

University of Central Florida Design, Construction, and Renovation Standards



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University of Central Florida Design, Construction, and Renovation Standards

Signature Page

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10-28-10

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Lee Kernek 

This document hereby supersedes and replaces any document formerly referred to as the University of Central Florida Design and Construction Standards

**Provost's Standards for the Planning, Construction, and Usage of Academic Buildings
New Construction and Major Renovations Requirements
Professional Services Guide**

Introduction to Design, Construction, and Renovation Standards

**Responsibilities of Facilities and Safety Design, Construction, and Renovation
Standards Committee**

Facilities and Safety Design, Construction, and Renovation Standards Committee

Design, Construction, and Renovation Standards Revision Process

Basic Definitions

**UCF Standards Division Requirements and Critical Needs Documentation (Must be Used for
All Design Submissions)**

Division 01 - General Requirements

General

Work on Other Projects / Items Furnished by the Owner / Future Work /
Scheduling the Work

Alternates

Cutting and Patching

Codes and Standards

Submittals

Progress Schedules

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Water / Temporary Sanitary Facilities / Temporary Fire Protection / Hoists and
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Environmental Health and Safety Construction Information

Remodeling or Renovations

Environmental Issues during Construction

Procedures to Identify and Manage Environmental Issues during Construction /
Storm Water Protection, Sediment, and Erosion Control / Hazardous Substances
and Waste / Indoor Environmental Quality

Security

Building and Site Security

Safety

Safety of Persons and Property / Emergencies

Access Roads and Parking Areas

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Noise and Dust Control / Site and Interior Drainage / Repairs of Damages to
Facilities

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Parking / Access to Construction Area / Planning for Temporary Traffic Control / Contractor's Responsibilities

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Field Offices and Sheds

Materials and Equipment

Salvage on Demolition and Renovation Projects / Storage and Protection / Storage of University Equipment

Starting of Systems

Contract Closeout

Final Cleaning / Project Record Documents / Record Drawing and Specifications

Operations and Maintenance Data

Description of Systems / Submission of Operating and Maintenance Manuals / Operations and Maintenance Data / Final Inspection / Project Turnover Procedures

Warranties and Bonds

Affidavits, Bonds, and Guarantees

Basic Design Services and Approval Procedures

Appointment of Architect or Engineer / Description of Services Required / Award of AE Contract / University and AE Orientation / Communications / Auxiliary Material / Project Approval and Authorization / Facility Program Modification / Bidding / Award of Major (>\$2 Million) Construction Contract / Construction Supervision / Design and Progress Conferences / Conference Memoranda / Format for Memoranda / The Design Review Process / Formal Approval and Comments / Submissions for Approval / Design and Construction Required Submissions / State Fire Marshal Design and Approval

Quality Control and Submittal Standards

Design Services / Schedule / Project Architect and Resident Inspector's Responsibilities

Architectural and Design Engineering

General Design Objectives / Proper Operation of Building, its Systems and Surrounding Amenities / Overall Economy / Quality of Work / Responsibility of Design / Within Available Funds / Energy Modeling / Noise and Vibration Control / Interior Design / Segments of Interior Design Services

Contract Documents

Document Requirements / Preparation of Drawings / Drawings for Remodeled Projects / Room Numbers / Arrangement of Drawings / Drawing Title Page and Cover Sheet / Finish Schedules / AutoCAD Standards / Drawing Format / Final Deliverables

Construction Specifications

General Instructions / Continuity of University Operations / Inspection / Organization / Format / Binders / Project Manual / Coordination of Specifications and Drawings / Selection of Materials / Materials and Equipment / Computerized

Specifications / Unacceptable Terminology / Prohibited Construction Practices / Project Manual

Project Turnover Procedures

Conditions of Final Completion / Inspections / Transfer of Custody and Data / Warranty Procedures / Final Completion and Final Payment / Warranty Disputes / After Action Review (AAR)

Division 02 - Site Work

General

Subsurface Exploration

Architect and Engineer Responsibilities / Preparation of Plans for Borings

Site Preparation

Clearing of the Site / Grubbing

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Top Soil

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Backfilling

Trenching

Termite Control

Asphaltic Concrete Paving

Concrete Paving

Expansion Joints / Control Joints / Finish / Utility Cuts / Walks

Water Distribution System

Storm Drainage System

Sanitary Sewer System

Landscape Irrigation

Bike Racks

Sodding

Landscaping Plant Materials

Trees, Plants and Ground Cover

Pipe and Pipe Fittings

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Water Distribution Systems

Normal Flow Demands / Fire Flow / Fire Hydrant Location / System Size Computation / Valve Locations / Fire Hydrants (Approved Manufacturers) / Pipe Depth (Top of Pipe) Minimums / Identification Tape and Tracer Wire / Testing /

Disinfection / Sanitary Gravity Sewer Distribution Systems / Peak Design Flows /
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Introduction / Identification and Definition of Typical Areas

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Site Lighting / Natural Vegetation / Soil Requirements / Site Landscape Grading

Irrigation Specifications

Roadway Area Landscape Development

Roadway Buffers and Medians

Major Collector (Four-Lane Roadway) / Secondary Roadway and Service Roads
(Two-Lane Roadway)

Roadway Intersection Landscaping

Art-in-State Landscaping

Campus Entrance Landscaping

Parking Lot Landscaping

Bicycle Parking Facilities

Building Area Landscape Development

Project Boundary / Building Setbacks / Open Space / Foundation Planting /
Service Area Enclosures / Site Signage / Seating and Retaining Walls

Open Space Development

Pedestrian Walkways / Landscaping in Developed Areas / Retention and
Detention Ponds / Fencing / Landforms and Grading / Recreational Features

Site Design

Project Siting / Site Drainage / Storm Drainage / Roof Drainage

Division 03 - Concrete

Concrete Reinforcement

Pipe Shafts / Bush Hammer Finish / Exposed Vertical Concrete Wall Finishes /
Snap Tie Cones Holes / Sidewalks and Ramps / Stairs

Division 04 - Masonry

Mortar

Admixtures / Tolerances / Wall Mock-Up Sample Panel

Concrete Unit Masonry

Weeps and Vents / Joint Reinforcing and Split Coursing / Size / Coursing

Glass Unit Masonry

Masonry Cleaning

Cleaning Materials / Exterior Waterproofing

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Site Painting

Structural Metal

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Tree Grates

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Stairs

Division 06 - Wood and Plastics

Pressure Treated Lumber

Laminated Plastics

Millwork

Back-Painting / Wood Railings

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Roofing - "Special Treatment"

Sheet Metal Flashing and Trim

Gutters and Downspouts

Skylight Structures

Sealants, Caulking, and Seals

Roofing

Scuppers / Roof Access / Roof Mounted Equipment / Primary Roof Systems / Walkpaths / Modified Bitumen Minimum Requirement / Single-Ply Membrane Minimum Requirement / Standing Seam Metal Roof Minimum Requirement / Wind Lift Requirement / Testing / Roof Curbs / Warranty / Shingled Roof Minimum Requirement / Qualifications / Pre-Installation Conference / Conference Agenda Requirements / Safety Requirements / Products / Cleaning / Protection / Roofing Requirements

Division 08 - Doors & Windows

General

Building Entrances

Public Entry Doors / Service Doors / Overhead Doors / Power Door Openers

Steel Doors and Frames

Wood Doors

Windows

Metal Windows

Finish Hardware

Glazing

Division 09 - Finishes

General Material and Finish Standards

Lath and Plaster

Tile

Quarry Tile / Ceramic Tile / Shower Room Walls

Carpeting

Rooms and Corridors / Stairways / Replacement, Remnants,
and Maintenance

Suspended Acoustical Ceilings

Suspension Systems

Painting

Application / Exterior Concrete and Masonry / Gypsum Dry Wall Systems /
Plaster Ceilings / Stain Woodwork / Ferrous Metals / Millwork / Shower Room
Floors / Exterior Waterproofing / Miscellaneous / Wall Paint Type Finishes /
Special Floor Coatings Finish Types

Division 10 - Specialties

Teaching Aids

Tack-boards / Dry-Erase Boards

Restrooms

Restroom Partitions / Toilet and Bath Accessories / Feminine Napkin Disposal
Container / Mirror / Owner Provided and Contractor Installed Equipment /
Waste Receptacle / Coat Hooks / Exterior Louvers and Vents / Wall and Corner
Guards

Identifying Devices and Signage

Signs / Exterior Site Identification / Interior Room Identification Signs / Sign Index
/ Specialty Signage / Fire Extinguisher Signs / General Life Safety Signage /
Exterior and Interior Signage for Health Sciences Campus at Lake Nona / Signage
/ Building Signage

Fire Extinguishers

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Recycling

Trash and Custodial Rooms

Requirements (Trash and Custodial Rooms) / Requirements for Central Custodial
Room / Requirements for Central Trash Room

Division 11 - Equipment

Loading Dock Equipment

Lifting Equipment

Waste Handling Equipment

Trash Disposal

Central Vacuum Cleaning System

Laboratories

Eyewash and Safety Shower / Floor Drains / Compressed Gases / Chemical Storage / Laboratory Air / Fume Hoods / Biological Safety Cabinets (BSC) / Fume Hood and BSC Monitoring / Local Exhaust / Fume Hood Field Performance Testing / Laboratory Ductwork / Emergency Shutoff Valves and Shunt Trip

Kitchen Exhausts

Division 12 - Furnishings

General

Laboratory Casework

Countertops

Auditorium and Theater Seating

Division 13 - Special Construction

Instruction Resources

General / Media Equipment / Teaching Consoles / Electrical Service and Connectivity

Miscellaneous

Division 14 - Conveying Systems

Elevators

Non-Proprietary Control Equipment / Elevator Machine Rooms / Elevator Cabs / Finishes / Operating Features / Disabled (Wheelchair) Lifts / Elevator Hoist-ways / Electrical Requirements / Elevator Manufacturers / Training / Certificates / Warranty and Service

Division 15 - Mechanical Equipment

General

Design Conditions

Chilled Water Systems

Chilled Water Piping / **Underground Chilled Water Valve Vaults** / Valves, Fittings, and Strainers / Piping Insulation and Jacketing / Chilled Water Piping Cleaning / Chilled Water Booster Pumps / Expansion Tanks / Air Separators / Mechanical Rooms

Air Distribution Systems

Diffusers and Grilles / Balancing Dampers / Outside Air Dampers / Actuators / Flexible Ductwork / Metal Ductwork / Fume Hood Ductwork / Turning Vanes / Ductwork Insulation / Duct Access Doors / Filters / Filter Installation Requirements / Final Belt Requirements / Final Filter Installation Requirements / Final Air Handling Unit Cleaning / Louvers / Fire Dampers / Combination Fire and Smoke Dampers / Server Closets and Server Rooms / Ceiling Return Air Plenums / Ceiling Insulation

Toxic and Hazardous Materials

Equipment

Chilled Water Air Handling Units / Condenser Coils / Refrigerant Lines /
Condensate Lines / Direct Expansion (DX) Condensing Units / Direct Expansion
(DX) Air Handling Units / Chilled Water Fan-Coil Units / High Entrainment Fume
Hood Fans

Plumbing Systems and Toilet Rooms

Lavatory and Custodial Closet Exhaust Fans / HEPA Filter Systems / Laboratory
Air Supply and Exhaust Valves / Variable Air Volume (VAV) and Fan Terminal
Units / Cooling Towers / Air Cooled Chillers / Water Cooled Chillers / Boiler
Systems / Natural Gas Systems

Controls

Chilled Water Monitoring Station / Thermostats / Building Pressure Monitoring
Systems / Variable Frequency Drives (VFD)

Smoke Control and Air Pressurization Systems

HVAC Systems Smoke Detection

DDC Control Systems

Network Requirements / Submittal Requirements / Hardware Requirements /
Controller Requirements / Graphics

Electrical

Equipment Arc Flash Rating / Partial Renovations / Training

Plumbing Systems

Sanitary Sewer / Storm Water Drainage / Domestic Water Service / Plumbing
Fixtures and Fittings / Concealed Carriers / Public Drinking Fountains / Floor
Drains / Cutoff and Isolation Capability / Hot and Cold Water Supply

Fire Protection

General / Design / Installer Qualifications / Materials and Installation / Extra
Materials / Identification / Training / Approval, Testing, Documentation, and
Warranty

Clean Agent and Early Detection Systems

General / Design / Installer Qualifications / Materials and Installation /
Identification / Training / Approval, Testing, Documentation, and Warranty

Division 16 – Electrical Equipment

General Provisions

Primary Power Raceways / Basic Materials and Methods / Service and
Distribution / Transient Voltage Surge Suppression

General Lighting Considerations

Exterior Lighting / Interior Lighting / Lighting Fixture Types / Lighting Controls /
Emergency and Exit Lighting / Classroom Lighting / Lightning Protection /
Standby Power Generation Systems

Fire Alarm and Detection Systems

General / Design / Installer Qualifications / Materials and Installation / Extra Materials / Identification / Training / Approval, Testing, Documentation, and Warranty

Mass Notification Systems

Controlled Access Systems

Door Network Security Conduit for Classrooms and Conference Rooms

Video Camera Conduit for Classrooms and Conference Rooms

Telecommunications and Cable Television

Tele-Data Design Standards

Summary of Critical Needs

Attachments

01 – Design Phase Submission Report

02 – Sub Contractor List Requirement

03 – Change Order Requirement

04 – Final Completion Requirement

Introduction to the Design, Construction, and Renovation Standards

These Standards establish minimum requirements for design, construction, and renovation for all University Facilities on the main campus and other associated campuses. The Architect/Engineer or Contractor is encouraged to assist UCF in keeping these standards current by bringing to the Owner's attention innovations in technology, materials, and construction systems.

The Owner does not intend for the standards to conflict with current building, ADA, and life safety codes, and has attempted to avoid creating such conflicts. If a conflict is discovered in the course of implementing the standards, it is the Architect/Engineer's or Contractor's responsibility to immediately bring this conflict to the Owner's attention in writing along with recommendations for resolving the conflict.

These standards serve as a supplement to the UCF Professional Services Guide.

The Standards are unique to the University of Central Florida. These Standards are not specifications; however, they are to be used as the basis for the development of the Contract Documents. In cases where the Standards exceed current codes, the Standards will take precedence.

Regulations are revised periodically and care must be taken to verify compliance with other applicable governmental standards. Approval by the Owner does not constitute approval by other governmental or regulatory agencies.

All major projects (projects in excess of \$1 million) shall be reviewed and approved by the University Standards Committee and the Building Code Office and other approving agencies as applicable. These may include the State Fire Marshal, the Department of Environmental Protection, and the Department of Health and Rehabilitative Services.

All references to Codes shall mean the latest editions adopted through legislation for use in State owned or leased buildings. Construction documents must list appropriate codes and effective date of that code.

Compliance with these standards shall in no way constitute a waiver of the Architect/Engineer or Contractor's liability.

Responsibilities of the Facilities and Safety Design, Construction, and Renovation Standards Committee

Update the UCF Design, Construction, and Renovation Standards on a semi-annual basis.

Approve all suggested revisions to the UCF Design, Construction, and Renovation Standards **as they occur** by majority vote.

Be represented as a voting member on all selection committees.

Be represented in all design phase meetings and workshops including the kick-off meeting for all major projects.

Emphasize that buildings are “UCF buildings”, not departmental or college buildings.

Review and approve all design submission checklists before the Architect/Engineer is permitted to proceed to the next phase.

Review and approve all value-engineering (VE) suggestions. All VE suggestions must be approved by all Facilities and Safety Departments before they can be incorporated into the project.

Review and approve all change orders that may affect compliance with the Standards.

Be the final interpreter of the Design, Construction, and Renovation Standards.

Approve all sub-contractor lists, make recommendations, and if necessary, provide documentation to support the rejection of a sub contractor.

Approve the final completion of all construction projects.

Review and approve Owner project requirements starting with the program verification phase.

Facilities and Safety Design, Construction, and Renovation Standards Committee

Frank Ballentine

Kerry Farr

Michelle Humphries

Dustin Jackson

Michele Meister

Timothy R. Newman

John Siler

Thomas O'Connor Bruno, Special Projects and Standards Coordinator

Matthew Green, CAD Designer

The Design, Construction, and Renovation Standards Committee is appointed by and reports directly to Lee Kernek, Associate Vice President of Administration and Finance (Facilities and Safety).

Design, Construction, and Renovation Standards Revision Process

The requester must prepare the suggested revision, in writing, for review by the Standards Committee.

The requester must send the suggested revision to the Standards Committee Coordinator via email.

All revisions will be voted on by the Standards Committee with majority rule governing.

The Standards Committee Coordinator will notify the Facilities and Safety Director's Committee, chaired by the Associate Vice President of Administration and Finance (Facilities and Safety), of the Standards Committee's decision regarding the revision.

The Facilities and Safety Director's Committee will approve or deny the proposed revision to the Standards.

The Standards Committee Coordinator will notify the requester, in writing, of the committee's decision.

If the revision is approved, it will be posted on the website and noted in "red". If the revision is a deletion, it will be struck-through in "red". The revisions will be posted on a monthly basis.

Basic Definitions

The Owner: the University of Central Florida and its representatives

Board of Trustees: the local governing body for the University of Central Florida

Facilities and Safety: the unit comprised of Energy and Sustainability, Environmental Health and Safety, Facilities Operations, Facilities Planning and Construction, Landscape and Natural Resources, and Police Department.

