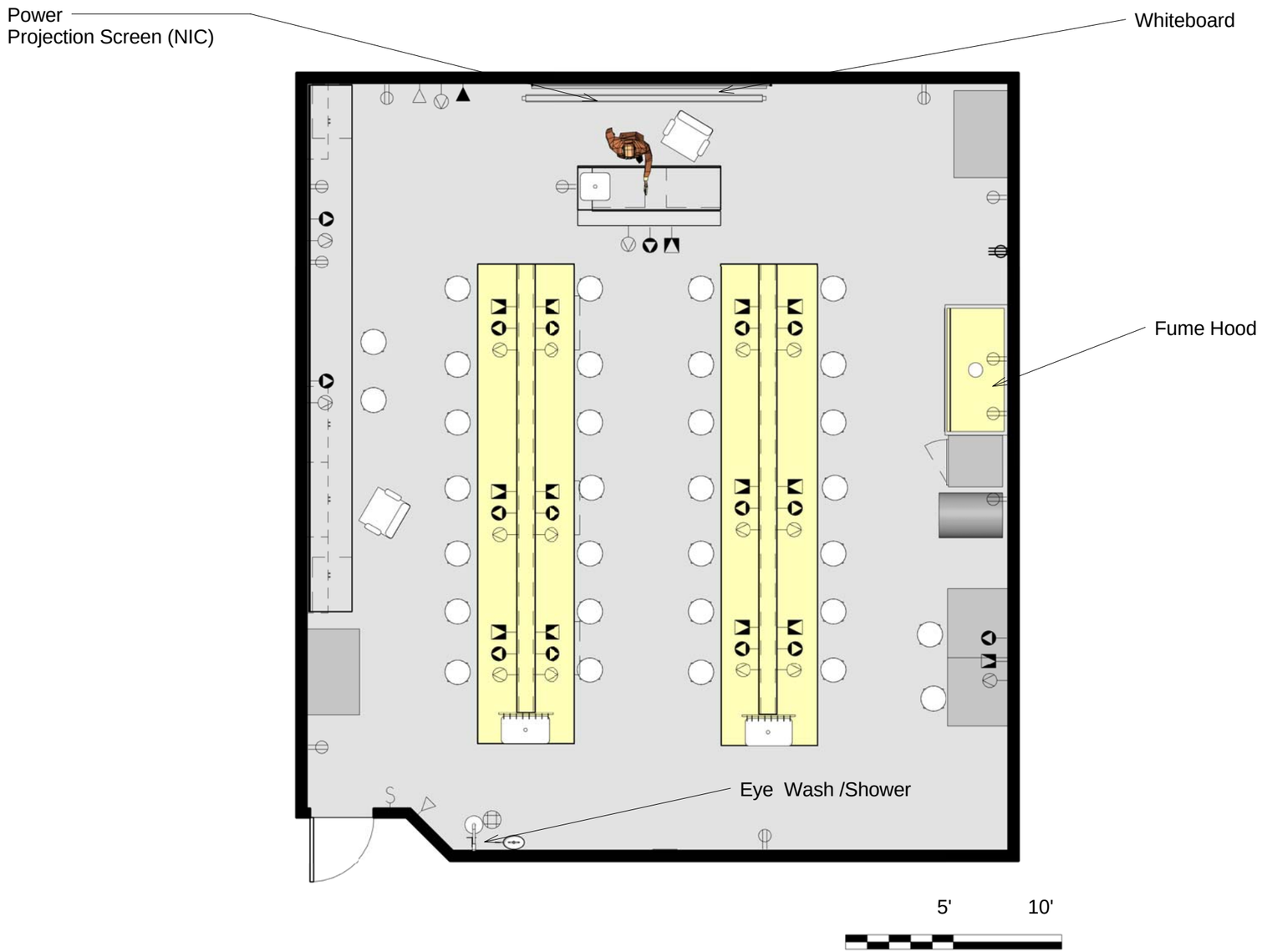
Power
Projection Screen (NIC)
Whiteboard
Fume Hood
Eye Wash /Shower
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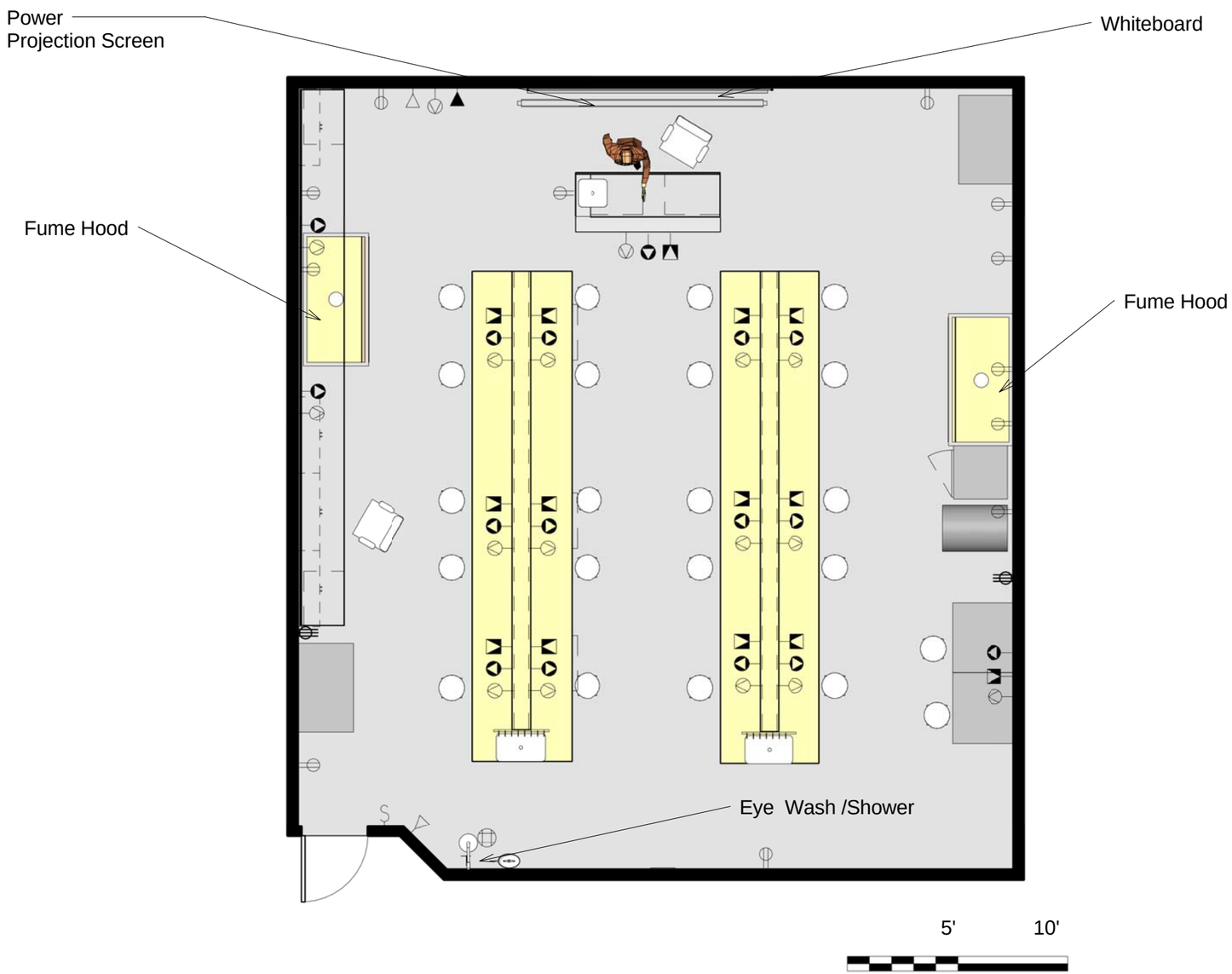
10'

Projector (NIC)
Projector Screen (NIC)
Eye Wash /Shower
5'
10'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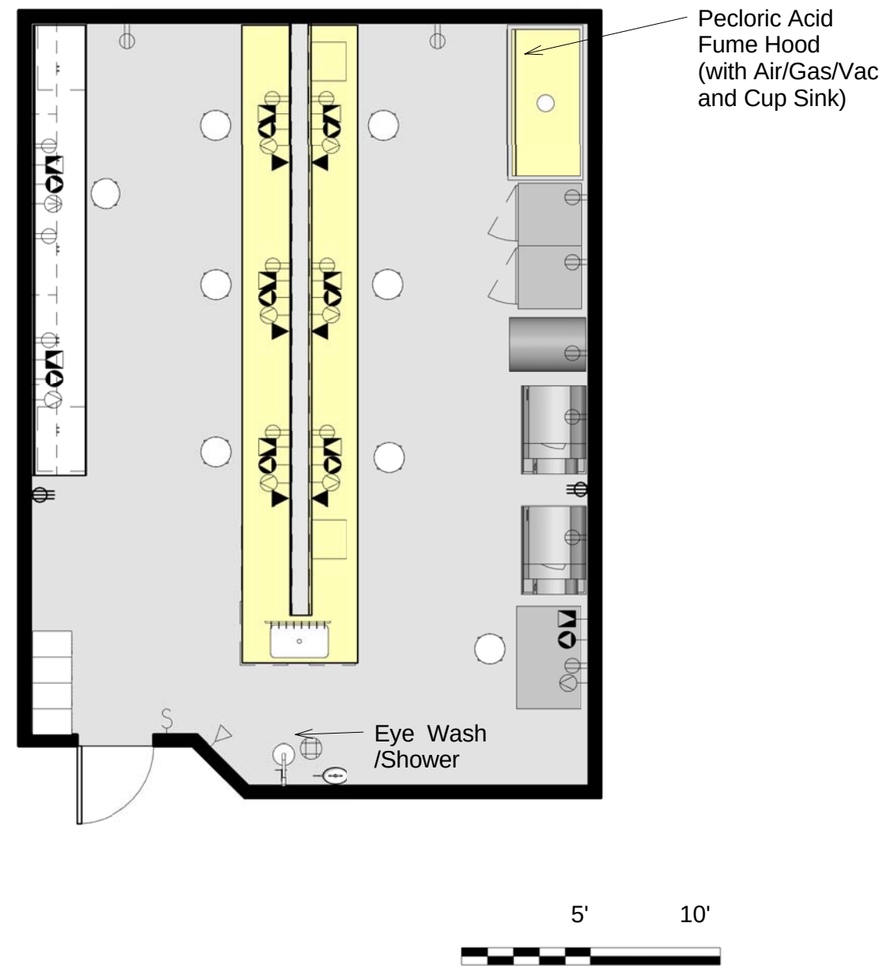
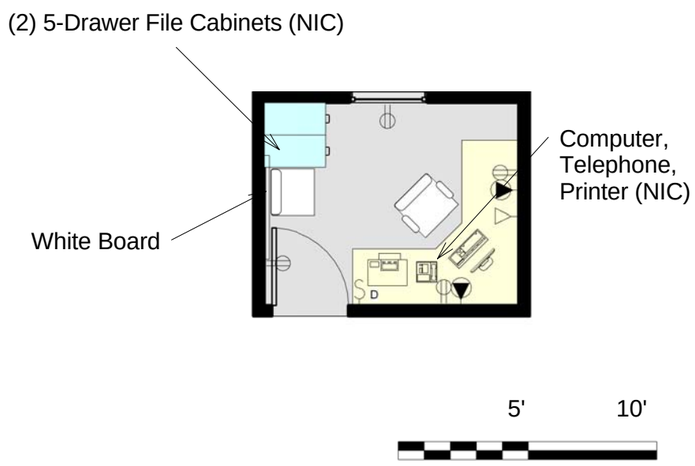
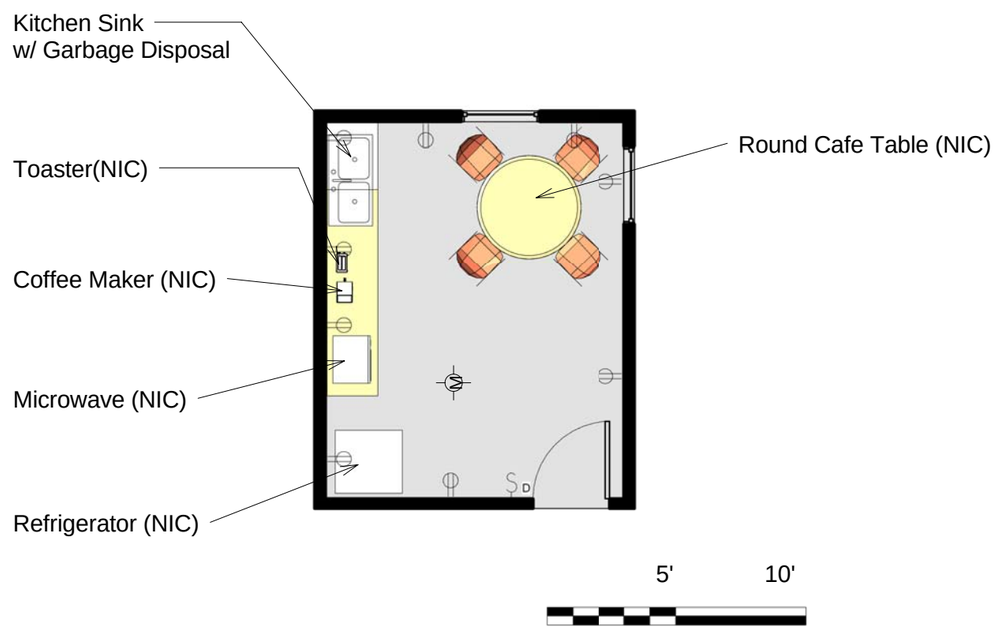
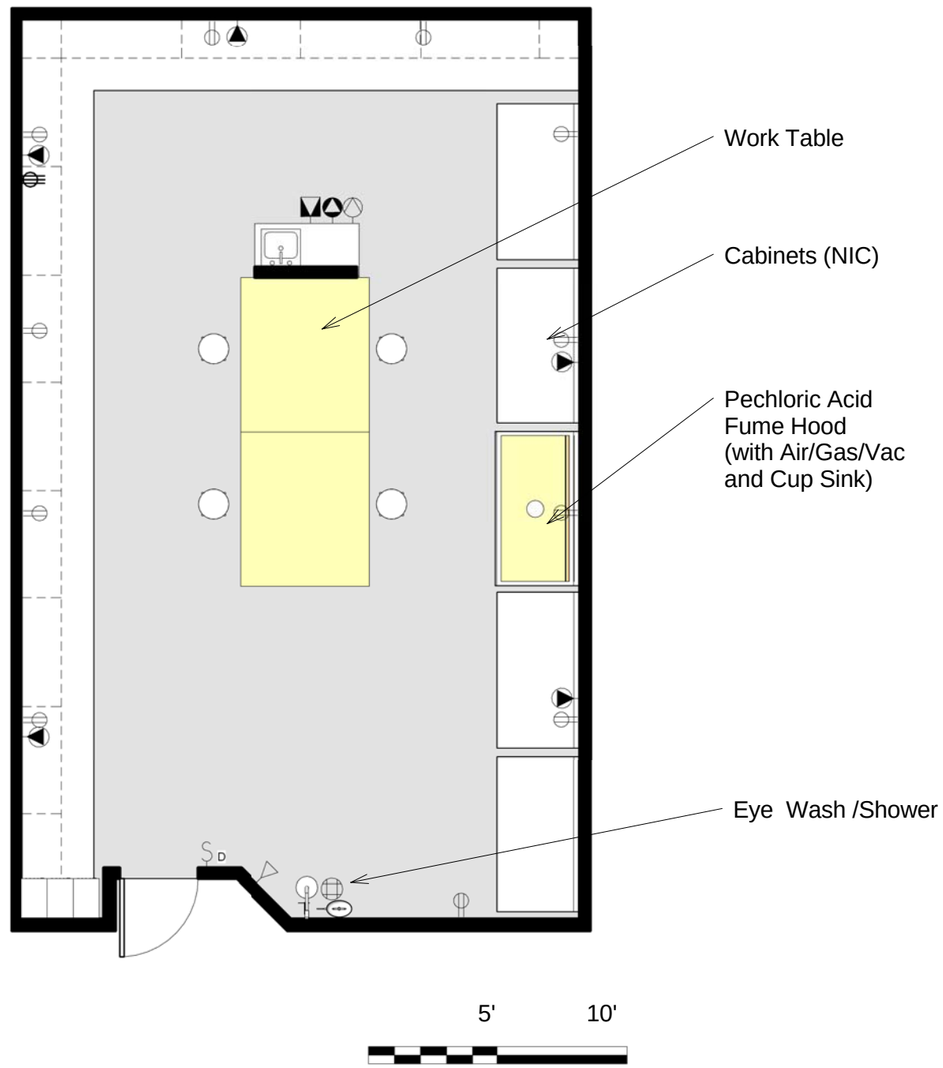
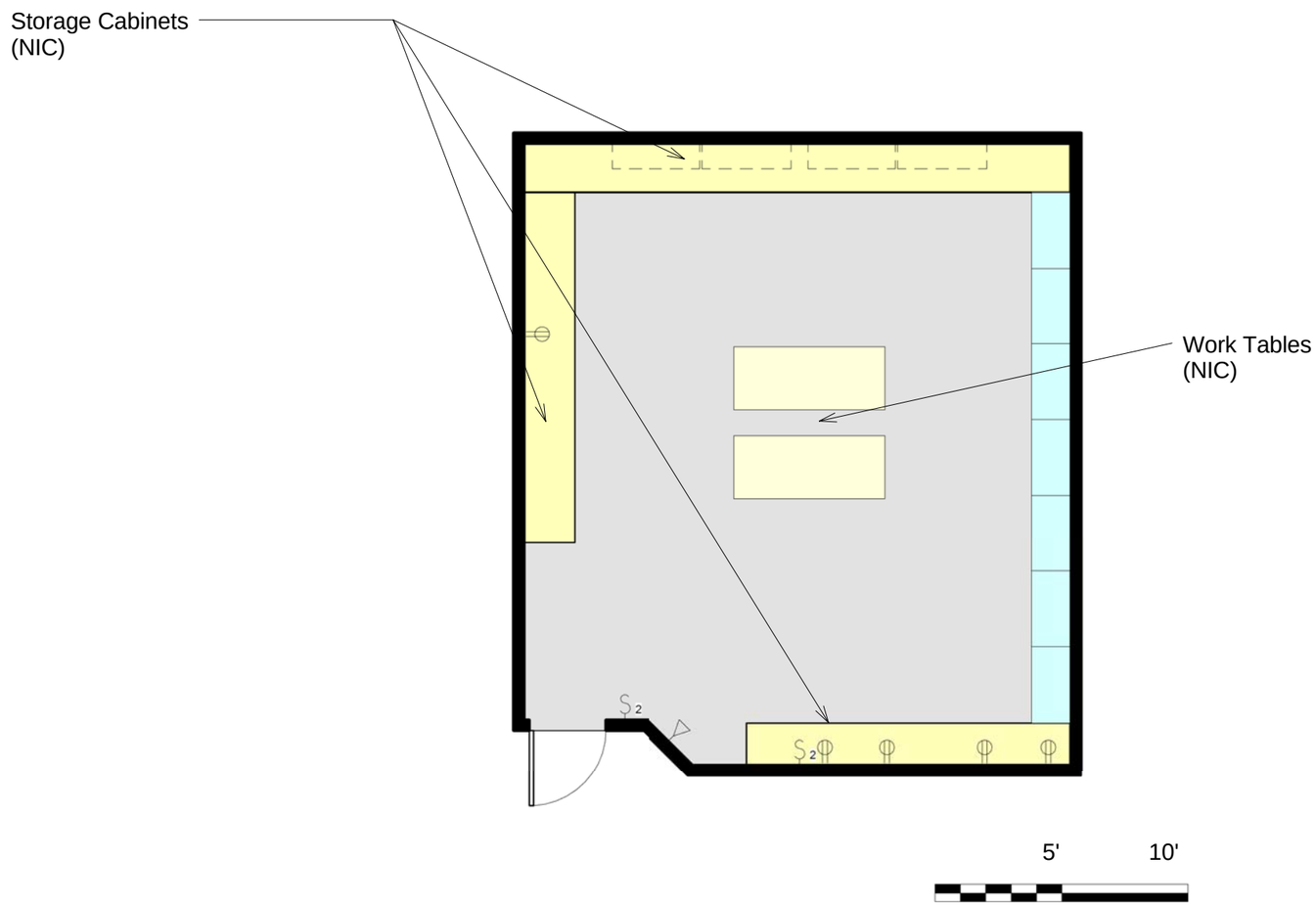
Projection Screen
Whiteboard
Fume Hood
Fume Hood
Eye Wash /Shower
5'
10'

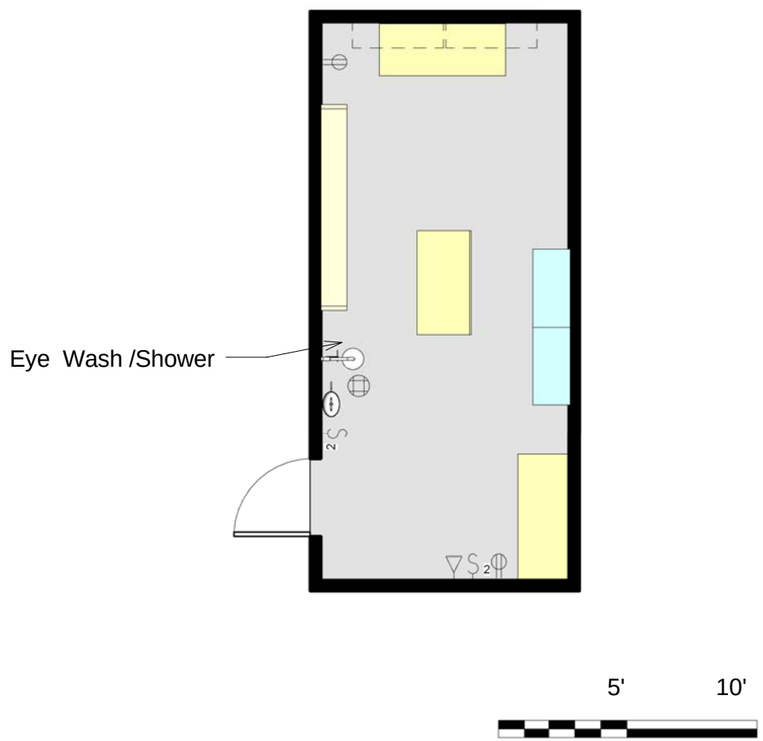

Pecloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash
/Shower
5'
10'

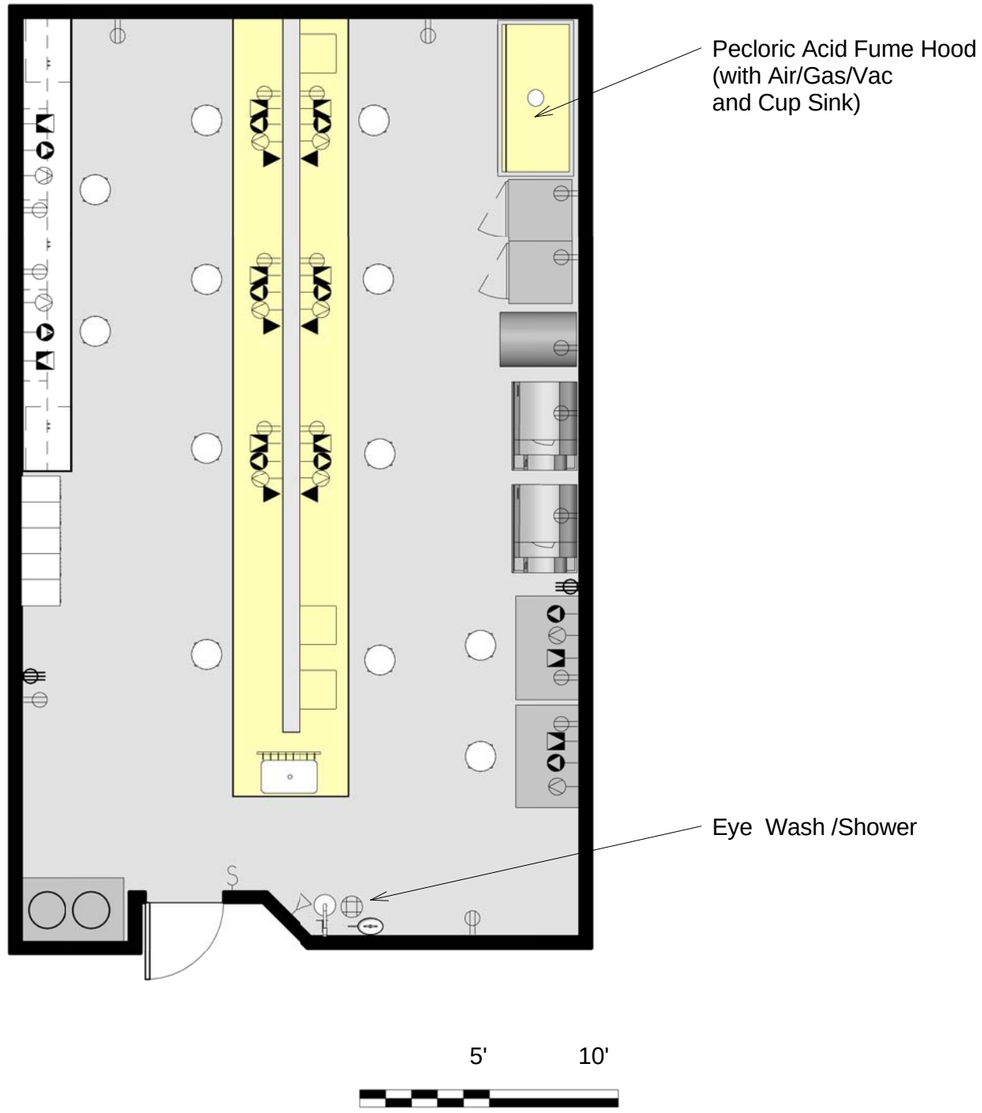

(2) 5-Drawer File Cabinets (NIC)
Computer,
Telephone,
Printer (NIC)
White Board
5'
10'

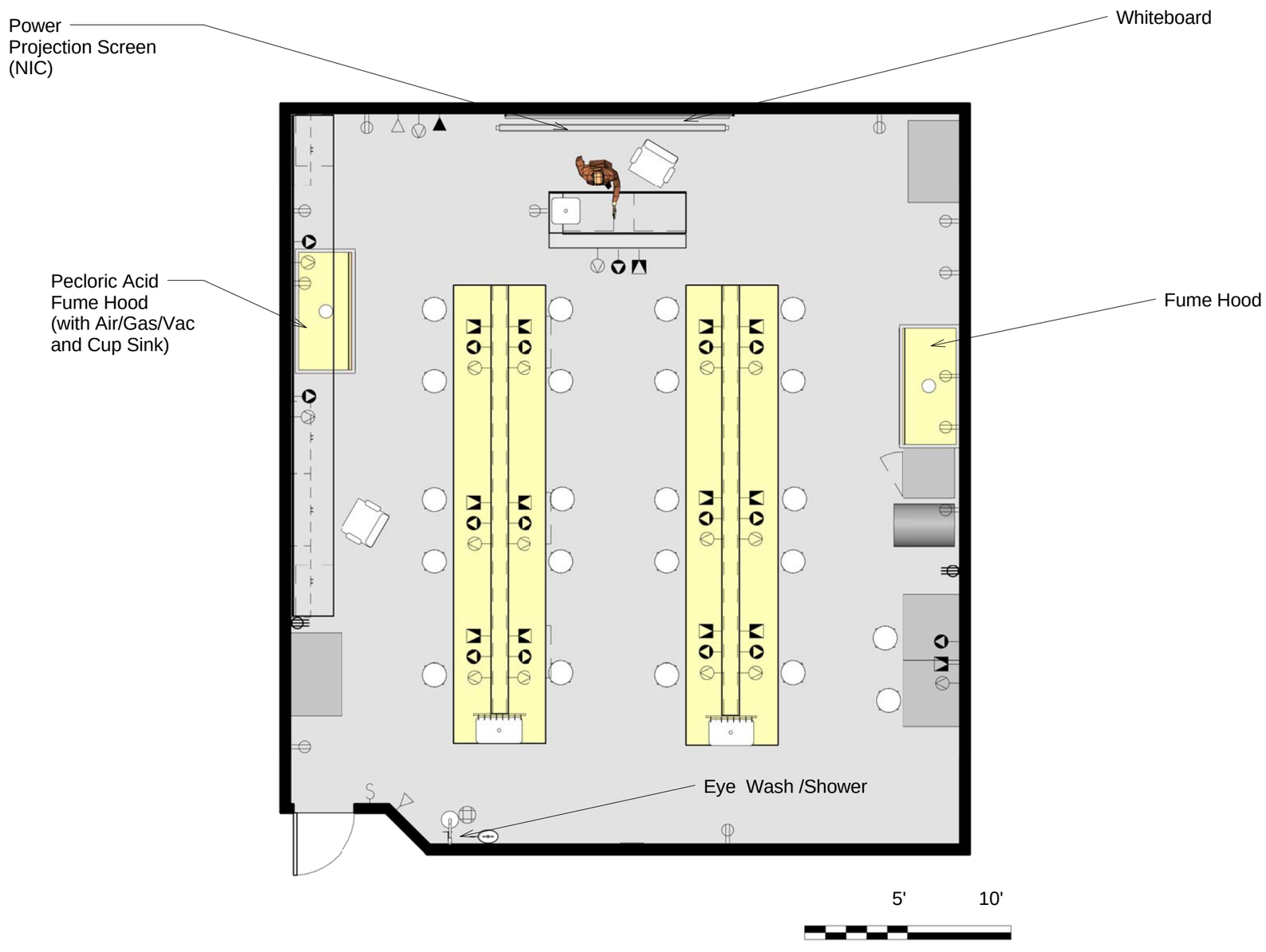

Kitchen Sink
w/ Garbage Disposal
Toaster(NIC)
Coffee Maker (NIC)
Microwave (NIC)
Refrigerator (NIC)
Round Cafe Table (NIC)
5'
10'

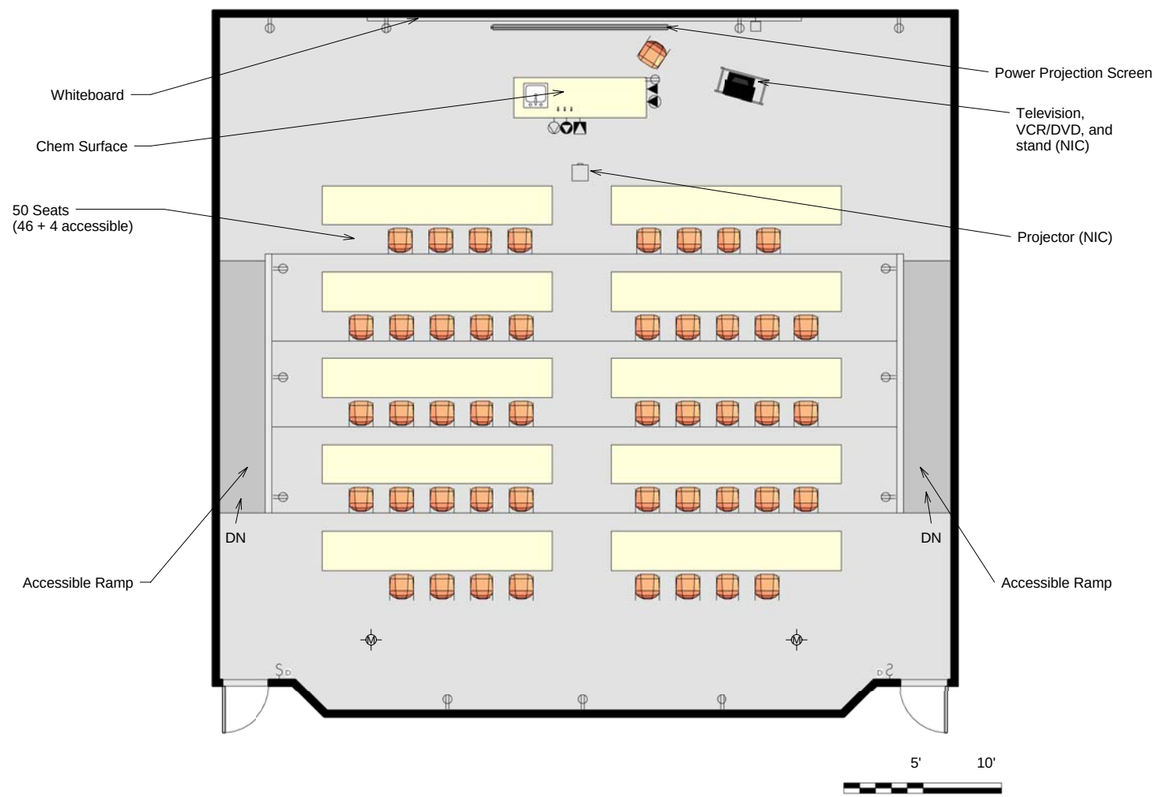

Work Table
Cabinets (NIC)
Pechloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash /Shower
5'
10'

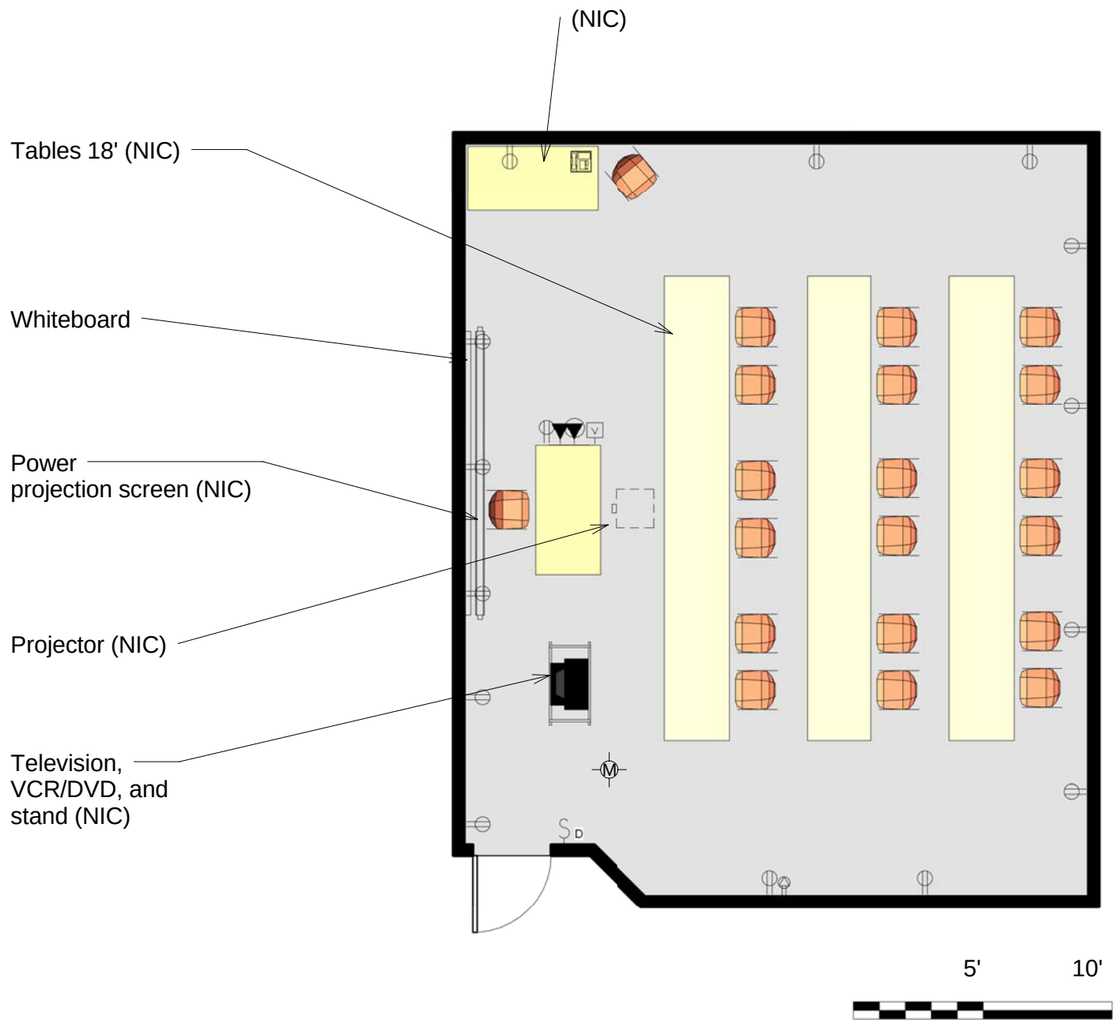

Storage Cabinets
(NIC)
Work Tables
(NIC)
5'
10'

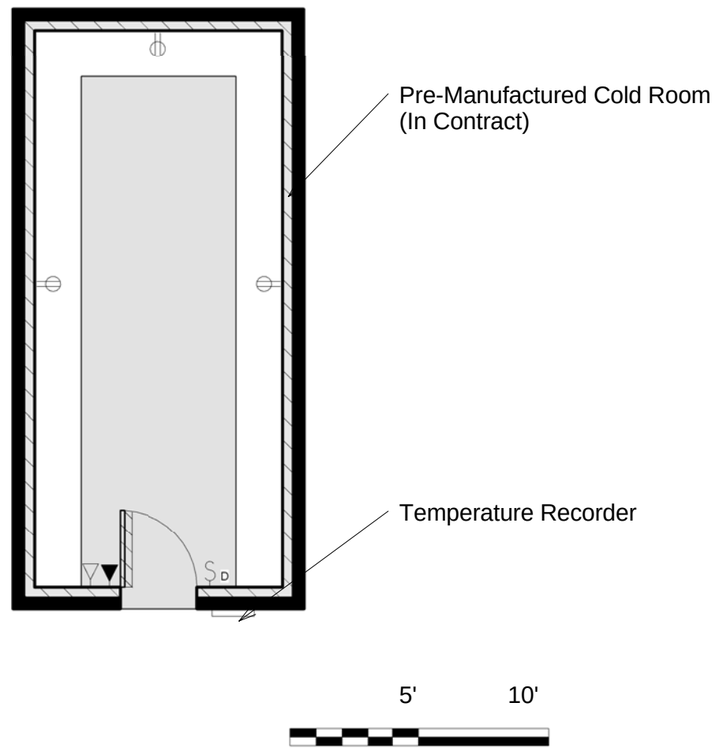

Eye Wash /Shower
5'
10'


Pecloric Acid Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash /Shower
5'
10'