UCF Design, Construction, and Renovation Standards (04-28-11)

Standards Committee: the group responsible for the development and enforcement of the UCF Design, Construction, and Renovation Standards

Design, Construction, and Renovation Standards: to be used as the basis for the development of the Contract Documents

Provost Guidelines: specific rules governing the use and size of space categories

Professional Services Guide: a guide to assist Architects, Engineers and other design professionals in the design and construction of facilities at UCF

Educational Plant Survey: the State approved listing of the space categories with square footage

Building Committee: responsible for the development of the building program and participating in the design process through the 50% level of the Design Development phase

Architect of Record: the architectural firm under contract for a particular project

Project Manager: the individual who manages the project for either design or construction; at construction meetings it is the Project Manager's responsibility to direct questions to the appropriate individuals pertaining, but not limited to: code, fire, standards, etc.

Design Review Workshops: an intense review session held at the end of each design phase with the Facilities and Safety Unit

UCF Standards Division Requirements and Critical Needs Documentation

By signing and dating this document, the Architect of Record affirms that all of the Standards within a particular Division have been reviewed and incorporated into the Contract Documents.

Any deviation from the Standards must be applied for by the Architect of Record and approved, in writing, by the UCF Standards Committee.

Identify where each Critical Need is addressed in the plans and specifications.

Design Phase: _____

*The document below must be completed and submitted for all design phases along with the Design Phase Status Report (Attachment 1).

Professional Services Guide	Plan Page #	Specification Page #
PSG.1		
PSG.2		
PSG.3		
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Division 01	Plan Page #	Specification Page #
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UCF Design, Construction, and Renovation Standards (04-28-11)

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UCF Design, Construction, and Renovation Standards (04-28-11)

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Division 02	Plan Page #	Specification Page #
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UCF Design, Construction, and Renovation Standards (04-28-11)

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Division 05	Plan Page #	Specification Page #
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UCF Design, Construction, and Renovation Standards (04-28-11)

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Division 06	Plan Page #	Specification Page #
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Division 07	Plan Page #	Specification Page #
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UCF Design, Construction, and Renovation Standards (04-28-11)

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Division 08	Plan Page #	Specification Page #
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Division 09	Plan Page #	Specification Page #
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UCF Design, Construction, and Renovation Standards (04-28-11)

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Division 10	Plan Page #	Specification Page #
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Division 11	Plan Page #	Specification Page #
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UCF Design, Construction, and Renovation Standards (04-28-11)

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Division 12	Plan Page #	Specification Page #
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Division 13	Plan Page #	Specification Page #
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Division 14	Plan Page #	Specification Page #
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UCF Design, Construction, and Renovation Standards (04-28-11)

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Division 15	Plan Page #	Specification Page #
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Division 16	Plan Page #	Specification Page #
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Division 01 – General Requirements

General

All contractors must adhere to all ASTM, ANSI, FBC, FFPC, ASHRAE, and NEC standards as they apply to the Work and as noted in the Professional Services Guide and all UCF Policies which can be found at: <http://policies.ucf.edu/>.

Conditions of the Contract including the Standard State of Florida General and Special Conditions of the contract provide the basis for structuring the responsibilities for all contractual parties. Bidding Documents include the invitation to bid and various instructions for the bidders, as well as proposal forms and requests for submittal of certificates confirming the Contractors compliance with Contract Documents. **Changes must not be made to the General or Special Conditions without written approval from the Owner.**^{1.1}

Changes requested by the End User must be made prior to 50% Design Development Documents. "Changes equal time plus money."^{1.2}

The Owner may be providing insurance on the project through the Owner Provided Insurance Program (OPIP). Consultants need to check with the Owner to determine which insurance coverage is to be provided and which of the Owner's supplements to the Project Manual should be included.

A general description of elements of the project, including exterior work and any other related work, will be provided. This description must indicate the full scope of work in each contract so that prospective bidders can decide whether or not they wish to bid on the project. The use for which the project is being built should be explained. A description can be obtained from the Draft Building Program and the Educational Plant Survey.

Work on Other Projects

If other Work, outside the scope of contracts for this project, is being performed simultaneously with the Work on this project, it is understood that contractors must cooperate with outside contractors and with the Owner to avoid interference with each other's Work.

Items Furnished by the Owner

The Owner may be furnishing items to be installed by the Contractor. A list of Owner furnished items including manufacturer number and pertinent specifications must be presented to the Architect for incorporation into the design for installation by the Contractor.

Future Work

Specific guidance for a project must be given with provisions for future Work such as an addition, installations of special equipment, or other such tasks. Requirements of this contract which are critical to future Work such as structural provision, utilities, areas of the site to be kept clear, or site preparation must be described. Areas of Work must be identified such as piping, ductwork, and conduit that may be extended in future Work without necessitating a system shutdown later.

Scheduling the Work

Job conditions affecting phasing and scheduling of the Work must be described. Particular attention must be given to scheduling remodeling work in buildings, which will remain in operation during remodeling. Examples of some problems encountered are:

- Providing and Maintaining Means of Ingress and Egress
- Maintaining Security
- Use of Docking Facilities
- Storing of Construction Materials
- Scheduling for Moves by the User
- Maintaining Services
- Dust Control and Noise Control

Alternates

A limited number of alternates may be used as a means of ensuring base bids within the available construction funds. **The Architect/Engineer must consult the Owner regarding priority of alternates. Only additive alternates must be used.**^{1,3} Proposed alternates must be clearly defined, listed in priority of need, and will be discussed with the Owner. See Instructions to Bidders in the Project Manual.

Cutting and Patching

Cutting and patching must be identified in detail. This includes the incidental cutting, fitting, and patching required to complete the work or to make several parts fit together properly.

Codes and Standards

The following codes and standards must be followed:

- The latest edition of the Florida Building Code with all revisions including all related specialty codes referenced must be used
- Florida Fire Prevention Code (FFPC)

- American National Standard Safety Code (including handicapped requirements)
- Department of Education Criteria Codes
- Sheet Metal and Air Conditioning National Association and other specific codes related to the project
- Barrier Free Design
- Fair Housing Act Requirements
- Refer to Professional Services Guide Supplement for additional Codes, Standards, and requirements

Submittals

The Owner is specific about the selection of materials and equipment included in a new building. It is the responsibility of the Architect/Engineer to request and receive approval concurrently from the Owner for all submittals.

- Plumbing Fixtures
- Lighting Control Systems
- Occupancy/Day-lighting Control Systems
- Lighting Fixtures
- Variable Frequency Drives (VFDs)
- Motors
- Fire Alarm System
- Electrical Devices
- Fire Pump and Controller
- Generators and Auto Transfer Switch
- Meters and Back Flow Preventers
- Roofing System
- Lift Stations and Associated Equipment
- Lightning Protection
- Air Handlers
- Fan Coil Units
- Terminal Boxes
- Air devices (Registers, Grills, Diffusers and Dampers)
- Pumps
- Building Automation Systems
- Chillers
- Boilers
- DX Equipment (Fans, Condensers, etc)
- Fans
- Coils
- Underground Piping
- Expansion Tanks

- Air Separators
- Louvers
- Fire and Smoke Dampers
- Fume Hoods
- Cooling Towers

All submittals must be provided as one (1) package for each division to the Owner for review and approval. The Owner must have a minimum of one (1) week to provide comments to the Architect before the Contractor is released to purchase the equipment. The Architect must approve the submittals package before the submittals are sent the Owner. The Architect must provide a submittal review form and a sequence of submittal review to the Owner.

Progress Schedules

The specifications must require the Construction Manager or Contractor to prepare a network analysis system using the critical path method, as outlined in the Associated General Contractors of America (AGC) publication "The Use of CPM in Construction - A Manual for General Contractors".

Quality Control

A quality control and quality assurance plan must be provided and implemented by the Construction Manager or Contractor.^{1,4}

Before construction begins a detailed plan must be submitted to the University by the Contractor describing the systems, adequacy and competency of the construction inspection program. The university has the right to add specific systems or equipment to the plan. If the plan is deemed to not meet the needs of the university, a new plan will be drawn up to include the university's needs.

The construction quality assurance plan must include:

- A detailed construction schedule with a summary of planned construction activities, their sequence, interrelationships, durations, and terminations is required.
- A description of the construction management organization, management procedures, lines of communication, and responsibility.
- A description of the anticipated quality control testing to include the system, the type of test, frequency, and who will perform the tests.
- A description of the change order process to include, who will initiate change orders, as well as who will review, negotiate, and approve change orders.
- A description of the technical records handling methodology to include where plans and specifications, as-built drawings, field orders, and change orders must be kept.

- A description of the construction inspection program to include inspection responsibility, anticipated inspection frequency, deficiency resolution, inspector qualifications, and inspection reports is required.
- Products or workmanship specified by association, trade, or federal standards, must comply with requirements of the standard (except when more rigid requirements are specified or required).
- Areas specified that require evidence and examples of required expertise from the contractor in conjunction with specified items, such as system components, design element or special treatment must be identified.

Construction Facilities and Temporary Controls

The Architect/Engineer must specify that the Contractor adequately protect the Work, adjacent property, the public, and the Owner's property from injury or loss arising in connection with the construction contract, and that the Contractor must be responsible for any damage or injury due to the Contractor's act or neglect. Adequate barricades, night lights, and flashers must be used to protect the public.

Utilities

The Architect/Engineer must specify modifications regarding payment for water, fuel, chilled water, and power consumed. Contractor's utilities are required for the progress of the work. Specifications must be written to stress this point. The general contractor must make arrangements with the Facilities Planning and Construction Project Manager for installation of temporary lines.

The Architect/Engineer must provide information to avoid damage to existing underground lines. Drawings indicating the approximate location of all known lines will be furnished by the Owner for general knowledge. The Architect/Engineer must verify and indicate all existing utilities on Contract Documents

No excavation, including drilling, exploratory work, fence posts, etc., will be permitted until the drawings of existing lines are reviewed in the field by the, Contractor and Subcontractors, Architect/Engineer, university trade-specific representatives, the Owner's representatives, and completion of the UCF Dig Permit. Any damage to utility lines during construction will be repaired immediately by the Contractor in a manner acceptable to the Owner and the appropriate utility company at no cost to the Owner.

Utility Company Installations

Plans for reviewing lines running through university property must be clearly identified in the Contract Documents and must be approved by the Owner.

Connections to Existing Utilities

If connections to university utilities are required and permitted, the specifications must contain instructions to the Contractor to make requests for utilities service through the Owner. The Contractor must make all necessary arrangements for the service, including the point of tie-in, with Facilities Operations (through the Owner). The Architect/Engineer must obtain drawings of existing utilities and must consult university personnel regarding services available and points of connections to services. All services must be metered through meters furnished by the Contractor, and the Owner must be reimbursed for utilities. The Contractor must establish an account with the Facilities and Safety Business Office prior to any utility connection.

Cost

Costs for providing temporary services must be borne by the Contractor. The specifications must clearly identify the Contractor's responsibility for the installation of service lines and payment for services, whether services are furnished by the utility company or by the university. Billing for utilities will be made by the university in accordance with the current Rate Schedule of the university. Advance arrangements must be made with Facilities Operations through the Owner before Contractor begins Work at the site.

The Contractor must pay for water, chilled water, fuel for heat, electric power, and any other utility consumed until final completion has been accepted.

The Contractor must install water supply lines and make changes in accordance with the FDEP permit.

The Contractor must install and maintain HVAC and electrical systems.

Duration of Services

The specifications must clearly identify Contractor's responsibility for providing continuous utility services until date of Final Completion including operation of permanent equipment and services.

Temporary Heating, Cooling, and Ventilation

The Contractor must provide, at the Contractor's expense, all heating and cooling necessary to protect the Work from dampness and cold, and to dry out the building, especially prior to millwork doors, paint, and acoustical tile installation. A plan must be provided for review and approval by the Owner detailing how the permanent HVAC systems will be utilized during construction.

Temporary Water

Potable and reclaimed water that is necessary for construction must be obtained from the department of Facilities Operations through the Owner. The connection point must be verified by Facilities Operations. The line size must be adequate for all demands. The Architect/Engineer must specify that the Contractor make necessary connections and install a meter and backflow preventer, and that the Contractor be responsible for installation of all pipe from the meter, and removal of temporary lines upon job completion. All costs, including use and connection fees, must be paid by the Contractor at current rates.

Temporary Sanitary Facilities

Temporary tie-ins are not permitted.

The Contractor must provide and maintain, in a neat and sanitary condition, such accommodations for the use of the Contractor's employees as may be necessary to comply with the regulations of the State Board of Health, and the county and municipality where the project is located. Chemical toilets will not be emptied in the university sewage system. Pit toilets are not permitted.

Temporary Fire Protection

The specifications must call for temporary, as well as permanent fire protection facilities including fire hydrants. Prior to building construction, fire hydrants must be installed within the specified distance of a building according to the occupancy classification to meet the FFPC requirements.

Hoists and Elevators

The specifications for new construction must call for all new elevator components.

The Warranty Period will begin at Final Completion.

If any elevator, existing or new, is used by the Contractor, any damages caused by such use will be the responsibility of the Contractor.

Barriers and Enclosures

The Contractor must provide barricades, shielding, and/or warning signs, site lighting and audible warning devices for the sight impaired. This is to protect all University employees, students, and the general public from hazards outside the required construction site fence; this

includes but is not limited to: open trenches, falling objects, and the lighting and posting of warning signs about physical hazards during darkness to comply with all OSHA requirements.

Construction Fence

The Construction Fence location must be shown on drawings and indicate the following:

A six-foot high fence with gates must be erected around the project site.

A chain link fence with privacy screening on steel posts is required.

"No trespassing" signs must meet OSHA requirements.

The Owner will be held harmless for any injury or damage related to the construction site.

Environmental Health and Safety Construction Information

The Environmental Health and Safety checklist can be found [here](#).

Emergency Medical Services on the project site are available via Orange County 911. Calling 911 from any campus landline phone will connect you with the UCF police dispatch who can immediately contact the necessary EMS responder. UCF PD will also respond and assist in escorting the Orange County EMS directly to the site. Services are not available from campus medical facilities. In the case of an emergency, if using a cell phone, contact 911 directly.

Contractors are individually responsible for meeting and monitoring the requirements set forth by OSHA. A copy of the current OSHA required safety manuals should be kept on site. A copy should be supplied to the UCF Construction Project Manager.

Lock out/tag out regulations are required to be utilized in all campus facilities. For renovations to facilities, contact the UCF Construction Project Manager.^{1.5}

Crane, forklift, or other heavy equipment operators must be trained and certified. Flagmen for all large vehicles must be provided.

Appropriate and sufficient warning signage must be used to identify the site and any hazards that may be present.

The construction areas must be fenced off by chain link fence with privacy screening. Where part of a remodeling/addition project, the area must be adequately barricaded and secured to prevent unauthorized or accidental entry. All construction debris is to be kept within the secured construction staging area. All electrical hazards must be suitably protected.

Exiting that is affected from University occupied buildings must have adequate directional signage. Building exits must not be blocked. Contact the UCF Construction Project Manager for coordination with EH&S and the State Fire Marshal for review and approval of alternate exit routes prior to construction. This requirement must be shown on the Life Safety Drawings incorporated in the 100% Construction Documents.

Construction fencing and staging areas must not block exits, hydrants, FDC's, or ADA parking/access. A clear path to a public way must be provided.

Approved drawings and permit for work must be on site at all times. Changes, shop drawings, and missing details must be submitted for review.

Building Code Inspections are requested by fax to the UCF Building Code Office no later than 4:00 PM the work day prior to the requested time. When the University is closed for holidays, requests must be sent in advance so that arrangements can be made. Emergency/Special inspections are available with an additional fee. Information can be found at: <http://www.ehs.ucf.edu/buildingfire/building.html>

State Fire Marshal inspections must be coordinated directly with the local inspector and followed up with a SFM Request for Building Site Inspection Form emailed to Tallahassee. Requests for the State Fire Marshal inspections should be coordinated through the project architect/engineer of record, or the University Construction Project Manager. When contractors call for inspections that they have failed due to lack of coordination or performance, inspection expenses will be the responsibility of the Contractor. The SFM will visit the site and provide a document package to the Contractor after construction starts.

Remodeling or Renovations

Fire extinguishers must be temporarily relocated if the area of renovation will make them inaccessible. The contractor must provide all fire extinguishers needed to cover the area of construction/renovation. Notify the EH&S department if any building extinguishers will be affected within the construction area.

Known asbestos locations must be identified in the project Construction Documents. For areas in question, contact UCF Construction Project Manager.

Existing building systems such as Fire Alarm and Sprinkler must remain fully functional at all times. The alarm system must not be left in the "trouble" mode. UCF Police Department and Orange County Responders (currently OCFR Dispatch 407-737-2444) are to be notified any time a fire sprinkler system is temporarily taken off line for maintenance or tie in. Where a system is to be replaced in whole or part, the old system is not to be removed until the State Fire Marshal has accepted the new one.

Environmental Issues during Construction Information

Procedures to Identify and Manage Environmental Issues during Construction

During renovation, demolition and new construction projects, it is the university's intent to ensure that environmental issues including sediment/erosion control, hazardous substances/waste, and indoor environment quality (for renovation/demolition in occupied spaces) affecting such projects are handled in compliance with applicable regulations. The identification and documentation of potential environmental issues by the Contractor during the pre-construction phase will be required.

The Contractor must be responsible for providing applicable forms, plans, permits, inspection reports, storm water and hazardous materials/wastes training certifications, and hazardous materials lists to Environmental Health & Safety for filing or distribution. Whenever possible, electronic submittals are requested.

All Contractors or designees must attend a one-hour annual session covering UCF Environmental Management System construction specific components and to provide certification that the information has been transmitted to all affected employees and sub-contractors.^{1.6} UCF Environmental Management System construction forms to be used for documentation are available at www.environment.ucf.edu/forms.htm and include the Contractor EMS Agreement and Contractor Hazardous Material/Waste Inventory forms.

All construction sites are subject to inspection by UCF representatives and federal or state agents. Contractor is responsible for all fines incurred due to the failure of their employees and subcontractors to follow federal or state regulations. Failure to follow UCF Environmental Issues Construction Standards can result in stop work orders or other penalties.

Storm Water Protection and Sediment and Erosion Control

Fill soils kept on site during construction must remain covered at all times by covering or other means of containment.^{1.7}

Minimize the extent of removal of natural vegetation and the duration of the exposure.

The Contractor must remove mud and spillage from public and university streets on a daily basis. Failure to clean streets daily will result in streets being cleaned by the Owner at the Contractor's expense.^{1.8}

Site debris and waste waters from construction activities, cement truck wash out, dumpsters, vehicle rinsing and sanitary systems must be prevented from entering the storm water system.

All catch basins and storm drain lines in the vicinity of the site must be protected at all times. If cleaning is done, it must be contained and the Contractor must remove the residue from the campus with other construction refuse.

For sites disturbing one or more acres of land, the Contractor must adhere to UCF's Phase II NPDES Storm Water permit. The Contractor is responsible for preparing a Storm Water Pollution Prevention Plan (SWPPP) per F.A.C. 62-300(7) (a) VI.4 for review by the UCF Storm Water Manager and submitting Notice of Intent, Notice of Termination and Environmental Resource and Dewatering Permits where applicable.

For sites disturbing less than one (1) acre of land, the Architect/Engineer and Contractor must submit an Erosion Control Plan to address prevention of loss of soil from storm water runoff and wind erosion, sedimentation of storm water system, and air pollution from dust and particulate matter.

The UCF Storm Water Manager reserves the right to request alternate or additional Best Management Practices and to perform weekly, pre-scheduled site inspections.

Copies of routine inspection documentation must be submitted to the UCF Project Manager on a monthly basis.

Hazardous Substances and Waste

A complete list of hazardous substances to be used on the project must be submitted prior to the substances arrival on UCF property using the Contractor Hazardous Material/Waste Inventory form which can be found under Contractor Hazardous Waste Generation at: <http://www.environment.ucf.edu/forms.htm>. Material Safety Data Sheets must be made available when requested. Less toxic alternatives should be used wherever possible.

All containers of hazardous substances and waste, including new and used petroleum products must be stored in a covered area on impervious surface. Outside storage must be in rain-tight, secondary containment. Hazardous substance or waste storage must be secured.

Hazardous substances used in occupied spaces will require the Contractor to prepare and follow a ventilation plan. The plan is to be submitted to a UCF EH&S representative for approval prior to use of the substance.

The University is registered as a Large Quantity Generator (LQG) of hazardous waste. All hazardous waste generated must be handled per the UCF Management System. In general, 40 CFR parts 261 thru 270, and FAC (Florida Administrative Code) 62 parts 730 and 731 should be followed.

A UCF representative must verify all hazardous waste is properly managed prior to its transportation off campus. The UCF EPA ID number must be used on all manifests. Transportation and disposal facilities must be pre-approved by a UCF EH&S representative. Alternatively, approved waste may be disposed through the University hazardous waste program at a charge to the project.

All spills must be cleaned up immediately. Discharges to pervious surfaces, sanitary or storm water conveyances or bodies of water must be reported to a UCF EH&S representative upon discovery.

Indoor Environmental Quality

During construction operations, especially those involving demolition or renovation, appropriate measures are required to maintain acceptable air quality levels. Any activity generating dust, debris or pollutants should be performed in unoccupied areas. If this is not possible, the contractor must be required to ensure proper isolation of all such dust, debris or pollutants. The Sheet Metal and Air Conditioning Contractor's Association's (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction must be followed.

Security

All persons, including UCF personnel, staff, students and employees, are required to coordinate with the UCF Construction Manager for site visits. Warning signs will be posted to assist in the enforcement of this requirement.

Building and Site Security

During the Conceptual Schematic Design Phase, a police officer certified in Crime Prevention Through Environmental Design (CPTED) will attend the workshops to discuss Crime Prevention strategies based on the needs of the building. Information on CPTED can be found at: "[Site Security Planning and Design Criteria](#)".

The Contractor must secure the building site and the keys will be provided to the UCF Construction Project Manager and the UCF Police Department. At least three (3) Contractor emergency contacts must be provided to the same.

The Contractor must keep gates locked at all times except during working hours.

Safety

The Contractor is responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

The Contractor and their employees, while working on the premises, must comply with the Safety Orders issued by OSHA, the University Director of Environmental Health and Safety and any other safety, health or environmental regulations of the State of Florida having jurisdictional authority.

All walkways and working surfaces, such as ladders, stairs, guards, etc. must comply with the OSHA regulations.

Safety of Persons and Property

The Contractor must take all precautions necessary as defined by OSHA for the safety and protection of persons and property.

The Contractor must inform the Owner of the “competent person” as defined by OSHA.

The Contractor must not load or permit any part of the Work to be loaded so as to endanger its safety.

Emergencies

For any emergency affecting the safety of persons or property, the Contractor must act to prevent potential damage, injury or loss. Notification of such occurrences must be made to the University Police Department immediately. Contractor must provide a written severe weather plan to the Owner prior to the start of any construction activity.

Access Roads and Parking Areas

This section must be addressed specifically in the bid documents. Specific requirements for temporary access roads and parking areas for the Contractor must be provided. This section must be used for all bid documents. Include reference to university's traffic and parking rules.

Temporary Controls

Noise and Dust Control

In occupied buildings, the Architect/Engineer must indicate areas for which noise and dust control must be provided and must specify methods of control. If details of installations are involved, specify these in the applicable sections of the technical specifications. The Contractor must be required to install barriers indicated by the Architect/Engineer and must provide other dust control barriers as required by construction.

Site and Interior Drainage

All interior spaces which must drain water during construction must be drained to the sanitary sewer system. All exterior areas which must drain water during construction must be drained, following applicable Best Management Practices (BMP), to the storm water drainage system. A temporary drainage plan must be provided to the UCF Construction Project Manager.

Repairs of Damages to Facilities

Damage to roads or other facilities resulting from Contractor's hauling, storage of materials, or other activities in connection with the Work, must be repaired or replaced, at no expense to the Owner. Repairs or replacements must be made to the Owner's satisfaction. Clean-up of areas must occur on a daily basis. Contractor must not overload vehicles with material causing spillage or possible damage.

Traffic Regulation

Parking

Parking on campus is subject to regulations established by the University Parking and Transportation Services at the particular campus. Temporary fencing for parking and storage areas must be specified by Architect/Engineer with approval from University Parking Services. Employees of the Contractor and subcontractors must secure parking permits from the university and must park cars in areas assigned to them. Parking on streets or in restricted areas is prohibited. At the beginning of the Work, the Contractor must report to the university the approximate number of parking permits which will be required for all employees, including employees of Subcontractors.

Access to Construction Area

A detailed plan of the existing streets and roads on campus that will be utilized must be submitted to the UCF Construction Project Manager.^{1.9}

Planning for Temporary Traffic Control

The University Police Department must be notified at least 72 hours in advance of any anticipated Work affecting traffic flow. To ensure maintenance of flow and to safeguard all parties involved in planning temporary routing, a field inspection should be made jointly by the Architect/Engineer, the UCF Construction Project Manager, and Contractor prior to performing any Work that would interrupt normal traffic patterns. Rerouting of traffic must be planned, as to route and direction, in cooperation with the University Police Department.

Contractor's Responsibilities

The maintenance of traffic flow must follow all aspects of FDOT MOT Guidelines.

Project Identification and Signs

The site must be adequately labeled for deliveries and emergency response.

The location of the sign must be approved by the Owner. The Contractor must provide a shop drawing showing layout of the text. One copy of the shop drawing must be submitted to the University Construction Project Manager for inspection and approval.

Field Offices and Sheds

The Contractor must provide and maintain a clean, weather-tight office at the site suitable for the Contractor's own use, and for use of the Subcontractors. All expenses including the installation cost, and the use of telephone, heat, light, water, and janitor service must be borne by the Contractor.

The office must be heated, lighted, and provided with doors with locks, and private line telephone service. Two lockable office spaces must be provided for the Architect/Engineer's representative and the University Construction Project Manager; space must be equipped with plan table, desk, suitable chairs or stools, plan rack, filing cabinet, network and telephone. The Contractor or an authorized agent must be present on site while the Work is in progress.

Materials and Equipment

Salvage on Demolition and Renovation Projects

On all projects involving demolition and/or renovation, the Architect/Engineer should review with the University Construction Project Manager the possibility of salvage of materials and equipment, either for use in the remodeling project, or by Facilities Operations. The University Construction Project Manager will notify the Architect/Engineer of materials and equipment to be removed by the Owner or to be turned over to the Owner by the Contractor. Non-reusable materials will be removed from campus and recycled when possible before disposal by the Contractor. The Architect/Engineer must specify in the "Project Summary" accompanying the Invitation to Bid and in the contract specifications that the university reserves the right to remove salvage prior to start of construction, or in certain instances the Contractor is to turn over certain items of salvage to the Owner.

Storage and Protection

The Contractor and all Subcontractors must provide suitable weather-tight storage containers of sufficient size to hold materials required on the site at one time for storage of materials which might be damaged by the weather. Outdoor storage of materials must be confined to the areas within the construction fence. Temporary structures must be painted with one coat of paint; color must be approved by the University Construction Project Manager. No signs except small identification signs are permitted on sheds. Indoor storage must be confined to unused spaces in the building; corridors, stairs, and other public spaces must not be used for storage.

Storage of University Equipment

Spaces must be made available to the Owner for the storage of equipment. Details must be arranged through the University Construction Project Manager.

Starting of Systems

A detailed plan must be provided by the Contractor and approved by the university regarding the requirements for building systems start up. This is in addition to and separate from full commissioning.^{1.10}

Contract Closeout

The requirements contained in the UCF Professional Services Guide must be followed regarding final cleaning, adjusting of equipment, project record documents and close out procedures.^{1.11}

Final Cleaning

The Architect/Engineer should review the General Conditions regarding final cleaning to determine whether or not this subject is adequately covered; some amplification might be required.

Project Record Documents

The Contractor must maintain on site one set of the following record documents to record actual revisions to the Work:

- Contract Drawings
- Specifications
- Addenda
- State Fire Marshal Approved Documents
- Change orders and other Modifications to the contract
- Approved shop drawings, product data, and samples

These record documents must be stored separately from documents used for construction and kept concurrent with construction progress. The Architect/Engineer should monitor and verify progress prior to approval of Contractor's monthly Applications for Payment.

All projects must be documented using the Multi-Vista Program format or Owner approved equal.^{1.12}

Record Drawings and Specifications

The agreement for professional services with the Architect/Engineer requires submission of record drawings reflecting "record set" conditions which must include a copy of the Contractor's "red lined as-built" drawings and electronic copies of the updated as-built Architectural and Engineering Construction Documents in both DWG and PDF formats.

The specifications must be annotated to show the actual selected products which are incorporated into the project.

At the end of the project the Architect/ Engineer must attach a set of the final structural, mechanical, and electrical calculation sheets, which were prepared during design. Submitted material should be clearly marked "record set" and dated.

An **ACCEPTABLE** record set of Construction Documents must be received and **APPROVED** by the University prior to Final Payment to the Architect/Engineer and Contractor.^{1.13}

For all field changes made during construction, the Architect/Engineer is responsible for the accuracy of information placed on the construction documents.^{1.14}

All drawing corrections must be dated.

Operation and Maintenance Data

It is the responsibility of the Architect/Engineer to incorporate these Standards into the specifications or other contract documents, and to secure compliance of the Contractor with these Standards, including changes in design and specifications during construction incorporated into "record set" conditions.^{1.15}

Description of Systems

In the specifications or as a preface to the manuals the Architect/Engineer must describe the design intent of the building systems (HVAC, electrical, fire alarm and miscellaneous) and the principles of their operation in a manner to permit prompt initial understanding of the systems by qualified university maintenance personnel. These descriptions must include flow-charts,

riser diagrams, zone control layouts, and other visual aids showing the components, and their relationship to the entire system.

All systems require operations and maintenance manuals.

Manufacturer's printed installation, maintenance manuals, and operating instructions must include the technical specifications, instructions, periodicities, and troubleshooting procedures, not "sales" brochures and promotional matter. Instructions must include all modes of operation in sufficient detail to be readily understood by university maintenance personnel.

The O&M Manual must include detailed identification of the actual equipment installed as described in the manufacturers' instructions, including dimensional drawings, model, type, size, performance parameters such as curves, efficiencies, power requirements, operating ranges, etc.

In cases of multiple installation of identical equipment, only one manual submitted for the identical equipment is necessary, but model and serial numbers of the several pieces of equipment must be listed.^{1.16}

Names, addresses, telephone numbers, contact person of Subcontractors and/or Sub-subcontractors, their suppliers, manufacturers' representatives, available service facilities, and normal channels of supply.

Detailed parts list showing manufacturer's parts numbers and such other identification as necessary to facilitate procurement of spare or renewal parts and Owner-Manufacturer communications.

Manufacturers' maintenance instructions must include schedules showing proper time intervals for lubrication, adjustment, calibration or checking. Contractor must consolidate manufacturers' schedules with a single master schedule of required maintenance.^{1.17}

Systems that are known to be obsolete or are soon to be obsolete must not be specified.^{1.18}

An all-inclusive Warranty Matrix that clearly identifies start and end dates of the Contractor's warranty and the Manufacturer's warranty must be provided by the Contractor for all equipment. All warranties must begin at Final Completion.^{1.19}

Submission of Operating and Maintenance Manuals

The Contractor must be required to submit the Architect/Engineer approved O&M Manuals to the UCF Construction Project Manager no later than sixty (60) days prior to Final Completion.

One (1) reproducible electronic copy of each system's O&M manual must be provided.

Operation and Maintenance Data

Detailed requirements should be stipulated in the appropriate sections of the specifications.

All name plate data to include manufacturer, model number, serial number, date of installation, room number (location), and operating parameters. This data must be provided in ODBC database format (MS Excel or Access).

Final Inspection

Procedures must be as outlined in the General Conditions and UCF Professional Services Guide, except that a UCF Construction Project Manager must be included in the arrangements for joint final inspections.

Project Turnover Procedures

The General Conditions of the contract for construction contain instructions and requirements of the Contractor, Architect/Engineer and Owner for acceptance of the project. The Architect/Engineer is responsible for including in the Specifications the obligations for the Contractor, for an orderly acceptance and turnover. Included in such obligations are: punch lists, "record set" plans and specifications, operating and maintenance manuals, and training of the university personnel. Include written notification for insurance purposes.

Warranties and Bonds

Affidavits, Bonds, and Guarantees

In addition to the standard forms required by the contract documents, the following are required. When statements applying to these requirements are provided in these guides, the statements (or paragraphs similarly worded) must be included in the specifications.

The roof system requires a twenty (20) year warranty. The remainder of the building envelope requires a minimum ten (10) year warranty against water intrusion to be provided by the Contractor at no additional cost to the Owner.^{1.20}

"Extra Stock" requirements must be reviewed with the University Construction Project Manager and specified as required (i.e. ceiling tile, paint, etc).

Basic Design Services and Approval Procedures

Appointment of Architect or Engineer

Upon approval of the Facilities Program, based on the approved Educational Plant Survey, and the project budget, an Architect or Engineer (A/E) and Construction Manager (CM) are selected through the competitive selection process.

Descriptions of Services Required

After the selection of an A/E, the Office of Facilities Planning and Construction will transmit a copy of The University of Central Florida (UCF) Professional Services Guide to the A/E. The Office of Facilities Planning and Construction will supply a copy of the approved Facility Program to the A/E. These documents, plus this Design, Construction, and Renovation Standards document will indicate the extent of the work to be accomplished by the A/E and serves as the basis for the A/E's fee negotiation with the University.

Award of A/E Contract

The A/E is authorized to begin work only upon receipt of written Notice to Proceed, issued by the Office of Facilities Planning and Construction, University of Central Florida.

University and A/E Orientation

Prior to any design work, the selected team is required to contact the Director of Facilities Planning and Construction for the University of Central Florida to arrange a project orientation session. At the orientation session, introductions of the Building and Standards Committees will be made. University project representatives will discuss and answer questions regarding design objectives, character of the particular site, the design review procedures outlined, and preliminary planning undertaken. Other conferences are scheduled throughout the planning and design period to suit the needs of the A/E and the University.

The Architect of Record is directed to work through the Office of Facilities Planning and Construction and simultaneously copy the Commissioning Authority for all communications and coordination of the project.^{1,21}

Communications

The University of Central Florida will appoint a UCF Project Manager on the staff of the department of Facilities Planning and Construction at the onset of the project. This individual is the focus of all project activities. All communication between the Architect and the University of Central Florida should be channeled through this person in writing. Additionally, all communication must be copied to the Commissioning Authority. Occasionally, the Project

Manager may authorize direct contact between the Architect and other University departments. In such cases, the Architect must keep the UCF Project Manager informed of the results of the direct contact in writing.

All correspondence relating to the A/E contract or the construction contract must reference the assigned UCF project number, project title and location.

Auxiliary Material

During the normal course of any project, the A/E often submits auxiliary material for the client's information and/or approval. Examples are sketches, overlays, catalog cuts, details, addenda, etc. Since the University handles many simultaneous projects, it is vital that such submitted material be adequately and uniquely identified. Each auxiliary item submitted must have the following minimum identification on the right hand quadrant:

Project Name, University of Central Florida
Project Number
Date (including current revision, if any), and
Appropriate drawing or sketch number

Project Approval and Authorization

No construction or alteration of a building, interior or exterior, utilities, signs, pavement, fencing, landscaping or other improvements may be initiated without the prior approval of the plans and specifications for such construction or alteration by the Facilities Planning and Construction Office.