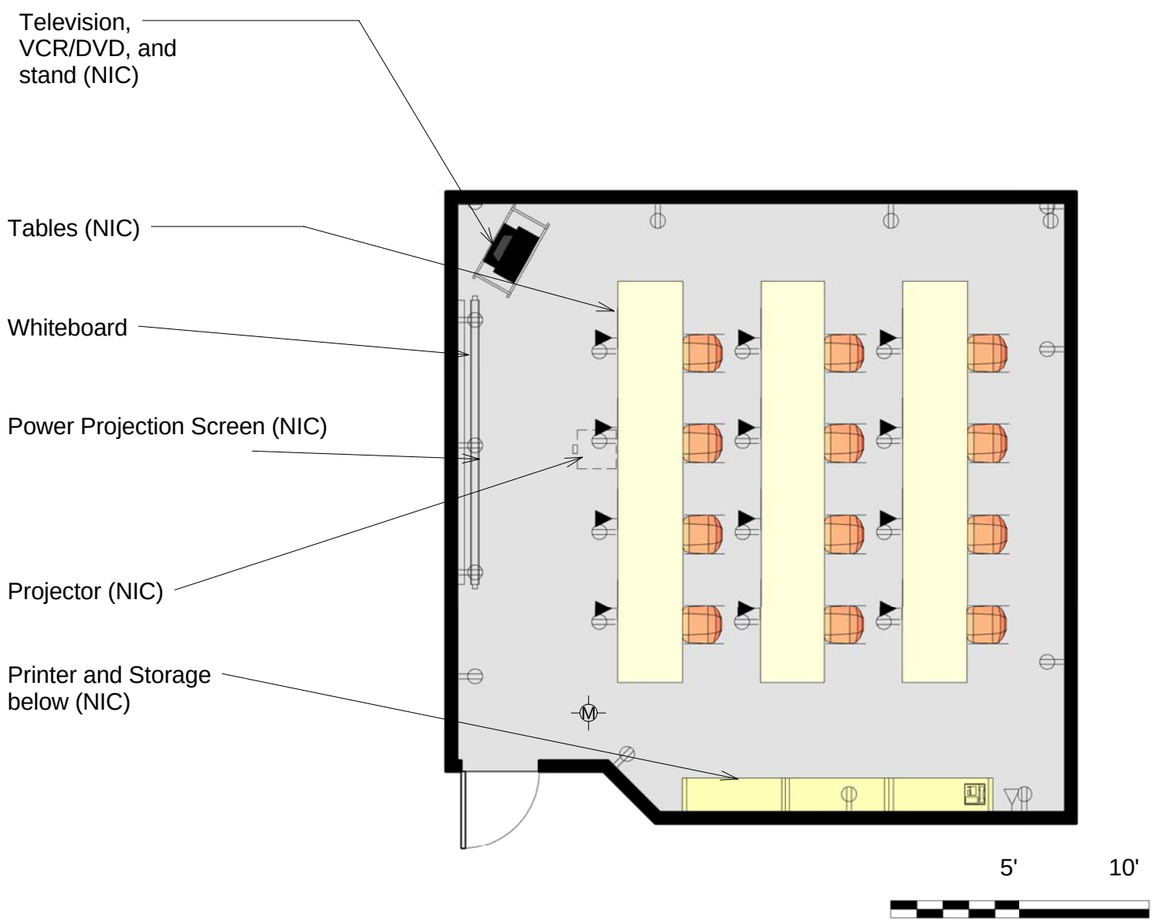

Power
Projection Screen
(NIC)
Whiteboard
Pecloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Fume Hood
Eye Wash /Shower
5'
10'

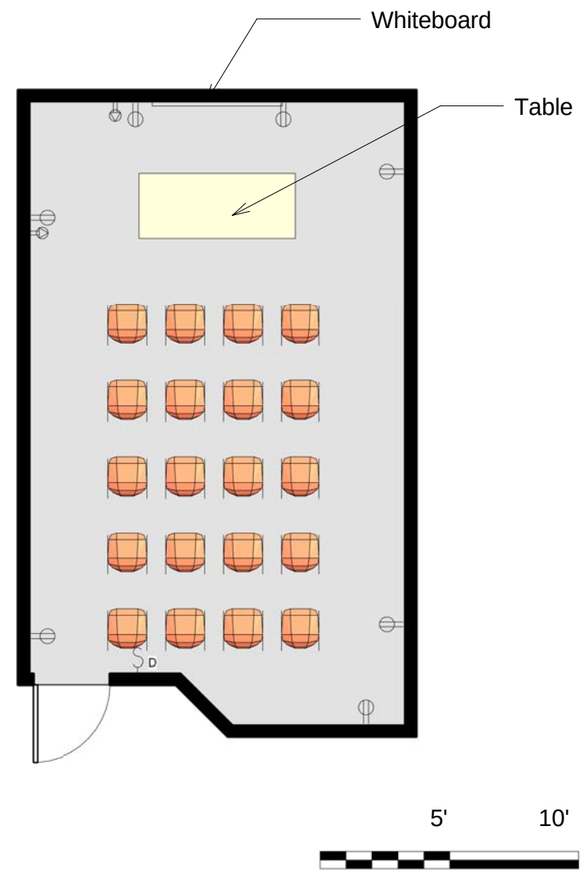

Whiteboard
Chem Surface
50 Seats
(46 + 4 accessible)
Accessible Ramp
DN
Power Projection Screen
Television,
VCR/DVD, and
stand (NIC)
Projector (NIC)
DN
Accessible Ramp
5'
10'

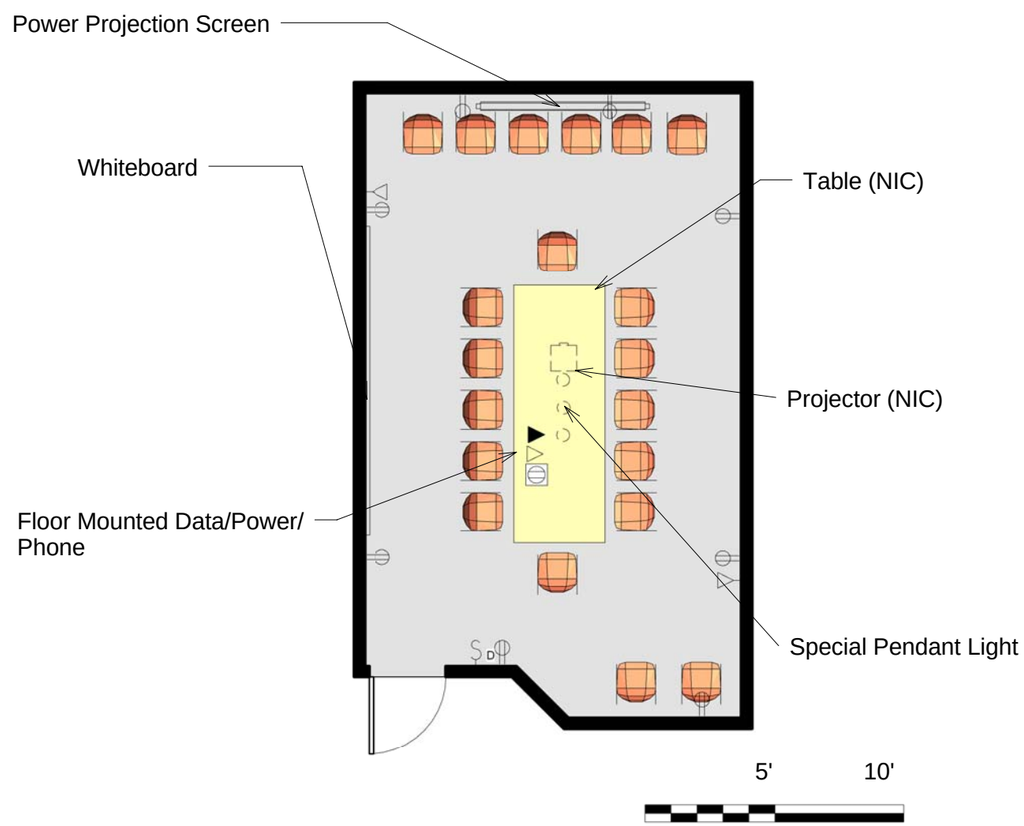

(NIC)
Tables 18' (NIC)
Whiteboard
Power
projection screen (NIC)
Projector (NIC)
Television,
VCR/DVD, and
stand (NIC)
5'
10'

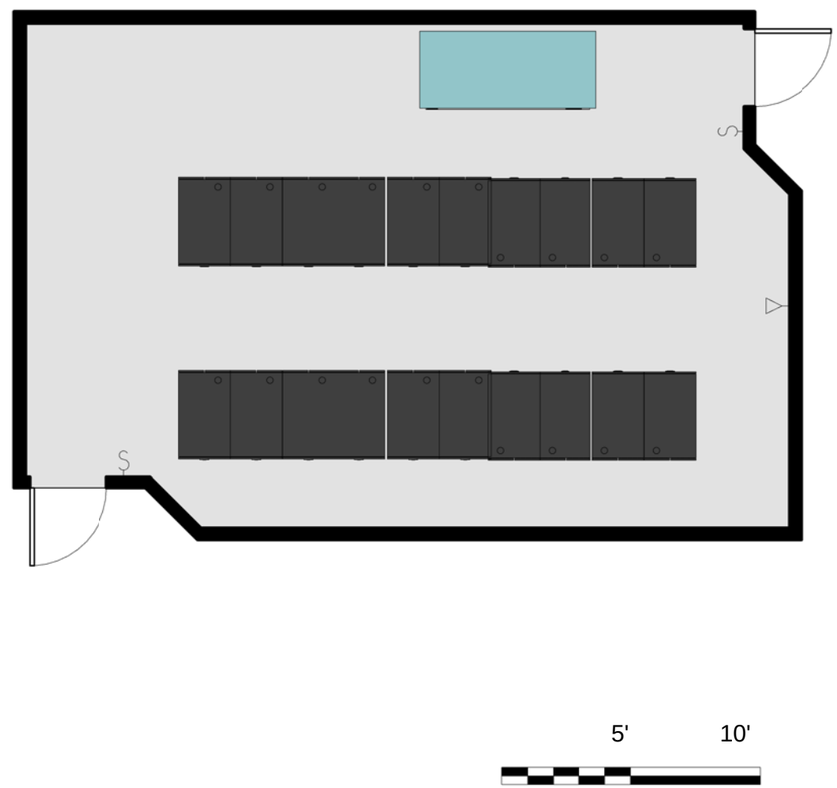

Pre-Manufactured Cold Room
(In Contract)
Temperature Recorder
5'
10'

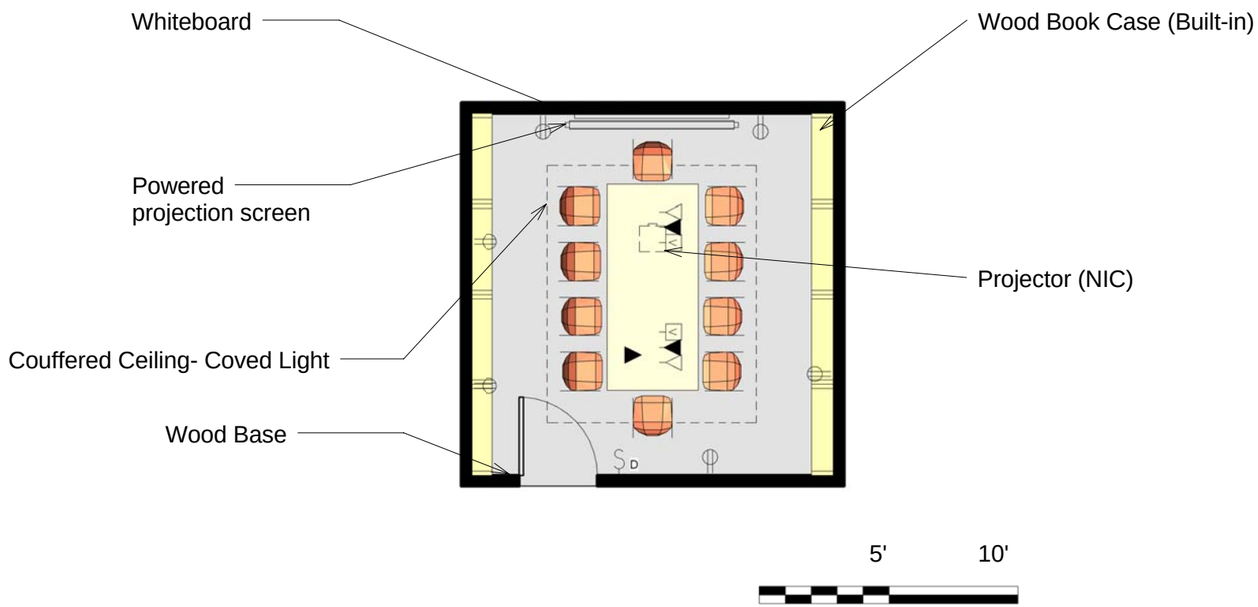
om

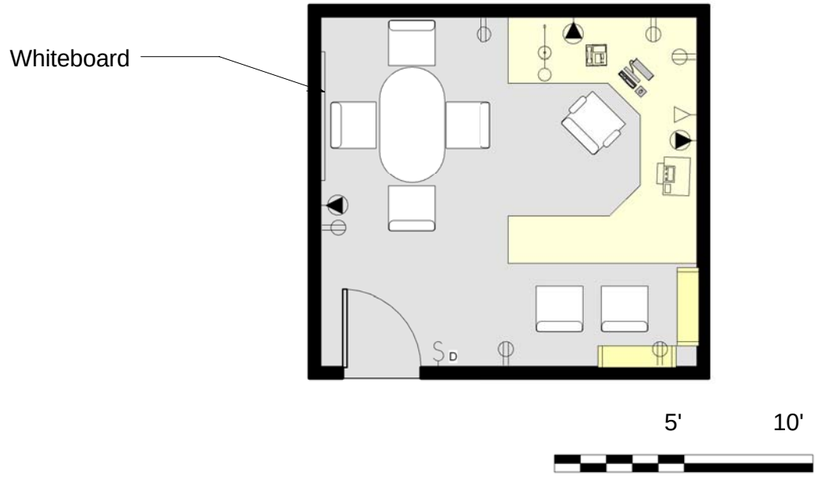

Television, VCR/DVD, and stand (NIC)
Tables (NIC)
Whiteboard
Power Projection Screen (NIC)
Projector (NIC)
Printer and Storage below (NIC)
5'
10'

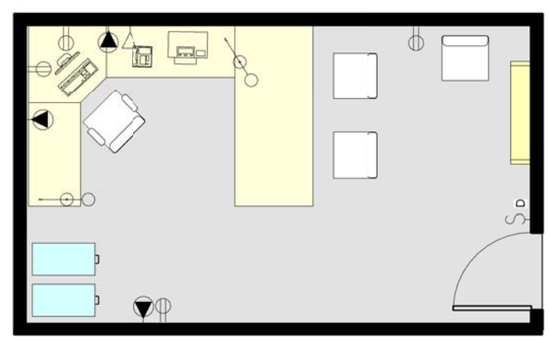

Whiteboard
Table
5'
10'


Power Projection Screen
Whiteboard
Table (NIC)
Projector (NIC)
Floor Mounted Data/Power/
Phone
Special Pendant Light
5'
10'

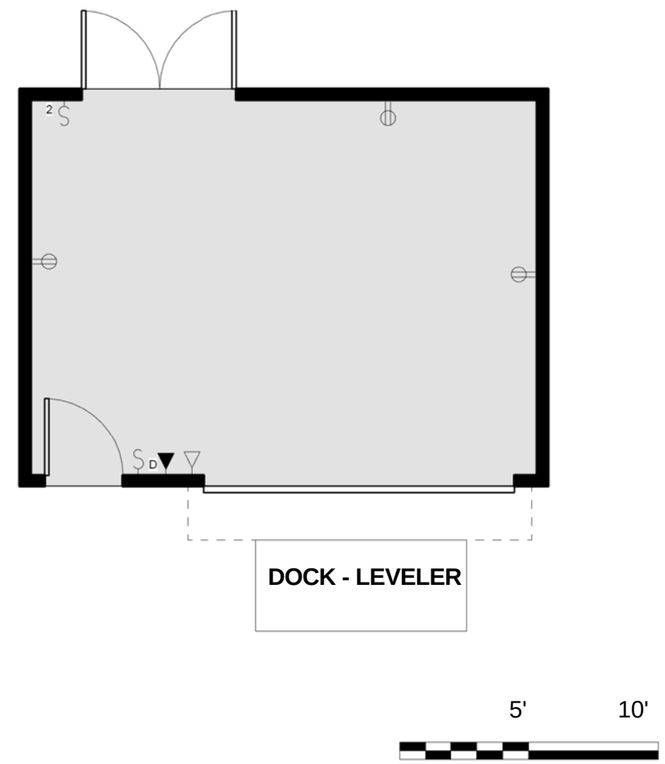

5'
10'

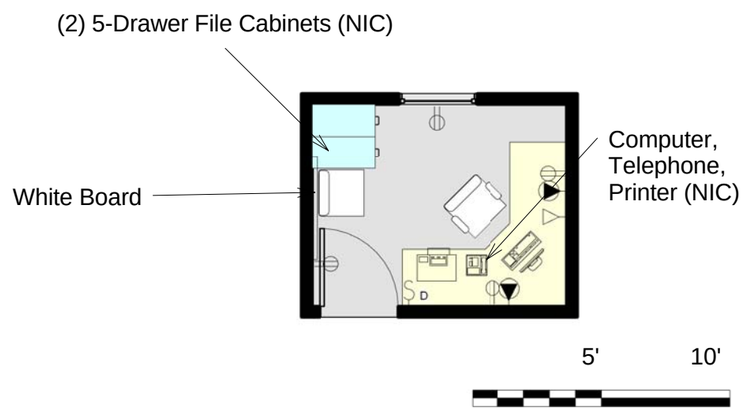

Whiteboard
Wood Book Case (Built-in)
Powered
projection screen
Projector (NIC)
Couffered Ceiling- Coved Light
Wood Base
5'
10'

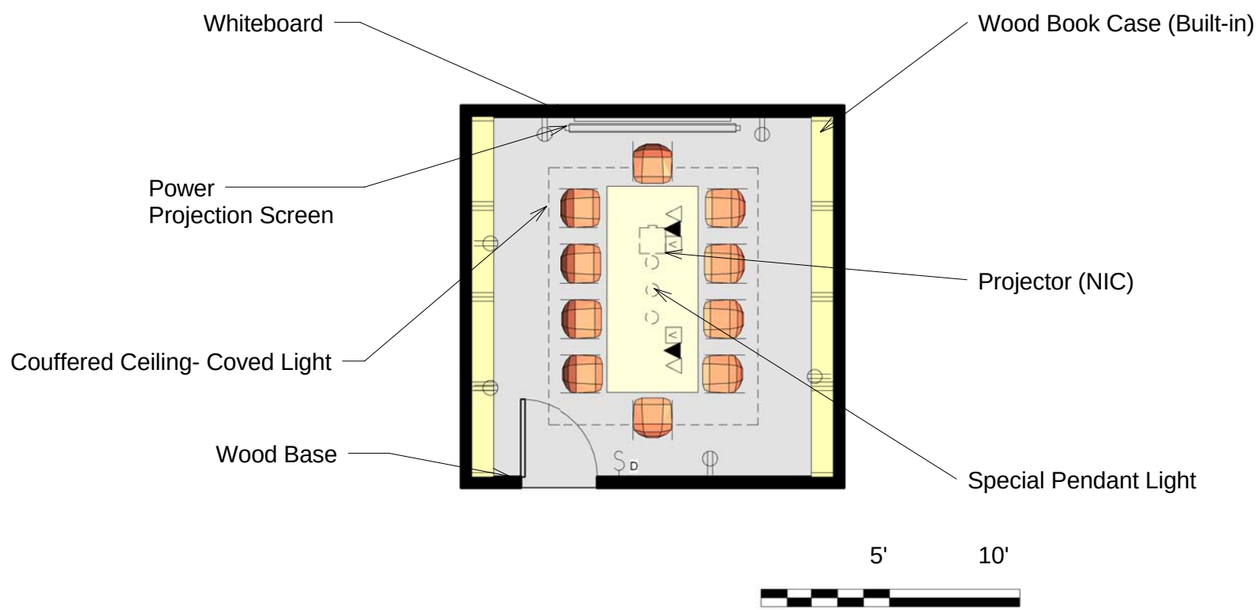

Whiteboard
5'
10'

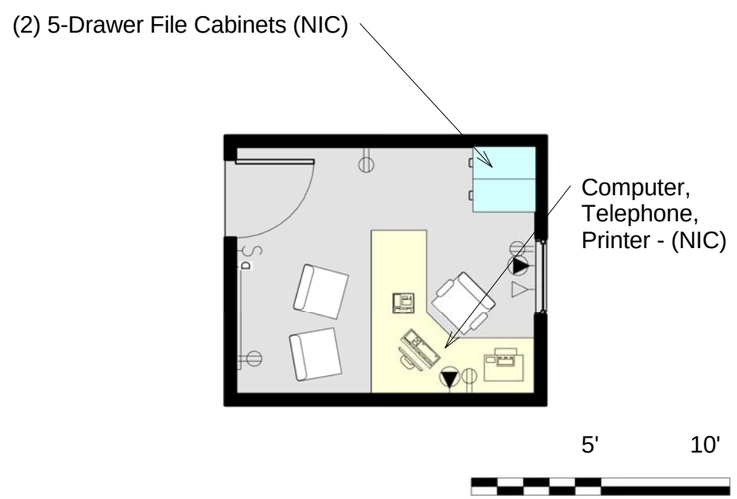


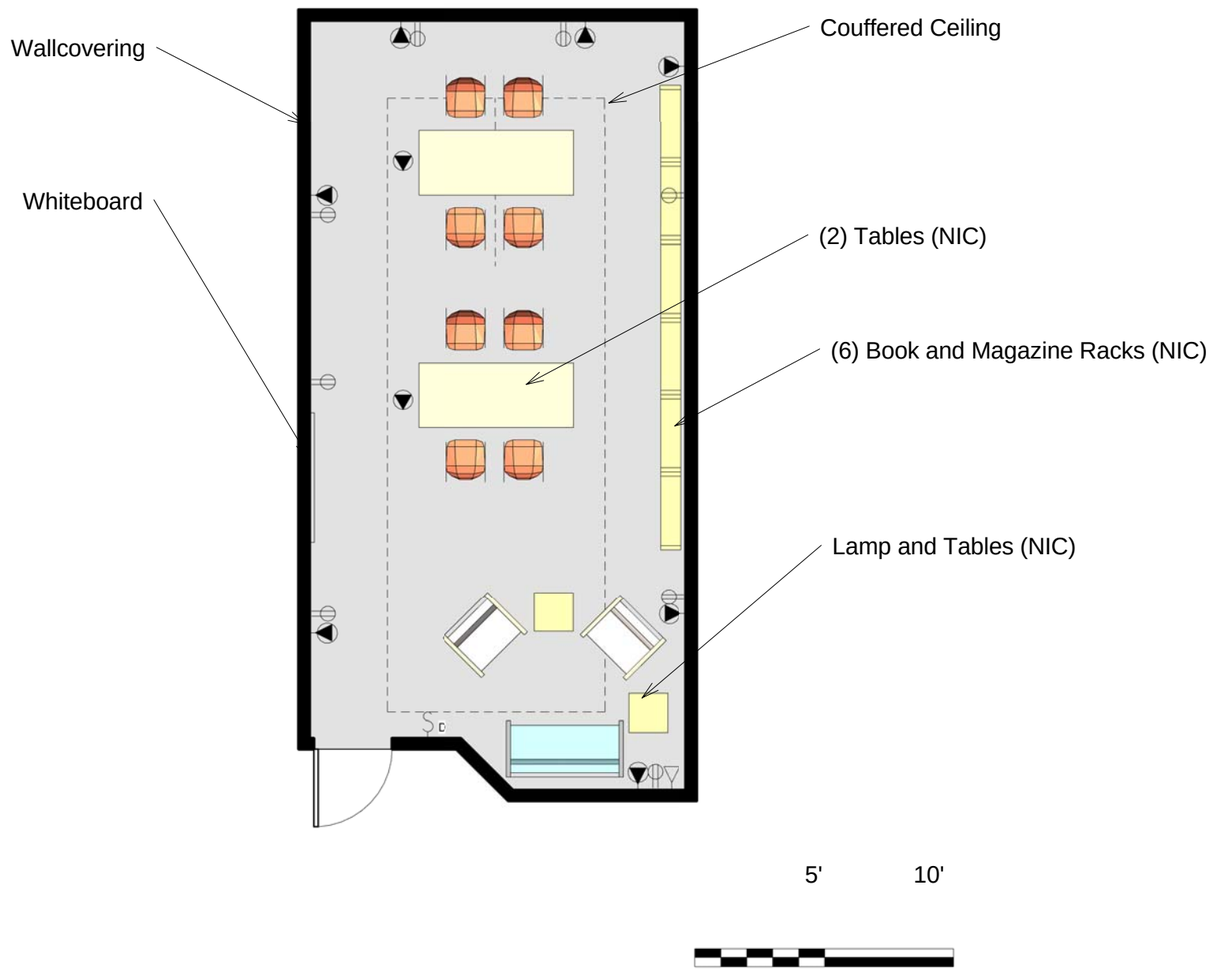
5' 10'


2
D
DOCK - LEVELER
5'
10'


(2) 5-Drawer File Cabinets (NIC)
White Board
Computer,
Telephone,
Printer (NIC)
5'
10'


Whiteboard
Wood Book Case (Built-in)
Power
Projection Screen
Projector (NIC)
Couffered Ceiling- Coved Light
Wood Base
Special Pendant Light
5'
10'


(2) 5-Drawer File Cabinets (NIC)
Computer,
Telephone,
Printer - (NIC)
5'
10'


Wallcovering
Couffered Ceiling
Whiteboard
(2) Tables (NIC)
(6) Book and Magazine Racks (NIC)
Lamp and Tables (NIC)
5'
10'

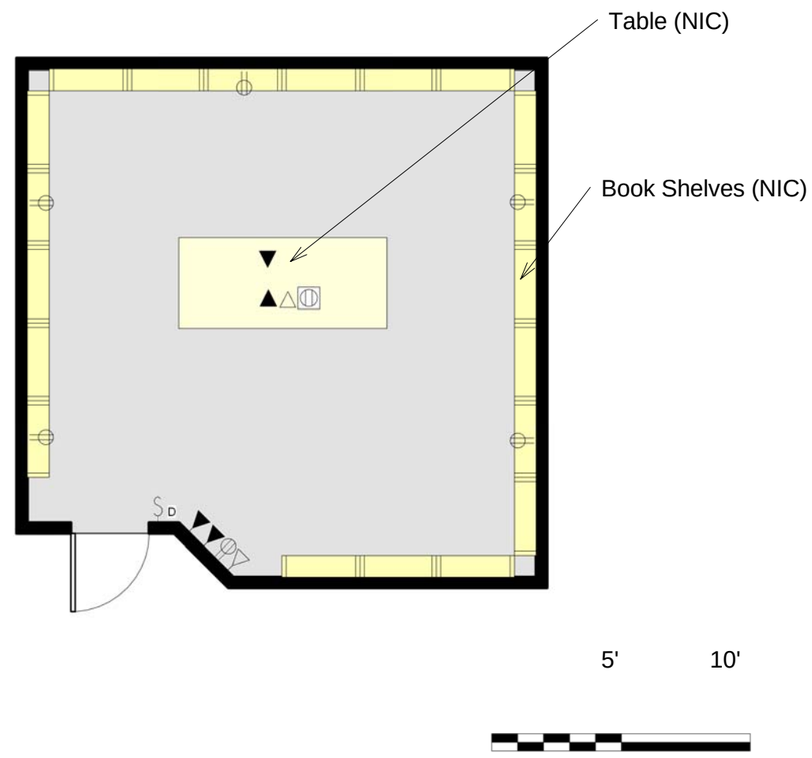
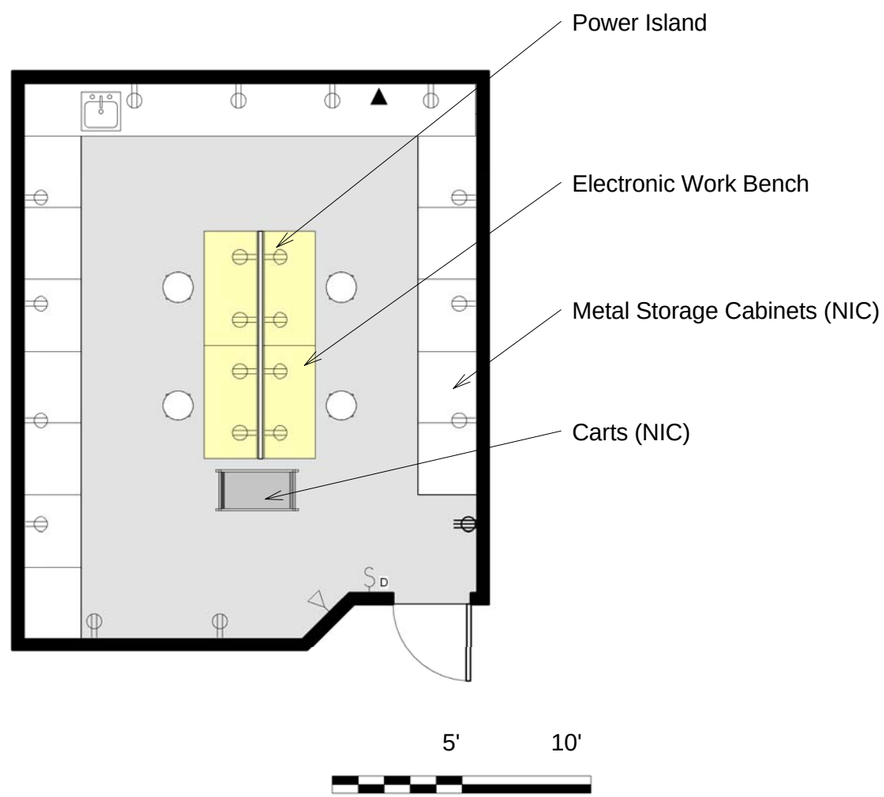
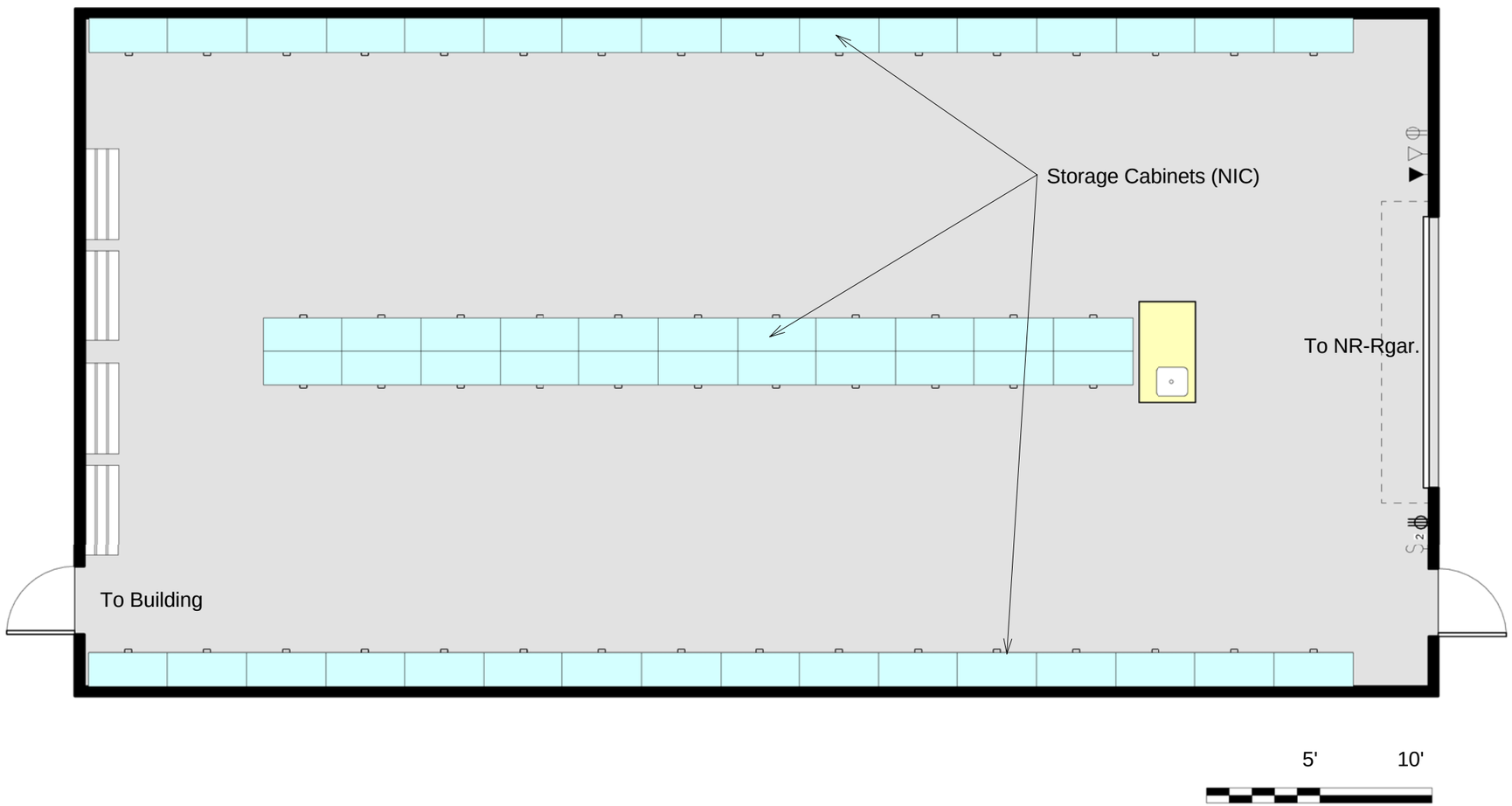
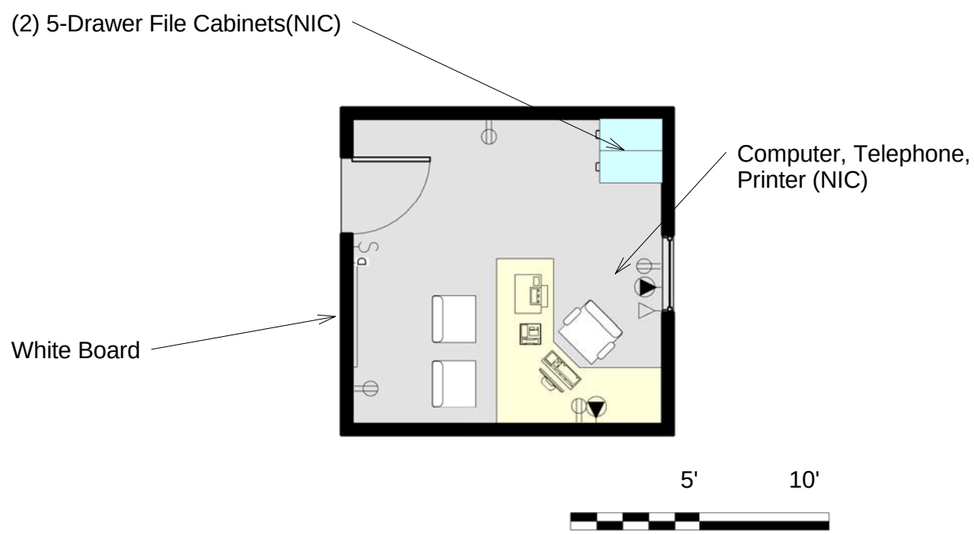
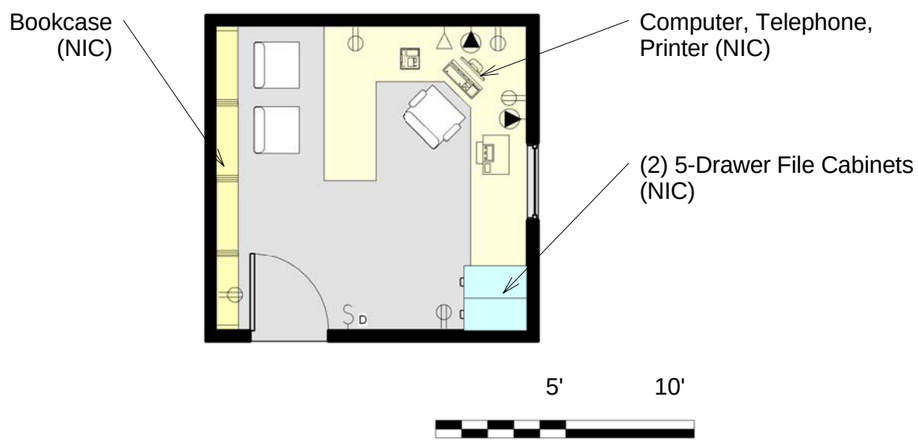


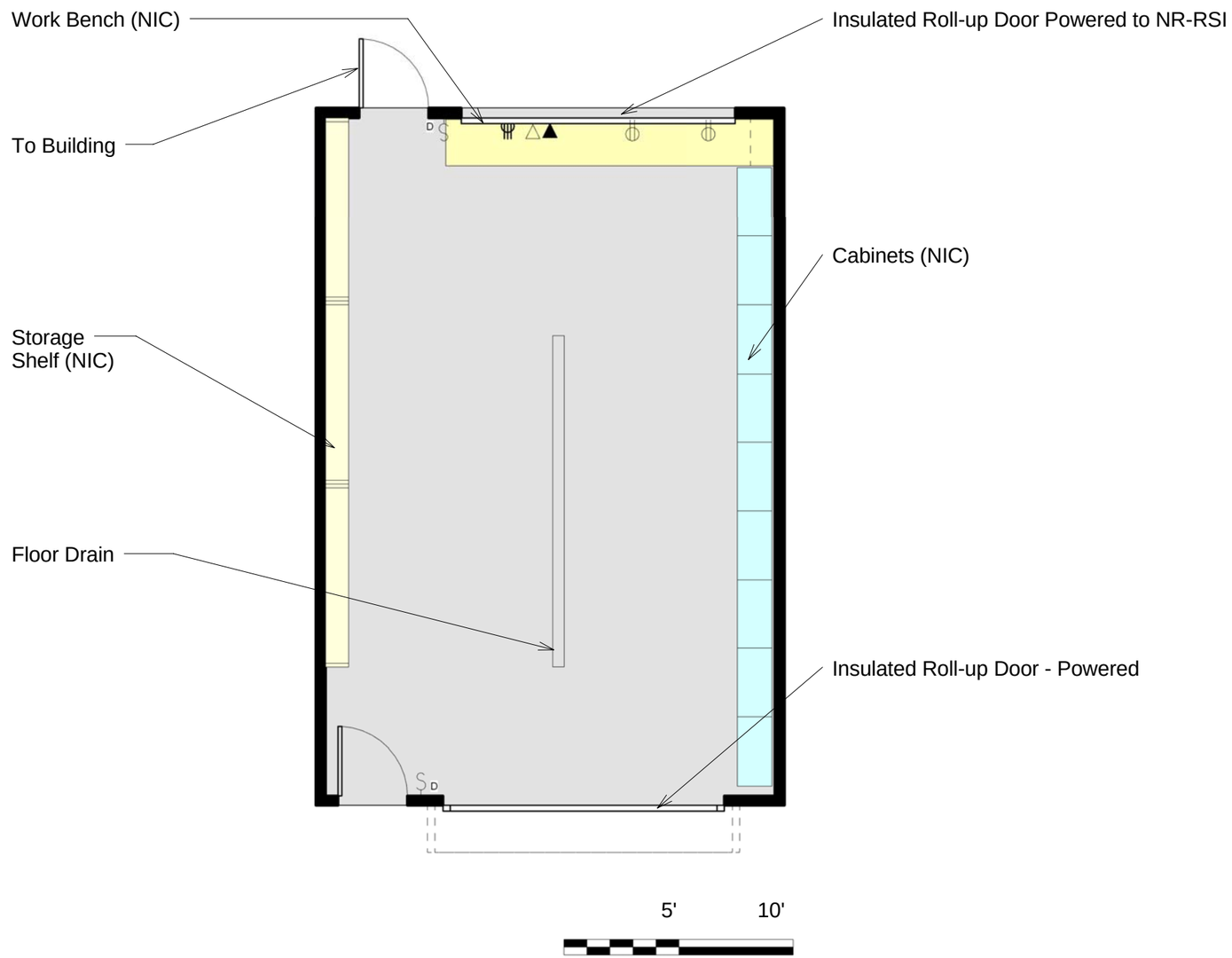
Table (NIC)
Book Shelves (NIC)
5'
10'