Facility Program Modifications

The approved Educational Plant Survey must be followed. Any modification in the approved Facility Program must be modified by written recommendation for approval to the President.^{1,22} Such amendments will be prepared by the A/E and submitted to the Office of Facilities Planning and Construction for review prior to further submission and approval by the President.

Bidding

Bid date will be set by the UCF Project Manager in conjunction with the A/E.

Any change in bid date must be cleared through the UCF Project Manager, as he or she is the Bidding Official. The UCF Project Manager will arrange for the location, time of taking of bids and will personally coordinate the opening.

In large projects where the A/E is responsible for the administration of the bidding process, he must document, from his records, the known contractors that have picked up bid documents. These contractors must be listed on a plan holders list, and reported by FAX to the UCF Project Manager periodically (each week) during the bidding process.

A/E is also responsible for being present at the bid opening and acting as the bid chairman's recorder for the tabulation of bids.

Award of Major (> \$2,000,000) Construction Contract

The architect/engineer and the Director of Facilities Planning and Construction, following approval of the Vice President of Administration and Finance and the President, make recommendation.

The University gives the official Notice to Proceed. The UCF Project Manager is responsible as the "Owner's Representative" during the construction period.

Construction Supervision

The A/E must provide construction supervision services to ensure compliance with the contract drawings and specifications. The extent and nature of such services will be explicitly identified in the Scope, or amendment to the Scope, covering these services. This service will be requested from the A/E for submission of an Additional Services Authorization to the President.

Design and Progress Conferences

Conference Memoranda

The A/E is responsible for the proper recording of the business content of meetings and conferences. As soon as possible, but no later than ten (10) calendar days following any conference, a memorandum containing a complete summation of decisions and actions which affect the various facets of the project must be submitted to the Project Manager, with copies to the conferees.

Format for Memoranda

Memoranda must be numbered in consecutive order. Summations must be in outline form with numbered paragraphs and alphabetical subparagraphs. Although statements should be brief, each statement must convey the entire message and must clearly state the problem or question and the recommended solution or directed decision.

Design Review and Approval Process

Design submissions will normally include the Schematic (Conceptual and Advanced), Design Development, Fifty Percent Construction Documents, and Final 100% Construction Contract Documents. Include information in sufficient detail for all phases of the work to permit a complete technical review. All items in each submission must be date stamped with the date and stage of design of submittal. Engineering calculations must be legible, neatly arranged, **bound** and **indexed**. The A/E's name, the project title, and construction contract number must be shown.

The Design Review Process

It is the goal and general practice of the University to review and to approve or disapprove plans and materials which are delivered to the Office of Facilities Planning and Construction (and which are deemed complete by its technical staff, the University department and/or consultants) in a timely manner.

The Office of Facilities Planning and Construction will disapprove incomplete submissions lacking material required by these Standards. Each submittal, in order to receive proper and timely consideration, must contain needed project information.

Outline specifications are among the most important documents to be submitted. Outline specifications should contain a brief, yet complete description of the entire project and should explain how the total work will be accomplished. (i.e., should name the separate Divisions of the Work for which contracts will be awarded).

Formal Approval and Comments

Submissions for Approval

Prior to starting any design phase, the design submission must be approved by the Office of Facilities Planning and Construction, the UCF Standards Committee, and the Associate Vice President of Administration and Finance (Facilities and Safety).

Design and Construction Required Submissions

Attachment 1: Design Phase Submission Report

- This must be completed by the Architect and approved by the UCF Standards Committee for all design submissions.

Attachment 2: Sub Contractor List Requirement

- This must be submitted by the Construction Project Manager to the UCF Standards Committee for review and approval.

Attachment 3: Change Order Requirement

- All change orders must be submitted by the Construction Project Manager to the UCF Standards Committee for review and approval.

Attachment 4: Final Completion Requirement

- This must be completed by the Construction Project Manager and submitted to the UCF Standards Committee for review and approval.

State Fire Marshal Review and Approval

For all new construction and renovation projects, the Architect must be responsible for submitting signed, sealed, and dated drawings to the UCF Building Code Office who will transmit the documents to the Florida State Fire Marshal (SFM) for approval prior to construction. For plan submittal requirements, contact the SFM for the most recent edition of the "*Plans review Fees, Procedures and Requirements Manual.*" This guideline outlines all pertinent information required on the drawings in addition to the UCF requirements outlined in other sections of these Guidelines. Also included are inspection guidelines. The State Fire Marshal in Tallahassee can be contacted at the following:

Division of State Fire Marshal
Bureau of Fire Prevention
Plans Review Section
200 East Gaines Street
Tallahassee, FL 32399-0342
(850) 922-3172

Floor-plan drawings must include separate layouts for fire alarm and fire protection system devices. The following should be included:

- Fire alarm point-to-point wiring or riser diagram
- Specific device locations
- Clear indication of any existing life safety features not included in the scope of work so that the "end result" can be evaluated as a whole.
- Occupant load calculations are required per building, per floor, per fire compartment, per Class A or B assembly room.
- Hydrant, FDC, and drain outlet locations

Fire protection specialty trades such as Fire Alarm and Sprinkler Contractors must be required to submit shop drawings to the SFM for approval prior to inspection.

The SFM stamped approved drawings are to be kept on the construction site for the duration of the project. Changes to these drawings are to be submitted to Tallahassee for approval. Upon inspection the SFM inspector will verify compliance with the "Approved Drawings" and applicable NFPA and State Codes.

When the contractor is ready for 50% and/or 100% inspections by the State Fire Marshal, the Architect must submit the necessary paperwork and schedule the inspection with the local inspector. Above and underground hydrostatic tests and generator acceptance tests also require witness by the local SFM inspector and are to be scheduled similarly if they cannot be coordinated with the 50% or 100% inspections. Final 100% inspections are not to be made until all fire protection systems have been thoroughly tested and the building is ready for occupancy. There will be a charge for inspections beyond those included in the plans review fee.

Quality Control and Submittal Standards

The following items are not intended to indicate the limits of the design professional's responsibilities. All contractual obligations must be met in addition to all other required professional duties whether explicit or implied.

Design Services

Project meets the Owner's program requirements, the Educational Plant Survey and complies with the UCF Design, Construction, and Renovation Standards.

Provide adequate staff, proper scheduling, early cost control/estimating, and understand project scope.

Responds and plans for any requirements that may be interpreted as a limitation.

Schedule

Establish and comply with the approved design schedule.

Respond to changes in scope that affect schedule and adjust accordingly.

Project Architect and Resident Inspector's Responsibilities

Participate in coordination meetings.

Screen shop drawings and submittals for contract compliance before submitting to owner for approval.

Keep logs of all on site observations.

Frequency of site visits per contract or additional service authorization. Prefer part-time every day versus full-time on selected days.

Monitor contractor for compliance with schedule.

Act as owner's agent in protecting owner from unnecessary delays and unreasonable costs on part of contractor.

An agreed upon time limit for the resolution of all conflicts will be established at the beginning of the contract on a job by job basis.

Inspections and Testing Companies must be employed on a per project case by case basis, to be determined at the time of bidding.

Architectural and Design Engineering

General Design Objectives

It is recognized that the designer for any project is continuously faced with the decision making process of selecting materials and methods to achieve an economical, aesthetically pleasing, and well functioning end product. While these objectives may be universally applicable on an industry wide basis, there are a number of additional considerations for the University of Central Florida projects, which the designer must bear in mind.

These objectives are listed below. It should be noted that they are not ranked in order of importance since they are all considered of equal importance.

Proper Operation of the Building, Its Systems and Surrounding Amenities

Satisfy the functional needs of the facility. The University of Central Florida facilities include a broad variety of building types (academic, administrative, research and laboratory, housing, service, etc.), each with its own unique function. The specific needs of each facility are therefore described in the Facility Program for the individual project and are discussed during the early design stages with the Architect/Engineer. The designer is encouraged to discuss these needs with the Office of Facilities Planning and Construction's Project Manager as fully as may be necessary to clarify these needs, in cases of question or doubt.

Overall Economy

Overall economy is another major design objective. While the University of Central Florida constantly seeks ways of reducing its construction costs, the increasing sophistication of

building systems often tends to obscure the fact that these systems require proportionately increased maintenance costs. Because lowest first cost does not necessarily mean lowest total cost, life cycle costing should be an important component of the design process. Examples of elements where lowest first cost may not necessarily equate to lowest ultimate or life cycle benefit are walls and floor finishes, ceiling accessibility, window treatment, partition systems, heating and ventilating systems and energy conservation details and systems.

The standards in these sections represent the desired standard of performance against which a project can be evaluated. Designers are encouraged to make suggestions for alternate approaches to meet or exceed these standards; as may be justified by engineering factors, operational criteria or cost. Among the operational factors to be borne in mind in designing building systems are:

- Functionality and cost considerations
- Reliability and long life
- Energy conservation
- Minimized maintenance requirements
- Simplicity and adequacy of control systems
- Accessibility of mechanical and electrical components for maintenance and repairs
- Stocking and availability of replacement parts

Quality of Work

The work of the A/E will be reviewed by UCF to the extent necessary to establish conformance with authorized scope and applicable UCF design criteria only, and to establish a reasonable assurance that the work can be completed within the funds authorized.

The university will not undertake a detailed technical review of the work. It will be the responsibility of the A/E, acting in a professional capacity, to ensure the accuracy, completeness and correctness of the cost estimate and all engineering concepts and details of the work, including the coordination of the various architectural, structural, mechanical, electrical, and other subdivision thereof with each other and with the specifications. The A/E assumes full responsibility for the technical accuracy and professional adequacy of all work.^{1.23}

Responsibility of Design

It is the design policy of UCF to conform to the best generally accepted standards applicable to the particular class of work, to retain the best qualified Registered Professionals and to accomplish the design within the criteria, scope, fiscal and legal constraints imposed by higher authority. Before beginning the design, the A/E should review current criteria, instructions and guide specifications provided by UCF, and make a thorough study of conditions at the site and the requirements of the project.

The overall facility and site design should fit aesthetically with other facilities on campus.

Within Available Funds

The budget prepared by the University and approved by the State establishes the maximum funds available for the project. The A/E is charged with incorporating all first and second priority items shown in the Facility Program, utility connections, and site work, including, but not limited to: general construction; plumbing; heating, ventilating and air conditioning; electrical; and fixed equipment, within the available construction funds. The A/E must continually monitor program requirements, for the purpose of assuring a project is designed within available construction funds. Estimates of costs must be projected to the proposed date for receipt of bids. If the approved Facility Program and the available construction funds appear to be incongruous, the A/E must so inform the UCF Project Manager without delay. The UCF Project Manager will arrange a meeting with the A/E for the purpose of reviewing priority requirements. Redesign, if required because of bids being in excess of available funds, must be the A/E's responsibility. No additional fees will be approved for such redesign unless the scope of the A/E's work is changed by amendments to the approved Facility Program.

Energy Modeling

All major new construction and renovations must include progressive energy modeling. The energy modeling must be updated as the project progresses from programming through completed design. The energy model inputs, outputs, reports, and findings must be reviewed with the Commissioning Authority and the Director of Sustainability & Energy Management prior to proceeding to the next phase. The initial model must be updated at the completion of the 100% Design Development phase, 50% Construction Design phase, and finally, at the completion of the 100% Construction Design phase.^{1.25}

Noise and Vibration Control

Noise and vibration in terms of emission control and transmission control is the combined responsibility of the A/E and his or her consultants, and must be considered in the design of every building, even though specific requirements might not be stated in the Building Program. Three principal considerations which must be given to noise and vibration control are:

- Noise control to provide for maximum usefulness of the facility by keeping levels of sound within ranges which are conducive to study and work, or other uses for which the facility is designed;
- Noise control latest revision in compliance with OSHA requirements for the health and safety of building occupants; control must be for all areas of the facility, particularly equipment rooms, boiler rooms, PRV stations and fan rooms;
- Vibration control to limit sound and motion produced by equipment and for protection of the equipment and the building structure.

Interior Design

The A/E is responsible for the fully integrated design of all facilities for which he or she contracts to prepare final contract drawings and specifications. Integrated design is defined as the thorough and complete development of the design concept, with proper attention being directed to all aspects, both functional and aesthetic, of the overall design problem. Thus, the successful design solution is one that observes the established precepts of architecture and of the various engineering disciplines involved. The design should also reflect an acute awareness of the requirement for proper orientation and attractive landscaping. As a part of his or her standard service the A/E will be required to provide coordination in conjunction with the University's standard interior finishes and color and finish schedules, including materials selections. At the option of the University of Central Florida, the A/E may be required to provide furniture, drapery selections, interior design brochures and shopping lists and other necessary data as an additional service. The UCF Project Manager will assist the A/E as required upon request for guidance.

Segments of Interior Design Services

- The Structural Related Segment is considered a part of the basic A/E design contract and must be included in the direct design costs. Structural related services must consist of design and/or selection and color coordination of building surfaces and built-in furniture, window coverings, interior graphics/signage and similar items which are integral or attached to the structure. The above will include display boards showing materials and color samples for the purpose of obtaining approval of the interior scheme, as well as color (finish) schedules to be included in the contract documents (viewed as a typical service in the A/E agreement).
- The Furniture and Furnishings Segment consists of the selection of furnishings from commercial sources in accordance with state procurement regulations and state contracts. This segment will include A/E orientation at: a concept meeting with the Program Committee; a preliminary submittal and presentation of a Concept Brochure; a pre-final submittal with placement plans and procurement data, specifications, waivers, and a final submittal of the complete interior design package (viewed as an additional service if required by the University).

Contract Documents

Document Requirements

The A/E must ensure the (100%) submittal is complete. The drawings, specifications, and cost estimate should be complete so that the project could be advertised without further change.

Project drawings will be final and complete with all elements thoroughly checked and coordinated.^{1.25}

Preparation of Drawings

Standard professional drawing practice as contained in the "Architectural Graphic Standards" is required. A complete legend of abbreviations, symbols, complete finish, equipment and fixture schedules must also be included in the drawings for each discipline. The drawings must be accurate and explicit. Additive Bid Items may be designated on the drawings as "Additive Bid Item." All elements of the work must be properly coordinated to insure that there are no conflicts between architectural, structural, civil, mechanical, electrical, plumbing, and landscape and irrigation portions of the work. Drawings must be prepared so that change orders to construction contracts will not be necessary as a result of errors, omissions, inadequacies, or conflicts with the Specifications.

Drawings for Remodeling Projects

Two (2) drawings of each floor plan are required: One drawing to show existing construction and demolition, the second to show the new construction and existing construction, which is to remain. When sheet size permits, the two plans must be drawn on the same sheet, for easy comparison of the two. This requirement applies to the floor plans for all Divisions of the Work.

Room Numbers

At the completion of the Design Development phase Academic Affairs will assign permanent UCF room numbers to each space. These assigned numbers become the permanent numbers and must be used when making references to spaces, both in notes on the drawings and in correspondence.

Arrangement of Drawings

Drawings should be arranged in the following order:

- Index (must be included with plot and vicinity plan cover sheet)
- Civil
- Landscape and Irrigation
- Life Safety
- Architectural
- Structural
- Mechanical (heating, ventilation, etc.)
- Plumbing
- Fire Protection
- Electrical

- Telecommunications

Drawing Title Page and Cover Sheet

In order to aid in future renovation of University of Central Florida buildings, the information listed below, as applicable, should be shown by the Architect on the Title Page of the construction document drawings (and the as built drawings). This information is required in addition to the standards found in the UCF Professional Services Guide.

- Type of Construction
- Occupancy Classification
- Net versus gross square footage calculation
- Educational Plant Survey square footage in comparison with the actual designed square footage
- Mechanical Areas
- Building Service & Storage Areas
- General Circulation Areas

Finish Schedules

A/E must provide one blank column on the finish schedule subtitled "University of Central Florida Room Number." This column should be adjacent to the space name, and must be appropriately completed when the UCF Budget Office assigns permanent room numbers.

On the finish schedule the A/E must provide a column for room areas. Each room area must be listed in square feet.

AUTOCAD Standards

This historical process has developed into a requirement of a computer-generated copy of all major building construction projects. In making this decision in favor of computer-generated drawings, we have chosen AutoCAD as our standard and now require that all drawings for new buildings be created using AutoCAD, most current version, or a version compatible with the most current version.

The University currently implements AutoCAD for three main purposes:

- Master Planning
- Maintenance of the university photogrammetric survey map database
- Maintenance of construction drawing databases for existing buildings and new projects

In order for the University to utilize drawings created by consultants on the University's AutoCAD system, the following standards have been established.

Drawing Format

Layering - Layering must be the AIA standard.

Symbols - Symbols and/or blocks created by the architect and used in the drawings must be provided to the University in disk form and 8 1/2" x 11" plot.

Fonts - An architectural style-lettering font must be used for all drawings in all disciplines. The University must provide a copy of the font if necessary. If the architect uses their own third party font, a copy of it will be provided to the University. Use only one font file for the entire set of documents. Exceptions will be made for fonts required for title blocks, logos, etc.

Schedules and Attributes - It is the University's goal to utilize attributes to help maintain inventory lists of items such as hardware, equipment, and furnishings. It is preferred that such items shown on the drawings be associated with an attribute, which is used to generate the schedules. If the items specified are not the items installed, then the attributes must also be changed on the as-builts.