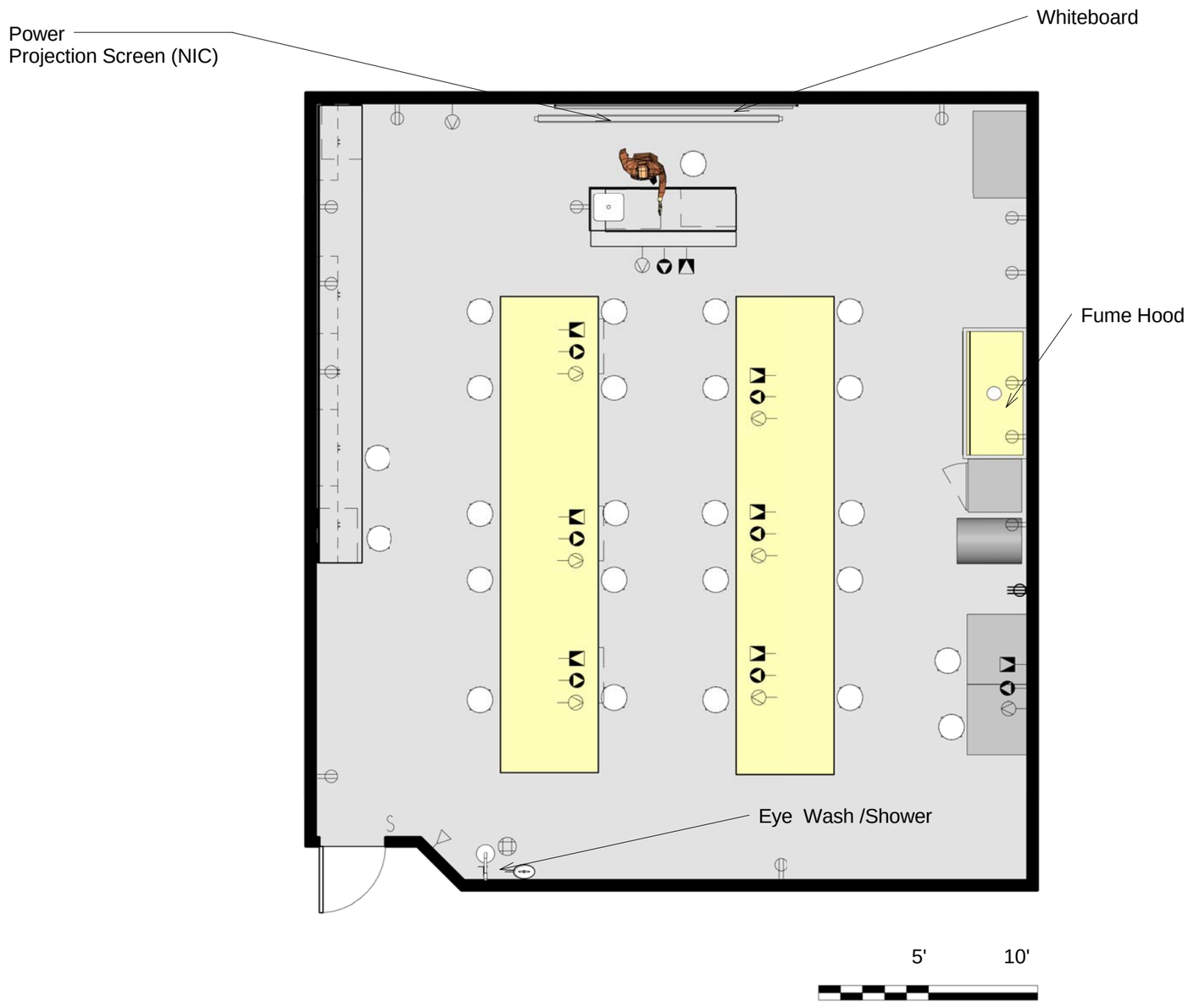

Power Island
Electronic Work Bench
Metal Storage Cabinets (NIC)
Carts (NIC)
5'
10'

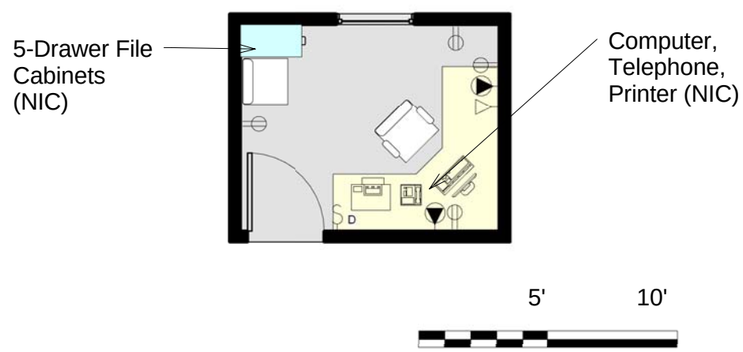

Storage Cabinets (NIC)
To NR-Rgar.
To Building
5'
10'

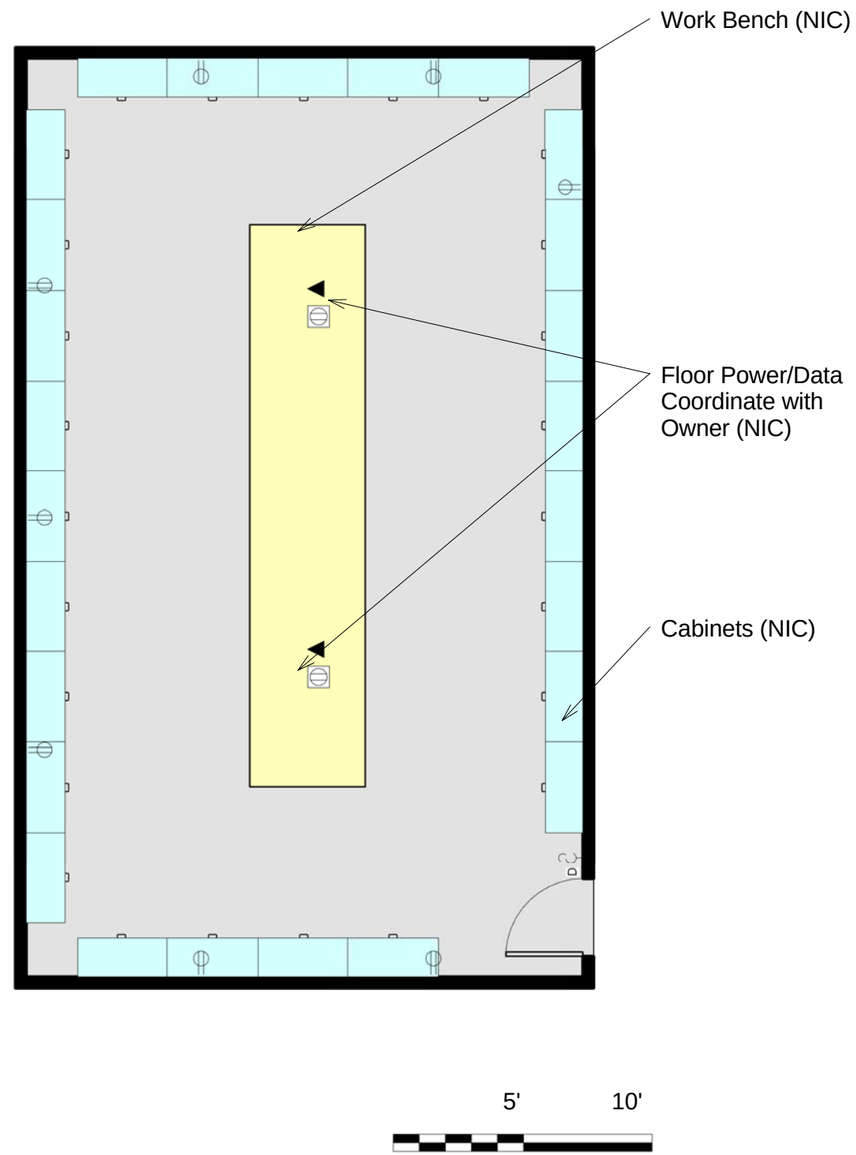

(2) 5-Drawer File Cabinets(NIC)
Computer, Telephone,
Printer (NIC)
White Board
5'
10'

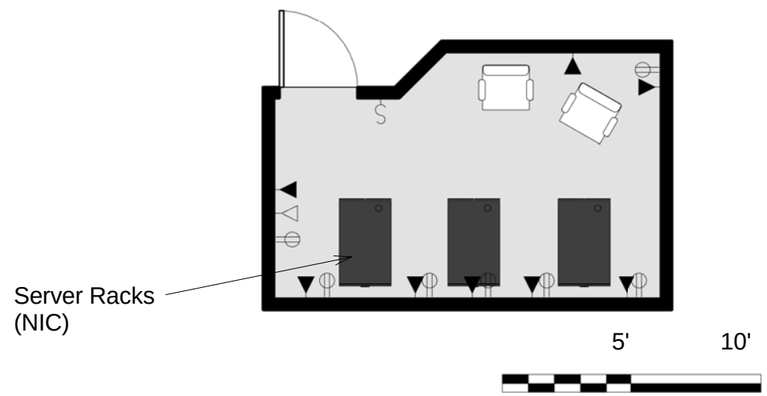

Bookcase
(NIC)
Computer, Telephone,
Printer (NIC)
(2) 5-Drawer File Cabinets
(NIC)
5'
10'

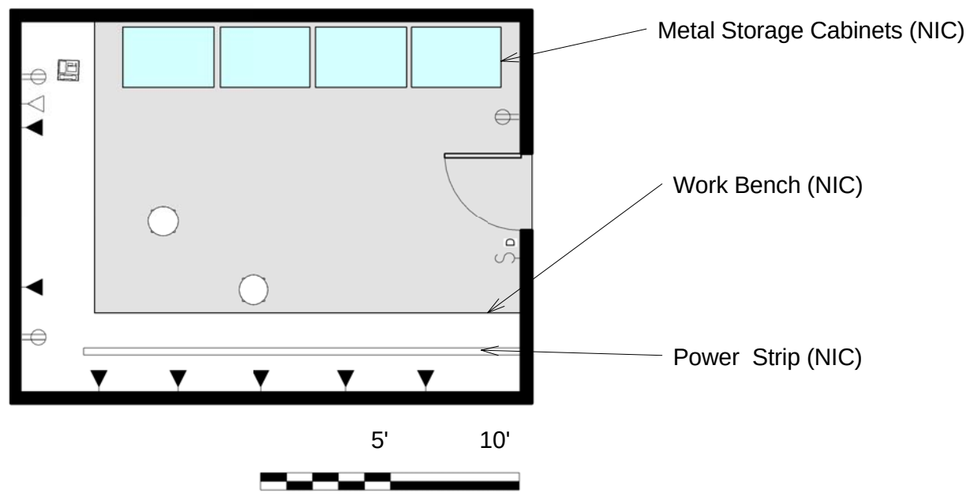

Work Bench (NIC)
Insulated Roll-up Door Powered to NR-RSI
To Building
Cabinets (NIC)
Storage
Shelf (NIC)
Floor Drain
Insulated Roll-up Door - Powered
5'
10'


Power
Projection Screen (NIC)
Whiteboard
Fume Hood
Eye Wash /Shower
5'
10'

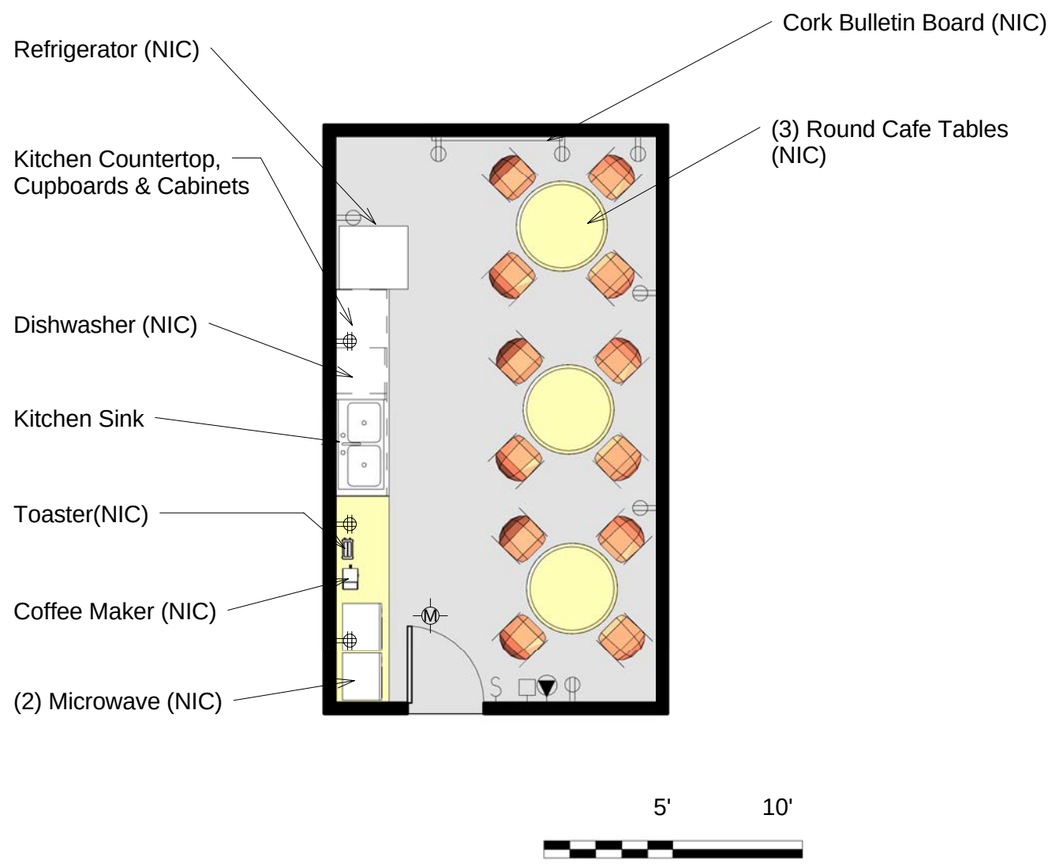

5-Drawer File
Cabinets
(NIC)
Computer,
Telephone,
Printer (NIC)
5'
10'

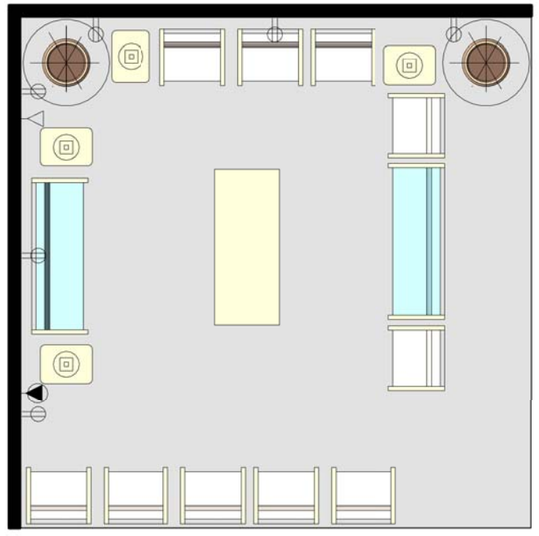

Work Bench (NIC)
Floor Power/Data
Coordinate with
Owner (NIC)
Cabinets (NIC)
5'
10'


Server Racks
(NIC)
5'
10'

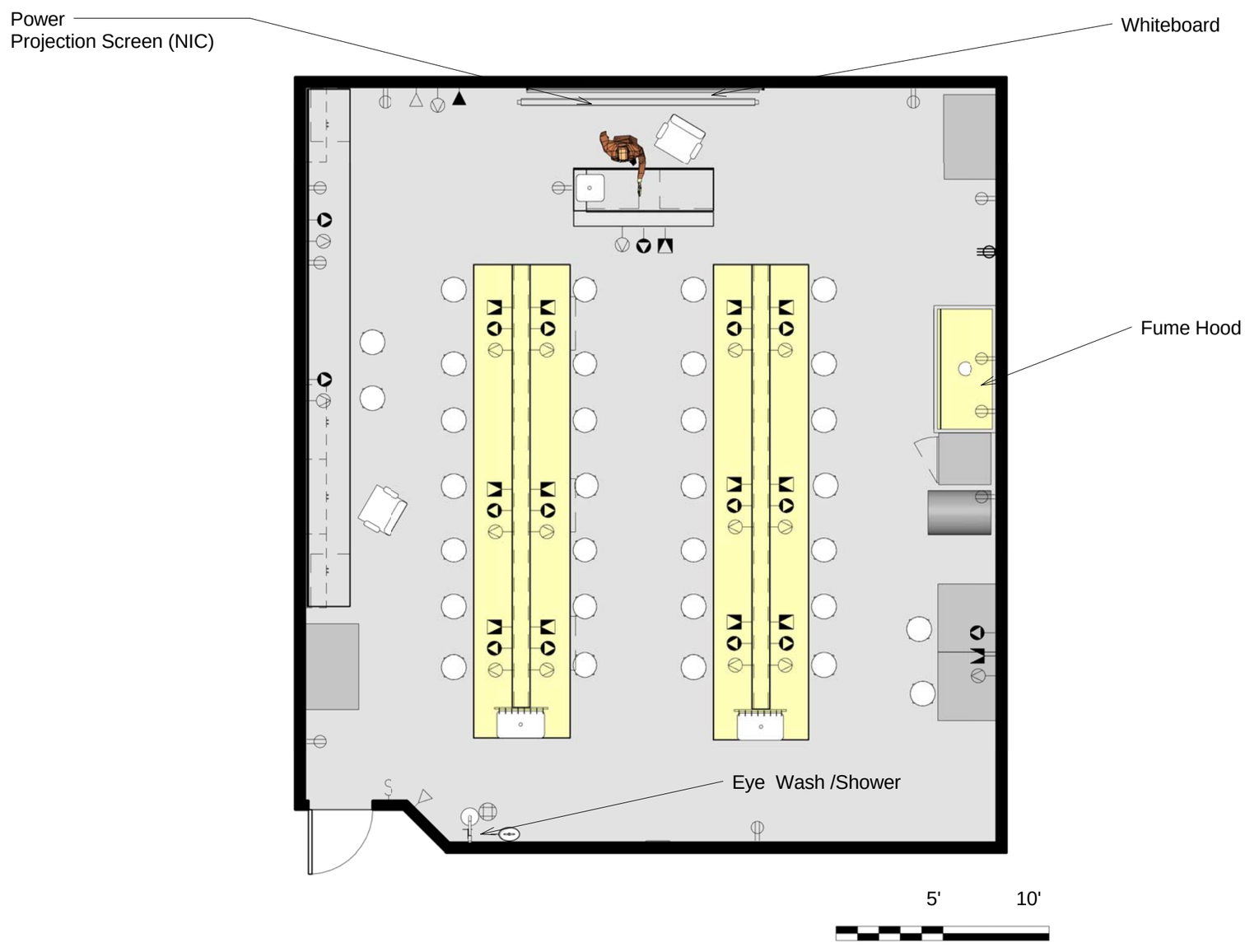

Metal Storage Cabinets (NIC)
Work Bench (NIC)
Power Strip (NIC)
5'
10'

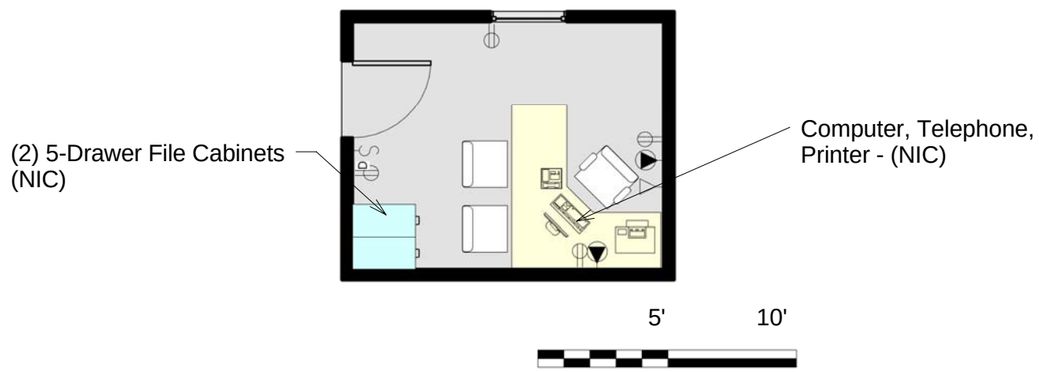
220 Outlet	Floor Drain	
Duplex Outlet	Motion Sensor	Air
Quadplex Outlet	Telephone	Gas
Switch	Telephone Data	Vacuum
D Dimmer Switch	Voice Data	Video
2 Double Switch	Data	CA-TV

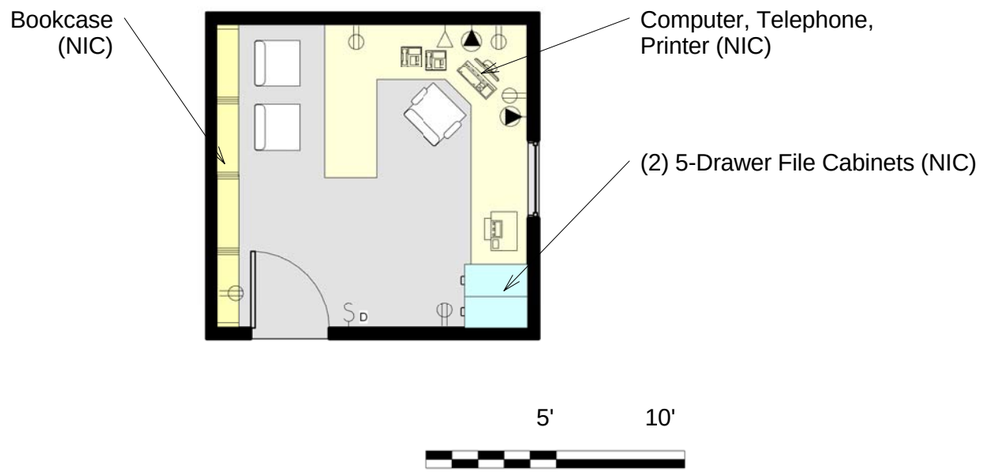

Refrigerator (NIC)
Kitchen Countertop,
Cupboards & Cabinets
Dishwasher (NIC)
Kitchen Sink
Toaster(NIC)
Coffee Maker (NIC)
(2) Microwave (NIC)
Cork Bulletin Board (NIC)
(3) Round Cafe Tables
(NIC)
M
S
5'
10'

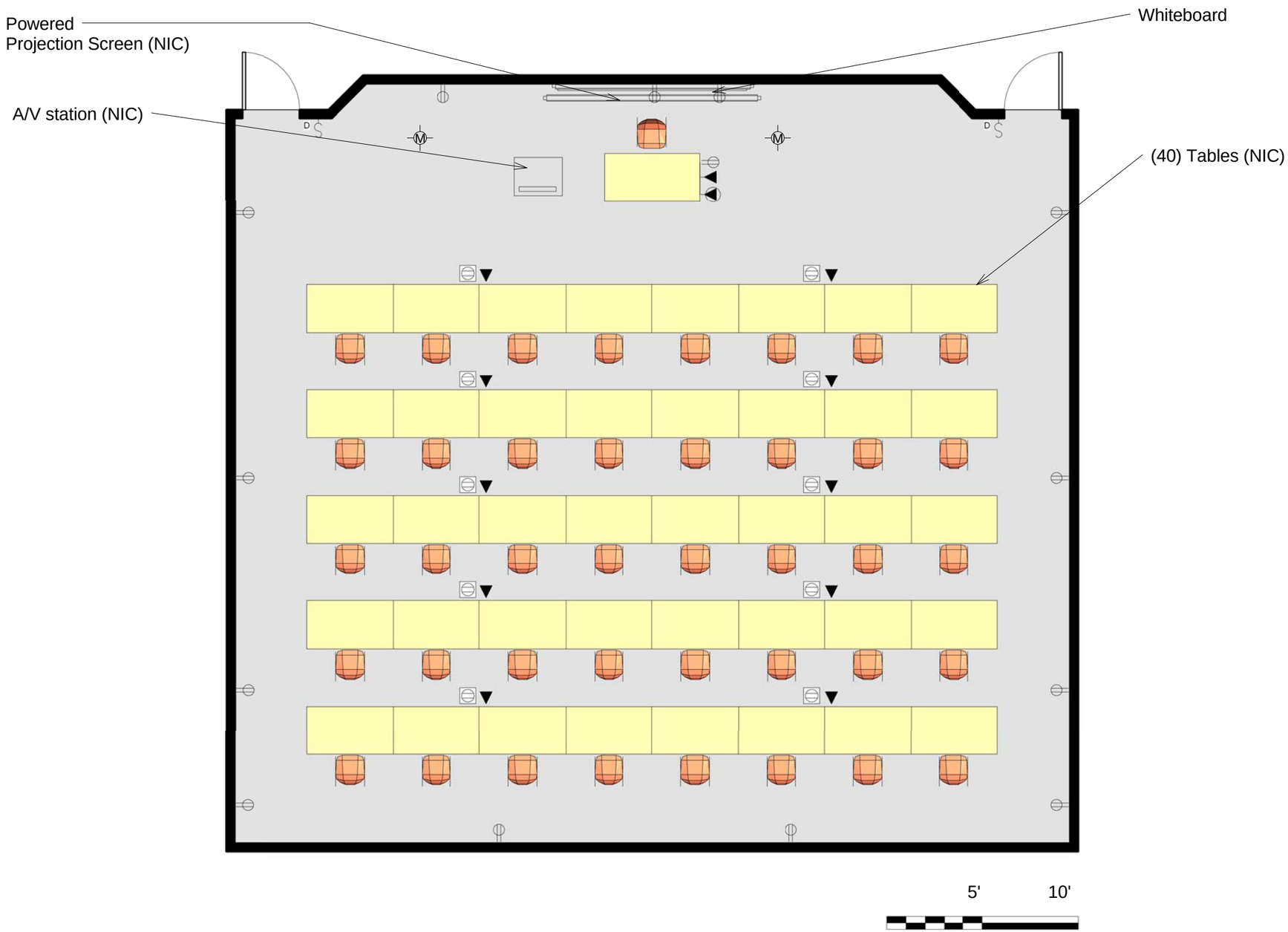


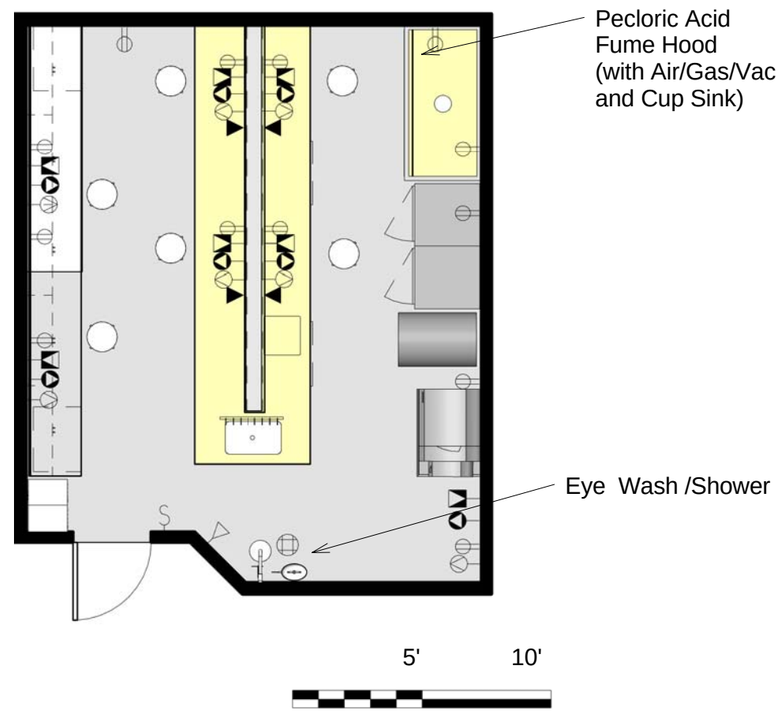
5' 10'

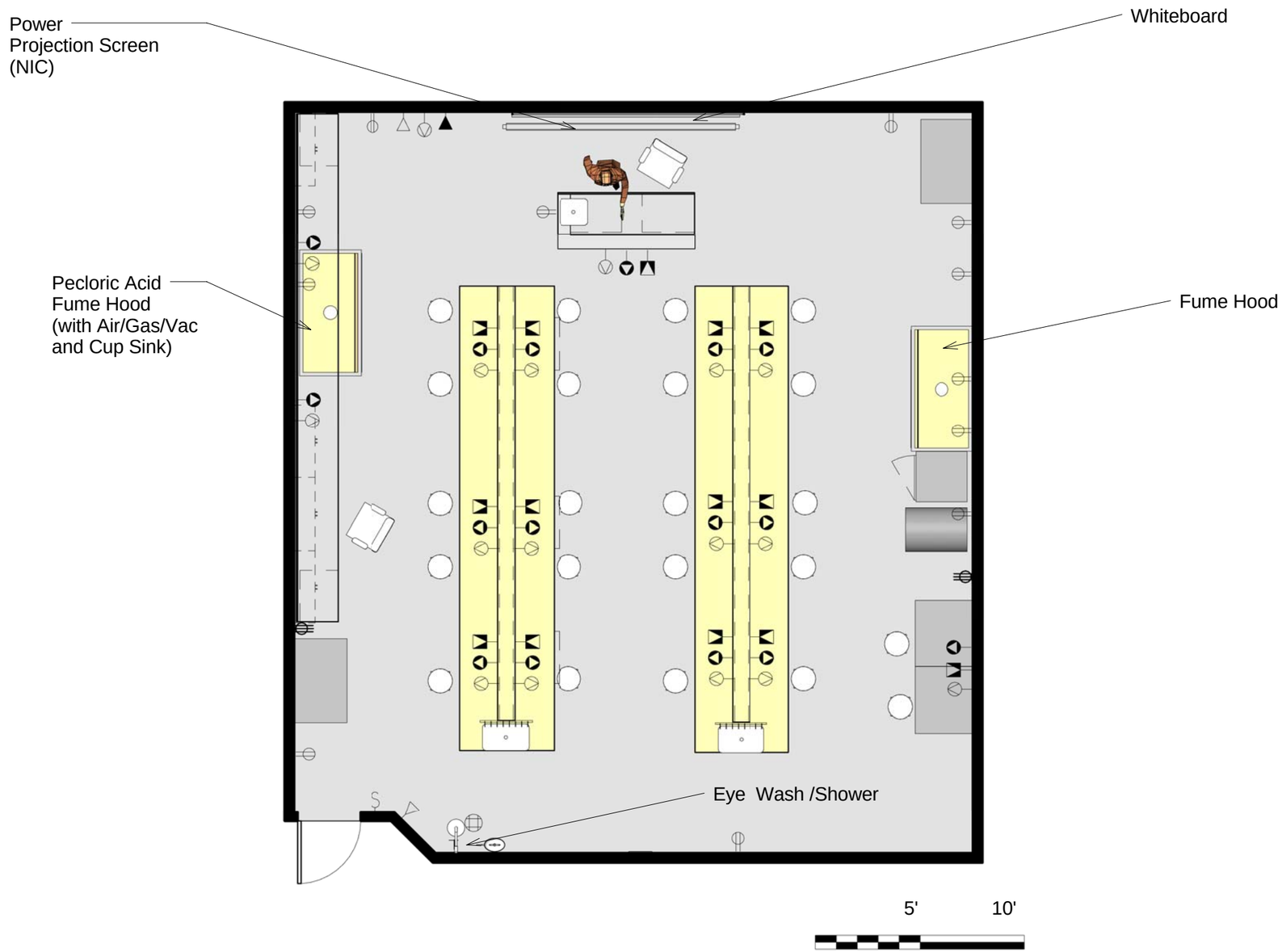

Power
Projection Screen (NIC)
Whiteboard
Fume Hood
Eye Wash /Shower
5'
10'

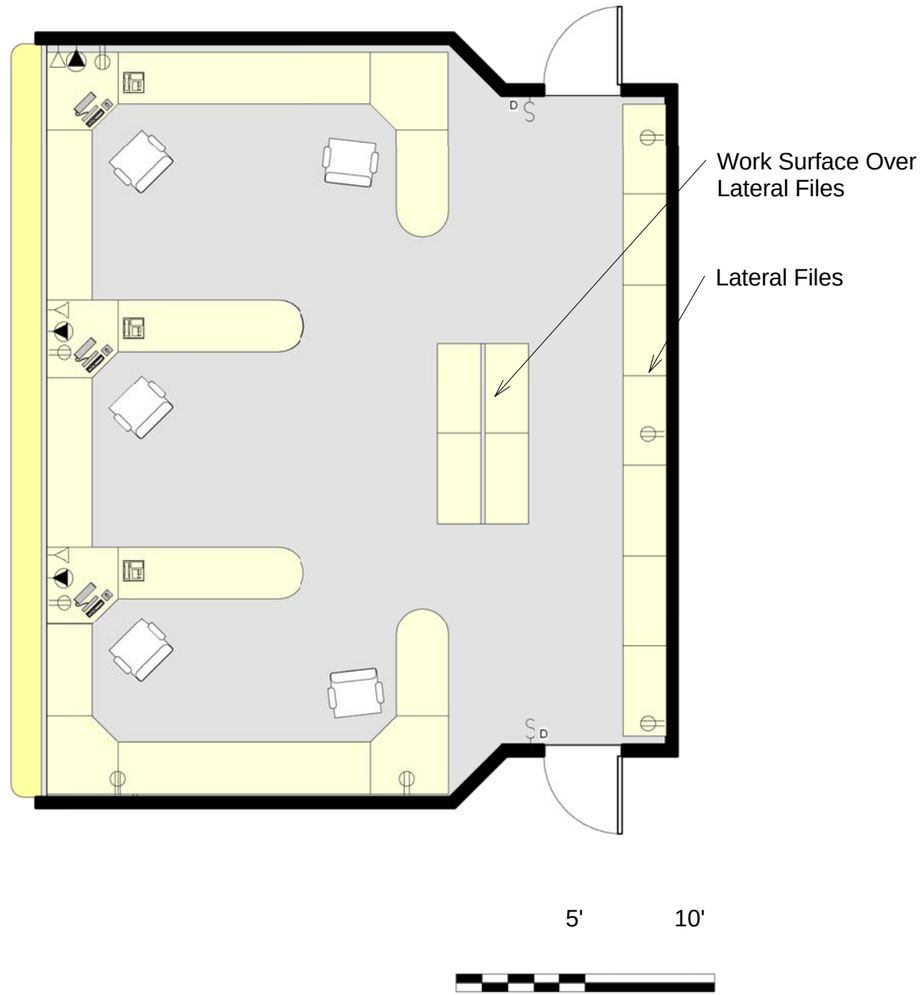

(2) 5-Drawer File Cabinets
(NIC)
Computer, Telephone,
Printer - (NIC)
5'
10'

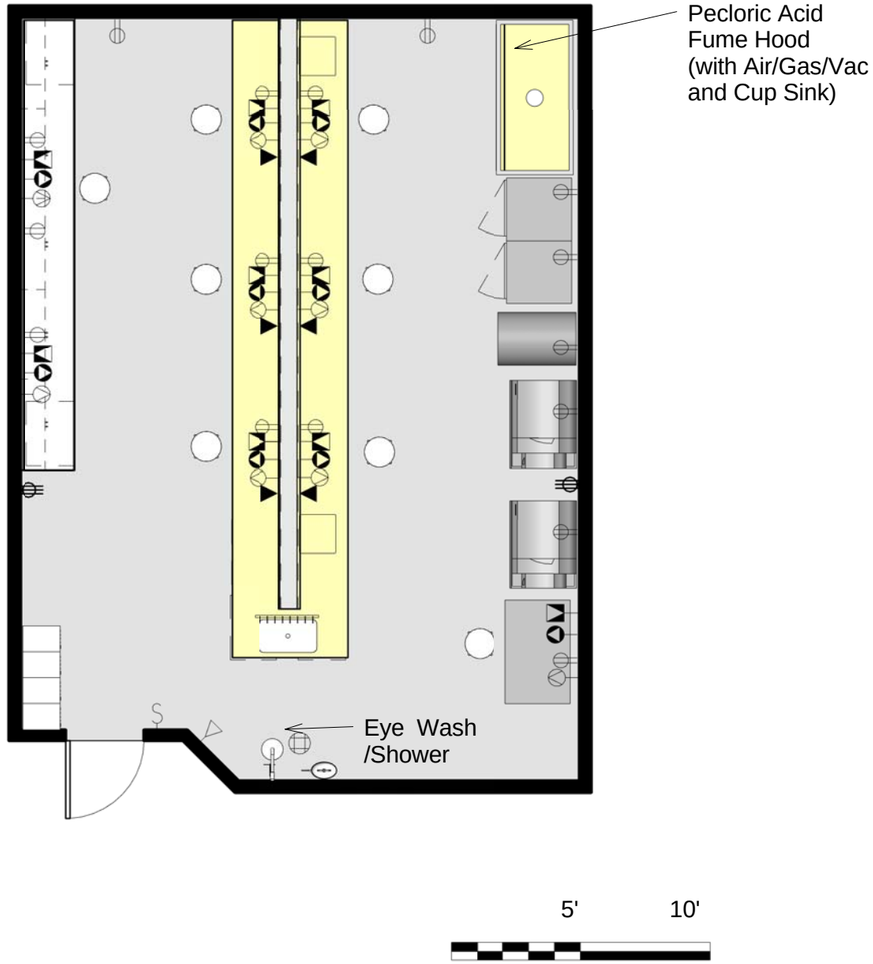

Bookcase
(NIC)
Computer, Telephone,
Printer (NIC)
(2) 5-Drawer File Cabinets (NIC)
5'
10'