Dimensions and Leaders - Dimensions must be created using slash tick-marks 3/16" long; extension line must extend beyond dimension line 3/16"; dimension line must not extend beyond extension line; dimension lines will be located 1/4" from object being dimensioned; adjacent dimension lines will be located 1/4" apart; architectural dimensions will be indicated to the closest 1/16" unless design requires closer tolerances; text must be parallel to dimension line 1/8" in height and must be centered 1/16" above dimension line when practical; all dimension components must be the same color in relationship to each other and the same color as the layer they are on.

File naming - The filename as delivered to the University will be the Board of Regents project number. For example: BR-499.

Scale - Drawings will be created full scale. Where differing scales appear on one sheet, the largest scale item will be drawn full scale, with the scales of the other items proportional to it.

Final Deliverables

Final Document Submittal - At the completion of 100% documents, the architect must turn over to the University the following:

- All drawing databases on recordable CD-Roms.* The disks must also include any fonts, custom blocks, symbols, etc. that the University does not have loaded on their system.

All conversions that may be required will be complete. Drawings will be loadable on the University's system without any further manipulation required.

Final Completion - At project conclusion, the Contractor must provide through the Architect as-built drawings. The Architect must supply the University as-built drawings as follows:

- All drawing as-built databases on recordable CD-Roms.* The disks must also include any fonts, custom blocks, symbols, etc. that the University does not have loaded on their system. All conversions that may be required will be complete. Drawings will be loadable on the University's system without any further manipulation required.
- Any drawings that are large enough to be required to be backed up must be done so at the root directory. Use of condensing utilities/software is not permitted.

Construction Specifications

All construction specifications must be university project specific, based on the current UCF Design, Construction, and Renovation Standards.^{1.26}

General Instructions

The project specifications form a part of the contract documents. Project specifications must be as brief as possible, definite, and free of ambiguities and omissions which might result in controversies and Contractor's claims for additional compensation. For construction projects which involve interruptions of existing building operations or major utility outages, it is the A/E's responsibility to discuss the required outages and interruptions with the UCF Construction Project Manager and establish a construction schedule in the Specifications for these interruptions.

Continuity of University Operations

Throughout the construction period, it is essential that University academic, research and service programs be maintained in continuous operation. These include class schedules, special events, research programs, routine services activity, and utilities services. Further, vehicular and pedestrian traffic and fire fighting equipment access to all buildings must be maintained without interruption. It is the responsibility of the Architect to include in the contract documents specific requirements for continuity of services. Such requirements may include schedules for certain features of the work, limitations on noise, temporary walkways, provisions for dust-proof partitions, and utilities disruptions. In each case, requirements for maintenance of University facilities must be coordinated with the UCF Construction Project Manager and all special limitations on the Contractor's construction methods must be included in the drawings and specifications.

All testing must be performed by the Contractor unless otherwise directed by the Owner.^{1.27}

The text should state what is to be tested, the Standard or Specification under which it is to be tested, which test should be used, the number of units to be tested, how many tests should be made, and the frequency at which they should be made.

In addition, acceptable limits of tests results must be stated. Manufacturer's certified tests, when made in accordance with recognized standards or procedures such as those of the ASTM are acceptable and should be used in lieu of testing and actual unit where possible. The Facilities Operations representative will witness the tests and the specifications should note this requirement.

Inspection

When the words "inspection" or "inspect" or words of similar meaning are used in the Specifications, the performance is to be accomplished by the Contractor.

The University will not "inspect" any portion of the work unless the Specification states that the University is to be the inspector.

Organization

The sequence of the specifications should follow the sequence of the drawing. Titles of sections should be brief but should reflect the principal items and/or trades specified in the section.

Format

The standard Construction Specifications Institute Divisional sectional format must be used unless otherwise directed by the UCF Construction Project Manager. For the 100% and Final Submissions list only those Divisions used; "empty" Divisions are not to be listed.

Indexing must be bound to contain the legal standard documents listed below. Use colored stock for printing as follows:

- WHITE - UCF Project Manual (Bidding Conditions and Contractual Conditions)
- YELLOW - UCF Project Manual (Special Conditions)
- WHITE - Architectural (Division 1-14)
- BLUE - Mechanical (Division 15), First page must be index to Division 15.
- TAN - Electrical (Division 16), First page must be index to Division 16.

Binders

Roll-form plastic/GBC binders are NOT acceptable.

Format of Submissions During Design Review Phases

The number of copies required for each submission must be as stipulated in the A/E contract. (Typically this is four (4) complete sets of documents at C size (22" X 24") and two (2) complete sets of documents at E size (36" X 42")).

The "cut-and-paste" method for preparing specifications is unacceptable.

Final Specifications must be single-spaced on 8-1/2" x 11" bond paper, typed on one side of the paper only, with 1 1/2" left margin and 1" right margin. At least one copy of the final Specification manuscript, printed both sides of paper must be provided.

All submissions require plans and specifications to be delivered in electronic format.

Project Manual

The latest version of the UCF "Project Manual" containing instructions to bidders, the General Conditions of the Contract for Construction, and the Special Conditions, must be included in each specification and be the basis for further development and completion of drawings and specifications. Contact the UCF Construction Project Manager for a copy to make sure the most recent document with changes is used.

Coordination of Specifications and Drawing

PROPRIETARY AND RESTRICTIVE REQUIREMENTS must not be used when specifying equipment and materials on drawings and in the Specifications. The drawings and specifications must permit unlimited competition consistent with the type of work. They must be prepared to utilize standard products and current models of equipment meeting the functional requirements of the facility.

Naming an acceptable commercial product followed by the words "or equal" as approved by the Owner must use the practice of specifying items by naming an acceptable commercial product followed by the words "or equal".

The University may list specific manufacturers because of life cycle costs justifications or maintenance continuity.

If manufacturer's names and trade designations are used, a minimum of three manufacturers must be included as a part of the required description followed by the words "or equal" to assure that the bidding will not be restricted to the particular named manufacturers or suppliers.

Selection of Materials

The State and/or University, through its various agencies has, and may, place restrictions on the use of certain materials. All materials, which have not been proven in the specific type of service involved and whose promotion is based upon unsupported statements and lists of supposedly satisfied users should be investigated thoroughly. **The use of untried materials will be rejected. Materials must be used in a manner, which will afford the maximum service at the lowest comparable cost.**^{1.28} Operation and maintenance costs must be weighed against initial costs to achieve maximum economy. Before deciding upon a specific material for design or specification purposes, the following must be considered:

Contemplated life of the construction

Climatic and operating conditions

Materials and Equipment

Specify by performance specifications or by manufacturers' model numbers. If manufacturers' model numbers are used, name three manufacturers whose products are equal in:

- Appearance
- Function
- Quality
- Operation
- Design
- Service Life and Warranty

State that the drawings and specifications are based on the first product named and that the contractor must make all changes required to accommodate products of other manufacturers. The A/E is responsible for insuring that all brands specified are compatible with the basic building design insofar as size, weight, and services are concerned and that brands specified are truly equal in properties listed above.

Computerized Specifications

The University requires the use of computerized specifications; however, the A/E is cautioned that such specifications must be edited to suit the requirements of the project being specified.

Excessive cost or delays in producing the final submittals due to University standard required editing or rewording would not be considered an Additional Service.

Computerized specifications must be printed on 8 1/2" x 11" size paper and must be color-coded, both as required by this Standard.

Unacceptable Terminology

The note "by others" must not be used, either on the drawings or in the specifications. In lieu of these words, name the specific contractor or agent.

The words "Using Agency" or "User" must not be used. The University Construction Project Manager acts in behalf of the using agency to see that requirements of the user are satisfied. The A/E is responsible only to the University Construction Project Manager, not to the "using agency" or "user."

Prohibited Construction Practices

The use of an ink based marking pen on wall surfaces of any kind is not permitted.

Ceiling grid systems must not be supported from ductwork, electrical conduit, heating or plumbing lines, and vice versa. Each utility system and the ceiling grid system must be a separate installation and each must be independently supported from the building structure. Where interferences occur, provide trapeze type hangers or other suitable supports for each system. Locate hangers and supports where they will not interfere with access to mixing boxes, fire dampers, valves, and other apparatus requiring servicing.

The use of wood unless specifically noted in the UCF Design, Construction, and Renovation Standards.

Project Manual

The A/E will be issued a copy of the latest edition of the UCF Project Manual for inclusion in the Contract Documents.

The A/E must supply complete technical specifications for all parts of the Project utilizing the 2004 CSI Master-format.

Project Turnover Procedures

The turnover procedure is to be administrated by the Architect. The University construction and design project manager(s) and administrative personnel will assist as required.

Conditions of Final Completion

A project achieves "final completion" when:

- All building systems are complete, operating correctly, and approved by the Commissioning Authority and the Owner.

- All associated training is complete and approved by the Owner.
- All closeout documentation, including O&M Manuals, must be complete and have been approved by the Owner.
- As-builts of the completed project must be delivered to and accepted by the Owner.
- Utility cost responsibility is transferred to the Owner.
- The State Fire Marshal, the Building Official, and the University's Department of Environmental Health & Safety must have inspected, tested, and approved the facility.
- The entire facility can be occupied and used for the designed purposes intended.
- All Facilities and Safety Departmental Directors have signed the certificate of final completion (see Attachment 05 - Final Completion Building Approval Form).
- All warranties must be accepted by the Owner to begin upon the date of final completion.
- All punch-list items must be completed.^{1.29}

The Architect, with Owner approval, may issue the certificate of final completion only after all of the above conditions have been achieved. A certificate of occupancy cannot be applied for until Final Completion has been achieved.^{1.30}

As a prerequisite to scheduling the final completion inspection, the General Contractor is required to prepare, certify, and deliver the "As-Built Drawings," maintenance manuals, and warranty information. The required operation and maintenance orientation training to be conducted with the Facilities Operations Department personnel is also to occur prior to scheduling the final completion inspection.

The training sessions will be conducted by the General Contractor's Electrical/Mechanical subcontractors, manufacturer's representatives, and may require the A/E's sub-consultants to be present to field verify systems performance. All tests results are to be provided to the Architect/Engineer by the General Contractor. The Architect/Engineer will be the sole source of responsibility to insure that all equipment performs in compliance with the initial design criteria.

Inspections

The Architect must begin the development of punch-lists, sixty (60) days prior to final completion.

Transfer of Custody and Data

At acceptance of final completion by the Facilities and Safety Department, the building will be the responsibility of the University.

Warranty Procedures

At acceptance of final completion, the Office of Facilities Planning and Construction is responsible for contacting the Architect and the General Contractor with respect to warranty items.

Final Completion and Final Payment

The Architect is responsible for initiating final inspections, verifying all punch-list items are complete, and recommending final acceptance to the University. All conditions of “final completion” must be met before final completion can be granted.

Neither final payment or the retained percentage must become due until the Contractor submits to the Architect the following:

An affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the University or the University's property might be responsible or encumbered (less amounts withheld by the University) have been paid or otherwise satisfied.

A certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the Owner.

A written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents.

Consent of the surety to authorize final payment.

If required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner.

A completed and notarized “Certificate of Contract Completion” must accompany the Contractor’s application for final payment. Any items required by the Contract Documents not previously submitted must accompany the application for final payment.

Warranty Disputes

If a dispute or problem occurs with a Contractor over warranty work the Office of Facilities Planning and Construction will discuss the dispute with the Contractor. In the event emergency

repairs are required, Facilities Planning and Construction will determine what action to be taken.

After Action Review (AAR)

The Owner will conduct an After Action Review (AAR) meeting to discuss the history of the project in detail to better the design and construction process for future projects.

All contractors will undergo a performance appraisal conducted by the UCF Standards Committee with client input.

Division 02 – Site Work

General

All projects must abide by the University Energy Sustainability policy. A portion of the requirements of this policy require that all projects achieve a minimum LEED Silver certification and earn the required number of LEED credits.^{2.1}

All designs must be consistent with the University's Master Drainage Plan approved by the St. Johns River Water Management District (SJRWMD). The Architect and Engineer must comply with the design and installation requirements as established by the Florida Department of Environmental Protection.^{2.2}

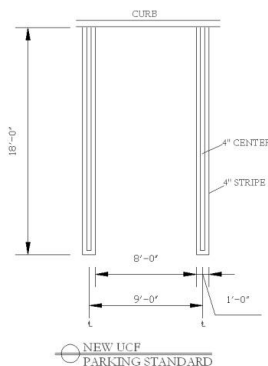
Fire lanes must be provided to all structures.^{2.3}

Driveways and Parking Areas

All driveways and parking surfaces must be paved with asphalt or concrete to a depth determined by the Engineer of Record with Owner approval.

Each parking space must include a minimum of 170 square feet in addition to space for access drives and aisles. The minimum width of each space must be 8.5 feet clear with double white thermo-plastic striping at a width of one (1) foot on each side. Islands must be a minimum of 17 feet wide and must be appropriately located to maximize the number of parking spaces. Islands must contain appropriate irrigation.

All roadway striping must be thermo-plastic.



Subsurface Exploration

Before any boring and digging can occur a dig permit must be applied for and approved. Dig permits must be obtained through the Owner.^{2.4}

Architect and Engineer Responsibilities

The Architect/Engineer must provide plans showing required test boring locations and provide the report to the University Project Manager.

Preparation of Plans for Borings

All utilities must be field verified and shown on 100% Construction Documents prior to construction start. Boring locations and sections through borings must show all soil conditions.

Site Preparation

Clearing the Site

Before removing site materials approval must be obtained from the University Project Manager.

Grubbing

Removal of trees and shrubs must include the removal of stumps and roots to the extent that no root greater than one (1) inch in diameter remains within five (5) feet of an underground structure, utility line, under footings, or paved areas. Grubbing in open areas must include the removal of stumps and one (1) inch roots to two (2) feet below finish grade elevations.

Structure Removal

In open areas, foundations of structures must be removed to a minimum of three (3) feet below finish grade elevation. Where new structures will replace existing structures, indicate extent of foundation removal on the drawings. No existing slabs will remain under fill for new structures. Hazardous material removal must be conducted prior to structural removal as required by federal, state, and local requirements.

All abandoned utilities within the construction boundary must be removed from the site.

Disposal of existing buildings and structures, trees, dismantled equipment, etc., is the responsibility of the Contractor with approval by the University Project Manager.

Earthwork

Earthwork includes, but is not necessarily limited to, the following:

- Excavating, filling, backfilling, positive-sloped grading and compaction.
- De-watering of excavations and work areas.
- Shoring and bracing.
- Disposal of excess and unsuitable excavated materials.
- Preparation of sub-grade for building slabs, walks, decks and pavements.
- Backfilling of trenches within the limits of construction.

Rough Grading

Slopes must not be greater than one (1) foot vertical to six (6) feet horizontal in grassed areas.

Topsoil

Existing stockpile topsoil must be free from sticks, stones, roots, clods, and any other extraneous material.

Imported topsoil must be a fertile, friable, natural topsoil of loamy character obtained from a well-drained, arable site free from sticks, stones, roots, clods and extraneous matter. Topsoil must be a clay loam, indigenous to general area in which the project is located and must be suitable for planting and seeding.

A six-inch depth of topsoil for seeded areas and twelve-inch depth for planting areas is required.

Excavating

Clean topsoil and other clean excavated soils must not be removed from the campus and will be stored at a site designated by Landscape and Natural Resources. All testing and transportation of excavated material is the responsibility of the Contractor. All soil and appropriate testing must be approved by Landscape and Natural Resources prior to transportation.^{2.5}

Soil that is compromised with debris, organic and inorganic, as determined by testing must be removed from the campus.^{2.6}

If such materials are not required for the project, the Contractor should consult with the University Project Manager, who will advise the Contractor regarding a storage location.

Care must be taken to prevent soil erosion in accordance with DEP and any required LEED certification. If soil is needed, the Contractor will have to obtain it from other sources at the Contractor's expense.

When necessary to hold large piles of excavated earth on the job site, the Contractor will be required to provide cover or adequate means of water sprinkling to keep the soil particles wet.

Backfilling

Backfilling is required at building perimeter and site structures up to sub grade elevation, fill under interior and exterior slabs-on-grade or pavement, and fill under landscaped areas must meet current ANSI/ASTM standards.

Trenching

The compaction of backfill must be properly specified and meet current ANSI/ASTM standards and the requirements of the Trench Safety Act.

Trenching of roads and parking lots is not permitted.

Termite Control

Termite treatment is required for every building. The Subcontractor for soil treatment must furnish a service agreement stating the work performed will be guaranteed for a period of five (5) years from the date of final completion and that the structure will be inspected yearly for infestation and treatment provided as necessary. The Subcontractor must offer an optional renewal of the service on the same terms. The type of chemical treatment must be specified, including the amount of application per unit area. The service agreement must state that in the event of damage during the guarantee period, the Contractor must make repairs to structurally damaged surfaces to a dollar value based on the size of the building. An independent testing laboratory must certify that the treatment meets the requirements of the Owner.

A perimeter bait system is required.

Chemicals and application must conform to EPA Federal Insecticide, Fungicide, and Rodenticide Act.

Asphaltic Concrete Paving

All materials and installation must comply with requirements of the Florida Department of Transportation.

Concrete Paving

Concrete paving must be installed in accordance with current ANSI and ASTM Standards.

Expansion Joints

Expansion joints must be shown on the drawings in accordance with the current ANSI and ASTM Standards.

Control Joints

Control joints must be saw-cut to squared relief, e.g., 6'0" wide sidewalk, 6'0" space between.

Finish

Finishes must be floated, troweled, and medium broom finished.

Utility Cuts

Directional boring must be used when crossing streets and roads. Concrete walks must be cut and replaced from joint to joint, doweled to the remaining slab.