Powered
Projection Screen (NIC)
Whiteboard
A/V station (NIC)
(40) Tables (NIC)
5'
10'


Pecloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash /Shower
5'
10'

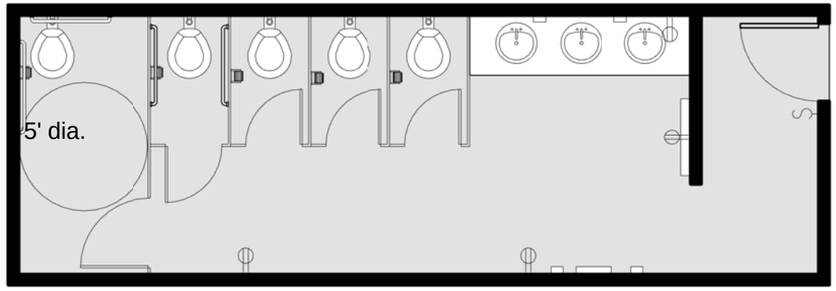

Power
Projection Screen
(NIC)
Whiteboard
Pecloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Fume Hood
Eye Wash /Shower
5'
10'


Work Surface Over
Lateral Files
Lateral Files
5'
10'

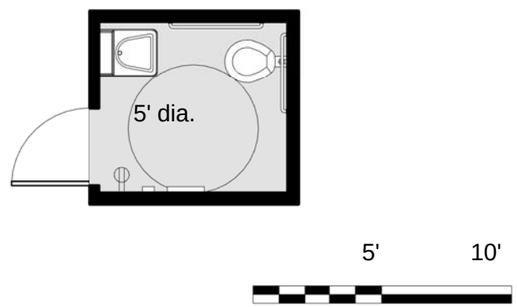


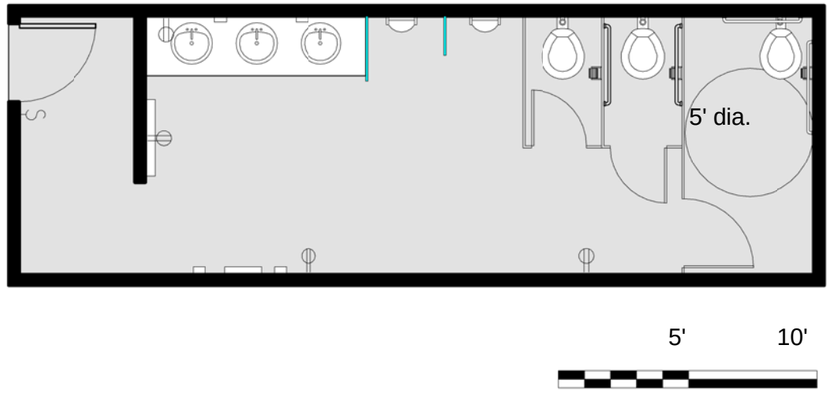
Natrual Resources Research Lab

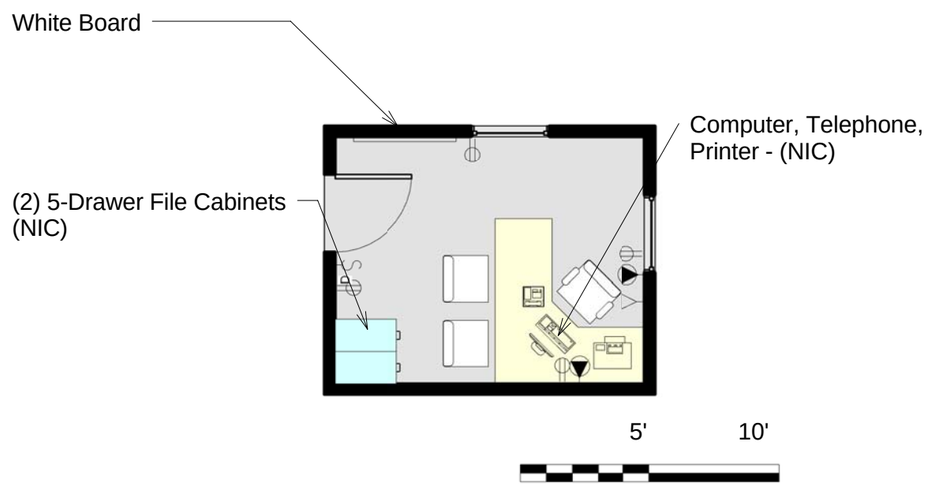
Eye Wash /Shower
5'
10'



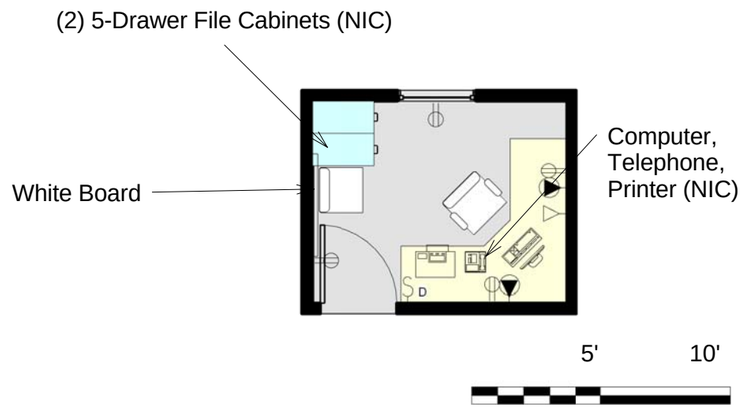
5' 10'

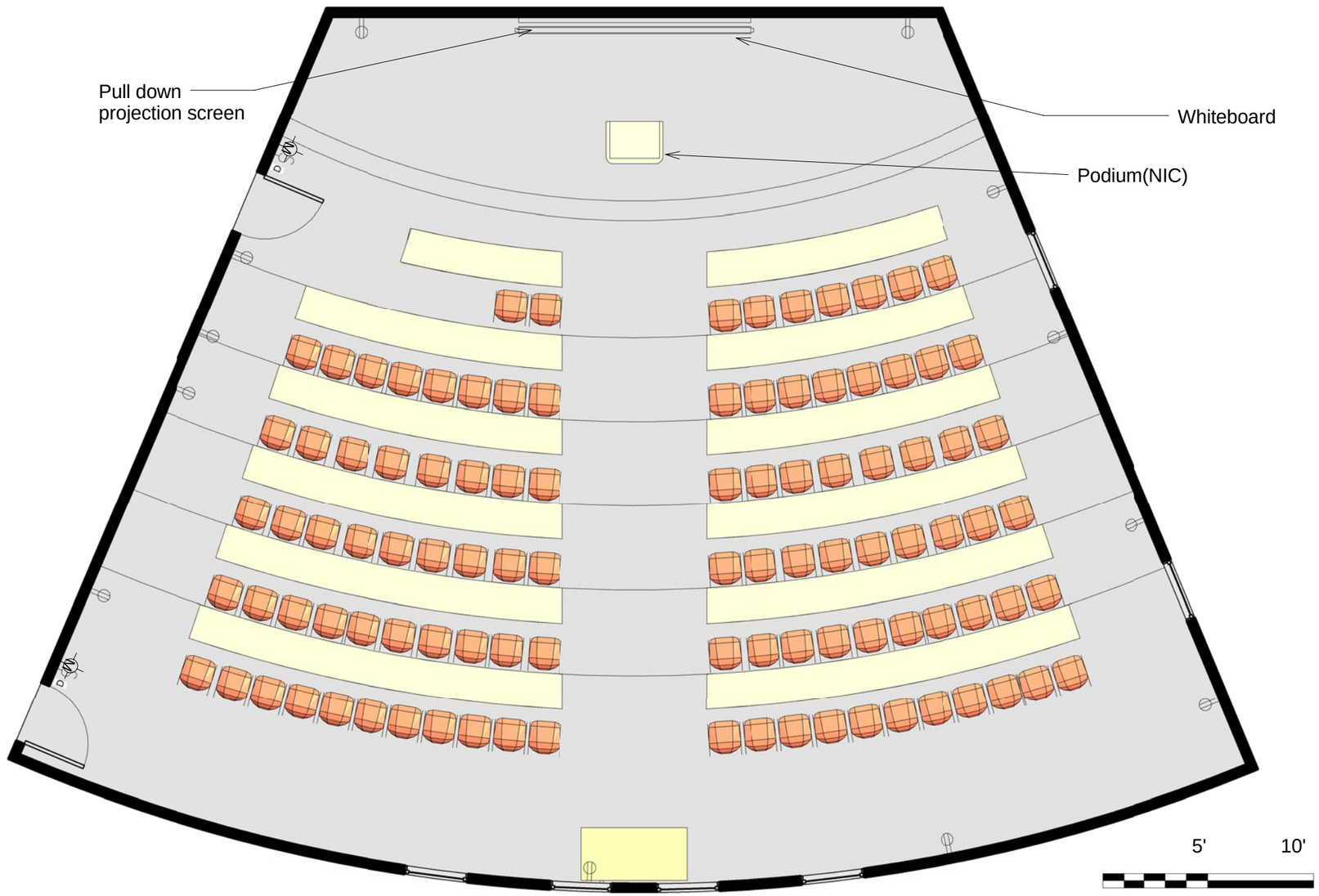

5' dia.
5'
10'

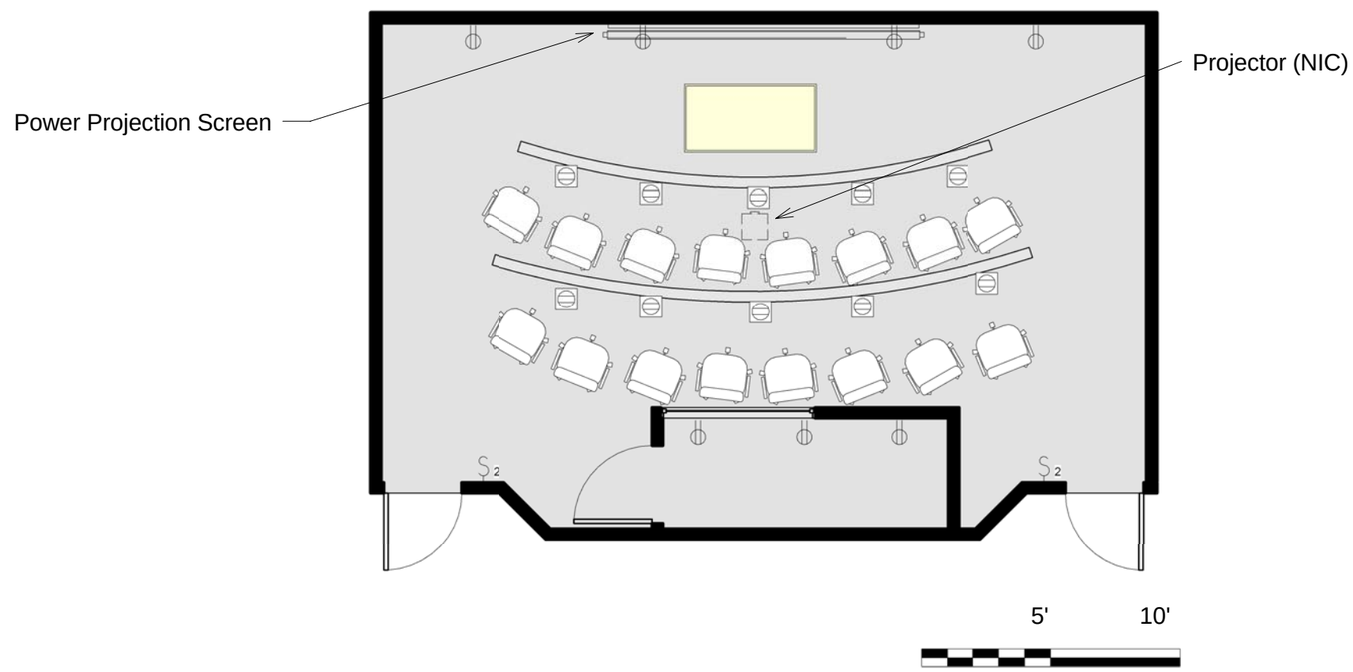

5' dia.
5'
10'



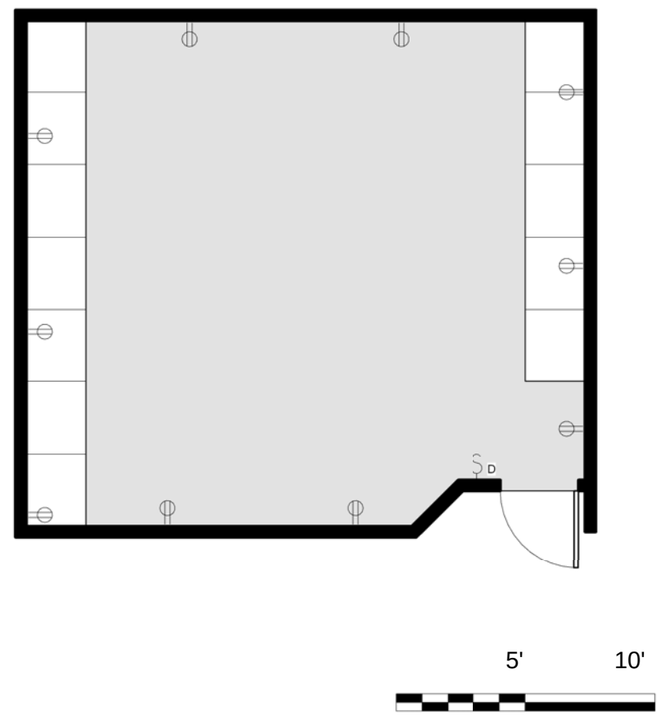
1 SBDC office
3/16" = 1'-0"


(2) 5-Drawer File Cabinets (NIC)
White Board
Computer,
Telephone,
Printer (NIC)
5'
10'

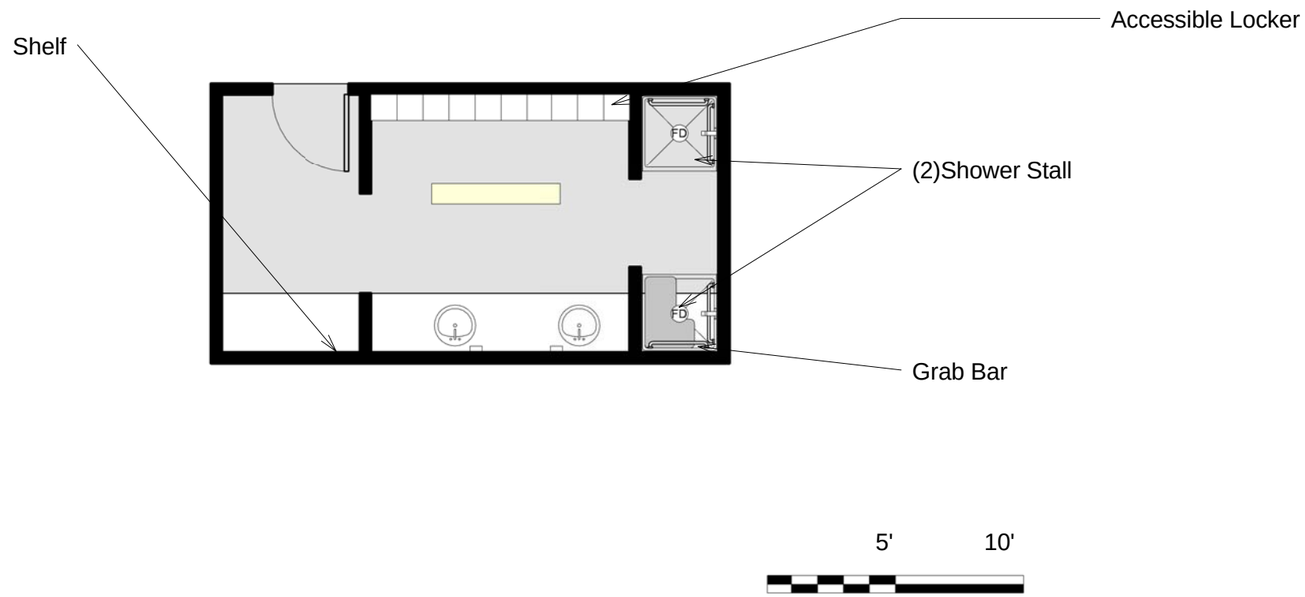

Pull down
projection screen
Whiteboard
Podium(NIC)
5'
10'

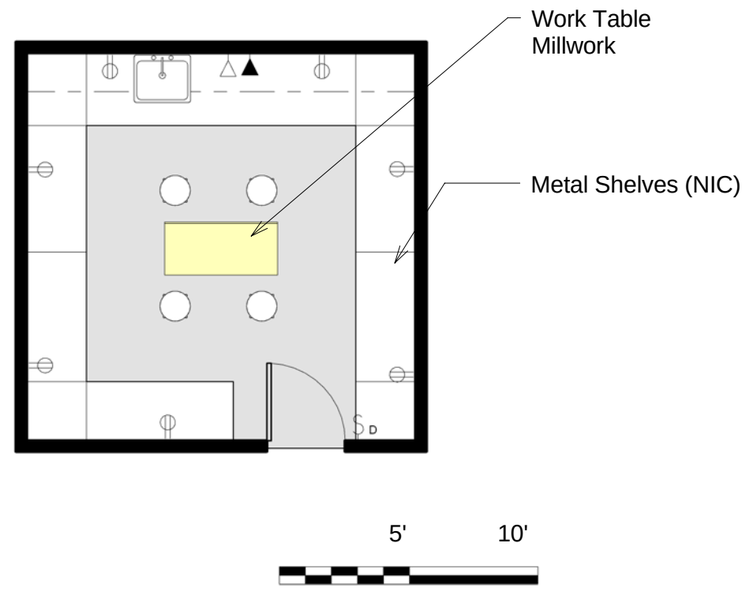


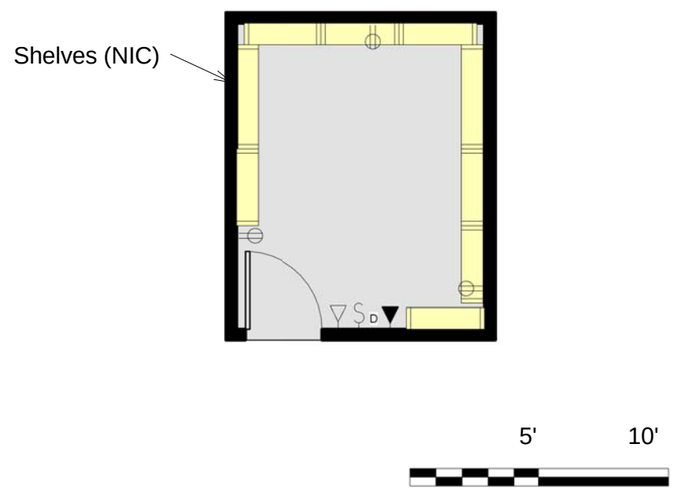
1 Small Seminar Room



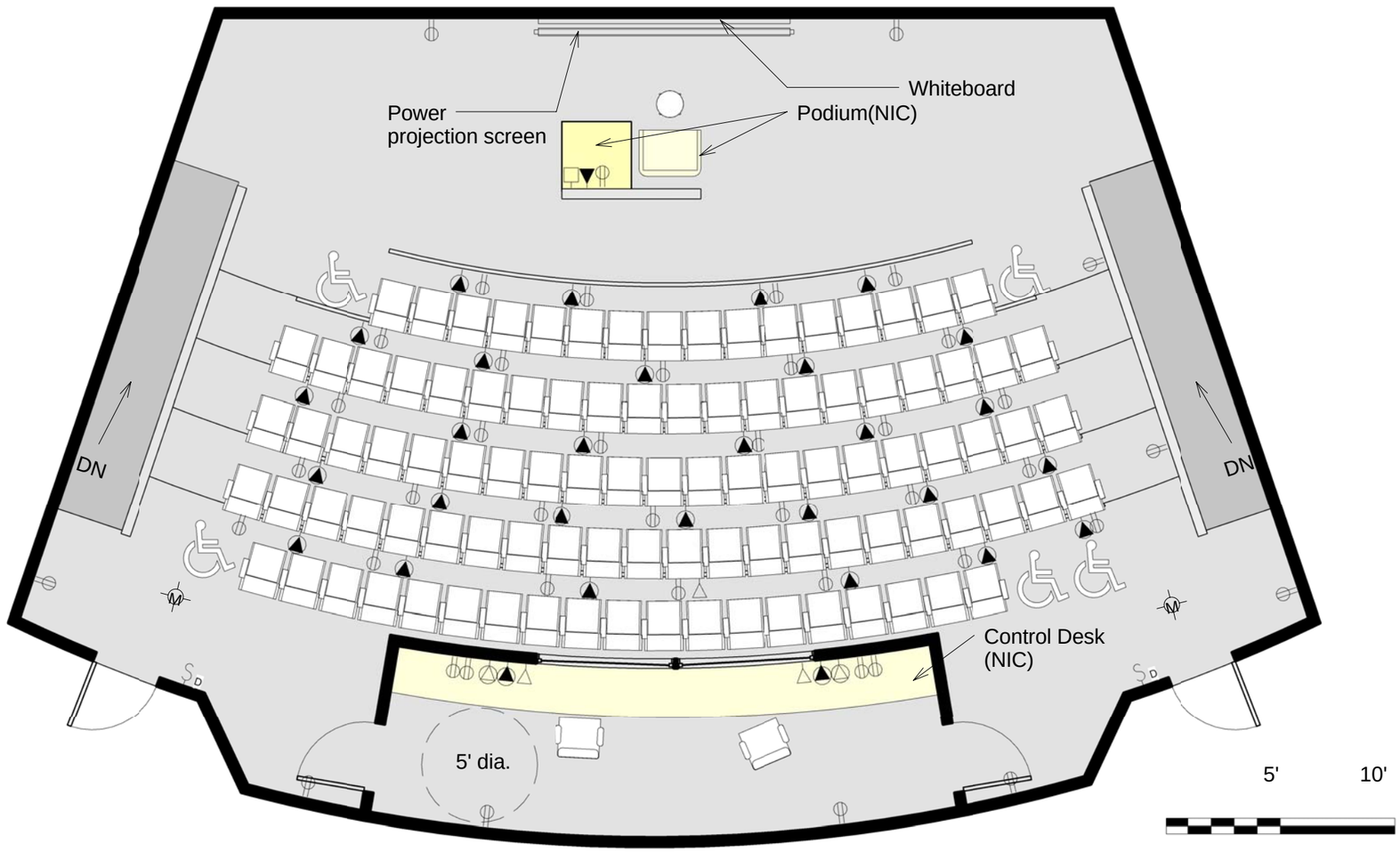
Specimen Room

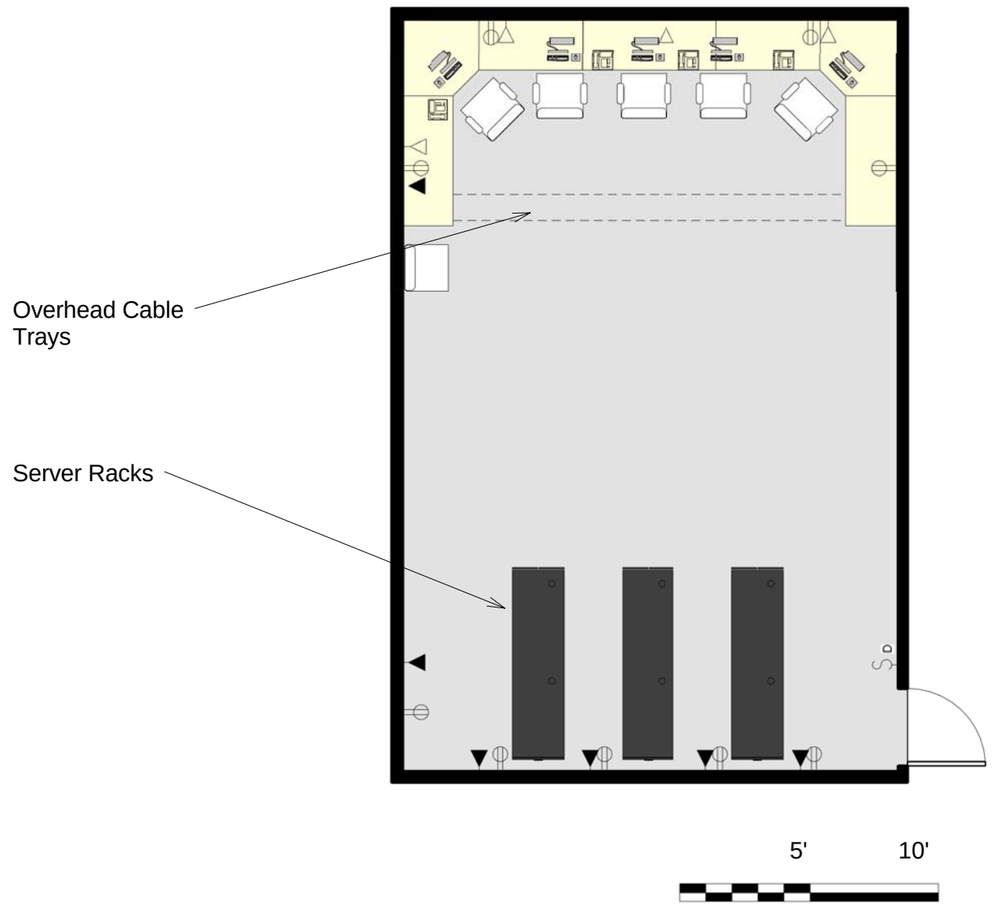

Accessible Locker
Shelf
FD
(2)Shower Stall
FD
Grab Bar
5'
10'

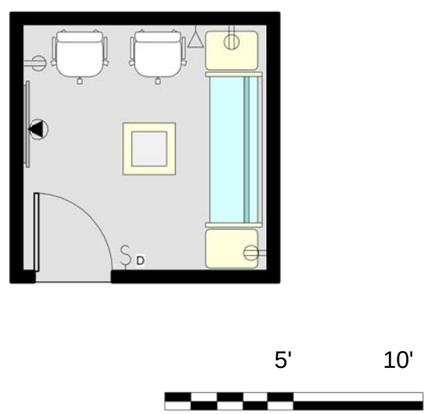

Work Table
Millwork
Metal Shelves (NIC)
D
5'
10'



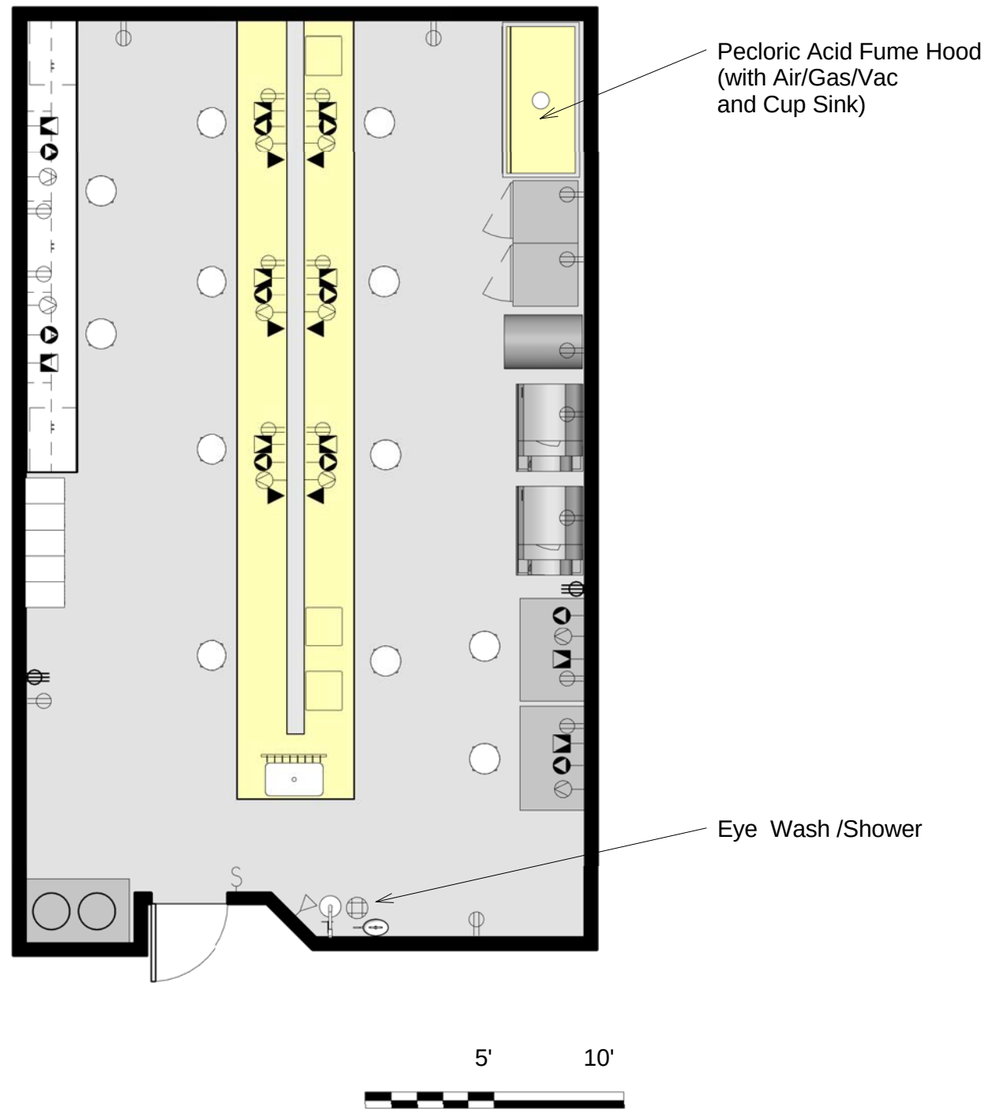
1 Storage - Vocational/Transportation
3/16" = 1'-0"

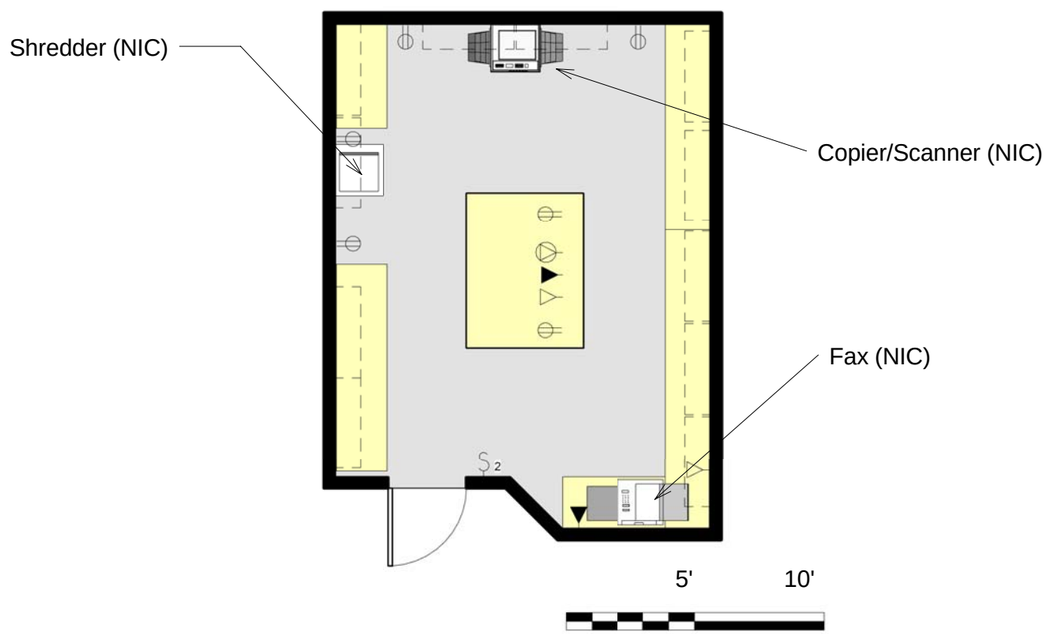

Power
projection screen
Whiteboard
Podium(NIC)
DN
DN
Control Desk
(NIC)
5' dia.
5'
10'

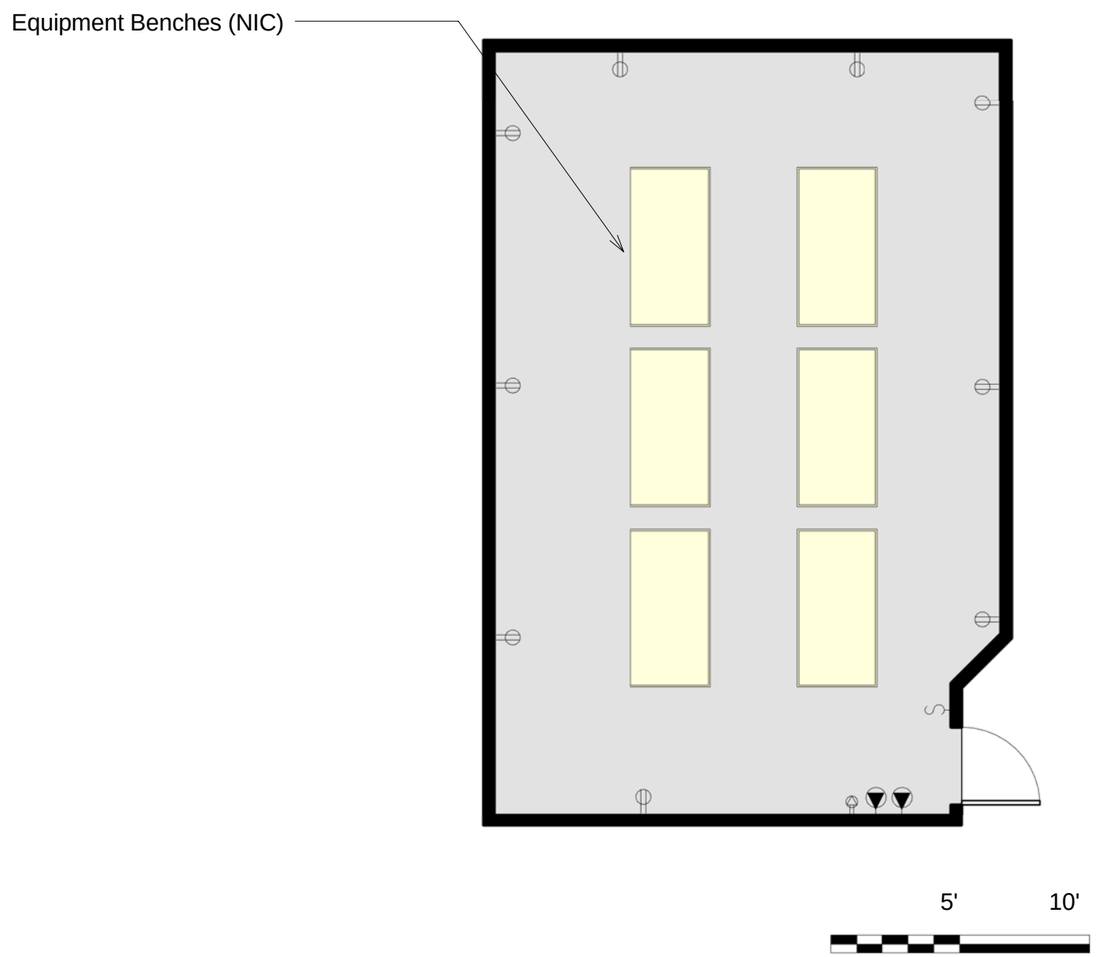

Overhead Cable Trays
Server Racks
5'
10'

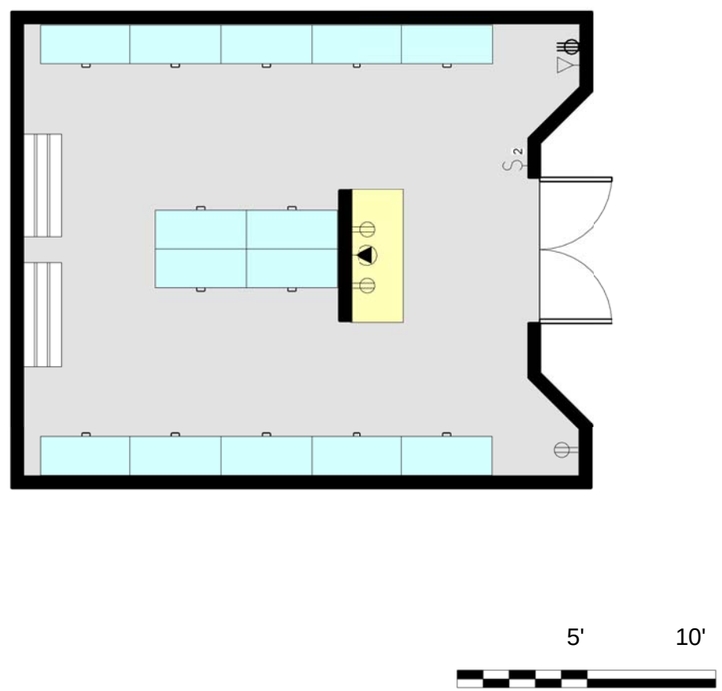


1 Waiting Area

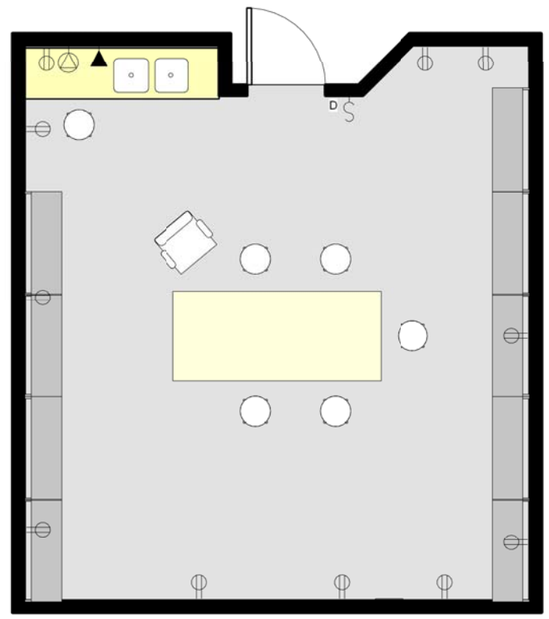

Pecloric Acid Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash /Shower
5'
10'

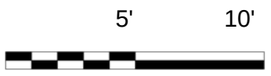

Shredder (NIC)
Copier/Scanner (NIC)
Fax (NIC)
5'
10'

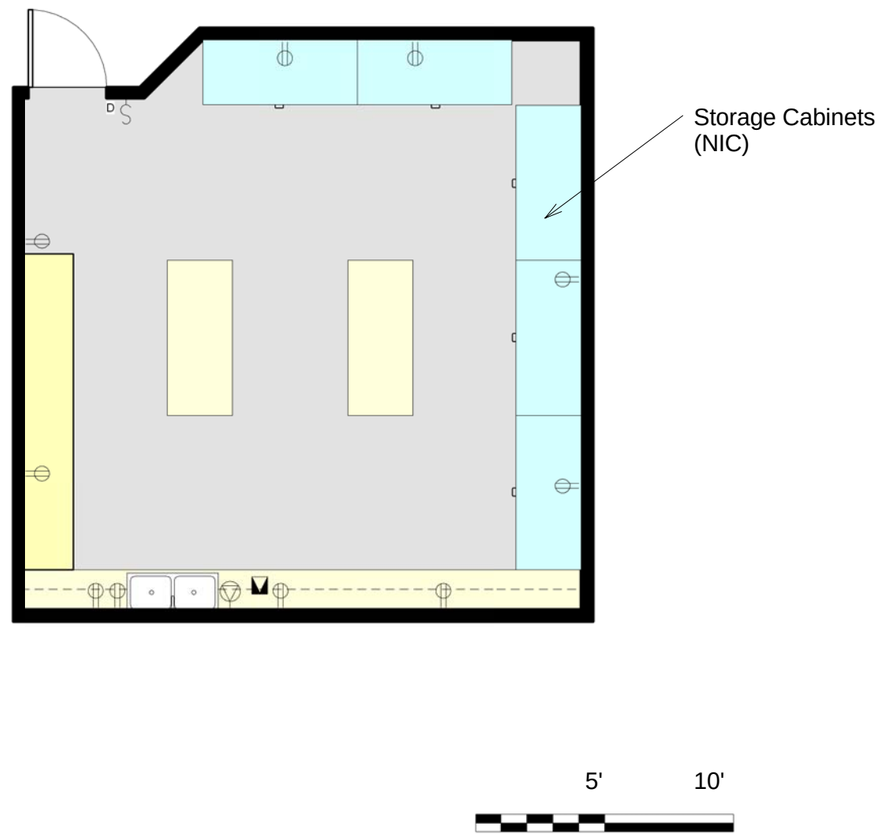

Equipment Benches (NIC)
5'
10'

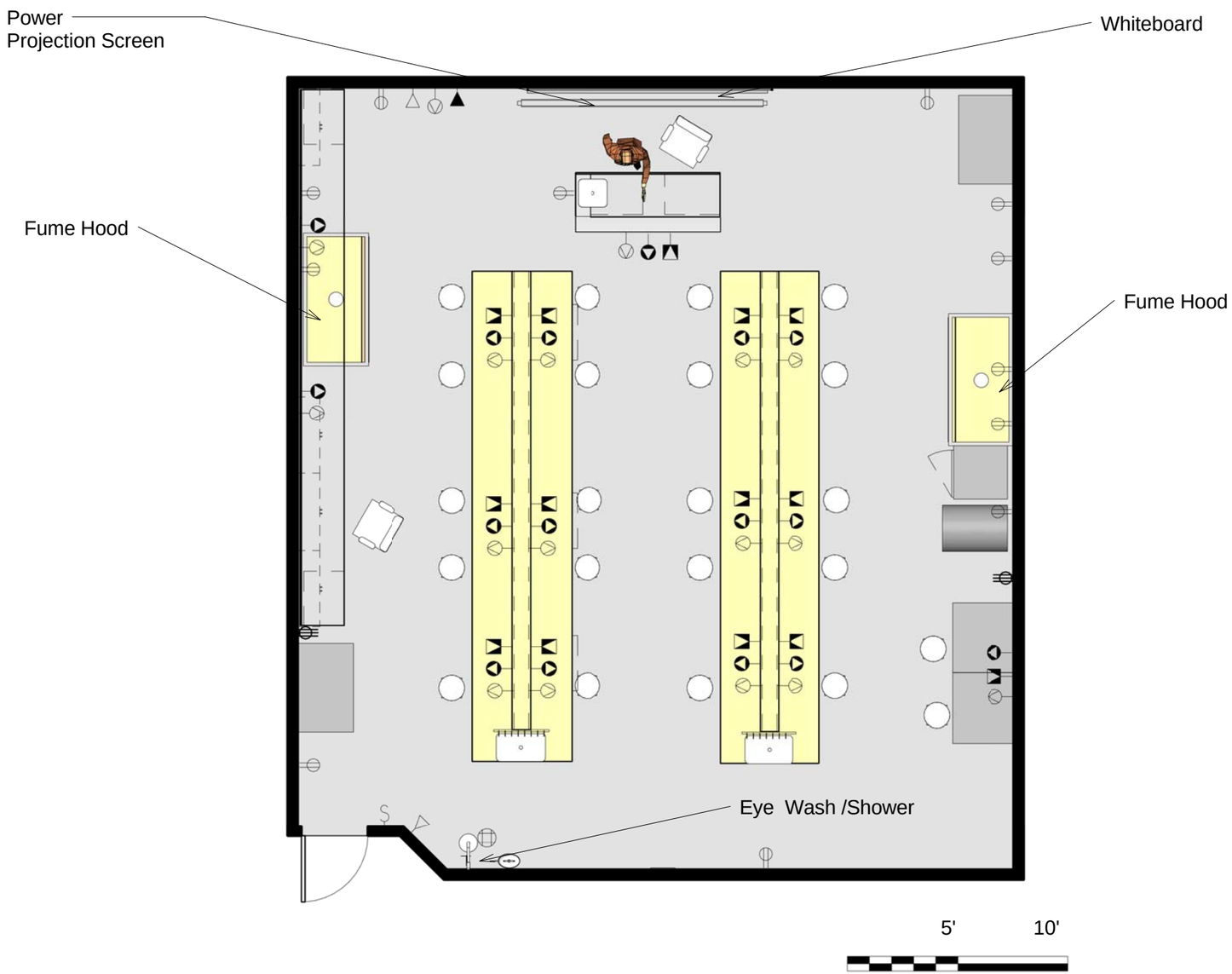


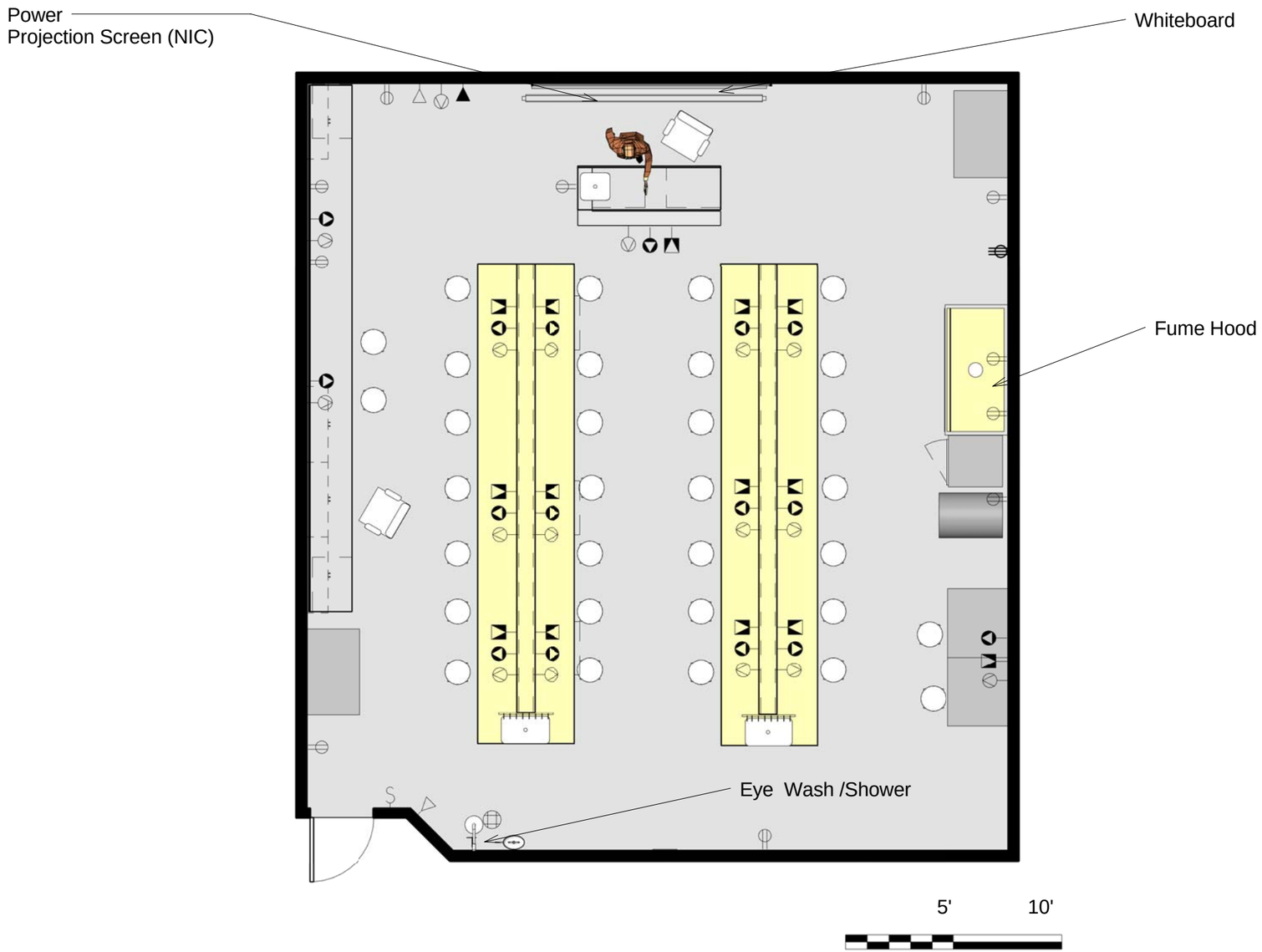
1 Bio Equipment Room
3/16" = 1' 0"


D
S

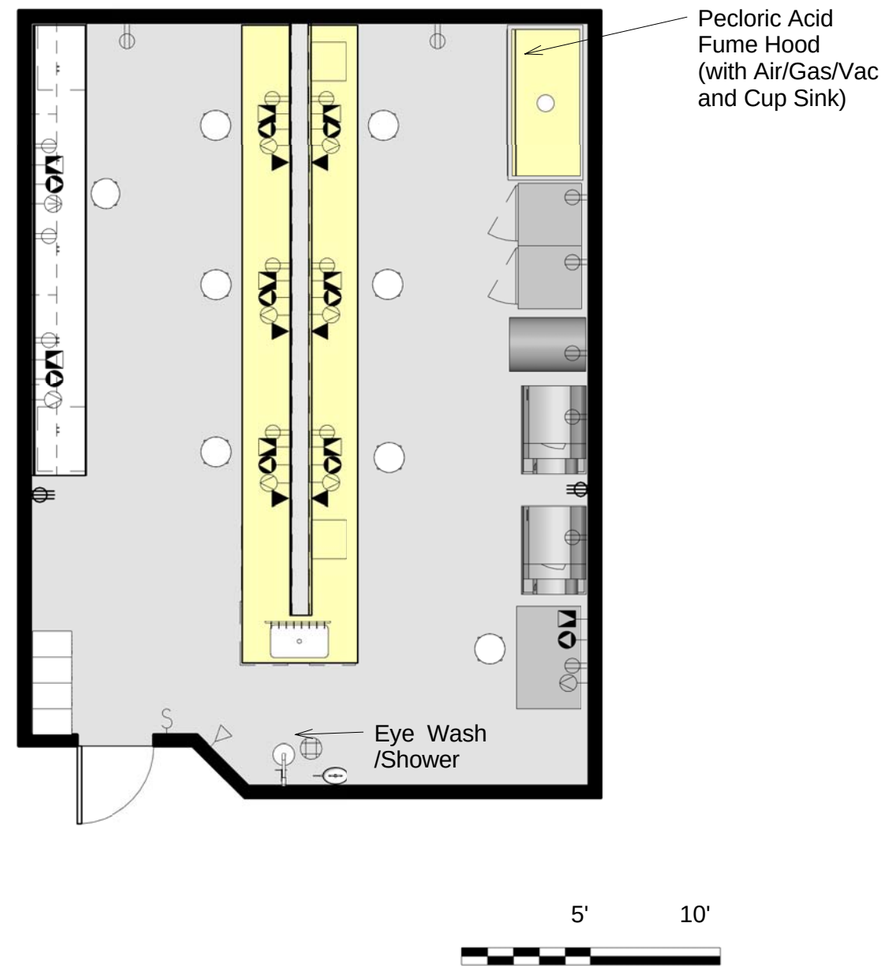

5'
10'

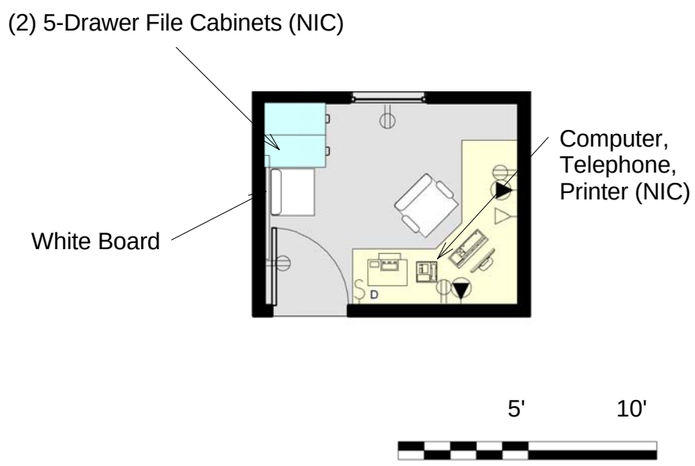

Storage Cabinets
(NIC)
5'
10'

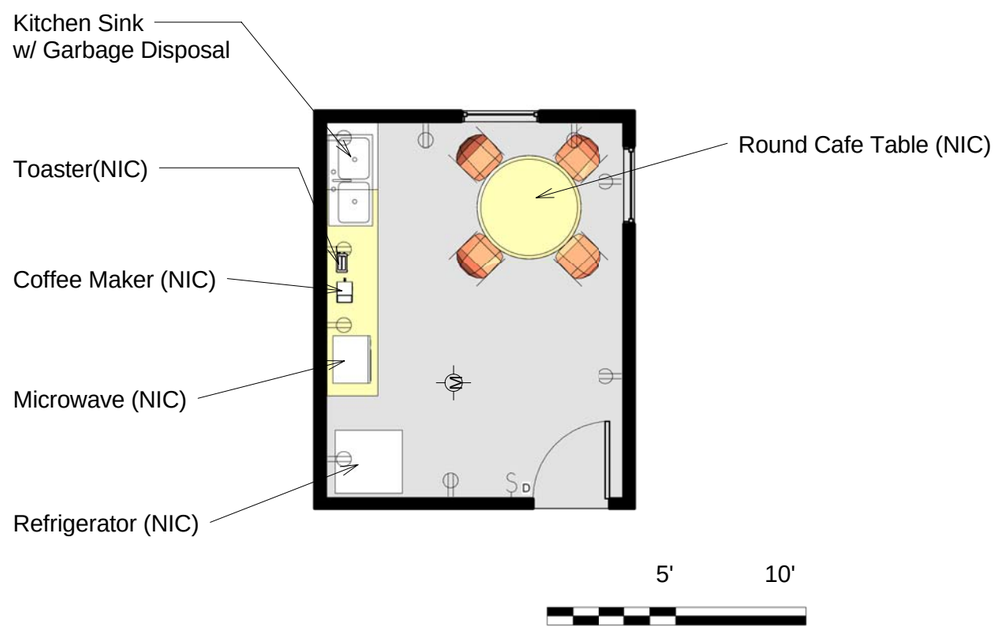

Power
Projection Screen
Whiteboard
Fume Hood
Fume Hood
Eye Wash /Shower
5'
10'

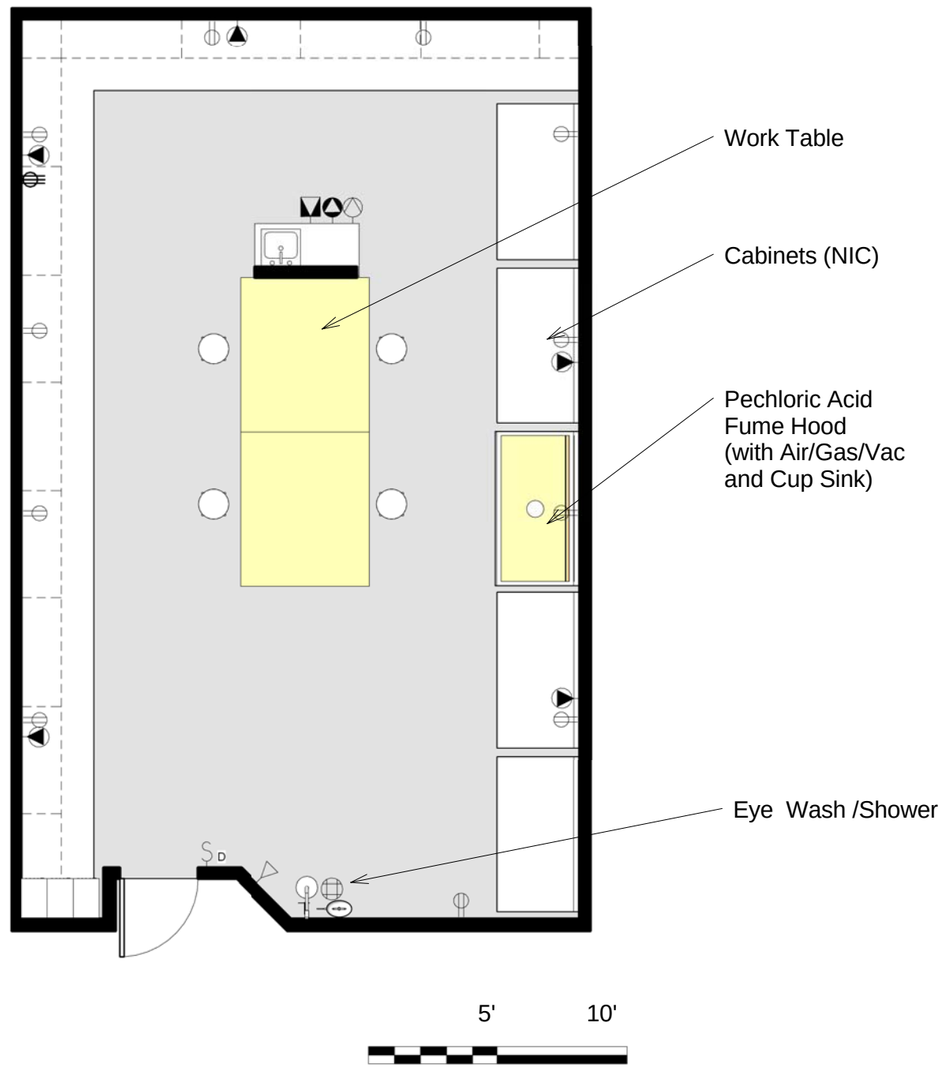

Power
Projection Screen (NIC)
Whiteboard
Fume Hood
Eye Wash /Shower
5'
10'

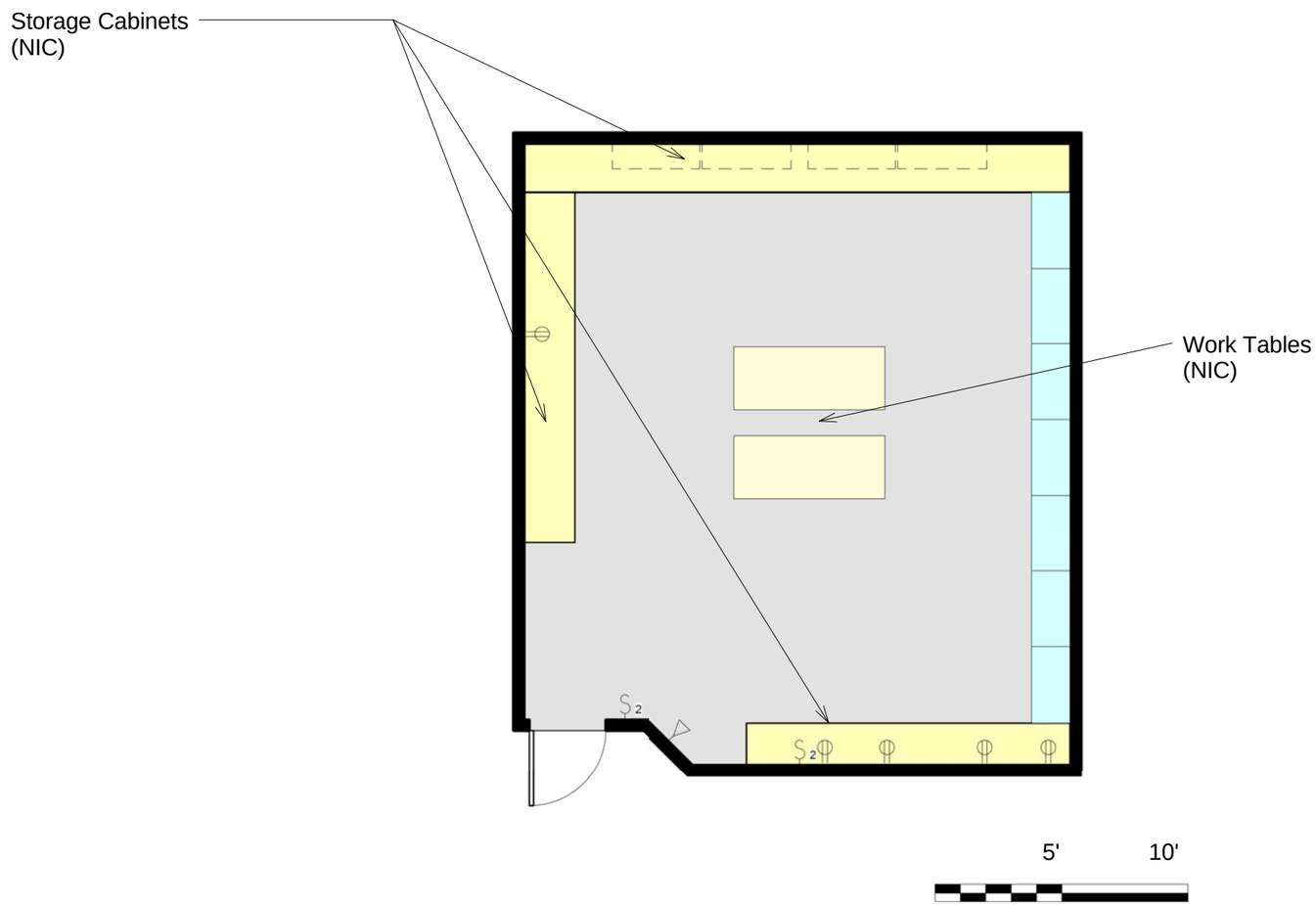
Projector (NIC)
Projector Screen (NIC)
Eye Wash /Shower
5'
10'

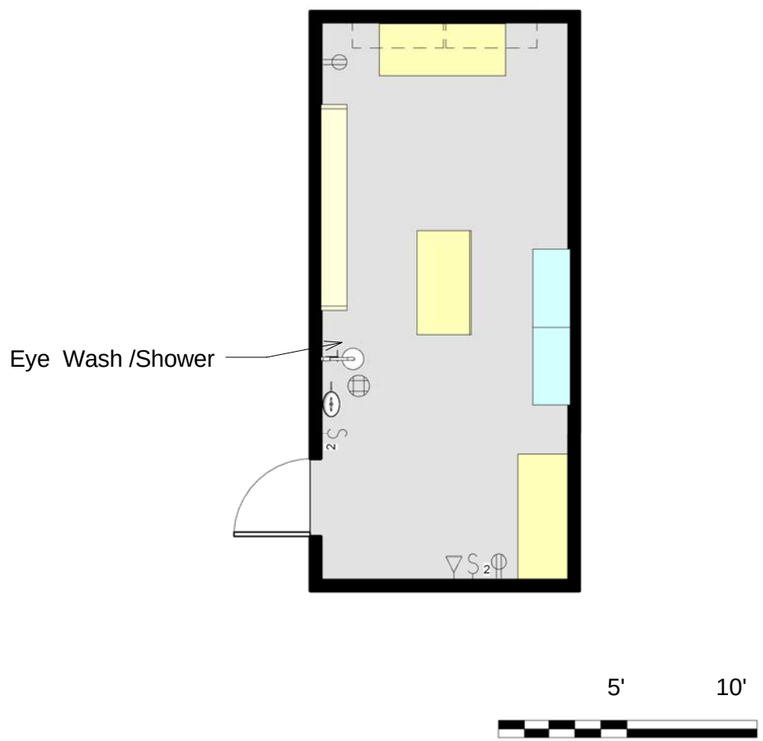

Pecloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash
/Shower
5'
10'

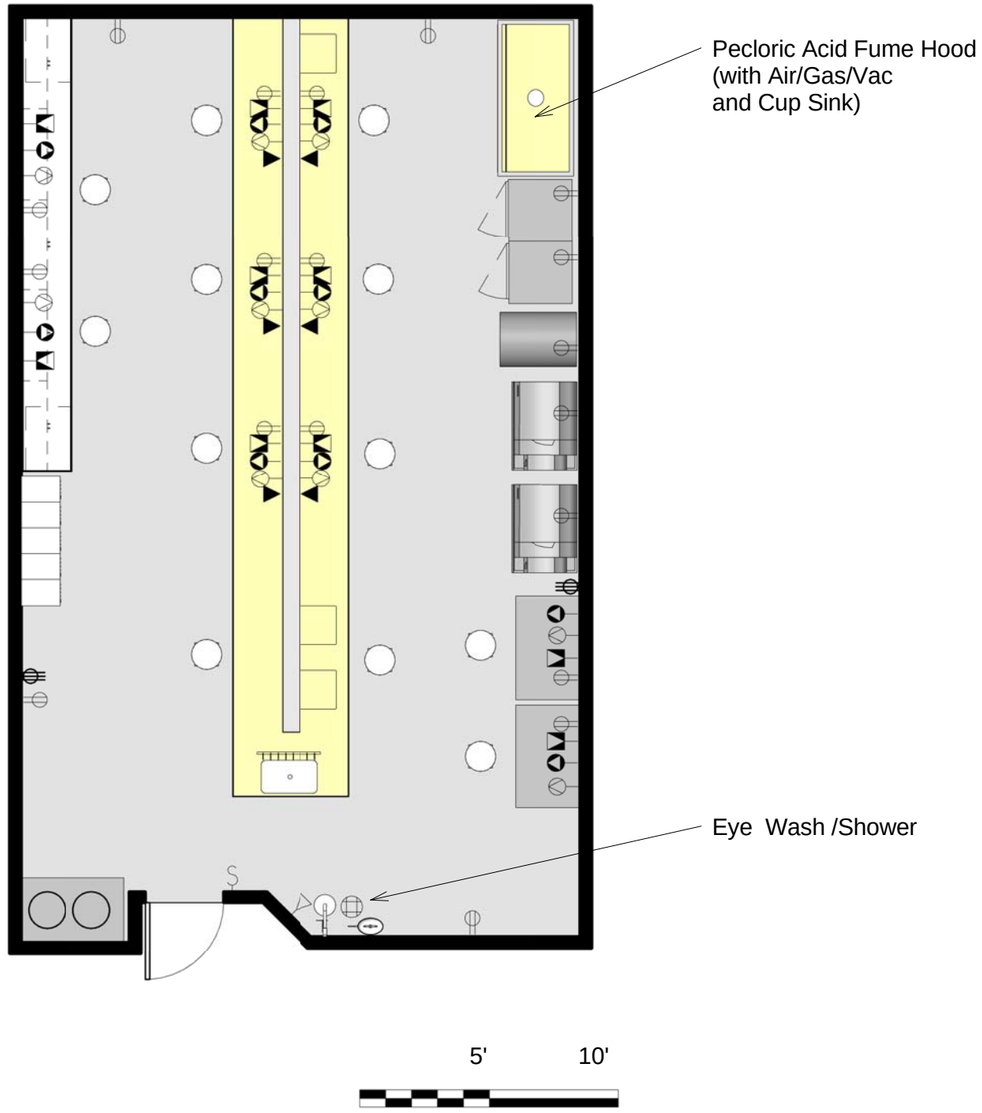

(2) 5-Drawer File Cabinets (NIC)
Computer,
Telephone,
Printer (NIC)
White Board
5'
10'

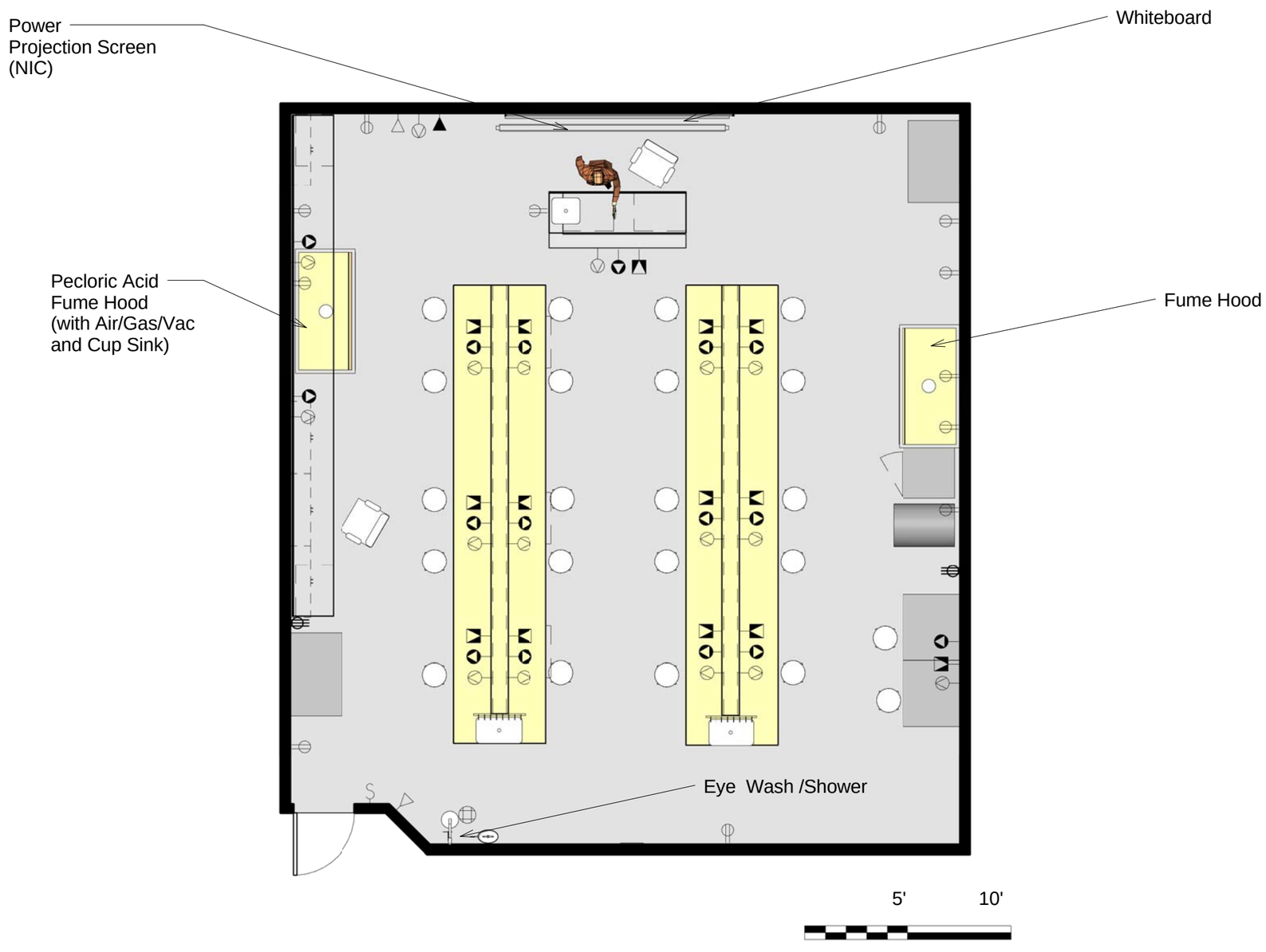

Kitchen Sink
w/ Garbage Disposal
Toaster(NIC)
Coffee Maker (NIC)
Microwave (NIC)
Refrigerator (NIC)
Round Cafe Table (NIC)
5'
10'

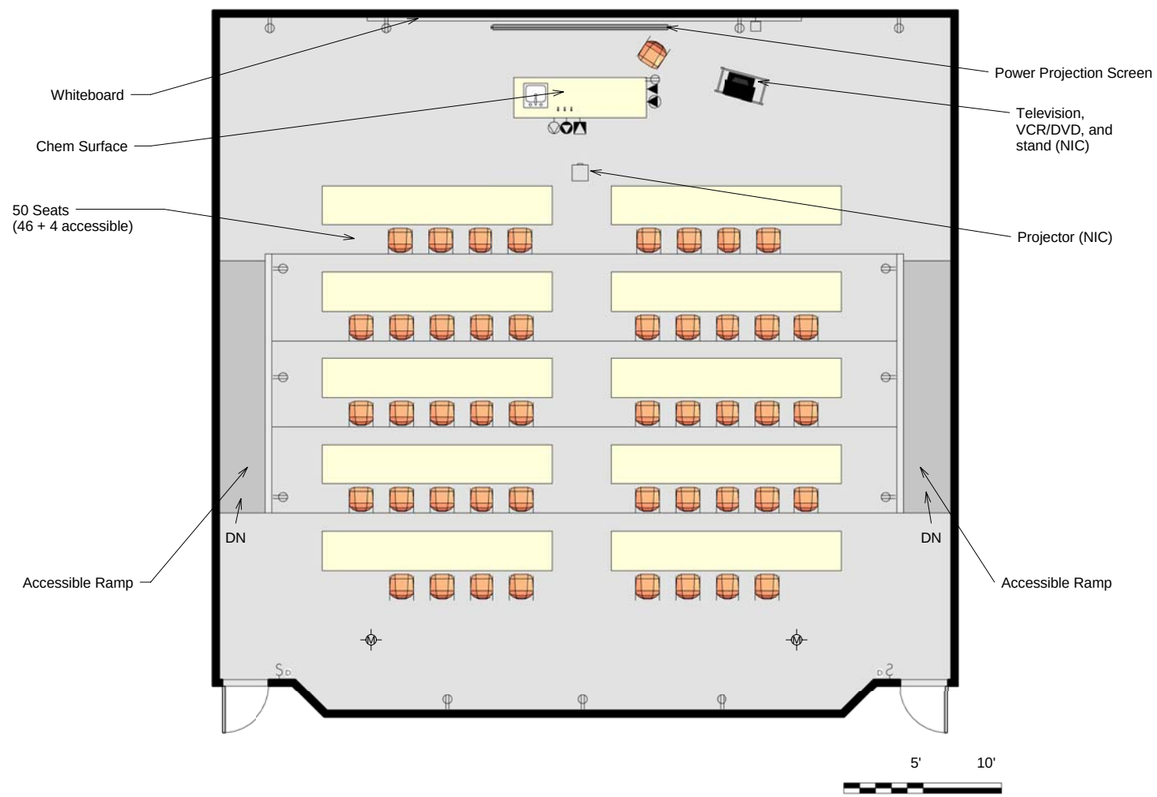

Work Table
Cabinets (NIC)
Pechloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash /Shower
5'
10'

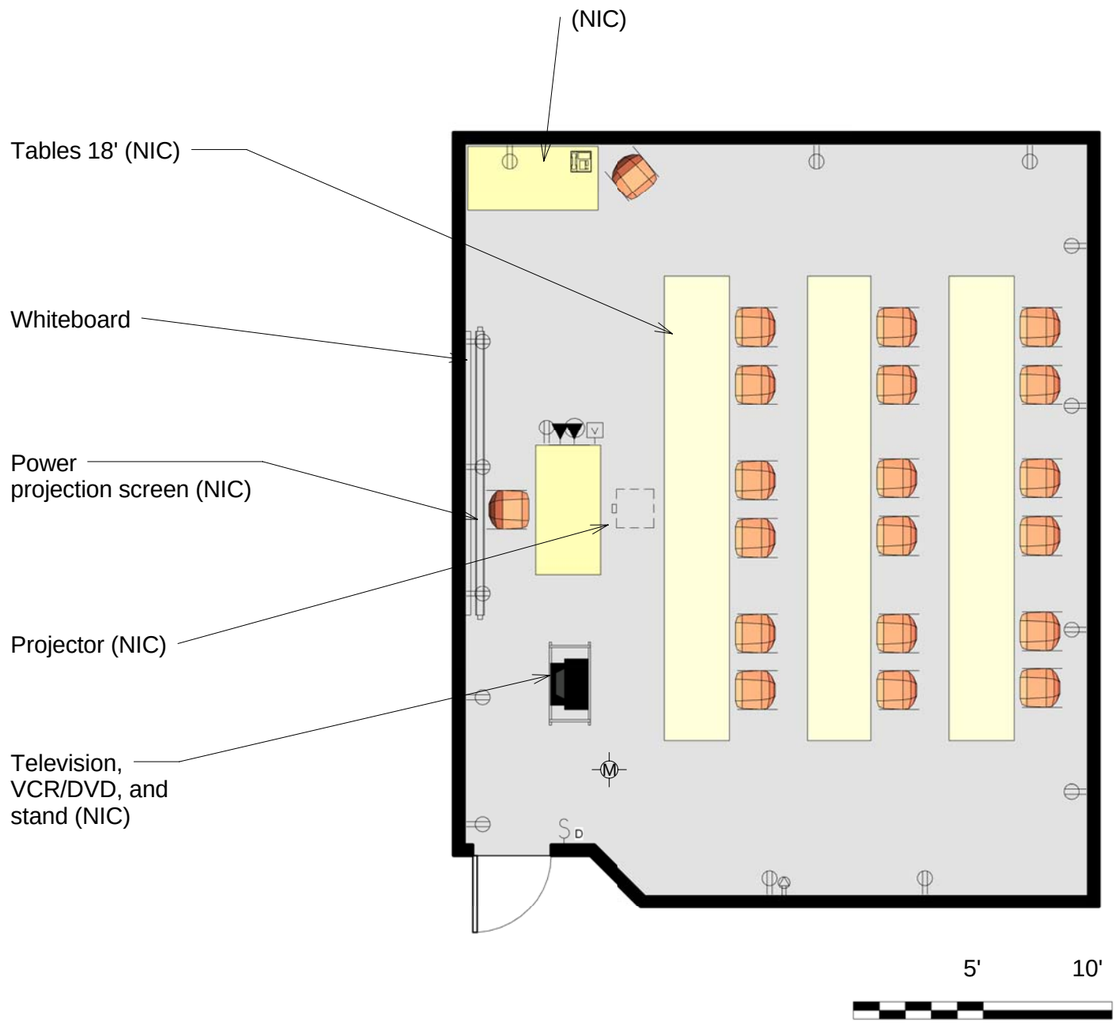

Storage Cabinets
(NIC)
Work Tables
(NIC)
5'
10'