Walks

All concrete sidewalks must be a minimum of six (6) inches thick with 6 x 6 #10 wire mesh reinforcement, and edge thickness increased a minimum of 8 inches.

ADA Detectable Warning Pavers must be placed where pedestrian walks meet roadways to



alert pedestrians.

Water Distribution System

Water main materials must be ductile iron pressure water pipe or PVC pressure pipe. Gate valves must be provided at all new branches, fire hydrants, backflow prevention devices, and meters. Water lines will be disinfected according to AWWA Standard C-601 and must be witnessed by the Owner. All pipes must be tested for leakage using current industry standards.

Detectable plastic marking tape and copper tracer wire must be installed underground above buried utility lines in accordance with current ASTM Standards.

Storm Drainage System

Catch basin or inlets pre-cast or cast-in-place concrete must be provided. Grates and frames must be cast iron. Drainage pipe must be reinforced concrete pipe (RCP) or metal pipe (bituminous coated or aluminum).

Sanitary Sewer System

Sanitary sewers must be PVC pipe rated for sanitary applications. Sanitary manholes must be precast concrete or cast-in-place concrete. Cover and frames must be cast iron. Cleanouts must be specified as commercially manufactured "Y" branches.

Landscape Irrigation

All landscaped and sodded areas must be irrigated. The irrigation system must be designed utilizing irrigation standards Best Management Practices (BMPs).

All components must be designed utilizing Rain Bird products or approved equal.

All landscaped areas must be adequately irrigated based on the following criteria:

- An automatic sprinkler irrigation system is required for all landscaped areas.
- An irrigation system designed and operated to prevent or minimize runoff of irrigation water onto roadways, driveways, walks, etc.

Bike Racks

All bike racks must be serpentine-style and constructed out of rubber-coated galvanized pipe with a 10" loop diameter.



Sodding

All areas not otherwise landscaped must be sodded with Argentine Bahia sod.

Subsoil must be scraped to a depth of six inches where topsoil is to be placed. Cultivation must be repeated in areas where the subsoil has been compacted by equipment.

Landscaping Plant Materials

Trees, Plants, and Ground Cover

All plant species will comply with Florida Friendly™ Standards.^{2.7}

Trees, plants, and ground cover must be specified in a schedule contained in the drawings. Schedule must include the plant name in botanical identification, nominal size of trunk or spread of branches, height, or other identifiable criteria. These plants must be specified as "Florida Grade #1" or better and selected for the climatic conditions of the specific university location.

Pipes and Pipe Fittings

Installation

Materials must be cleaned and maintained clean, with all coatings protected from damage. The interior of the pipe must be free of dirt and debris, and when work is not in progress, all open ends must be plugged. Materials for potable water systems including taps, repairs, etc., must be disinfected in compliance with American Water Works Association (AWWA) C601 and C900. Water from these pipes must not be used for any purpose prior to receipt of satisfactory test results.

Underground pressure piping system located in the traveled way or planned traveled way must be installed with five (5) feet of cover.

Exposed systems must be supported as necessary to hold the piping and appurtenances in a firm, substantial manner to the required lines and grades indicated, with no undue piping stresses transmitted to equipment or other items. Piping within buildings must be adequately supported from floors, walls, ceilings, or beams. Supports from the floor must be by suitable saddle stands or piers. Piping along walls must be supported by satisfactory wall brackets or saddles. For piping supported from the ceiling, approved rod hangers of a type capable of screw adjustment after erection of the piping must be used. Pipe above ground outside of buildings must be supported on concrete supports.

Flushing and testing of piping systems must be performed by the Contractor and witnessed by the Facilities Operations University Utility Supervisor.^{2.8}

Pipes and Pipe Fittings

All pipe and fittings must be clearly marked with the name or trademark of the manufacturer, the batch number, the location of the plant and strength designation, as applicable.

All piping and fittings for water service must meet current ANSI/ASTM and AWWA standards.

Main distribution piping must be ductile iron. Service piping may be PVC.

Piping Not Permitted

Corrugated Metal Pipe (CMP) and Vitrified Clay (V.C.)

Piping Permitted

- Concrete (RCP) – Storm Water
- Pre-Stressed Concrete (PCP) - Storm Water
- High-Density Polyethylene (HDPE) – Storm Water & Chilled Water
- **Steel – Chilled Water**
- As per TECO regulations – Gas
- Galvanized Metal - Compressed Air
- PVC – Irrigation
- PVC pipe rated for sanitary applications – Sanitary sewers

Inspection

All underground piping two-and-one-half (2.5) inches or greater must be camera-inspected and recorded. This recording must be given to the University Project Manager.

Plastic Pipe

Polyvinyl Chloride (PVC)

Connections for pipe four (4) inches in diameter and larger must be rubber compression ring type.

All PVC irrigation pipe and accessories must be schedule 40.

Connections

Connection of PVC gravity sewer lines to manholes must be “mortared-in”.

Tapping

All tapping must be witnessed by the University Project Manager.

Tapping Sleeves and Crosses

Units must be of the mechanical joint type, with outlet flange ANSI B16.1, 125 standard, and must be Mueller H-615 or American No. 1004 (Tapping Sleeve) and Mueller H-715 or American No. 1001 (Tapping Cross), or approved equal.

Service Saddles

Saddles must be as manufactured by Rockwell International Corp., Pittsburgh, Pa., or approved equal. Units for cast or ductile iron pipe must be double strap, ductile iron, Type 313, and for plastic pipe, Types 313 or 352, as applicable. Sealing gaskets must be suitable for the applicable service and straps must be corrosion resistant alloy steel.

Valves

All valves must be American manufactured and the valve type, size rating, and flow direction arrow must be clearly marked on each unit.

Hand wheel valves are not permitted below grade.

Gate Valves (GV)

Underground Service (General)

All valves must be of American manufacturer.^{2,9}

Valves must be iron body, epoxy-coated, bronze mounted, solid wedge (sewage) or double-disc (water), non-rising stem type, and must be equipped with two (2) inch square cast iron wrench nuts.

Valves must have accordion-sleeve concrete-cap with a cast-iron metal-top identifier, i.e. potable water, chilled water, sewage, etc.

Above Ground Service (General)

Valves must be iron body, bronze mounted gate valves, solid wedge (sewage) or double-disc (water), with the exception that valves must be outside screw and yoke (OS&Y), rising stem type. Valves must have cast iron hand wheels or chain operators with galvanized steel chains.

Butterfly Valves (BFV)

Butterfly valves are not permitted.

PVC Ball Valves

PVC Ball Valves are not permitted.

Backflow Preventers

The assembly must be the reduced pressure type, with shut-off gate valves provided at each end, and must comply with the applicable provisions of AWWA Standard C506, "Backflow Prevention Devices--Reduced Pressure Principle and Double Check Valve Types". Backflow preventers must be manufactured by Wilkins. Provide type RPZ, model 975 XL for 2" lines smaller, or model 975 for 2 1/2" lines or larger for building installations. Provide type 350DA on fire mains, and type DC, model 950 XL of irrigation systems. For 2" or smaller, the pipe supporting the device must be copper. For 2 1/2" and larger, the pipe supporting the device must be ductile iron.^{2.10}

All backflow preventers must be installed with concrete pads and protected by yellow rounded-top concrete bollards.

All backflow preventers must be tested by a certified testing agency. Results of the testing and maintenance reports must be submitted to the university. Hose-bibs are not permitted on backflow preventers.

Backflow preventers and their associated connections, piping, and fittings must be provided with a painted finish suitable for the application.

- Fire = Red
- Potable Water = Blue
- Reclaimed Water = Lavender

Meters

Meters must be provided on all domestic water main connections. Approved devices are Badger Brand with telemetry capabilities.

All meters will be provided by the university and paid for from the project budget and installed by the Contractor.

All underground meters must be installed in a concrete box with a metal-lid.

Valve Boxes and Meter Boxes

All valve and meter boxes must be concrete with a cast iron cap with appropriate foundry cast identifiers.

Water Distribution Systems

Normal Flow Demands

Flow demands must be based on the output capacity of the water plant. Design of water systems must account for peak flow rates for the entire campus. The design documents must provide the methodology for the diversity factors used.

Fire Flow

It is the responsibility of the Architect/Engineer to perform the necessary field flow tests (at Owner specified peak time) as described in the Florida Fire Prevention Code (FFPC). **The Owner's Representative will schedule, witness, and approve fire flow tests prior to the design of the fire protection systems.**^{2.11}

Fire Hydrant Location

The location of fire hydrants must be determined by FFPC and approved by Owner.^{2.12}

A hydrant must be located within one-hundred (100) feet of Fire Department Connection.

Hydrants must be served by a valve stub not less than 6" IPS, and must connect to a main not less than 8" IPS. The Owner must be consulted in all cases where the existing main servicing the site is 6" IPS or less.

System Size Computation

The allowable minimum service pressure must not be less than 20 pounds per square inch. Design flows and method of computation must be indicated on the Construction Documents.

Valve Locations

Valves must be provided for all branch connections, main ends, fire hydrant stubs, or other locations.

Distribution loops must have the ability of being isolated.

Valves are to be placed so that the maximum allowable length of water main required to be shut-down for repair work must be two-hundred (200) feet in high density or five-hundred (500) feet in other areas.

Building water distribution systems must have backflow prevention devices installed.

Fire Hydrants - Approved Manufacturers

Mueller type 5 1/4-inch

Kennedy Guardian-K-81D 5 1/4-inch

Hydrants must be equipped with a minimum of one (1) pumper outlet nozzle 4-1/2 inches in diameter and two (2) hose nozzles 2-1/2 inches in diameter. Threads, nozzle caps, operating nuts, and cap color must conform to Orange County Standards. Barrel color must be yellow. Units must be traffic type with breakable safety coupling located below barrel break line to preclude valve opening. Valve must be compression type with 5-1/4 inches minimum valve opening and shoe inlet connection to be 6-inches minimum. Hydrants must be secured with restraining assemblies. All units must be designed and installed to be self-draining. Gravel or crushed stone for the drain sump must be provided.

Pipe Depth (Top of Pipe) Minimums

Water Distribution Systems Piping Depth – Three (3) feet

Irrigation Piping Depth – Two (2) feet

Chilled Water Piping Depth – Five (5) feet

Identification Tape and Tracer Wire

Locating tape capable of registering on a metal locator must be installed directly above the pipe center-line of all non-metallic pipe and buried to a minimum of six (6) inches and a maximum of twelve (12) inches. The tape must be laid continuously without gaps between ends over all installed piping. The tape must have the words "Caution, Water Line Buried Below" printed continuously along its length. A tracer wire must be laid on the top of the pipe and properly terminated above ground.

Testing

The Contractor must perform hydrostatic testing of all piping (with the exception of sewer) and must conduct said tests in the presence of Owner with five (5) days advance notice provided.

Hydrostatic testing must be performed at a minimum of 150 pounds per square inch pressure for a period of not less than two (2) hours.

Disinfection

Following pressure testing, the Contractor must disinfect all sections of the water distribution system, and receive approval thereof from the appropriate agencies, prior to placing in service. Advance notice must be provided to the Owner before disinfecting procedures start.

All internal parts on tapping machines, such as cutting heads, etc., will be disinfected in compliance with AWWA C601 and C900, prior to making any tap. The cutout must be provided to the Owner.^{2.13}

Sanitary Gravity Sewer Distribution

Peak Design Flows

Gravity sewers must be designed on the basis of the current system.

Design Considerations

Sewers must be installed with straight alignment and grade between manhole spacing not to exceed four-hundred (400) feet.

Sewers of different sizes must always join at manholes, with no size conversions between.

Flow direction changes in excess of 90 degrees must not be included in sewer alignments without special consideration. Where directional changes exceed 45 degrees, an extra flow line elevation drop (0.1 ft.) across manholes must be provided.

Lift station alarm systems must match existing campus SCADA Reporting System.^{2.14}

Each pumping station control system must match existing campus infrastructure.^{2.15}

Landscape Design Standards

Introduction

These landscape design guidelines are intended to supplement but not supersede any requirements, rules or regulations of any regulatory agency (e.g., Board of Trustees, Florida Department of Environmental Protection, St. John's River Water Management District) having jurisdiction over the Campus property. These guidelines must in no way limit the legal liability

of the landscape designer or contractor from full compliance with all government rules or regulations.

Identification and Definition of Typical Areas

The provisions of this section will apply to all construction related projects, including structures, roadways, pedestrian ways, and parking lots for any University construction site. This section applies to the following campus facilities and areas:

- Major Roadways
- Secondary Roadways and Service Roads
- Roadway Intersections
- Campus Entryways
- Parking Areas
- Pedestrian Walkways
- Building Landscape Areas
- Service Areas
- Buffers and Organized Open Space Areas
- Retention and Detention Pond Areas
- Recreational Areas
- Special Use Areas

General Landscape Development

Site Lighting

Site lighting must be designed by the Architect and approved by the Owner.

Landscape Accent Lighting is not permitted.

Natural Vegetation

Every reasonable effort must be made to preserve any natural vegetation existing on a site.

Existing trees with a trunk diameter of six inches (6") or greater, as measured twelve inches (12") above ground, must be located on an accurate topographic survey and included with submission of landscape plan.

Landscape plan submissions must include tree protection plans both within the construction area and outside lay down areas.^{2.16}

All existing trees identified to remain must be tagged in the field for inspection. Barriers must be erected at the drip-line of trees for protection against construction activities.

Any existing tree(s) indicated to remain (per approved construction plans) that are damaged or removed during construction must be replaced with new tree(s) of similar size.^{2.17}

Soil Requirements

All soils will be tested to determine the suitability of the existing soils for the proposed planting. The result of the soil test must be provided to the UCF Project Manager.

Suitable off-site soil material must be brought in if necessary to replace poorly drained or otherwise unsuitable on-site soil material.

Site Landscape Grading

Site grading of landscaped areas must be consistent with natural contours wherever practical. Grading of all open space areas near buildings must occur so as to gradually channel storm water flows away from the structure. Grading must be minimized in areas where indigenous or otherwise established vegetation is to be maintained. Berming for screening or open space definition is encouraged consistent with the berming guidelines of this section. The standard berm slope must be 6:1. Berms must not exceed 3:1 slope under any circumstances. Berms sloped between 3:1 and 4:1 must be planted with groundcover. Berms sloped between 4:1 and 6:1 may be planted with lawn or groundcover.

Irrigation Specifications

Irrigation Specifications will be provided by the Owner.

Roadway Area Landscape Development

Roadway Buffers and Medians

Landscape buffer areas must be established along all major collector and secondary/service roadways within the UCF Campus. Buffer areas may be considered as part of the yard areas of adjacent buildings or designated activity areas. Buffer areas must be maintained in their existing natural vegetative condition or landscaped according to the guidelines contained herein.

Roadway buffer widths must be established as follows:

- Major Collectors (i.e., Gemini Boulevard)—forty feet (40') measured from the edge of the pavement (curb, street or walkway) to nearest building edge or parallel vehicular use area.
- Secondary Roadways/Service Roads—twenty feet (20') measured from edge of pavement (curb, street or walkway) to nearest building edge or parallel vehicular use area.

At a minimum, lawn areas within and/or adjacent to roadways must be sodded with Argentine Bahia grass for the first twenty feet (20') adjacent thereto. Disturbed areas beyond the 20' must be seeded with the same species of grass. Trees, shrubbery and other groundcover must also be installed consistent with the guidelines below for major collector and secondary roadways/service roads:

Major Collector (Four-Lane Roadway)

Along all major collector roadways, at least one (1) canopy tree and three (3) understory trees must occur for every fifty (50) linear feet, or fraction thereof, of frontage (refer to graphic detail, "Major Collector Roadway Landscaping," at the end of this Division). Canopy trees must have a minimum overall height of fifteen feet (15') and caliper measurement of 3-1/2" Diameter at Breast Height (DBH). Recommended canopy trees must be Southern Magnolia; understory trees must be selected from the recommended plant list found in this guideline.

Where parking or other vehicular use areas are located adjacent to Gemini Boulevard, or other designated collector roadways, a landscape screen must be provided within the roadway buffer area, in a manner that does not create a safety hazard, as follows:

An undulating grass and landscaped berm with a minimum height of three feet (3') and a maximum height of four feet (4') above the finish elevation of the adjacent vehicular use area. Berm must be designed to not create a safety hazard. Berm slopes must vary in order to provide visual interest, however, the recommended slope must be 6:1. The berm must be composed of natural landscape materials. A berm must not be constructed around existing vegetation where the grade will be raised more than six inches (6").

Where it is desirable to preserve existing vegetation and the construction of a berm will create a conflict, a screen of living landscape material a minimum of three feet (3') in height at the time of planting may be utilized. Live screening materials must be planted in areas not less than six feet (6') in width. The screening must occur in the first six feet (6') adjacent to the vehicular area.

Where roadways are proposed to be built as median-divided facilities, these areas must also be considered for standard or upgraded landscape treatment, provided that said landscaping must not interfere with the functional storm water management characteristics that may be considered in the roadway design, nor pedestrian and vehicular traffic visual safety. Median landscaping must include at least three (3) understory trees for every fifty (50) linear feet. Shrubby and groundcover may be used to supplement the understory trees.

Secondary Roadway and Service Road (Two-Lane Roadway)

At least one (1) canopy tree and one (1) understory tree must occur for every fifty (50) linear feet, or fraction thereof, of frontage along secondary or service roads. Canopy trees must have

a minimum overall height of fifteen feet (15') and caliper measurement of 3-1/2" DBH. Recommended canopy trees must be Live Oak; understory trees must be selected from the recommended plant list found in Part 7 of this guideline.