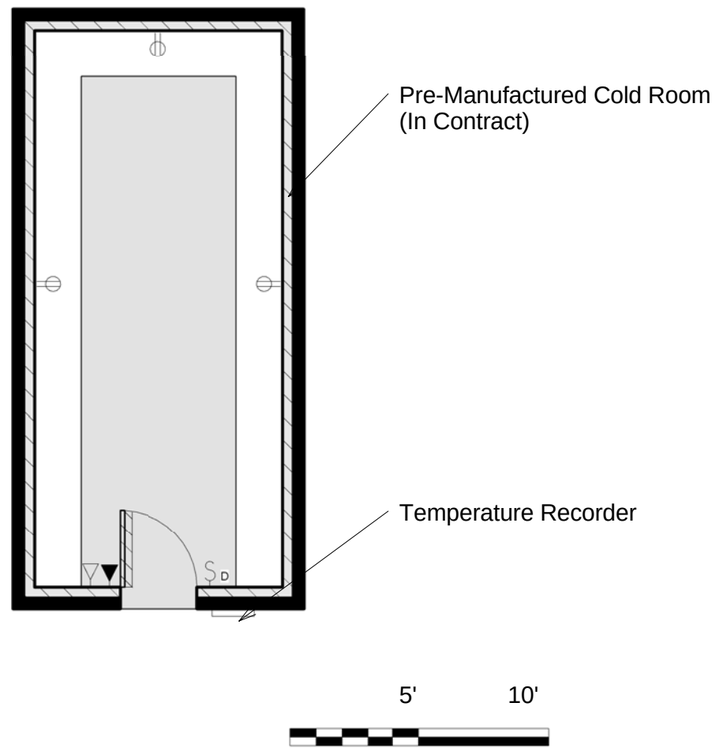

Eye Wash /Shower
5'
10'


Pecloric Acid Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash /Shower
5'
10'

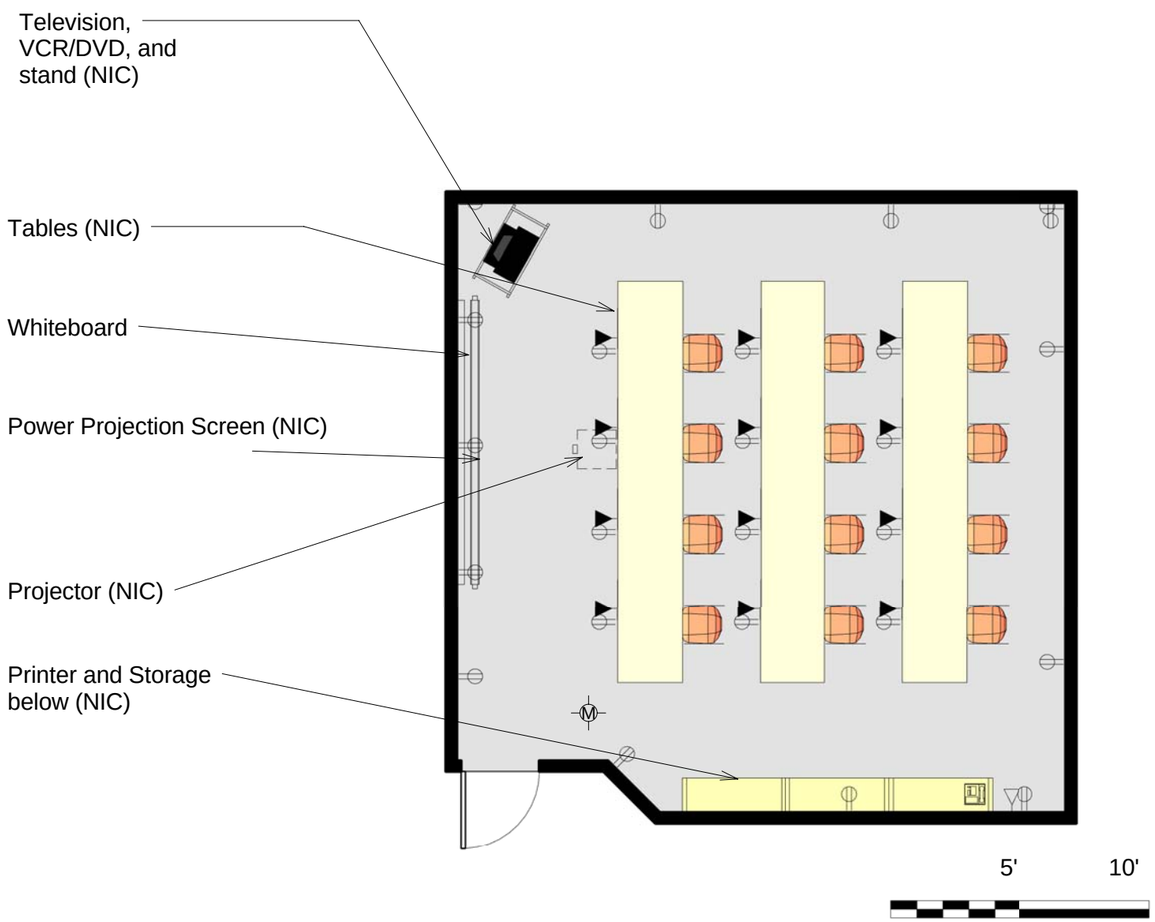

Power
Projection Screen
(NIC)
Whiteboard
Pecloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Fume Hood
Eye Wash /Shower
5'
10'

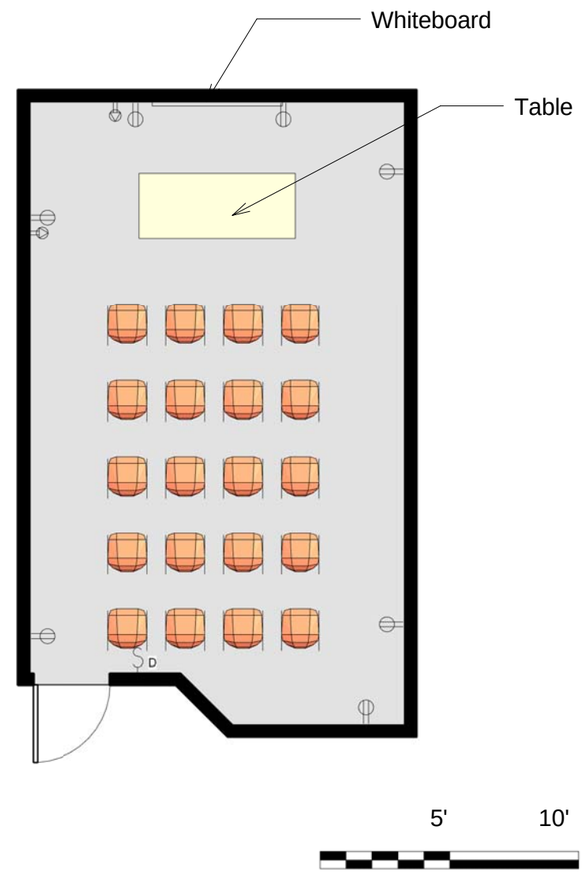

Whiteboard
Chem Surface
50 Seats
(46 + 4 accessible)
Accessible Ramp
DN
Power Projection Screen
Television,
VCR/DVD, and
stand (NIC)
Projector (NIC)
DN
Accessible Ramp
5'
10'

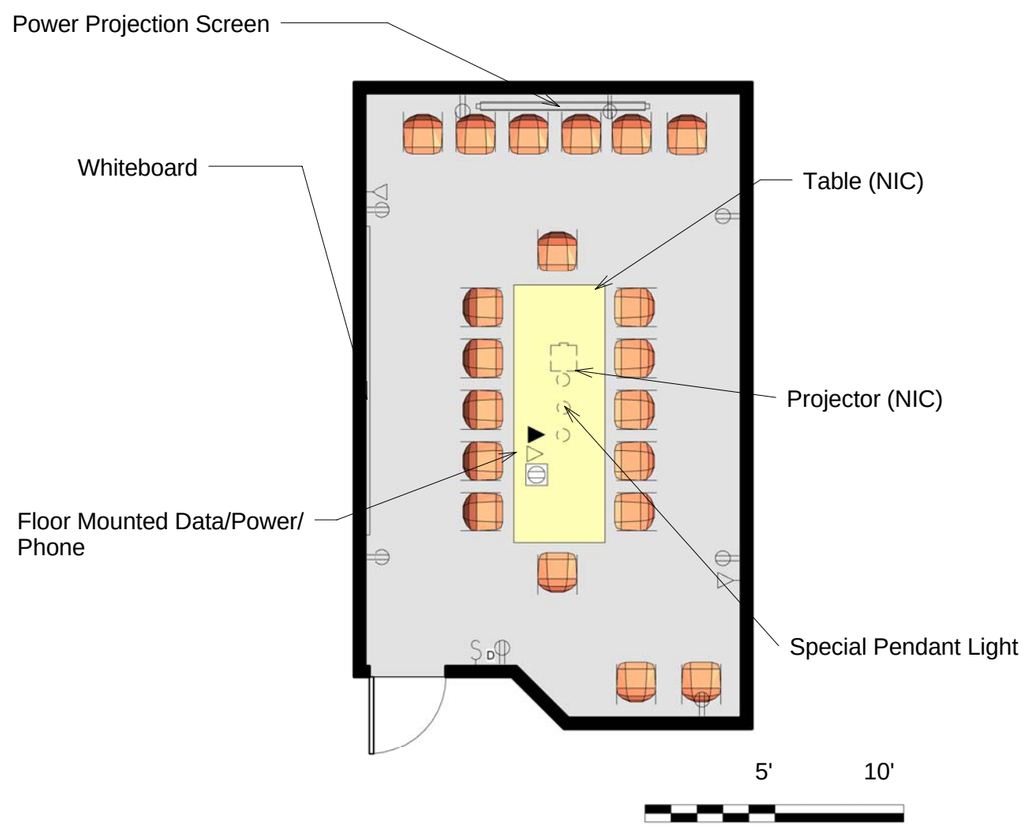

(NIC)
Tables 18' (NIC)
Whiteboard
Power
projection screen (NIC)
Projector (NIC)
Television,
VCR/DVD, and
stand (NIC)
5'
10'

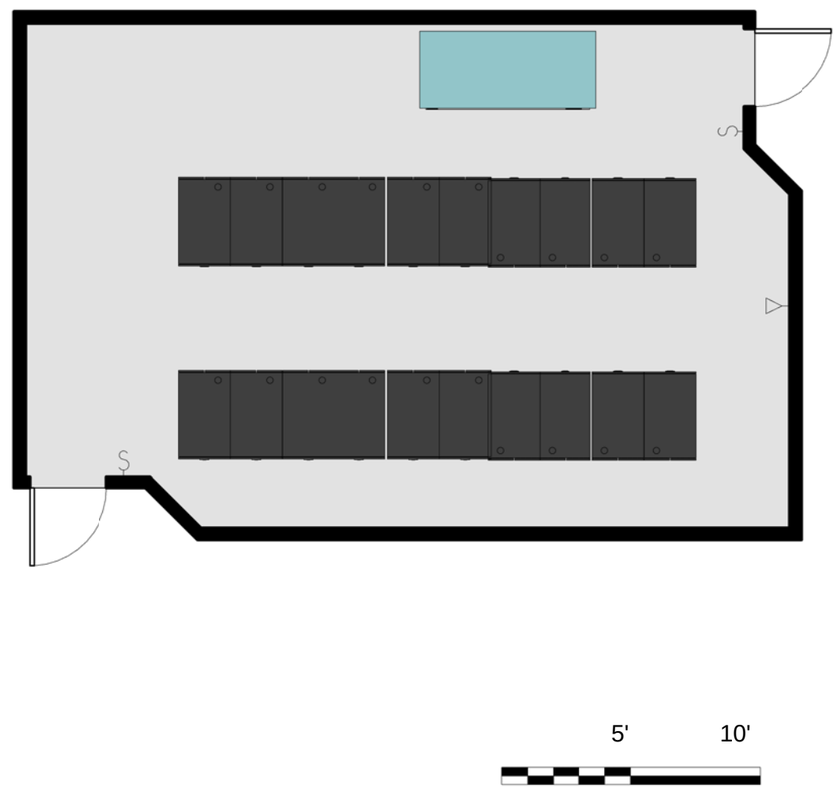

Pre-Manufactured Cold Room
(In Contract)
Temperature Recorder
5'
10'

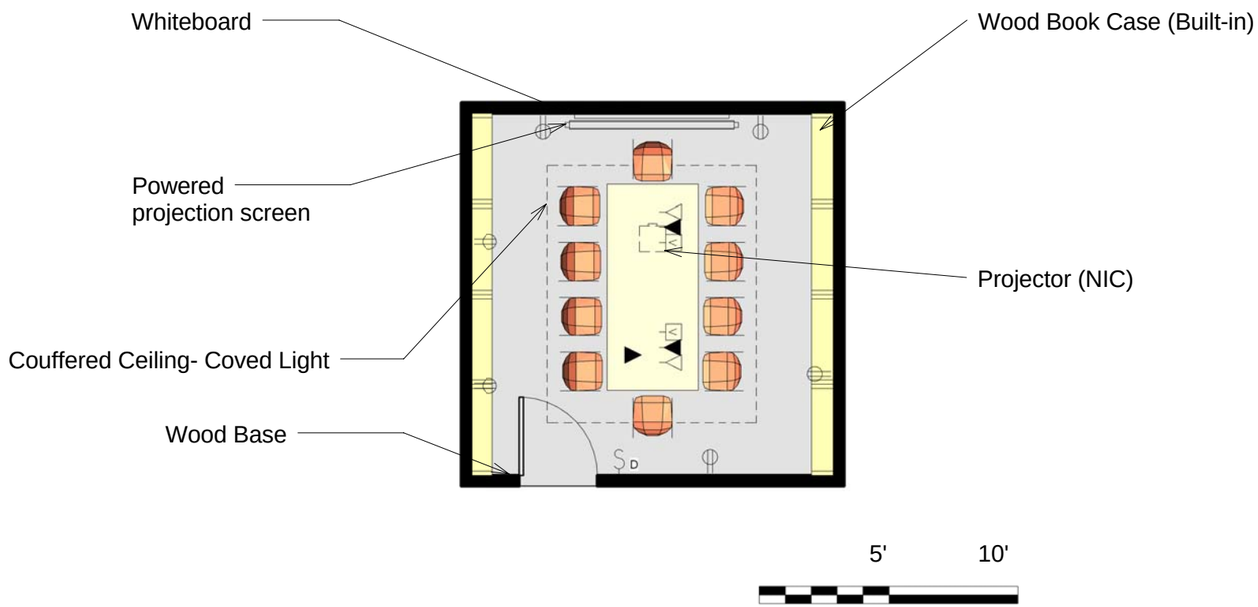
om

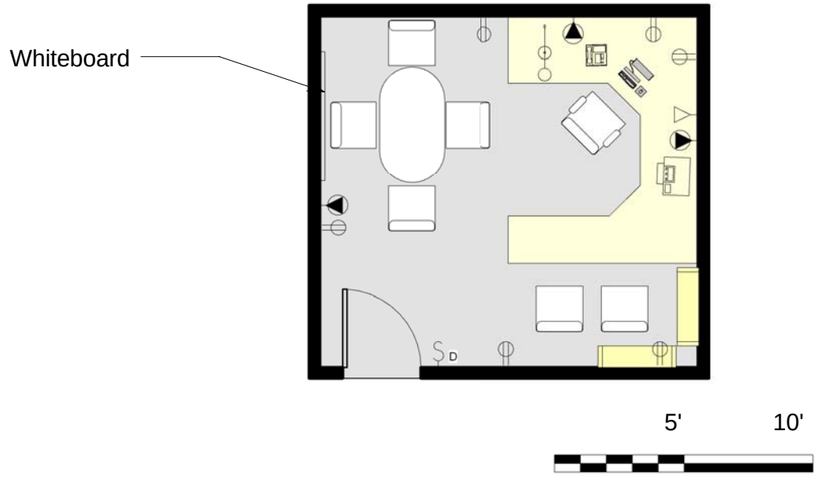

Television, VCR/DVD, and stand (NIC)
Tables (NIC)
Whiteboard
Power Projection Screen (NIC)
Projector (NIC)
Printer and Storage below (NIC)
5'
10'

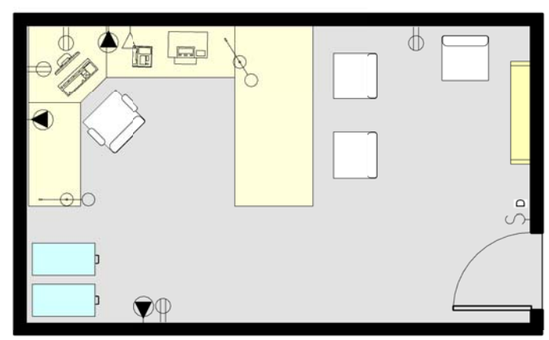

Whiteboard
Table
5'
10'


Power Projection Screen
Whiteboard
Table (NIC)
Projector (NIC)
Floor Mounted Data/Power/
Phone
Special Pendant Light
5'
10'

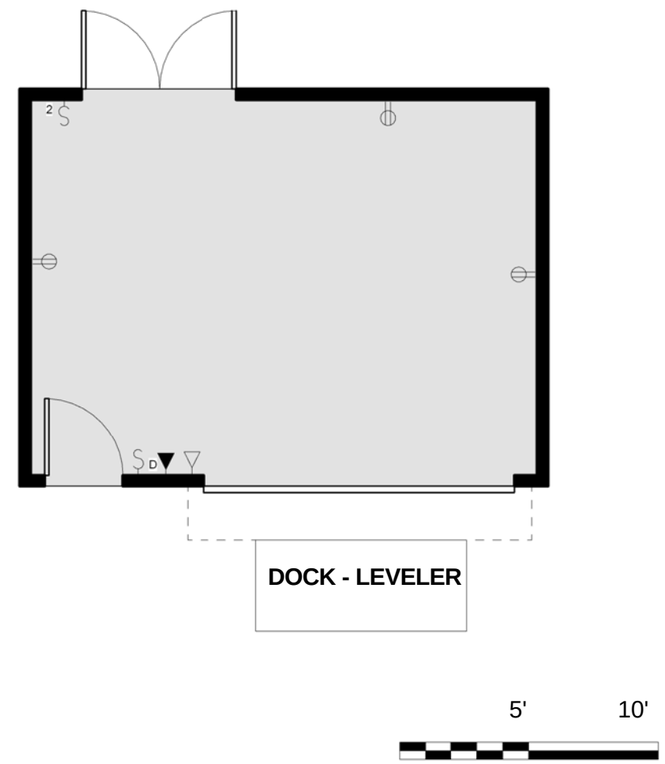

5'
10'

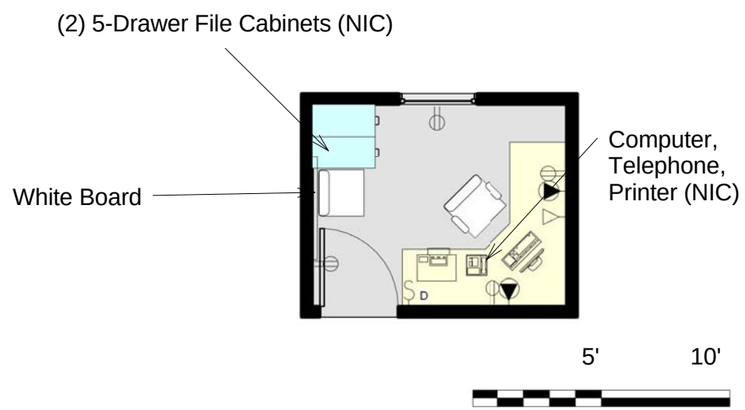

Whiteboard
Wood Book Case (Built-in)
Powered
projection screen
Projector (NIC)
Couffered Ceiling- Coved Light
Wood Base
5'
10'

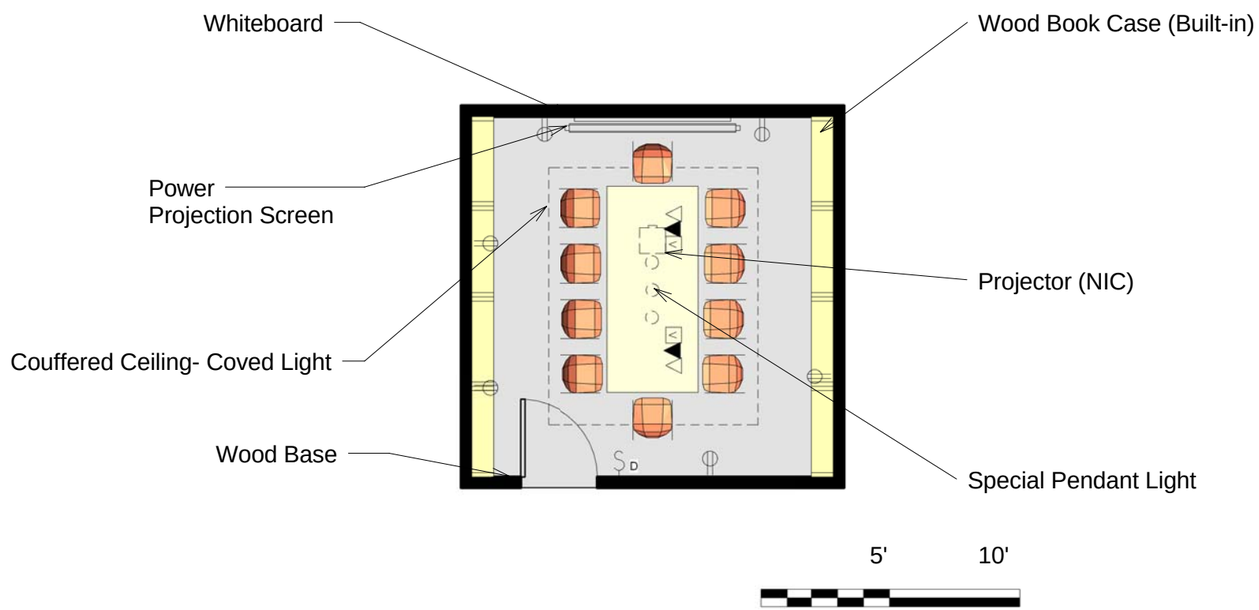

Whiteboard
5'
10'

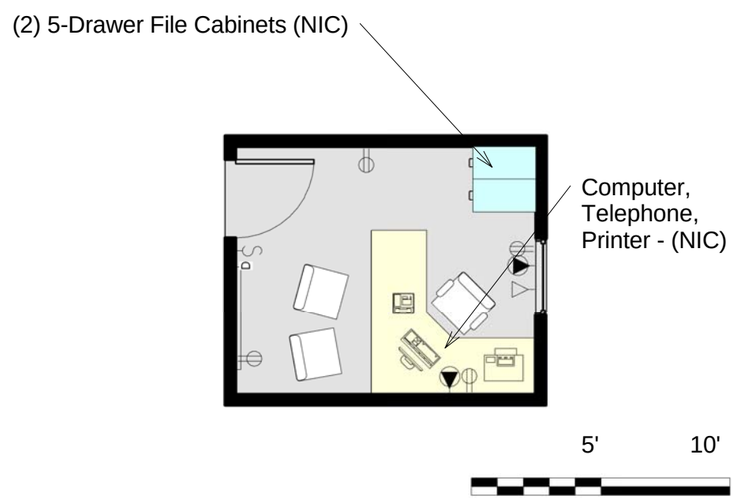


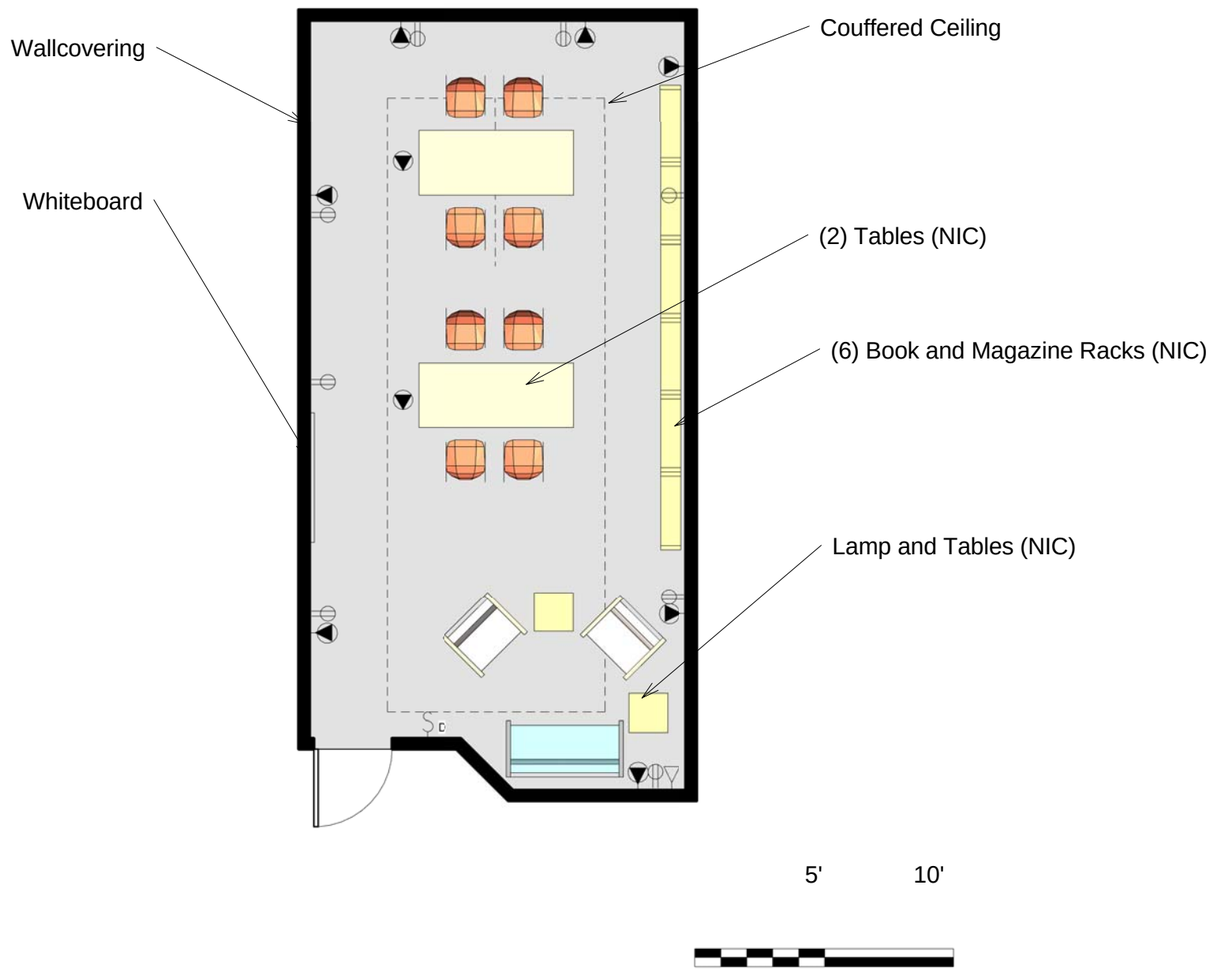
5' 10'


2
D
DOCK - LEVELER
5'
10'


(2) 5-Drawer File Cabinets (NIC)
White Board
Computer,
Telephone,
Printer (NIC)
5'
10'


Whiteboard
Wood Book Case (Built-in)
Power
Projection Screen
Projector (NIC)
Couffered Ceiling- Coved Light
Wood Base
Special Pendant Light
5'
10'


(2) 5-Drawer File Cabinets (NIC)
Computer,
Telephone,
Printer - (NIC)
5'
10'


Wallcovering
Couffered Ceiling
Whiteboard
(2) Tables (NIC)
(6) Book and Magazine Racks (NIC)
Lamp and Tables (NIC)
5'
10'

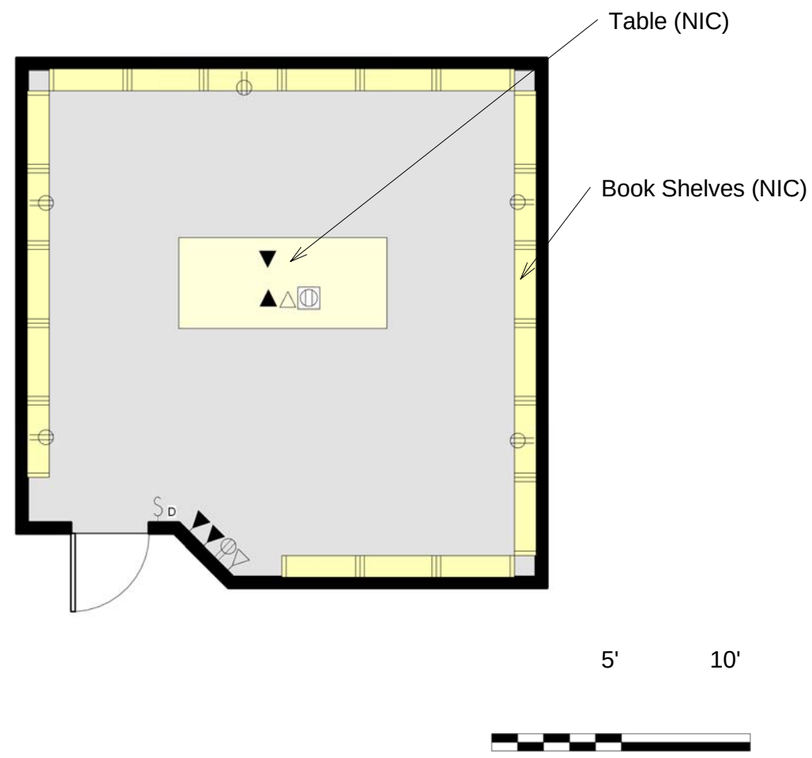
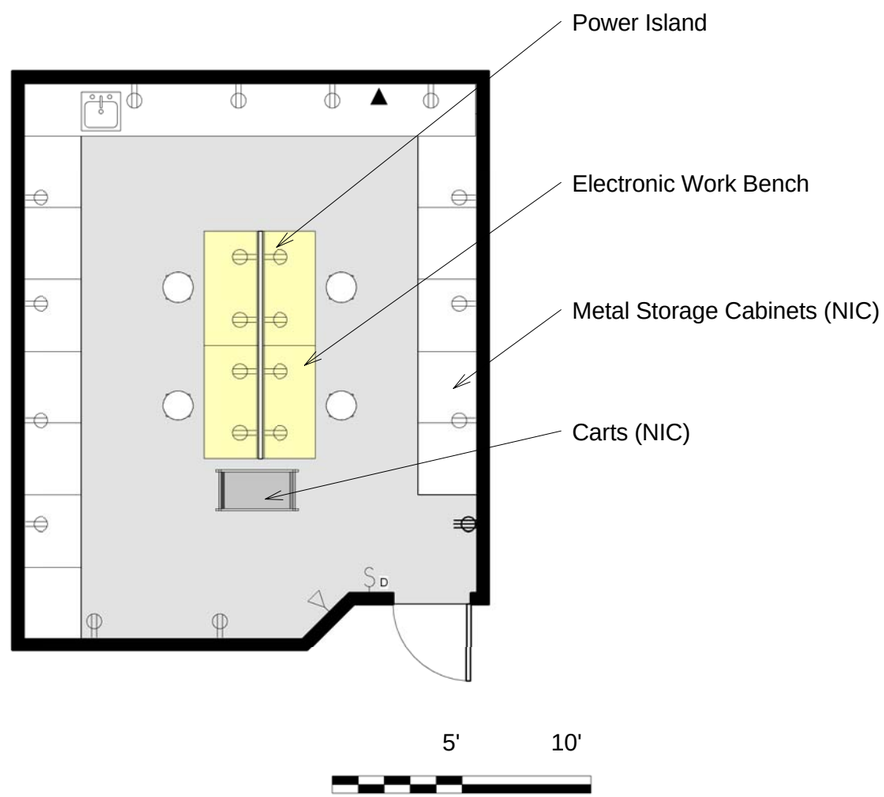
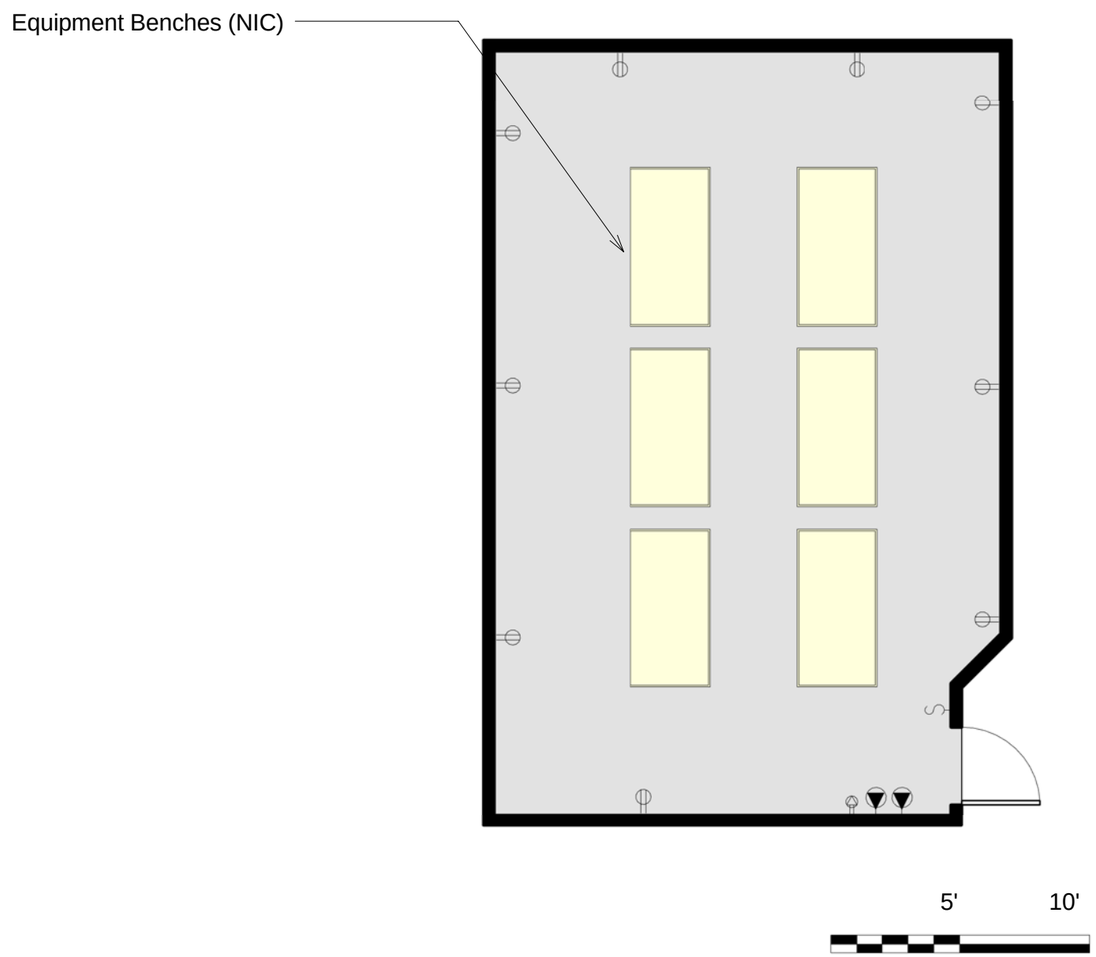
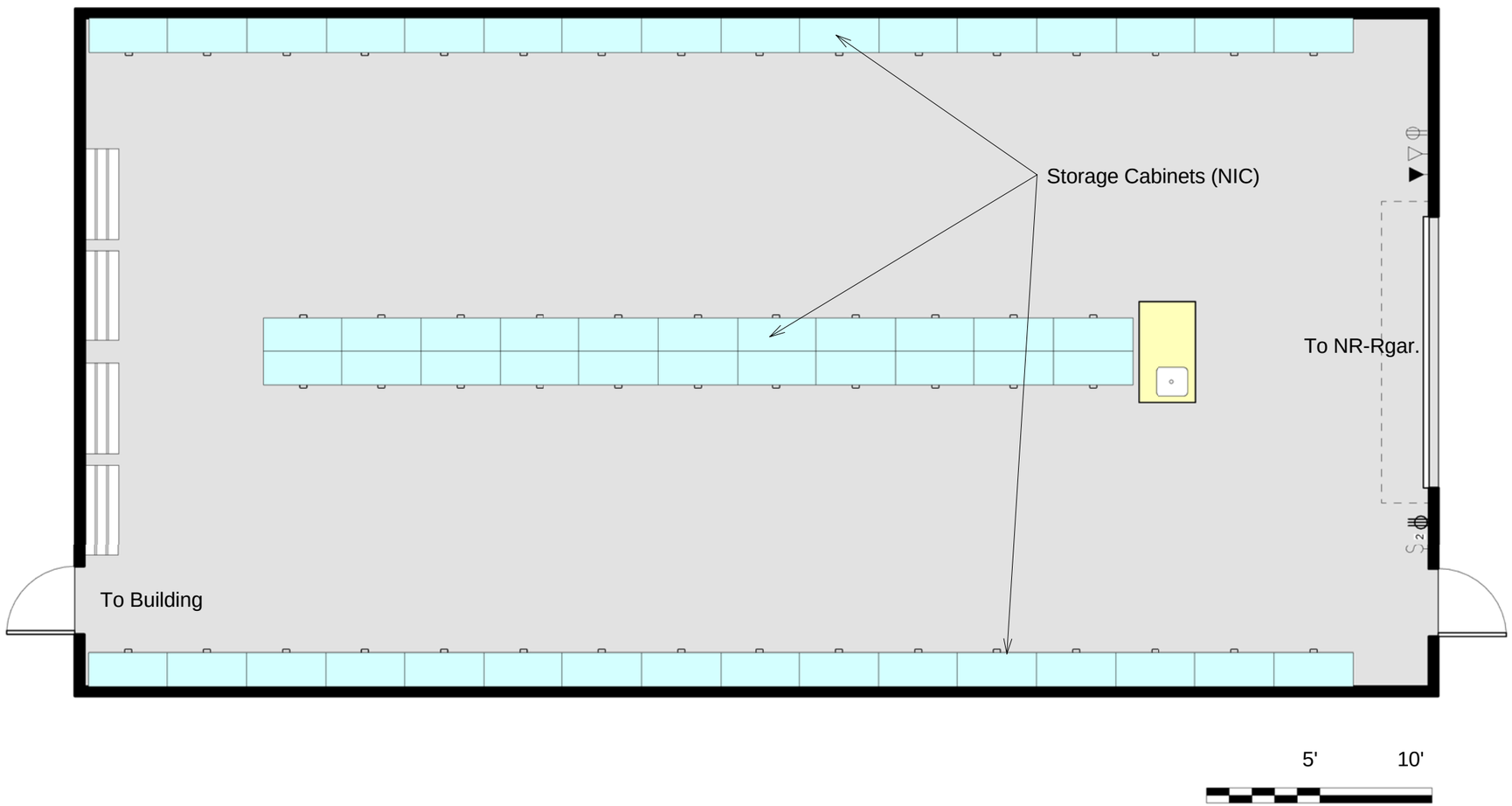
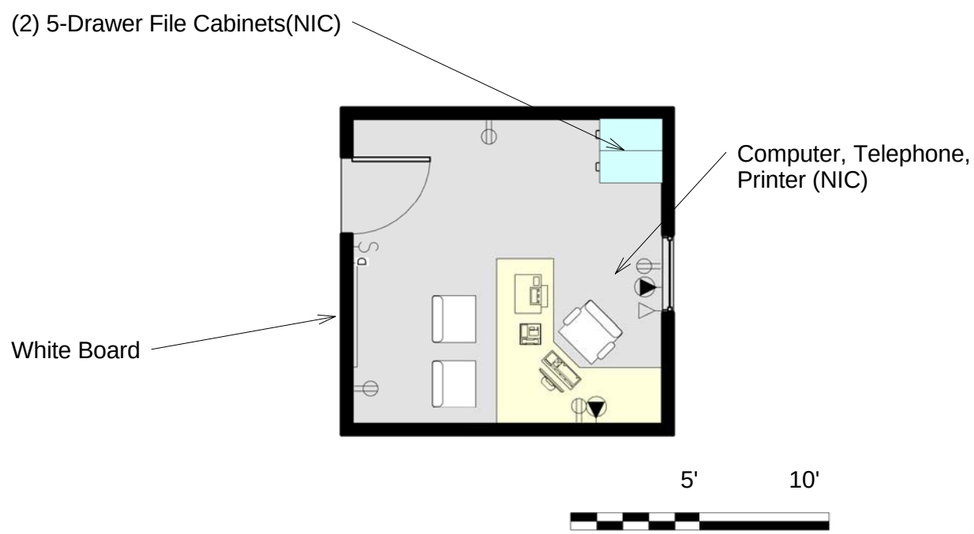


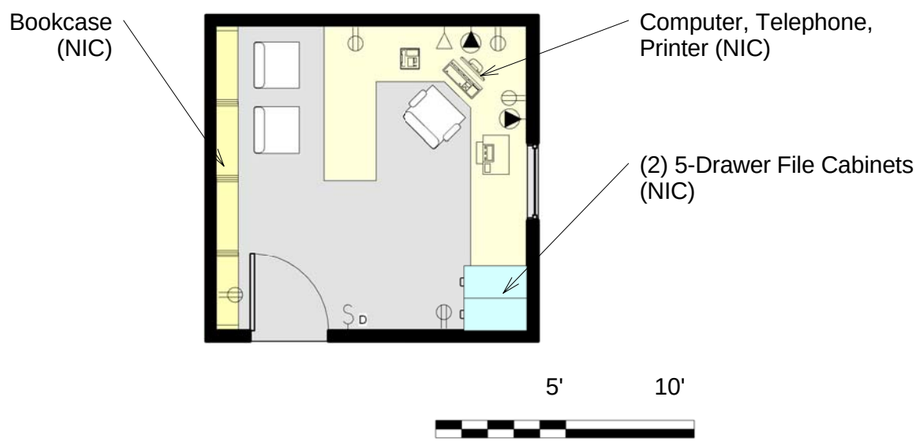
Table (NIC)
Book Shelves (NIC)
5'
10'

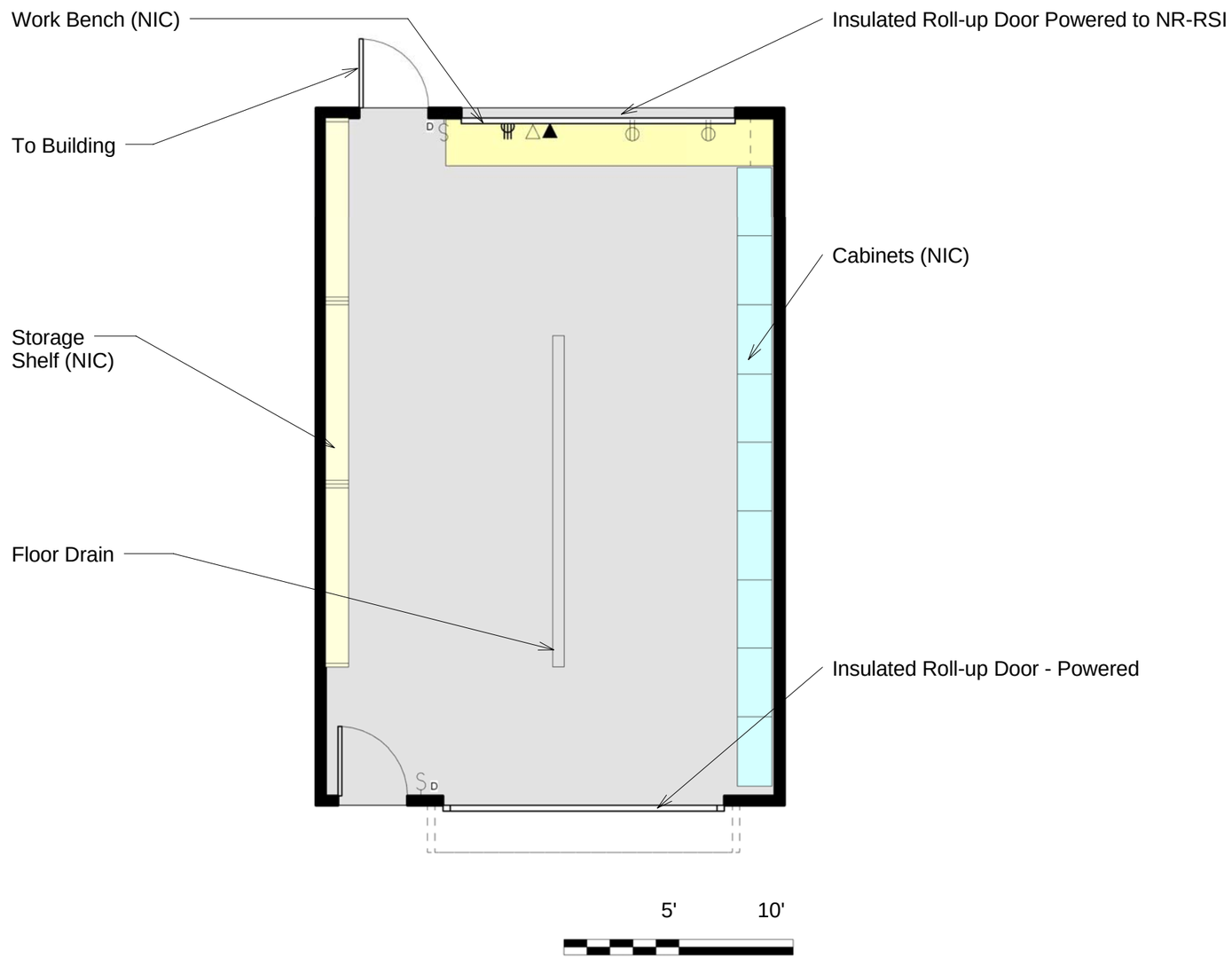

Power Island
Electronic Work Bench
Metal Storage Cabinets (NIC)
Carts (NIC)
5'
10'

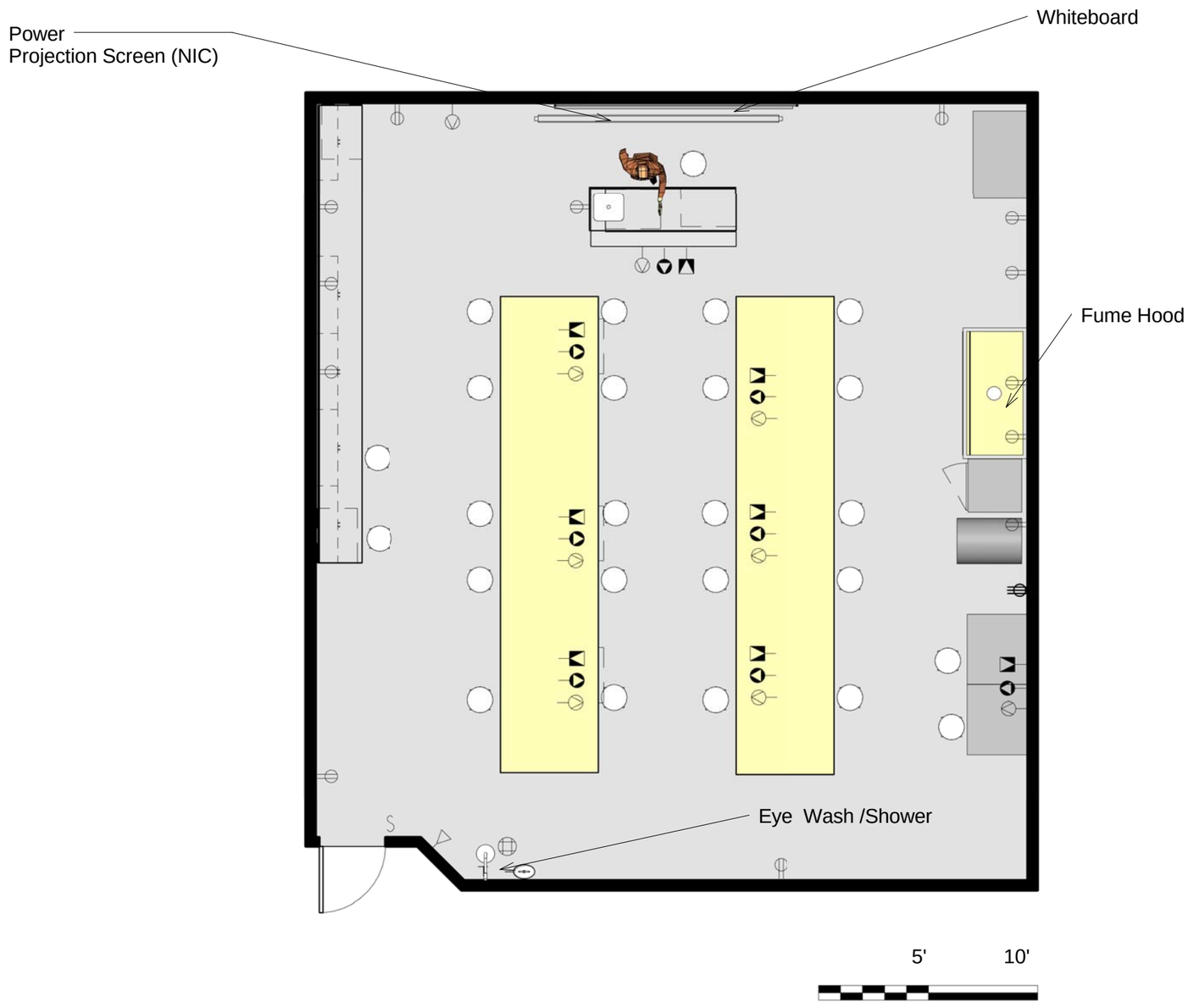

Equipment Benches (NIC)
5'
10'

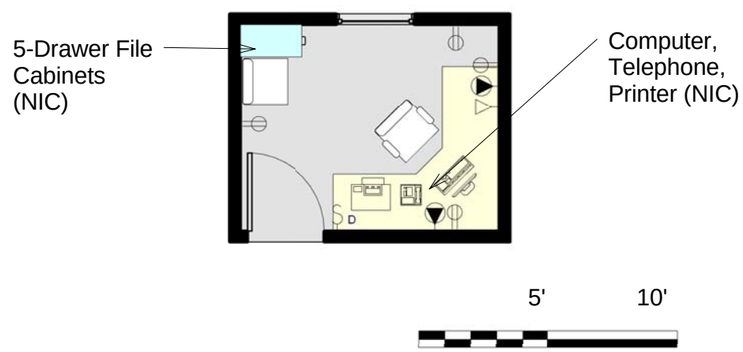

Storage Cabinets (NIC)
To NR-Rgar.
To Building
5'
10'

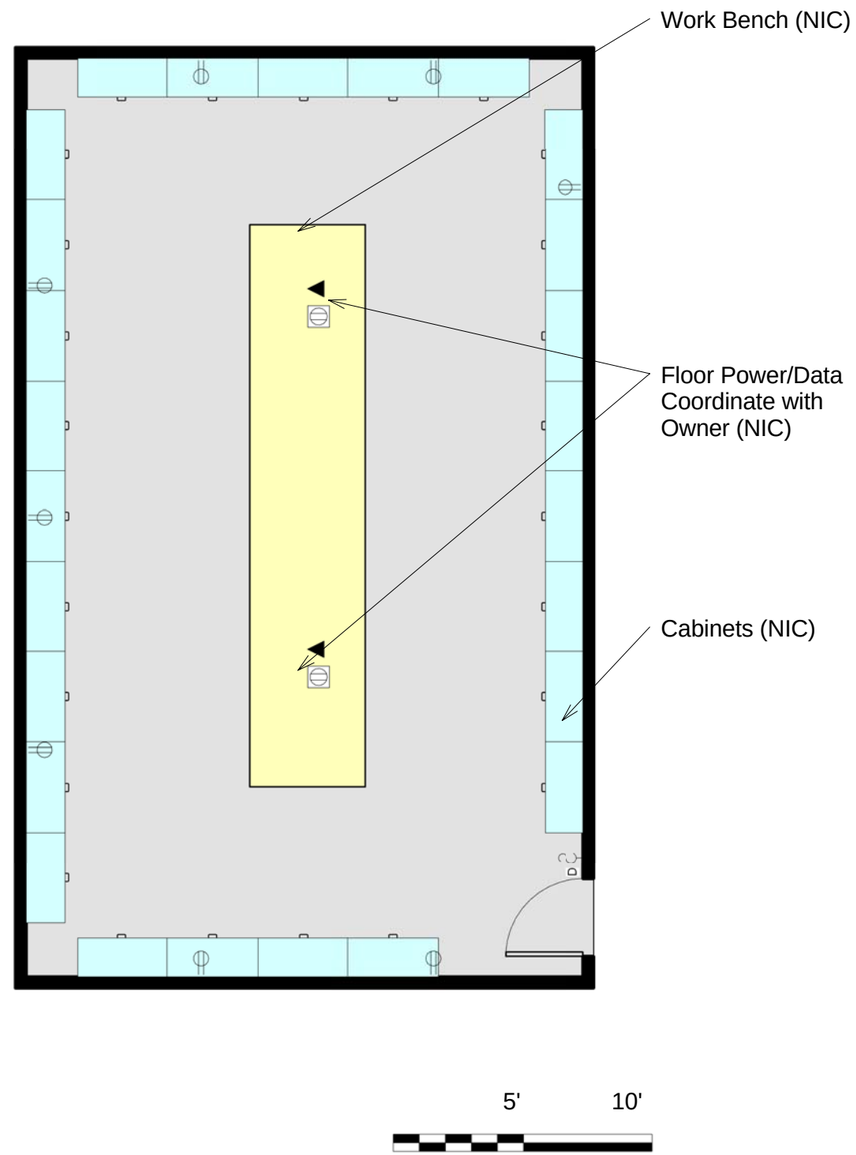

(2) 5-Drawer File Cabinets(NIC)
Computer, Telephone,
Printer (NIC)
White Board
5'
10'

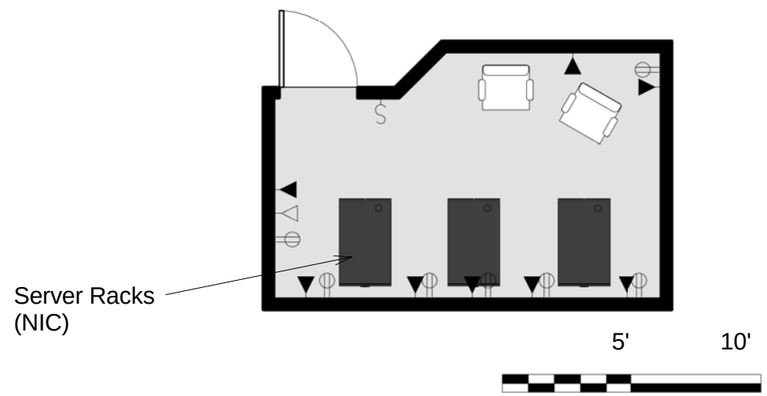

Bookcase
(NIC)
Computer, Telephone,
Printer (NIC)
(2) 5-Drawer File Cabinets
(NIC)
5'
10'

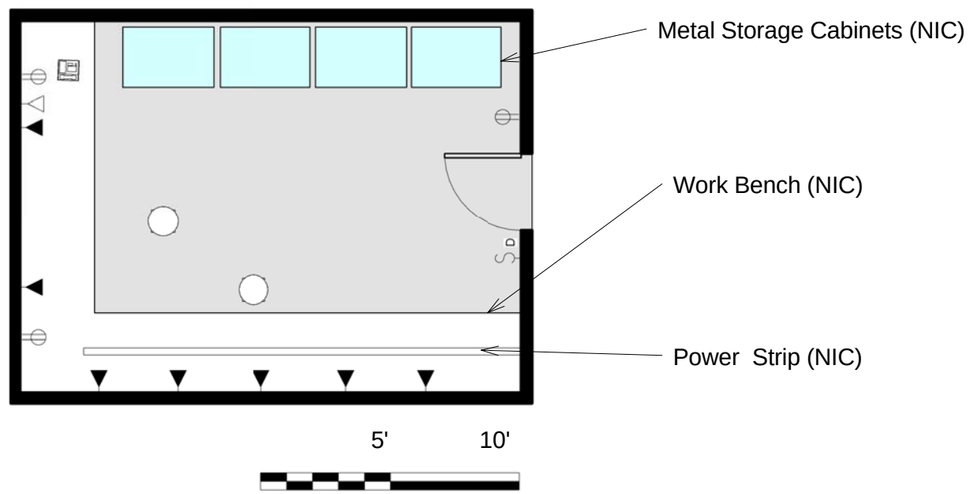

Work Bench (NIC)
Insulated Roll-up Door Powered to NR-RSI
To Building
Cabinets (NIC)
Storage
Shelf (NIC)
Floor Drain
Insulated Roll-up Door - Powered
5'
10'


Power
Projection Screen (NIC)
Whiteboard
Fume Hood
Eye Wash /Shower
5'
10'

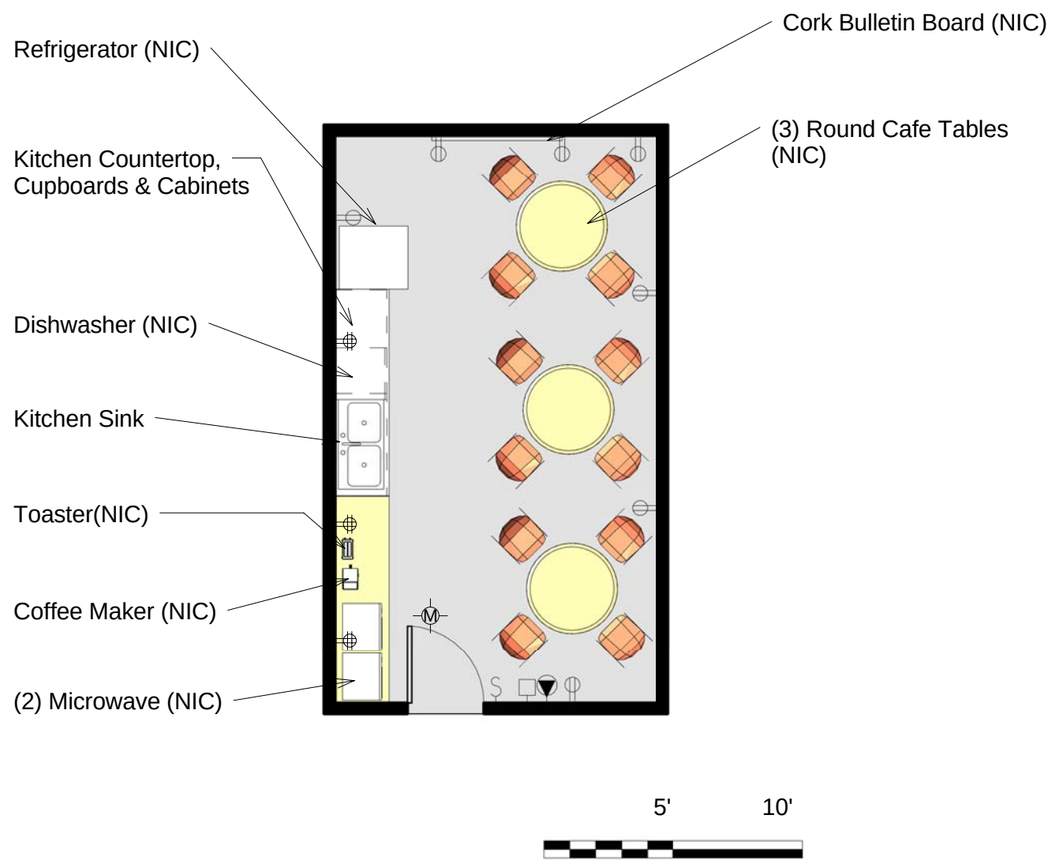

5-Drawer File
Cabinets
(NIC)
Computer,
Telephone,
Printer (NIC)
5'
10'

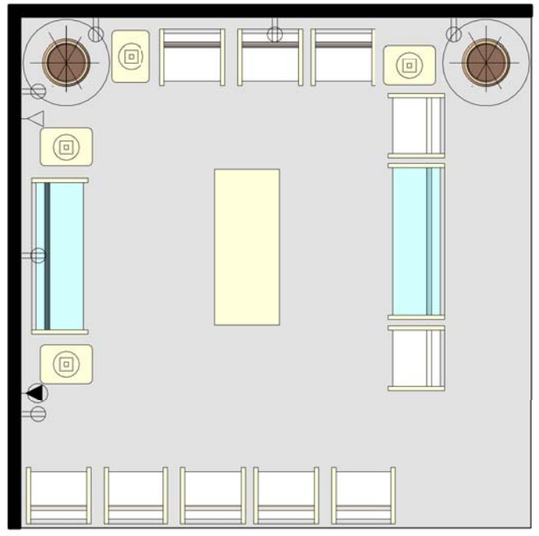

Work Bench (NIC)
Floor Power/Data
Coordinate with
Owner (NIC)
Cabinets (NIC)
5'
10'


Server Racks
(NIC)
5'
10'

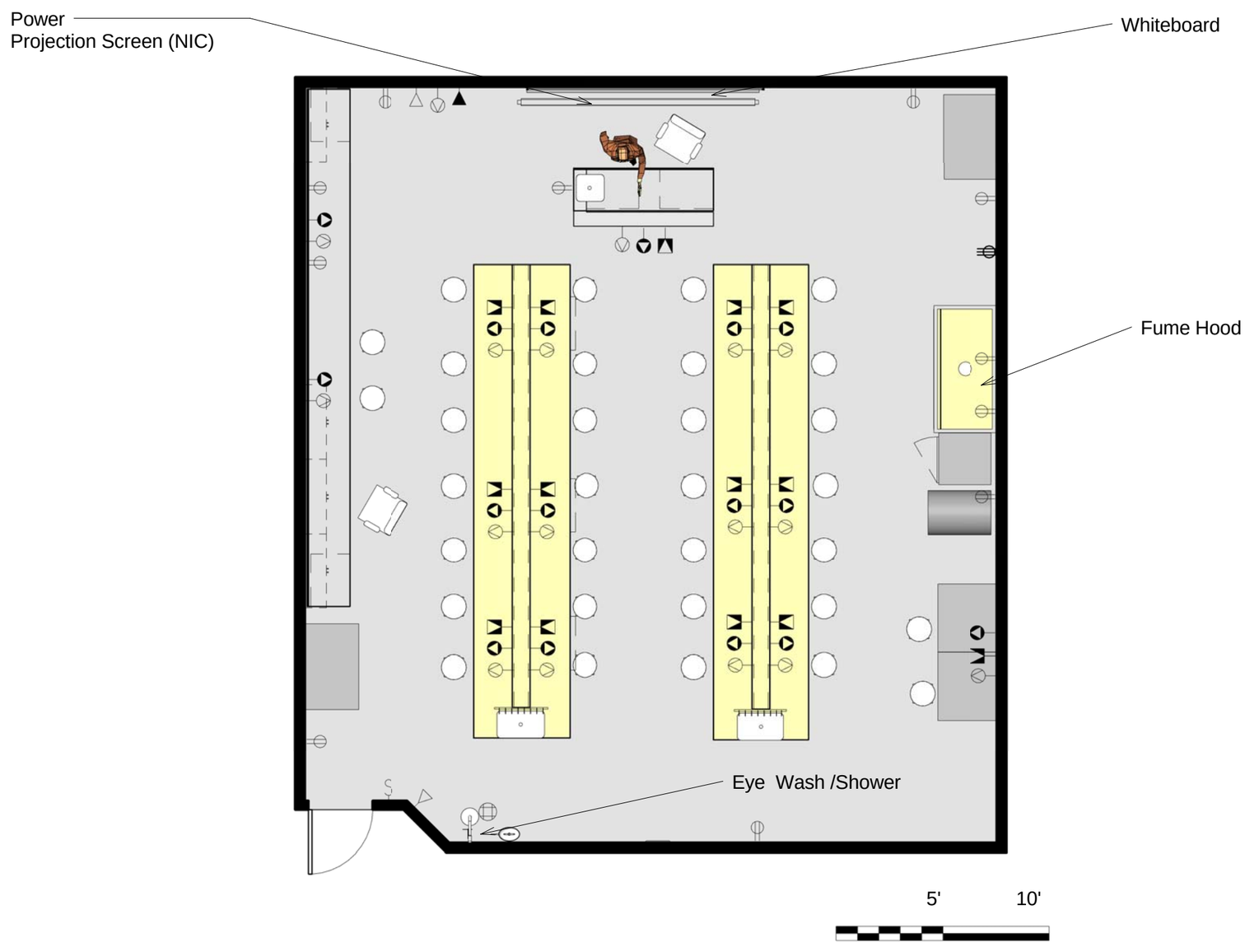

Metal Storage Cabinets (NIC)
Work Bench (NIC)
Power Strip (NIC)
5'
10'

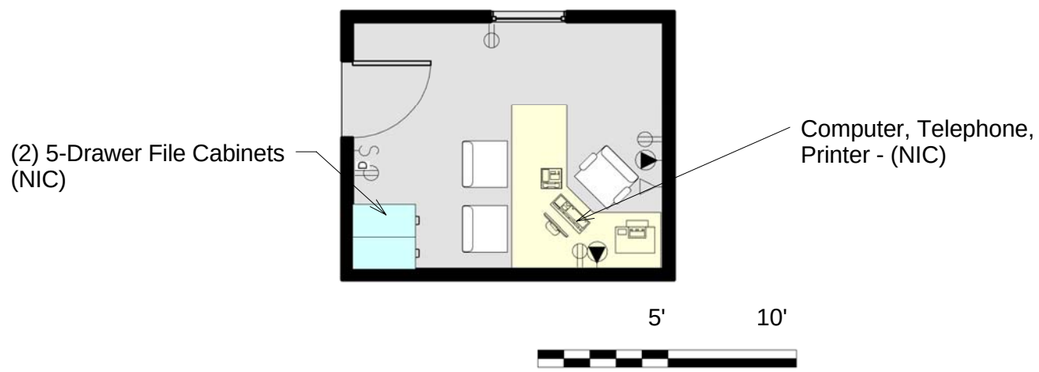
220 Outlet	Floor Drain	
Duplex Outlet	Motion Sensor	Air
Quadplex Outlet	Telephone	Gas
Switch	Telephone Data	Vacuum
D Dimmer Switch	Voice Data	Video
2 Double Switch	Data	CA-TV

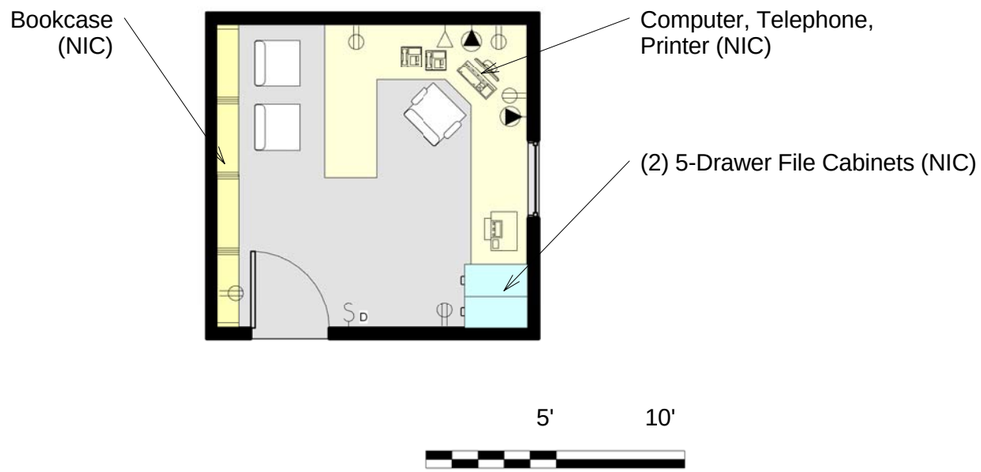

Refrigerator (NIC)
Kitchen Countertop,
Cupboards & Cabinets
Dishwasher (NIC)
Kitchen Sink
Toaster(NIC)
Coffee Maker (NIC)
(2) Microwave (NIC)
Cork Bulletin Board (NIC)
(3) Round Cafe Tables
(NIC)
M
S
5'
10'

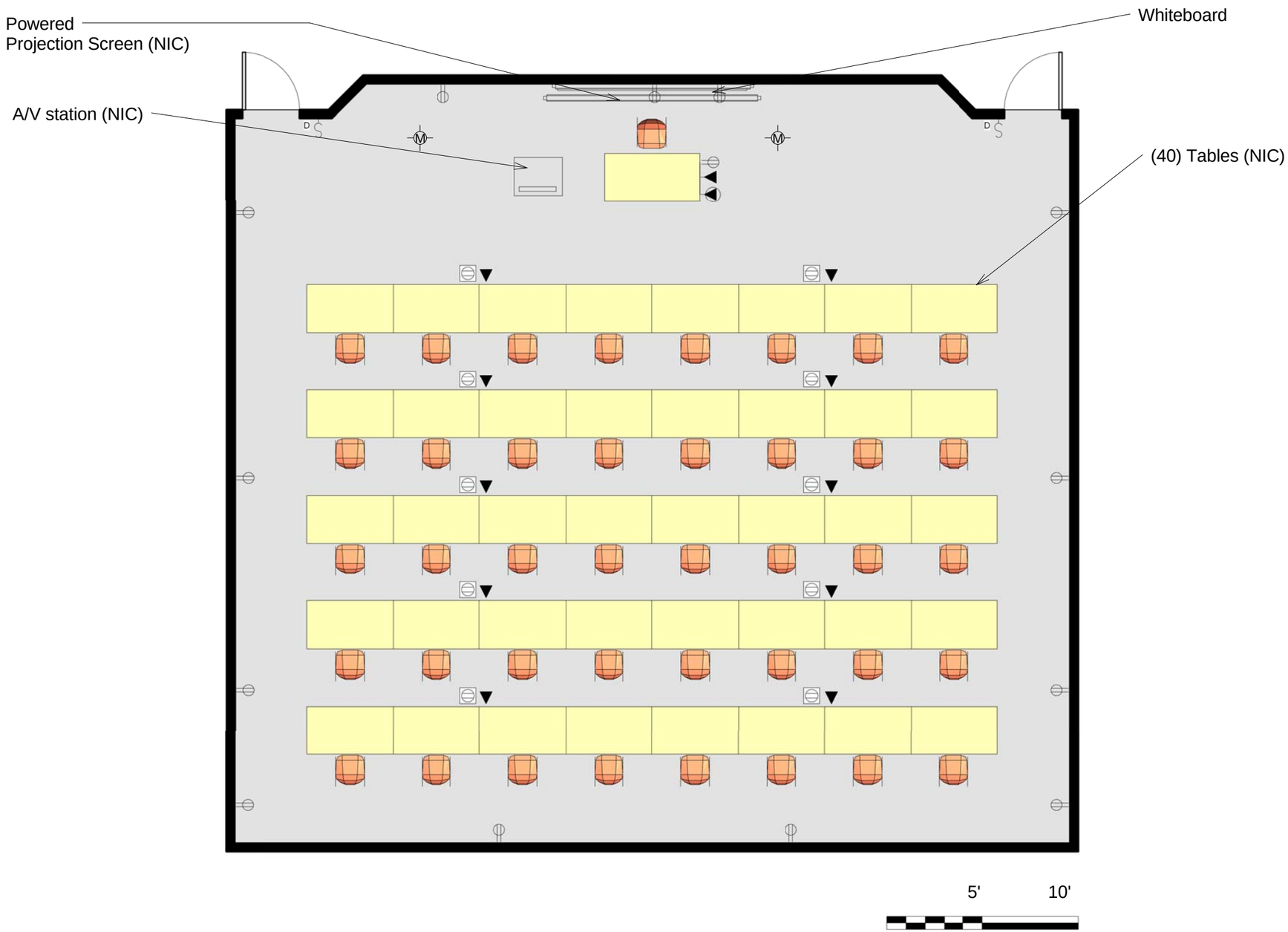


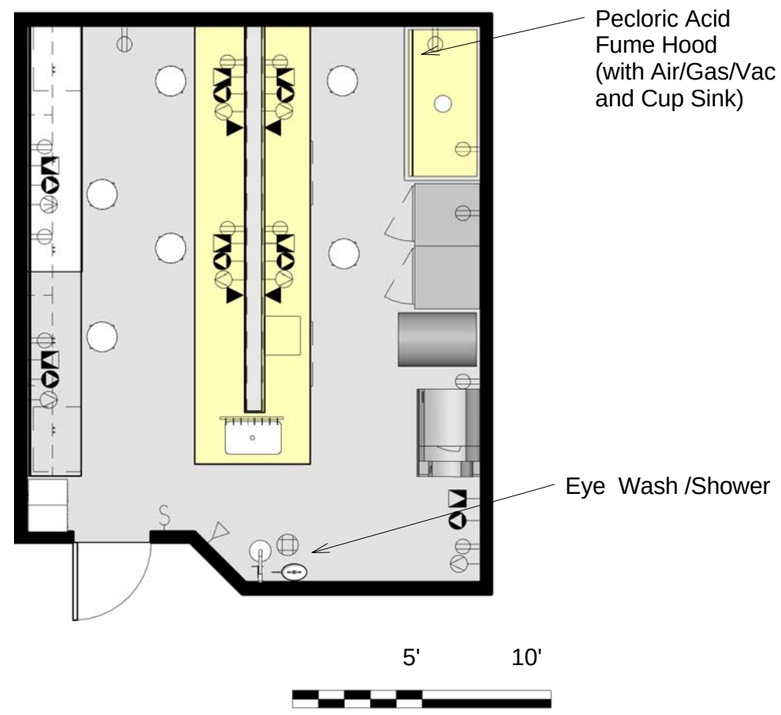
5' 10'

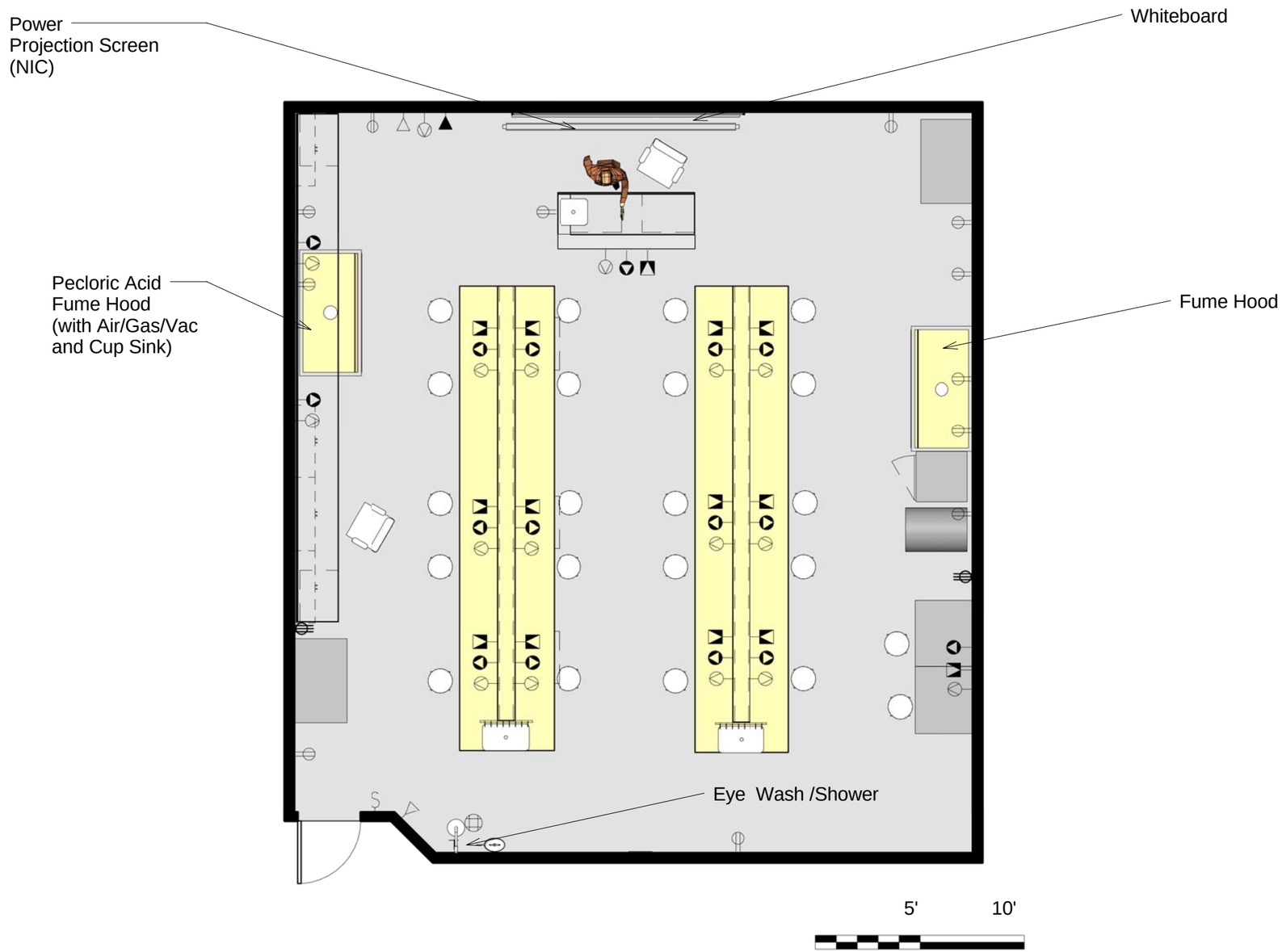

Power
Projection Screen (NIC)
Whiteboard
Fume Hood
Eye Wash /Shower
5'
10'