Where parking or other vehicular use areas are located adjacent to a secondary or service roadway, a landscape screen must be provided within the roadway buffer area as follows:

An undulating landscaped berm with a minimum height of two feet (2') and a maximum height of three feet (3') above the finish elevation of the adjacent vehicular use area. Berm slopes must vary in order to provide visual interest, however, the recommended slope must be 6:1. The berm must be planted with landscape materials. A berm must not be constructed around existing vegetation where the grade will be raised more than six inches (6").

Where it is desirable to preserve existing vegetation and the construction of a berm will create a conflict, a screen of living landscape material a minimum of three feet (3') in height at the time of planting may be utilized. Live screening materials must be planted in areas not less than six feet (6') in width. The screening must occur in the first six feet (6') adjacent to the vehicular area.

Roadway Intersection Landscaping

When a collector roadway intersects another collector roadway, landscaping may be used to define the intersection, provided however, that all landscaping within the triangular area described in the graphic detail, "Roadway Intersection Landscaping," at the end of this Division must provide unobstructed cross-visibility at a level between two feet (2') and six feet (6') above finished grade.

When a secondary roadway intersects another secondary roadway, landscaping may be used to define the intersection, provided however, that all landscaping within the triangular area described in the graphic detail, "Roadway Intersection Landscaping," at the end of this Division, must provide unobstructed cross-visibility at a level between two feet (2') and six feet (6') above finished grade.

No landscaping materials, except grass and ground cover, must be located closer than three feet (3') from the edge of any roadway pavement. Intersections must be planted with a combination of understory trees and shrubs and groundcover; canopy trees must be included only in areas distant from the immediate intersection in order to maximize visibility and safety considerations. A generalized planting scheme is depicted in the graphic detail, "Roadway Intersection Landscaping," at the end of this Division.

Art-in-State Landscaping

All Art-in-State pieces must be placed in a landscaped or hardscaped bed with ten (10) feet of protection surrounding the piece.

Campus Entrance Landscaping

Campus entrances must be landscaped in such a fashion as to create dramatic sense of arrival and identity for the University. Primary entries must include campus signage (subject to approval by the University Signage Committee) and must be landscaped with a combination of canopy and understory trees, shrubbery and groundcover. See the graphic detail, "Campus Entrance Landscaping" at the end of this Division for a recommended planting scheme and definition of corner chords where landscaping is limited to grass and other ground covers.

Parking Lot Landscaping

Landscaping must be provided within and between vehicular use areas and contiguous sites as follows:

A hedgerow or shrubbery bed at least three feet (3') in overall height above grade when planted, must be used between the site limits and parking areas.

At least one (1) canopy tree and three (3) understory trees must occur for every fifty (50) linear feet, or fraction thereof, along the perimeter of parking areas. These trees must be canopy and understory trees selected from the recommended plant list.

Parking lot interior areas must be landscaped when parking lot islands, medians or divider strips are included in the design. The Facilities Planning and Construction and Physical Plant staff must make the determination as to whether these islands, medians, or divider strips are to be included. When required, these islands, medians or divider strips must be landscaped as follows:

Parking Lot Islands: Provide one (1) canopy tree for each two hundred (200) square feet of island area.

Parking Lot Medians: Provide one (1) canopy tree for every fifty (50) linear feet of median.

Parking Lot Dividers: Provide one (1) canopy tree for every fifty (50) linear feet each way of divider area.

All open spaces within parking lots must be sodded or planted with groundcover or shrubbery not to exceed 24" in height at maturity.

Bicycle Parking Facilities

Each site must be provided with a bike rack as per LEED requirements.

Building Area Landscape Development

Project Boundary

Prior to the commencement of design, the architect and engineer must consult with the UCF Project Manager to confirm the boundary of the proposed building project. The site boundary may extend to the nearest adjacent roadway, pedestrian walkway, building or other existing site area. This determination of the boundary for the particular project must be the area to be developed (or, in some cases, to be left natural) within the responsibility of the architect and engineer's plans. Much of the land surrounding a building will be for open space, but may be improved with lawns and irrigation. The section below describes the minimum standards for open spaces surrounding buildings.

Building Setbacks

The University reserves the right to specify which, if any, side or rear property line of a given site may in the future become the right-of-way line of a common roadway or pedestrian way. The side or rear site lines may require the setting back of all structures or facilities in accordance with all roadway frontage buffer provisions contained herein.

Open Space

A landscaped open area must surround each building or otherwise occur between the facade of the building and paved areas.

Trees must be planted adjacent to structures on the site at the equivalent of one tree for each thirty (30) linear feet, or fraction thereof, of front and side wall length. Tree canopies, at full growth, must not exceed the height of the building or extend over any portion of the roof structure.

Vegetation that will grow on any surface of the building or structure is not permitted.

Foundation Planting

Foundation and accent plantings must be planted along the perimeter of all structures.

Service Area Enclosures

Loading and service areas, including solid waste facilities, should be located at the rear or side of the building and must be completely screened (e.g. brick or concrete block that matches the building).

Site Signage

All building and roadside signage must be reviewed and approved by the University Signage Committee. Signage design must be compatible with the building and landscape area. Roadway signage must be designed in accordance with standards by Florida Department of Transportation (FDOT) and the Manual of Uniform Traffic Control Devices (MUTCD).

Seating and Retaining Walls

All exterior seating and retaining walls must be designed with integral anti-skateboarding devices.^{2.18}

Open Space Development

Pedestrian Walkways

Primary sidewalks must be provided to all building entrances and exits. Secondary sidewalks are to be designed and constructed at the end of the warranty period.

Landscaping in Developed Areas

In developed areas of the campus, the following standards apply:

- Primary walkways must be bordered by Live Oak trees.
- Secondary walkways must be bordered by canopy trees.
- Trees must be located a minimum of six feet (6') back from the sidewalk edge. The spacing and selection of trees may be influenced by the character of existing or planted vegetation on the site.
- Tree locations must be coordinated with fire lane requirements.

Retention and Detention Ponds

The University of Central Florida has a storm water master plan. Individual projects must discharge storm water into the master system.

On-site retention or detention ponds are not permitted. New storm water ponds must be designed and constructed in a naturalistic shape, rather than a geometric shape. Littoral zones and aquatic plantings are required.

Existing trees must be protected.

Fencing

Fencing materials must only be used in recreational activity areas. Plant material proposed for use adjacent to fenced areas must be approved by the Owner.

Land Forms and Grading

Grading of landscaped open space areas must be consistent with natural contours. The grading of all open space areas near buildings must channel storm water flows away from the structure. Grading must be minimized in areas where indigenous or otherwise established vegetation is to be maintained.

Recreational Features

Recreational areas with natural grass must be irrigated. These areas may require screening.

Landscaping for passive recreation areas will depend upon the function of the specific area.

Site Design

Project Siting

Siting of the building must consider traffic and pedestrian patterns. Utilization of open space within the site is critical.

Site Drainage

The entire site must be graded to provide positive drainage away from the building.^{2.19}

Site drainage for new construction must be tied to the existing storm water drainage system.

Storm Drainage

All storm water runoff from paved areas must be collected in inlets and carried by underground pipe to retention areas. Open ditch runoff is not permitted.

Roof Drainage

Provide appropriate drainage design to accommodate roof drainage from the building or facility.

Roof drainage must be tied into the underground storm water system unless a local cistern is incorporated into the project. If a cistern is used, overflow must be directed to the campus storm water system.^{2.20}

Division 03 – Concrete

All concrete must conform to the current American Concrete Institute (ACI) standards.

Concrete Reinforcement

Plastic supports (reinforcing chairs) are required in exposed locations.

Pipe Shafts

Proper seals with sleeves must be used where pipes pass through walls and floors. If expansion space is needed, proper filler must be used.

Bush Hammer Finish

Bush Hammer Finish must not be used on pre-cast concrete.

Exposed Vertical Concrete Wall Finishes

"Ply-form" must be used on all formwork for exposed vertical surfaces.

Snap-Tie-Cone-Holes

All snap-tie holes must be filled and finished smooth with adjacent surfaces.

Sidewalks and Ramps

All sidewalks must be a minimum of six (6) inches thick and must be reinforced with wire mesh.

Thickened edges are required on sidewalks greater than ten (10) feet.

Fire lanes must be able to support gross vehicle weight of thirty-two (32) tons.

All expansion and control joints must be detailed to ensure straight appearance.

Stairs

All exterior concrete stairs must be pre-cast. Interior stairs may be pan filled.

Cast-in place stair systems must not be used.^{3.1}

All ramps, stairs, landings and exterior walks must have an integral non-slip finish.

All steps constructed for general-purpose use must be designed in compliance with the Life Safety Code as indicated in the "Stairs" section. Ships ladders or other similar fire escape type stairs shall only be considered for restricted access applications. Applications where equipment or materials will be carried will require standard stairs to ensure adequate footing for staff.

Division 04 – Masonry

All masonry must be in accordance with the current Brick Institute of America's (BIA) Technical Notes, the current American Society of Testing Materials (ASTM) standards and the current American National Standards Institute (ANSI) standards.

Mortar

Tinted or colored mortar must not be used.^{4.1}

Admixtures

Plasticizers, accelerators, retardants, water repellent agents, or other admixtures are not to be used for mortar.

Tolerances

All full height masonry walls, exterior and interior, should be built tightly against the floor or deck construction above.

Wall Mock-Up (Sample Panel)

A mock-up must be prepared for review and approval. Mock-ups must be erected in four (4) feet by four (4) feet panels, including specified mortar and any accessories. When accepted, the mock-up will demonstrate minimum standards for the Work. Color and blend of face brick must generally match brick work in adjacent buildings. The specifications prepared by the architect must call out the erection of the mock-up panel and clearly state that the mock-up panel must be approved in writing by the university before any brick must be ordered and before the Guaranteed Maximum Price (GMP) is submitted to the university. The panel must not be removed until masonry work is completed or until removal is authorized.

Concrete Unit Masonry

All exposed external concrete block corners, which extend to the floor or to top of base, must be bull-nosed. Rub out all casting irregularities (so as to result in smooth transitions from flat face to rounded corner) before any finish treatment is applied.

Weeps and Vents

Weep systems must be installed as required.^{4.2}

Joint Reinforcement and Split Coursing

“Split coursing” must be checked at the head of any type of opening.

Size

All face brick must be standard size (8" long x 2-½" high x 3-¾" wide) with net cross-sectional area not less than 75% of the gross area in the same plane, and with core holes not less than ¾" from any edge.

Coursing

All brick must be laid with modular coursing, three courses to 8", unless otherwise required to match existing coursing or to accentuate an architectural feature or pattern. ASTM standard must be complied with for all face brick, Grade SW, Type FBS. In addition, manufacturer's certification will be required stating that the rating for effervescence is not more than "slightly effervesced" in accordance with ASTM.

Glass Unit Masonry

Glass Unit Masonry must not be used on building exteriors.^{4.3}

Masonry Cleaning

The BIA Technical Notes must be referred to for bulletins covering cleaning. Cleaning should be done sufficiently early for the walls to dry thoroughly; at least four weeks prior to application of silicone or other recommended waterproofing. Specify that brickwork must be inspected prior to application of waterproofing.

Cleaning Materials

Cleaning agents of detergent or solvent must be used. **Acid solutions must not be used.**^{4.4}

Exterior Waterproofing

Any exterior waterproofing being applied to masonry or stone-walls must be approved by the Owner.

Division 05 – Metals

All metal components must conform to applicable ASTM requirements and must include gratings, castings, supports for ceiling hung equipment and framed partitions, construction inserts and fastening devices, expansion joint inserts and covers, stair nosing and access doors for both ceiling and wall applications, vertical ladder for elevator pit; welded steel ladder (to meet OSHA). Elevator pit sump gratings; corner guard angles; steel angles, channels and clips; pipe sleeves for mechanical and electrical trades; trench drain gratings and frames; galvanized steel corner guards and, miscellaneous structural shapes.

Site Painting

All primed iron and steel items must be corrected at the jobsite.^{5.1}

Structural Metal

All structural steel Work must meet AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and applicable ASTM Standards.

All facility components must be of non-wood and non-combustible materials except as noted in Division 06.

Metal Fabrications

Use galvanized steel angles in all exterior masonry, stone, or precast concrete walls and in all interior walls where used in conjunction with stone.

Handrails and Railings

All handrails and posts must be brushed aluminum pipe. Painted handrails are not permissible.^{5.2}

Tree Grates

Tree grates must be dimensioned as required with concentric patterns having iron frame sections and iron grate bolted to the frame. Grates must be sized or adjustable for twenty (20) years of growth for specific species.

Tree grates must be capable of handling pedestrian and vehicular traffic.

Expansion Control

The system must be complete and of compatible materials to produce waterproof expansion joint seals.

Stairs

All ramps, stairs, landings and exterior walks must have an integral non-slip finish.

All steps constructed for general-purpose use must be designed in compliance with the Life Safety Code as indicated in the "Stairs" section. Ships ladders or other similar fire escape type stairs shall only be considered for restricted access applications. In applications where equipment or materials will be carried standard stairs are required.

Division 06 – Wood and Plastics

Wood materials must not be used for any structural elements.^{6.1}

Pressure Treated Lumber

Pressure treated, and fire rated material (where applicable), must be used for all lumber in contact with concrete, masonry or steel.

Laminated Plastic

Plastic laminates must be installed per manufacturer's recommendations. This material must meet flame spread rating requirements of Florida Fire Prevention Code (FFPC).

Millwork

Back-Painting

Wood must be back-painted before setting.

Edges of door sections used to make up closet walls must be concealed.

Wood Railings

Wood handrails must not be used.^{6.2}

Division 07 – Thermal and Moisture Protection

The Architect, Engineer, and Construction Manager must coordinate with the university's building envelope consultant.^{7.1}

Roofing - "Special Treatment"

The Architect and Engineer must adhere to the latest State University System Standard Practice for Roofing.^{7.2}

Implementation of a modular green roof and associated storm and condensate water capture must be considered and evaluated for all University buildings. The decision to proceed with the design and development of the green roof, including additional requirements, will be made at the Advanced Schematic design level. Costs associated with the green roof must be reviewed by the Facilities and Safety AVP.

The evaluation must include the following requirements:

The energy model must be updated periodically throughout the design phase to reflect the specific benefits of the green roof, including enhanced insulation values and proportional and projected energy saving.

The cost for the enhanced structure and roof membrane required for the green roof and associated walkways and safety features.

The cost for the actual green roof system, apart from the other building elements, including installation.

The effects of the green roof on the building's roofing and drainage system, especially the roof warranty.

The cost for any associated storm water system, which may be required.

The cost for the long-term maintenance of the green roof.

A detailed summary of all costs for the proposed green roof system to quantify a total cost.

Using the total cost and the total energy savings, compute a life cycle cost analysis.^{7.3}

Sheet Metal Flashing and Trim

Aluminum or stainless steel flashing assemblies are required.

Gutters and Downspouts

Interior gutter systems are not permitted.^{7.4}

Gutters and downspouts, hangers, straps, and shoes must be completely detailed.

Skylight Structures

Traditional skylights are not permitted.^{7.5}

Sealants, Caulking and Seals

All sealants must have a thirty (30) year warranty.^{7.6}

Red-tone fire caulk must be used to seal all firewalls.

Roofing

Scuppers

Overflow scuppers must be provided in parapet walls.

Roof Access

The use of portable ladders for primary roof access is not permitted, except for single story buildings. A permanent stair access to all roof levels must be provided. All levels of roofs must be made accessible by permanent means.

Roof Mounted Equipment

The utilization of curb-mounted roof equipment is not permitted.^{7.7} Exceptions: hood exhaust, toilet exhaust, and smoke exhaust, or as approved by the Owner. Projects for re-roofing buildings that currently have roof-mounted equipment must include removing and relocating such equipment.

Primary Roof System

Single ply membranes are to be used on roofs with minimal equipment and traffic. All other roofs must be modified bitumen with Energy Star compliant cap sheet.^{7.8}

Walk paths

All roofs must have three (3) feet wide continuous walking pads from equipment to egress and must be of the same material type as the roof membrane.^{7.9}

Modified Bitumen Minimum Requirement

Metal deck, lightweight concrete, rigid insulation (R-30 minimum in all areas), base sheet, two inter-ply sheets, and white cap sheet.

Single-Ply Membrane Minimum Requirement

Metal deck, lightweight concrete, rigid insulation (R-30 minimum in all areas), and white, ~~0.045~~ 60 mil membrane that is either mechanically or adhesively applied.

Standing Seam Metal Roof Minimum Requirement

Metal deck with white standing seam roof panels mechanically fastened and laid-in insulation (R-30 minimum in all areas) with a fifty (50) year warranty.

Wind Lift Requirement

All roofs must meet ~~120 mph wind lift requirements~~ 130 mph wind lift requirements with a 130 mph wind rider.

Testing

A pull test must be witnessed by the Owner and written results must be submitted to the Owner prior to the manufacturer warranty being issued.

Within a period of three (3) to six (6) months after Final Completion, an aerial infrared scan of the roof must be performed by the Contractor and the results must be transmitted to the Owner.^{7.10}

Roof Curbs

For acceptable rooftop equipment, provide minimum twelve (12) inches high-insulated roof aluminum curbs with three (3) inches built-in cant.

Warranty

All roofing systems, unless otherwise specified, must have a ~~twenty (20) year~~ twenty-five (25) year no dollar limit (NDL) materials warranty issued by the manufacturer and a five (5) year labor warranty.

Shingled Roof Minimum Requirement

Thirty (30) year white, Energy Star compliant, architectural antimicrobial impregnated shingles are required with plywood decking. Pressboard and particleboard are not permitted.