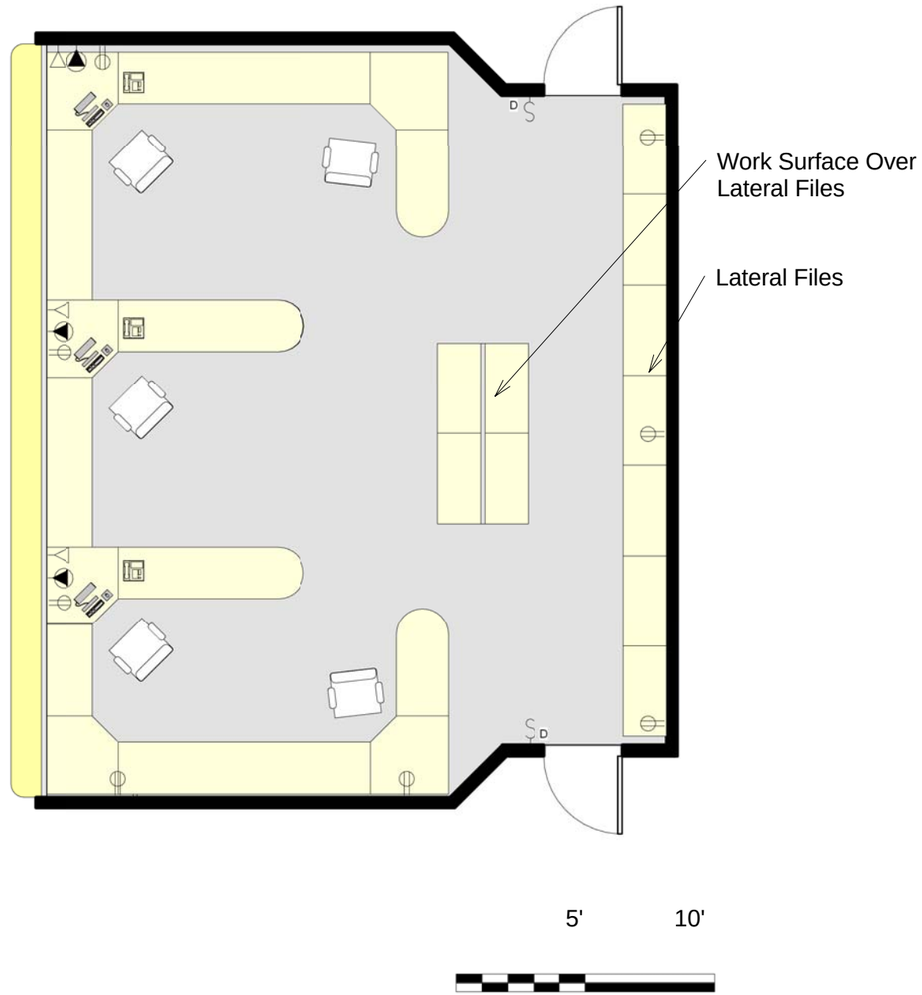

(2) 5-Drawer File Cabinets
(NIC)
Computer, Telephone,
Printer - (NIC)
5'
10'

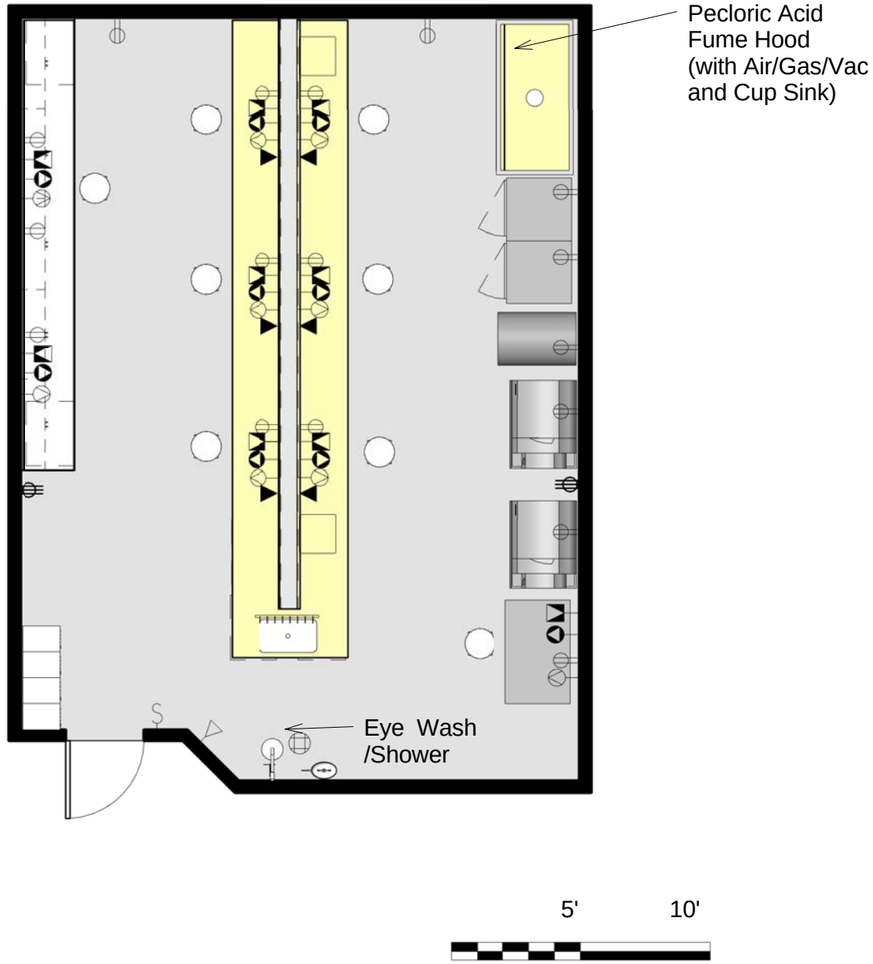

Bookcase
(NIC)
Computer, Telephone,
Printer (NIC)
(2) 5-Drawer File Cabinets (NIC)
5'
10'


Powered
Projection Screen (NIC)
Whiteboard
A/V station (NIC)
(40) Tables (NIC)
5'
10'


Pecloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash /Shower
5'
10'

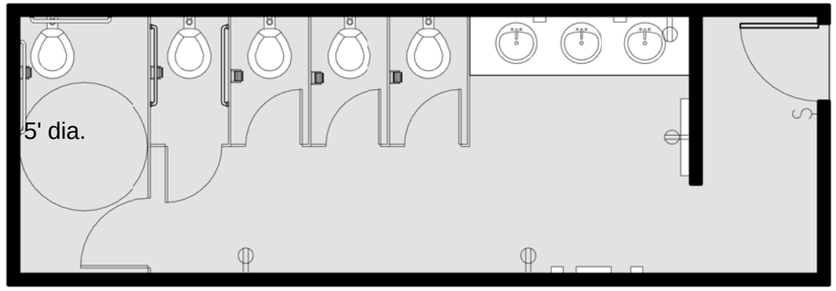

Power
Projection Screen
(NIC)
Whiteboard
Pecloric Acid
Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Fume Hood
Eye Wash /Shower
5'
10'


Work Surface Over
Lateral Files
Lateral Files
5'
10'

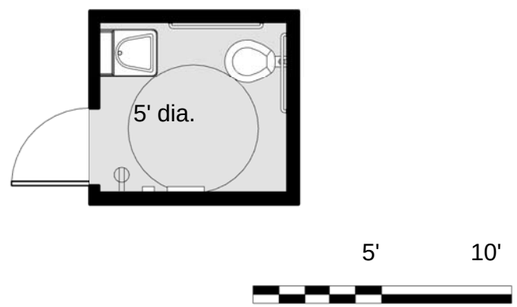


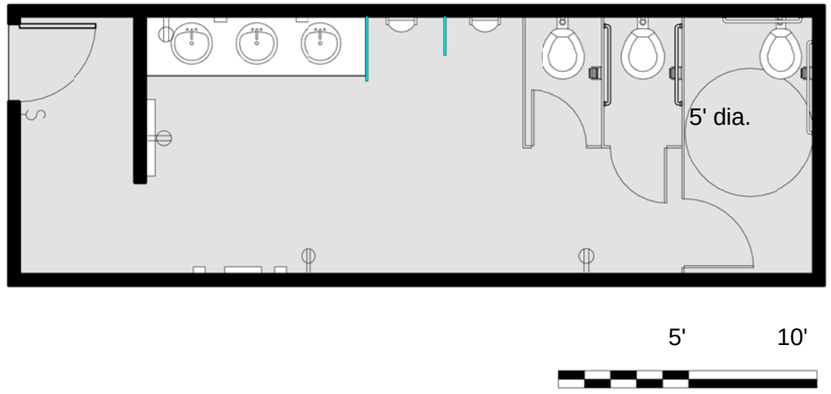
Natrual Resources Research Lab

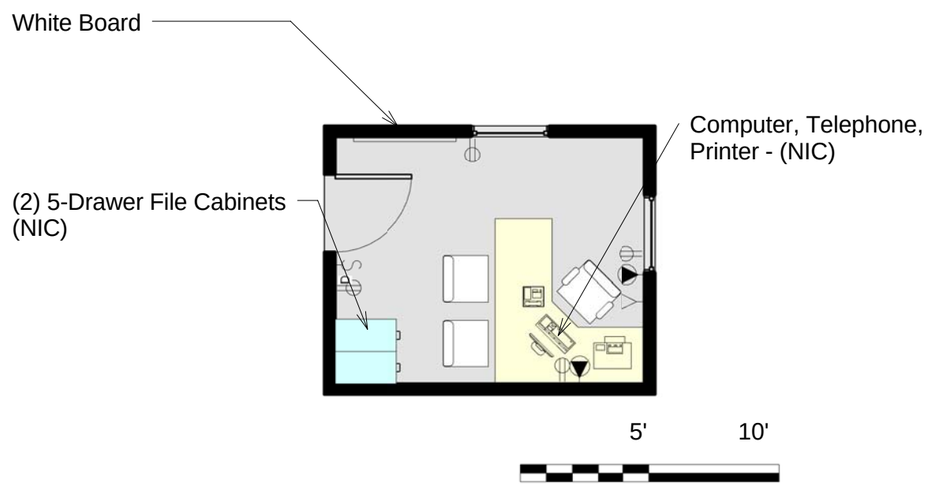
Eye Wash /Shower
5'
10'



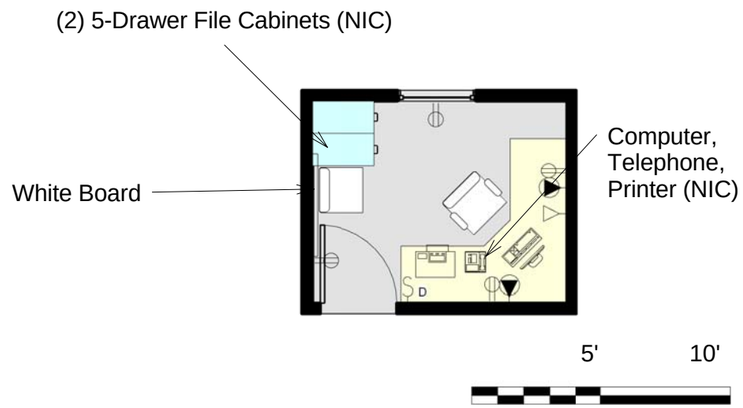
5' 10'

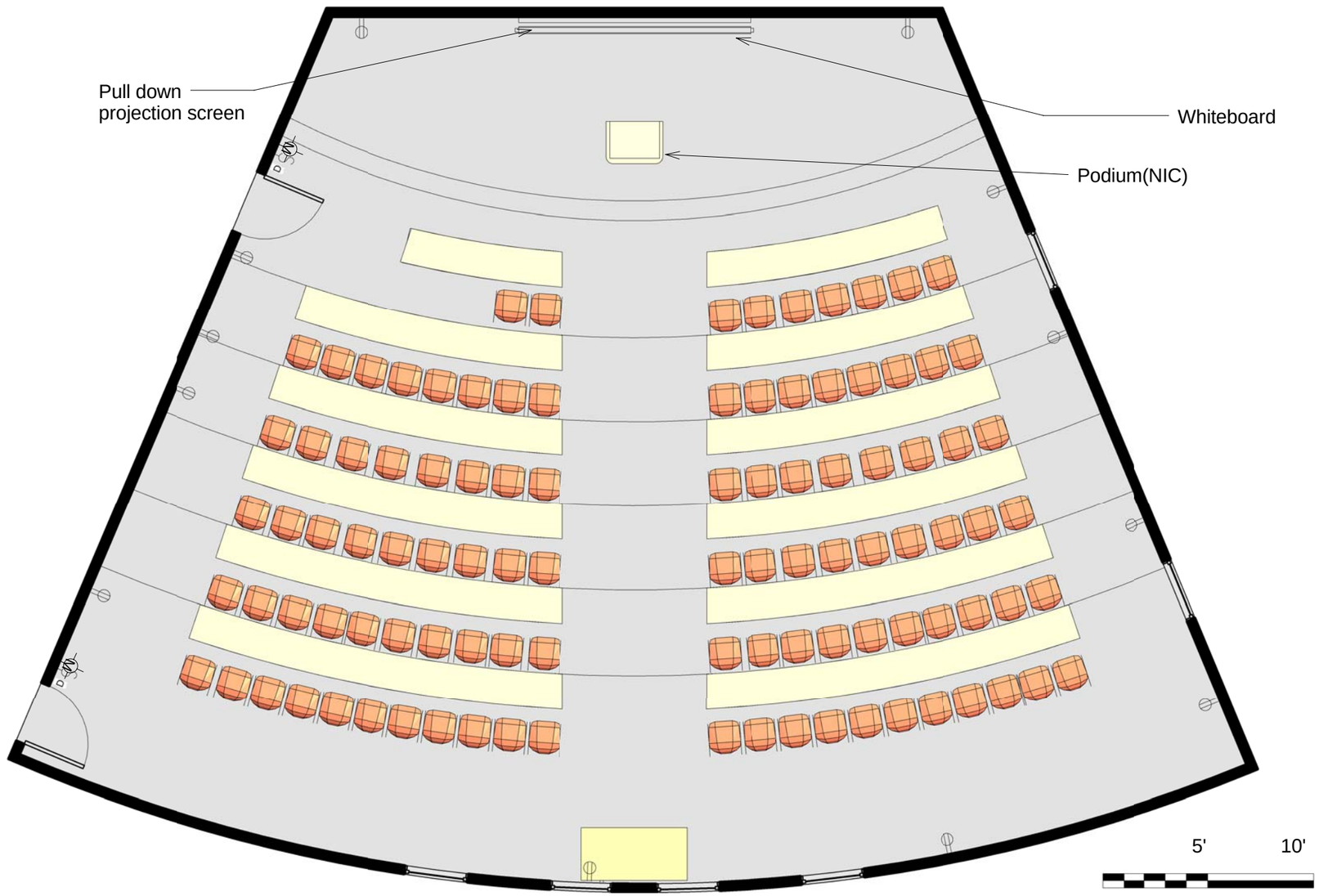

5' dia.
5'
10'

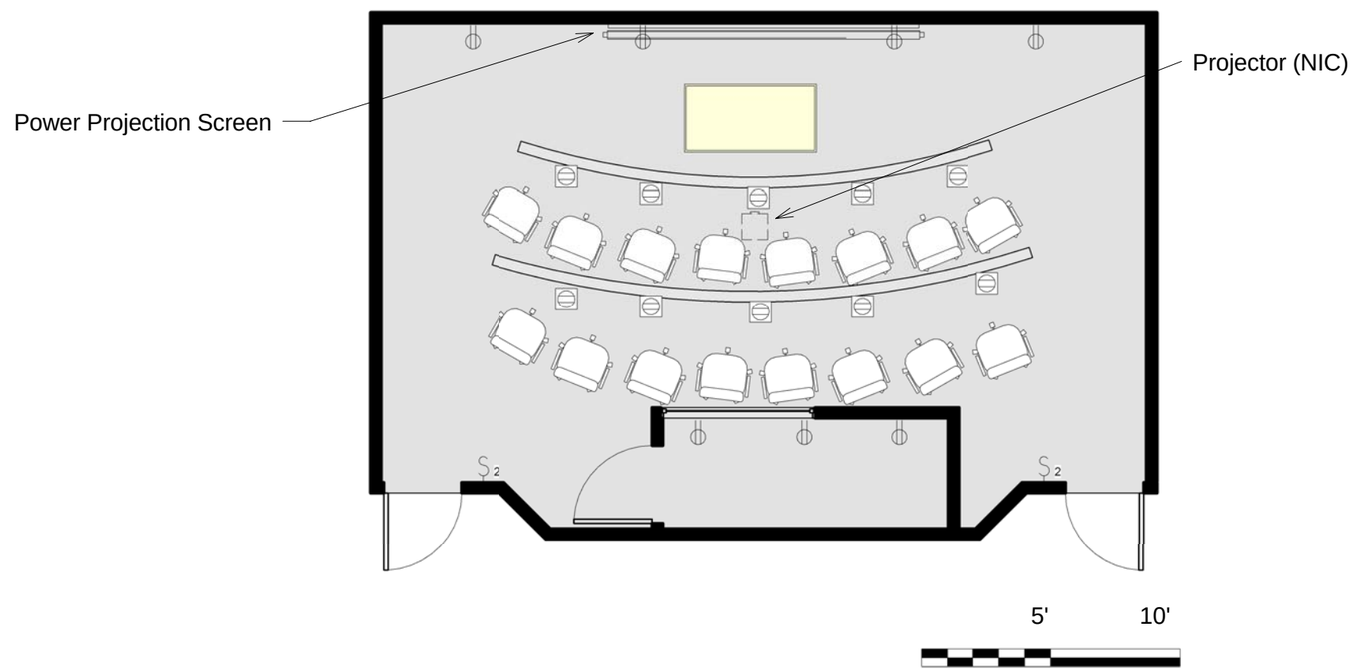

5' dia.
5'
10'



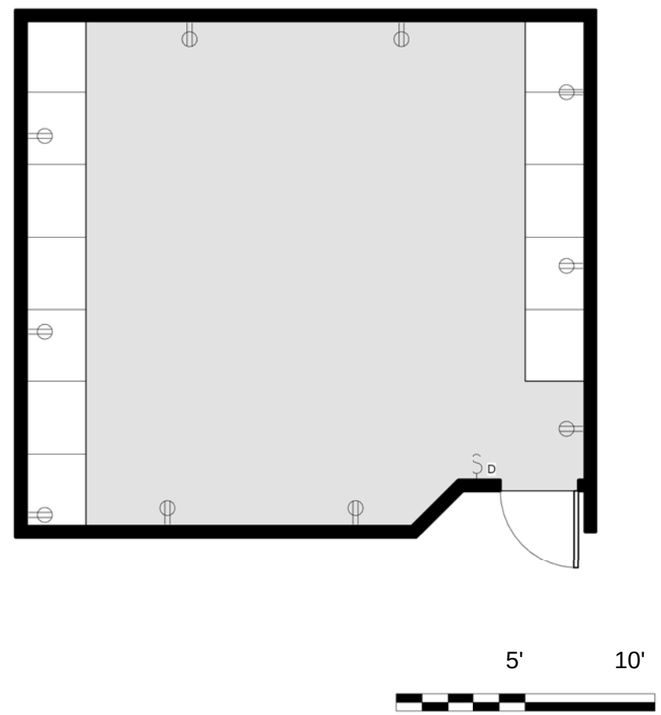
1 SBDC office
3/16" = 1'-0"


(2) 5-Drawer File Cabinets (NIC)
White Board
Computer,
Telephone,
Printer (NIC)
5'
10'

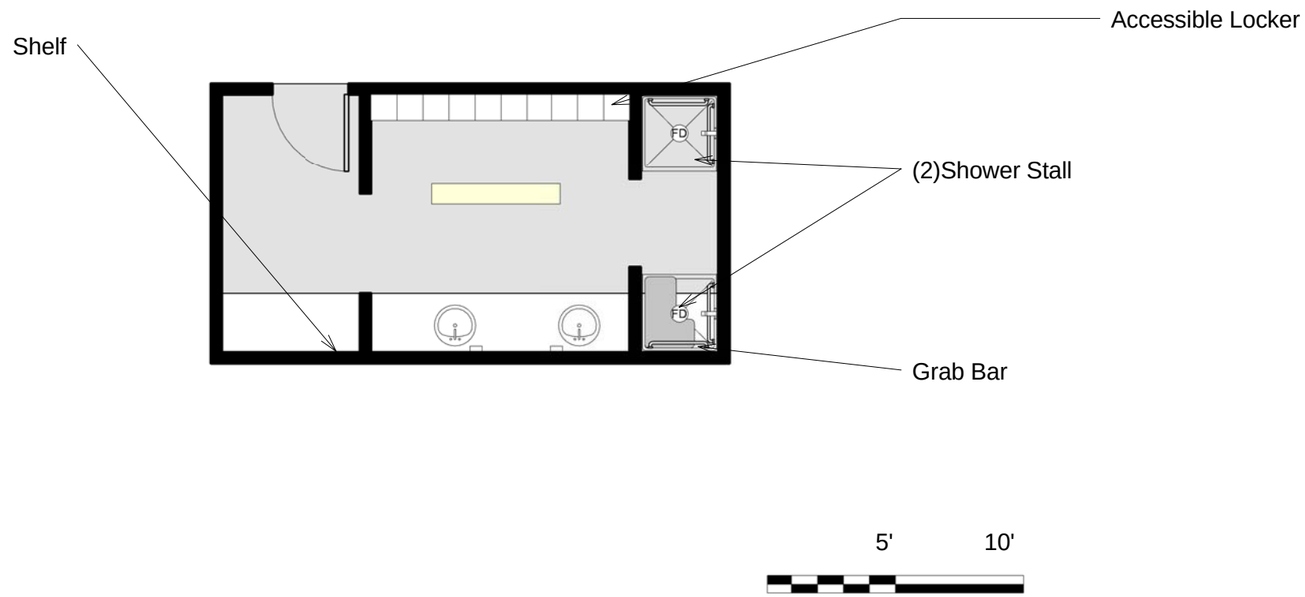

Pull down
projection screen
Whiteboard
Podium(NIC)
5'
10'

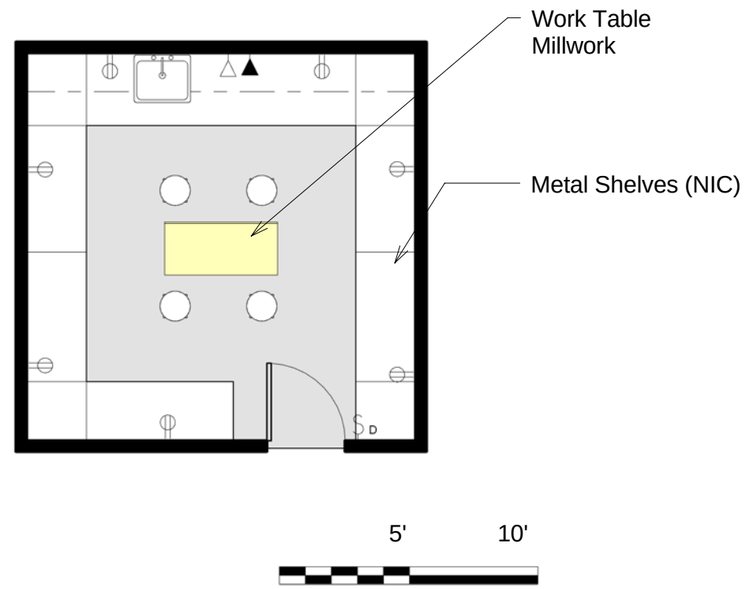


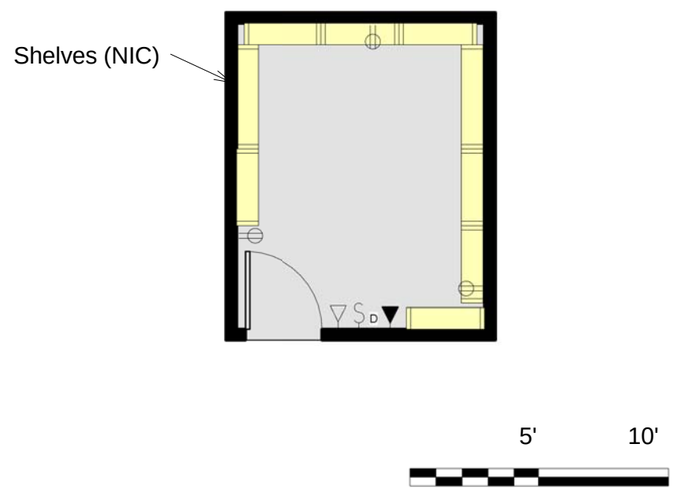
1 Small Seminar Room



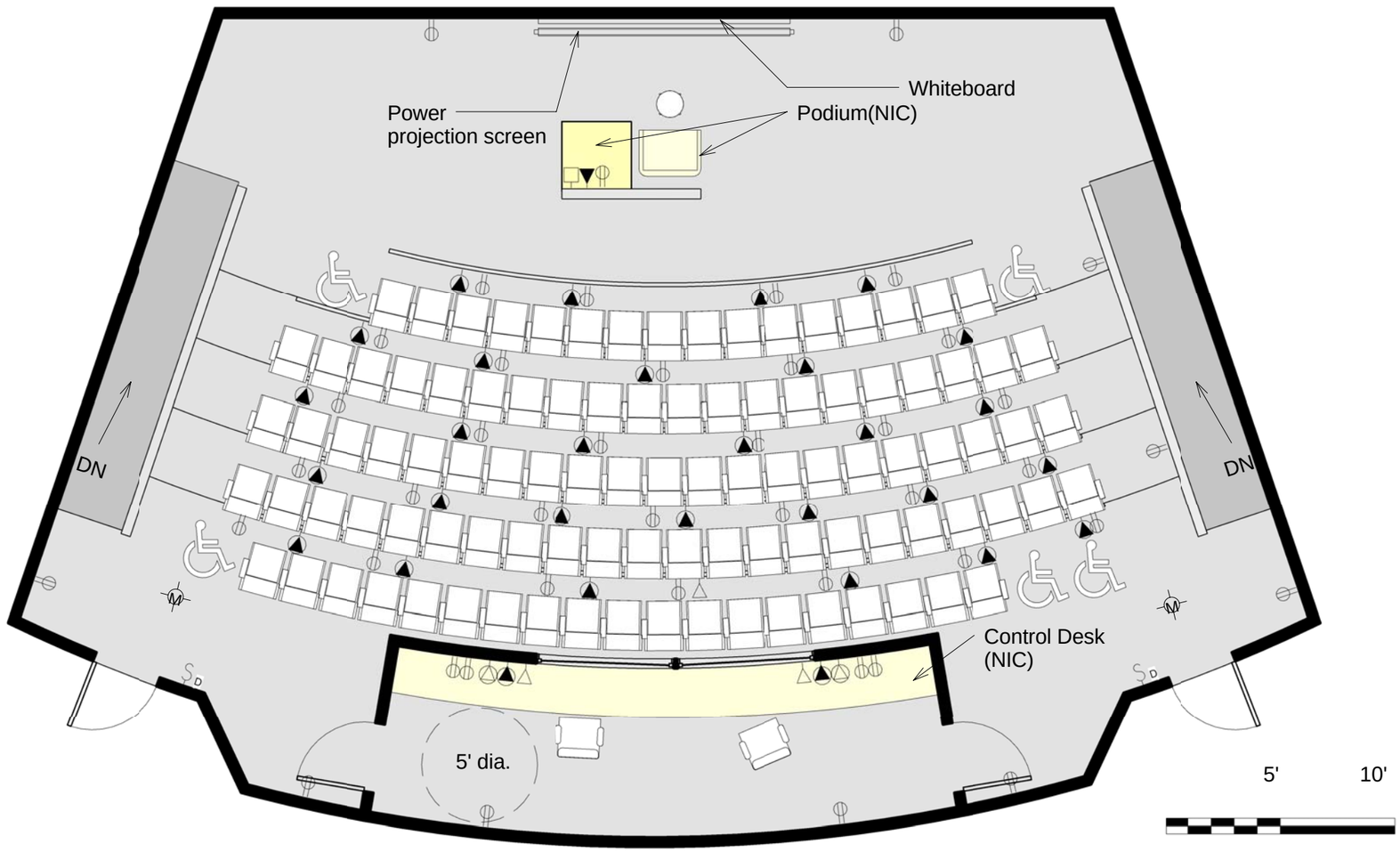
Specimen Room

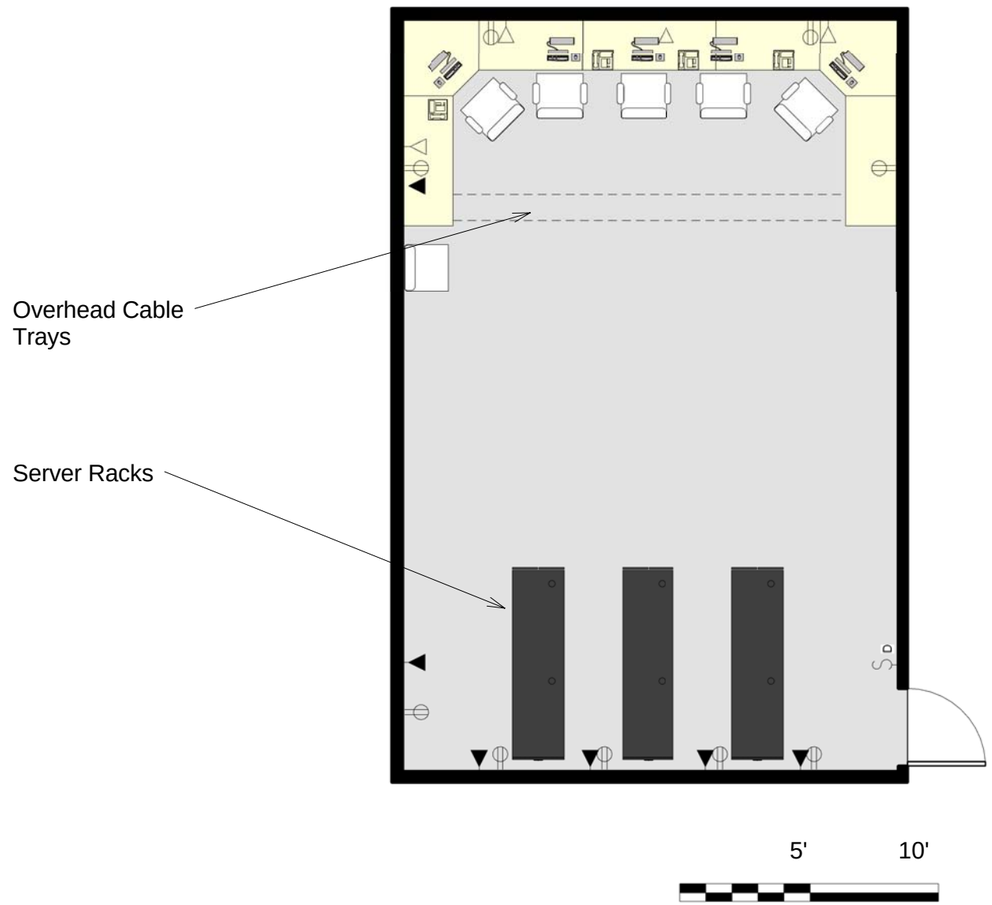

Accessible Locker
Shelf
FD
(2)Shower Stall
FD
Grab Bar
5'
10'

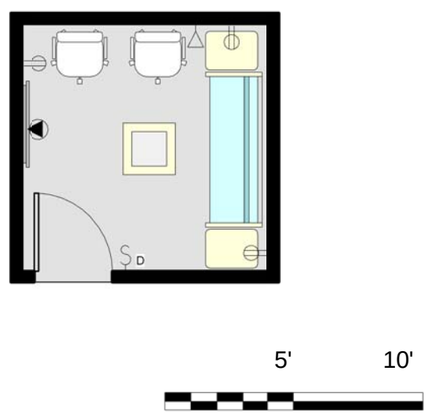

Work Table
Millwork
Metal Shelves (NIC)
D
5'
10'



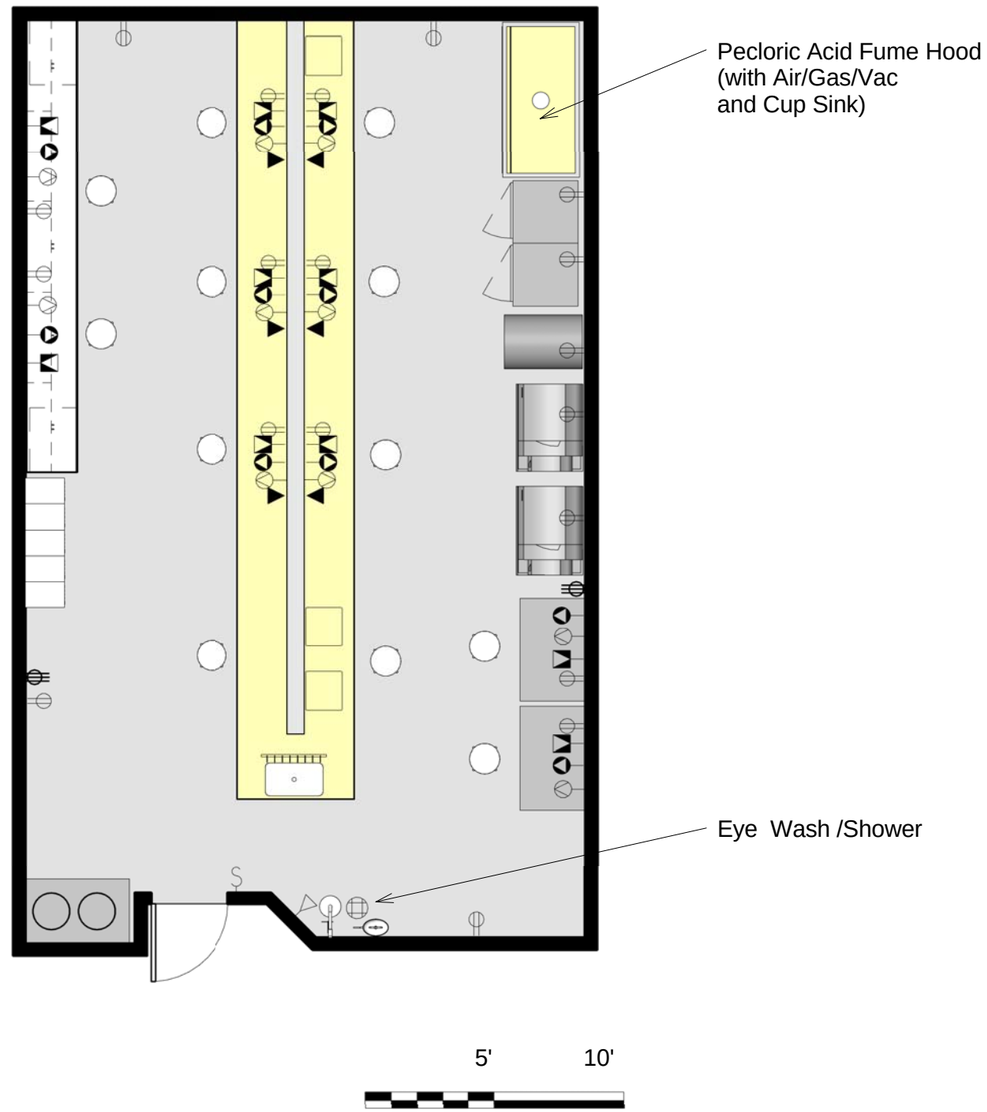
1 Storage - Vocational/Transportation
3/16" = 1'-0"

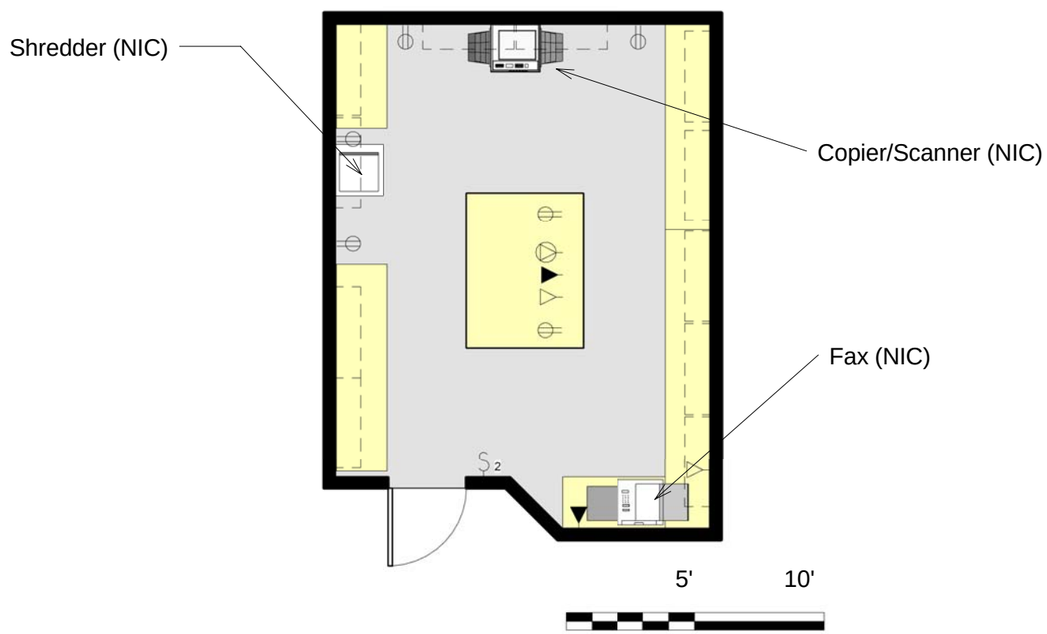

Power
projection screen
Whiteboard
Podium(NIC)
DN
DN
Control Desk
(NIC)
5' dia.
5'
10'


Overhead Cable Trays
Server Racks
5'
10'



1 Waiting Area


Pecloric Acid Fume Hood
(with Air/Gas/Vac
and Cup Sink)
Eye Wash /Shower
5'
10'


Shredder (NIC)
Copier/Scanner (NIC)
Fax (NIC)
5'
10'