Qualifications

All roofing installers must be certified by the roofing materials manufacturer.

Pre-Installation Conference

All roofing details must be reviewed and approved by the Owner, prior to the pre-installation conference.^{7.11}

Conference must convene one (1) week prior to commencing work of this section at project site, with 72 hours minimum notice to participants. The conference will include General Contractor or Construction Manager, Roofing Contractor, Subcontractors, University Building Envelope Consultant, Architect, and the Owner Representatives.

Conference Agenda Requirements

Agenda must include Contract Documents, submittals, sequencing, availability of materials and installation facilities, proposed installation schedule, requirements for inspections and testing or certifications, forecasted weather conditions, governing regulations, insurance requirements, worker qualifications, and proposed installation procedures. Address roofing system protection requirements for the construction period extending beyond roofing installation.

Minutes must include all discussions on matters of significance; a copy of the minutes must be provided to each participant.

Safety Requirements

Power driven shot fasteners are not permitted.

Hot mop applied roof products are not permitted in roof applications.^{7.12}

Products

Tapered Drain Sumps for use with Rigid Insulation 3000 psi structural grout or concrete with chopped fiberglass strand temperature reinforcement admixture; 4'-0" by 4'-0" overall size, ½" per foot minimum slope.

Cleaning

The roof must be thoroughly cleaned prior to turnover and must be approved by the Owner.

Protection

Once the final roof membrane is installed, the Contractor must protect it against damage until final acceptance.

Roofing Requirements

The selection of roofing materials must be limited to those manufacturers with a twenty (20) year history of satisfactory manufacture.

Utility supply lines (electrical, water, gas, etc.) to roof-mounted equipment must be installed within the supporting curb of that equipment.

The Owner must approve roof-mounted antennas.

Pitch pockets are not permitted.

A minimum slope of 1/4" per foot is required on all areas of the roof system before final acceptance of that roof system by the university.

Access door thresholds to the roof must be 12" above the adjacent roof surface with a ramp provided for equipment maintenance. An acceptable walking surface must be installed immediately outside the access door threshold on the roof system. The access door must be directly connected to the building stairs. No roof hatches are allowed. Provisions must be made for the movement of heavy equipment.

Re-saturants must not be used to rejuvenate an existing built-up roof system.

All thermal insulation must be installed at the roof deck. Insulation laid on suspended ceilings is not permitted.^{7.13}

Division 08 – Doors and Windows

General

All doors must be installed with a minimum of three (3) hinges with four (4) screws in each hinge.

Doors opening out into corridors or other pathways of pedestrian traffic must be recessed.

Doors must be installed so that the gap around the edges of doors and at meeting edges of pairs of doors does not exceed 1/8" (except where fire rated doors require more stringent tolerances). Additional means of gap covering must be provided where either code required or the room use dictates privacy.

All doors to laboratories or similar areas where chemicals are used, dispensed, or transported must be provided with a view panel to coordinate pedestrian traffic. Areas with lasers or light sensitive research do not necessarily apply. Panels in fire rated doors must be suitable for the application.

Specialty folding egress doors, similar to "Won" or overhead drop down type shutters for rated opening protection, must not be used for general area separation, egress, or convenience paths. Regular side hinged type doors requiring minimal annual maintenance shall be specified for all applications.^{8.1} Shutters will only be considered for service window openings and garage doors.

All double doors must be designed with a removable stile. All exterior roll-up doors must be insulated and properly weatherproofed.

Building Entrances

All building pedestrian exterior entrances must be designed with a recessed entrance grating or grid to collect tracked-in dirt and to provide positive drainage.

The design should be similar to KADEE Industries, Inc., Arc Clean Tread, SSS Clean Tread, or Deco-Guard Products, Inc.

Public Entry Doors

All public entry doors must be recessed at a minimum of four (4) feet to prevent water intrusion.

Aluminum and glass "store front" entrance doors will be used for public entries. If additional aluminum framing and glass is used with the doors, compatibility is required. Glass awnings are not permitted.

Service Doors

Exterior service and limited access doors and frames must be hollow metal. Inclusion of glass view panel in the doors is determined by the door location or function. All service doors must be insulated.

Overhead Doors

Overhead or double doors must be provided on all loading docks. The doors shall be at least eight (8) feet high and ten (10) feet wide. Larger doors may be required depending upon the function of the building.

Power Door Openers

For hinge-type, only **one door** in each pair shall be activated by the door opener for ADA purposes.

Steel Doors and Frames

All frames must be at least 14 gauge.

If fume hoods or other large equipment is installed in a room, the width of the doors must provide adequate clearance for moving items.

All exterior doors must be insulated metal doors with adequate weather stripping utilized to conserve energy. If glass is used, the glass must be thermal safety glass and non-reflective.

All operable items on exterior doors must have an integral finish - not applied, painted, baked on, etc.

Wood Doors

All wood doors must meet the Standards of The National Woodwork Manufacturers Association (NWMA).

All corridor doors and closet doors must be 1 ¾" solid core, and must be able to use standard locksets. Where cutouts for closers are required, the head rail must be six (6) inches or greater. All doors must have hardwood edges.

Interior doors must be solid or solid core, three (3) feet wide with a minimum height of seven (7) feet.

Classroom and laboratory doors must have wired glass view panels set in steel framing or stops according to code.

Wood doors must not be used on exterior of the building.^{8.2}

Windows

Operable windows must not be used.^{8.3}

Metal Windows

All metal windows must be a minimum dual pane glass and thermal break-insulation filled frames.

All classroom windows must be equipped with audiovisual blinds or acceptable window coverings.

Guardrails at all full height glass panels must be used in accordance with applicable codes.

Finish Hardware

The university will provide the consultant with the finish hardware schedule, standard locking, and keying system prior to the 50% Design Development phase.^{8.4}

Glazing

The types of glass and locations used must be reviewed by the University Building Envelope Consultants and approved by the Owner.^{8.5}

Division 09 - Finishes

General Material and Finish Standards

The selection of materials must be assessed for long range, life-cycle cost analysis.^{9.1}

The Architect must provide a non-returnable detailed interior color board, which demonstrates all color selections in the form of an over-all project color palette, to the Owner and it must be approved by the Owner.^{9.2}

The Architect must coordinate all color and material color selections prior to the product being ordered with the University Project Manager.^{9.3}

Color schedules must be reviewed with the Owner at the 50% set of construction documents phase.^{9.4}

All sheetrock must be a minimum of 5/8" thickness, Type X, and moisture resistant. Sheetrock must not be installed until the building is adequately dried-in to prevent sheetrock from developing mold and mildew issues.^{9.5}

Schedules and samples must be provided for interior finishes, such as paint, baseboards, carpet, tile, bathroom partitions, etc., as well as exterior finishes, such as paint, roof shingles, and glazing.

Vinyl wall coverings must not be used.

Samples of ALL finishes and finishing material must be submitted to the Owner for approval PRIOR TO ORDERING.^{9.6}

Where concrete finishes or brick work is required, a sample square of at least 4'-0" must be submitted.

Lath and Plaster

Galvanized steel metal lath in conjunction with acoustic plaster to eliminate rust stains must be used.

All lathing accessories must be made of zinc alloy.

Exterior stucco finishes are not permitted.^{9.7}

Tile

The Architect will determine preferences for finishes from conferences with the University Project Manager for approval by the Owner.

Quarry Tile

Quarry tile is the preferred material for stairways, corridors, kitchens, and for many other areas both interior and exterior.

Where quarry tile is used for stairs, it must have an integral abrasive surface.

Quarry tile nosing must be replaceable.

Quarry tile used for exterior slab finishes must have an integral non-skid surface.

Ceramic Tile

The current edition of "The Handbook for Ceramic Tile Installation," published by the Tile Council of America, must be used.

Ceramic tile must be used for floors and walls or wainscots in toilet rooms as well as in some laboratories. Toilet room floors must have dark grout.

Shower Room Walls

Ceramic tile on a masonry wall is insufficient to prevent water from permeating a shower room wall. Design must include adequate means of waterproofing.

Carpeting

All carpet must be direct glue down.^{9.8}

Carpet must be made of at least 70% recyclable materials and have stain resistant treatment.

Integral multicolored schemes must be used.

Carpet squares or rolled carpet may be used.

Rooms and Corridors

Class "A" or "B" carpets must be used in all areas of instructional and general office buildings.

Stairways

Stairways must not be carpeted.^{9.9}

Replacement, Remnants, and Maintenance

Replacement carpet, remnants, usable scrap, and overage in carpeting must be packaged in appropriate protective wrapping, labeled, and delivered to the Owner in coordination with the attic stock turnover requirements.

Requested number of copies of a printed maintenance manual written by the carpet manufacturers Technical Service Department must be delivered to the Owner.

Suspended Acoustical Ceilings

All acoustical ceilings must be designed, not only for the noise reduction coefficient, but also by tile thickness.

Adhesive tiles are not permitted.

Acoustical tile is not permitted in residence halls.

Subject to project requirements, one of the following must be used:

- Type C-1: Scored panels with painted finish and perforated and fissured pattern, fire-resistance rated; 2'x2' panel sized for installation in 15/16" fire rated grid system where applicable.
- "Mylar RH90 Fire Guard," Armstrong (Basis of Design). Hytone series, "Protectone Baroque Customline," #PBQCL-224; Celotex Auratone series, "Fire Code Illusion Omni Fissured," #3472; USG
- Type C-2: Vinyl faced panels, with non-perforated pattern, fire resistance rated panels; 2'x2' sized for installation in 15/16" fire-rated grid system. "ML Fire Guard," #874; Armstrong World Industries, Inc.
- Type C-3: Scored panels with painted finish and perforated and fissured pattern, non-fire-resistance rated; 2'x2' panel sized for installation in 9/16" non-fire-rated grid system. "Suprafine 1000," #6467; Armstrong (Basis of Design), Auratone series, "Fine Fissured," #3354; USG

Suspension Systems

Suspension systems must be hung only from structural framing members. Do not hang suspension systems from metal roof decking, sheet metal ductwork, pipes or conduits.

Placement of cast-in-place anchors and expansion anchors must be coordinated to ensure that no anchors are placed in the bottoms of precast "joist" sections of concrete systems.

Where widths of ducts and other construction within ceiling plenum interfere with the location of hangers at required spacing (4'-0" O.C.) to support standard suspension system members, supplemental suspension members and hangers in form of trapezes or equivalent devices must be installed. Supplemental suspension members and hangers must be sized to support ceiling loads within performance limits established by referenced standards.

Painting

All paints must meet LEED criteria for Volatile Organic Compounds (VOC).

Application

All paint materials must be applied in accordance with manufacturers' directions at not less than the recommended spreading rate. A total dry film thickness of the entire system must be provided as listed herein or recommended by the manufacturer, whichever is the greater.

All sheetrock installed in occupied spaces must be prepared for a Level 5 finish.

All mechanical rooms must be painted at Level 3 finish.

Exterior Concrete and Masonry (other than concrete masonry units):

- Lusterless (Flat) Acrylic Finish: Two coats with total dry film thickness not less than 2.5 mils.
- Zinc-Coated Metal: High-Gloss Alkyd Enamel: 2 finish coats over primer
- Interior Concrete: Semi-gloss Enamel Finish: 3 coats with total dry film thickness not less than 3.5 mils.
- Interior Concrete Masonry Units: Semi-gloss Alkyd Enamel Finish: 2 coats over filled surface with total dry film thickness not less than 3.5 mils, excluding filler coat.

All interior mechanical room floors must be sealed with a non-slip epoxy finish.

Gypsum Drywall Systems

Semi-gloss Alkyd Enamel Finish: 3 coats with total dry film thickness not less than 2.5 mils.

Plaster Ceilings

Lusterless (Flat) Emulsion Finish: 2 coats.

Semi-gloss Enamel Finish: 3 coats with total dry film thickness not less than 2.5 mils.

Stained Woodwork (Trim, Doors, etc.)

Stained-Polyurethane Finish
Stain Coat: Oil-Type Interior Wood Stain
Second Coat: Satin Polyurethane Finish
Third Coat: Clear Gloss Polyurethane Finish

Ferrous Metals

Semi-gloss Enamel Finish: 2 coats over primer with total dry film thickness not less than six (6) mils.

Millwork

A clear-coat finish must be used on all interior doors.

Shower Room Floors

A fluid applied synthetic polymer waterproof membrane must be applied on all ceramic tile floors. The membrane must be compatible with the mortar.

All shower floors must be installed with a pan.

Exterior Waterproofing

When required, a siloxane or silane solution containing material must be used. Products which have been used and found acceptable are: Professional Products of Kansas.

Miscellaneous

Undercoats will have slightly different tints and must be inspected by the Architect and approved by the Owner prior to application of the next coat.

The university will issue information to assist the Architect in specifying the quality of paint required. This information will contain acceptable vendor products as well as paint specifications for specific types of paint and their application.

Hollow metal door-frames in masonry walls must be back-painted prior to installation.

Wall Paint Finish Types

VIP offices and conference rooms must be eggshell or flat.

UCF Design, Construction, and Renovation Standards (04-28-11)

Classrooms, common areas, offices, corridors, service areas, custodial rooms, mechanical, electrical rooms, and telecom rooms must be semi-gloss.

Restrooms, food service areas, and break rooms must be gloss.

Special Floor Coatings Finish Types

Mechanical, electrical, telecom, and recycling rooms must be non-slip epoxy sealed.

Division 10 – Specialties

Teaching Aids

Tack-boards

Sizes and locations of tack-boards must be coordinated with the Owner.

Dry-Erase Boards

Fixed dry-erase boards must have at least four (4) map hooks per eight (8) feet of length. The tops must be specified at seven (7) feet above the floor.

Restrooms

Restroom Partitions

Waterless urinals are not permitted.

Toilet partitions must be one-inch (1") solid plastic.

Toilet partitions must be mounted to the structure with independent overhead reinforcements and wall brackets.^{10.1} Toilet partitions must not be mounted on the ceiling-grid.

Floor mounted partitions are not permitted.

Urinal screens must be wall mounted.

Toilet and Bath Accessories

The following accessories must be provided:

Feminine Napkin Disposal Container

A partition mounted, plastic receptacle with cover must be provided in each toilet compartment.

Mirror

Stainless steel framed without shelf above each lavatory.

Owner Provided and Contractor Installed Equipment

Soap Dispenser, Toilet Tissue Dispenser, and Towel Dispenser will be Owner provided and Contractor installed.^{10.2}

Waste Receptacle

Must be stainless steel, Owner provided, and free-standing..

Coat Hooks

One coat hook must be provided on the back of each toilet stall door.

Exterior Louvers and Vents

Exterior louvers must be extruded aluminum, horizontal drainable blades, and must include bird screens.

Wall and Corner Guards

High impact vinyl and stainless steel must be used.

Identifying Devices and Signage

The university will assign room numbers to **all** spaces during the review of the Design Development Phase. **All assigned rooms must have University standard signage denoting the room number.**^{10.3}

These numbers must be documented on the construction bid documents and used under doors, hardware, etc.

Identification systems, especially for piping, must be included.

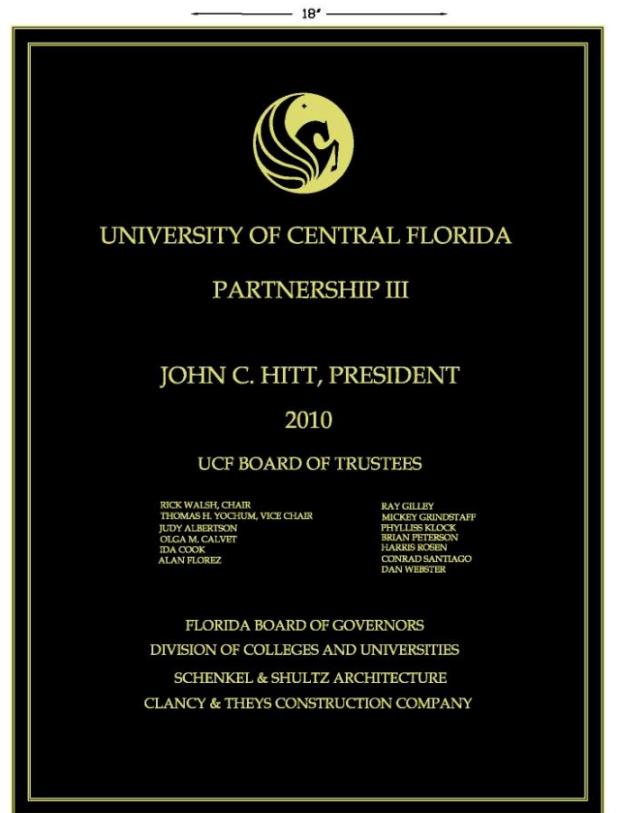
Pavement marking, including graphics, must be included.

Building Plaques

The location and placement of specialty plaques must be graphically presented to the Standards Committee for review and approval. **The year on the plaque must match the year of final completion. The names on the plaque must match the active Members of the Board when the construction contract was signed.**

A printed copy of the “draft” plaque must first be sent to Constituent Relations and then to the Associate Vice President of Administration and Finance (Facilities and Safety) for review and approval (in writing) of the names shown and spelling prior to casting.

All University buildings must have a cast bronze building plaque per the following example:



FONT : BOOKMAN ANTIQUA
FONT SIZES : 1/2", 3/8", 3/16", 5/16"

Signs

In addition to the minimum code required information, each stair floor-level landing shall be provided with the Building Number, Stair Number, and Floor Level.

Exterior Site Identification

The primary site identification device is a building mounted letter light sign.

Interior Room Identification Signs

The University will provide samples of the following minimum required signs. All signs must adhere to the University Signage Committee Standards.

Sign Index

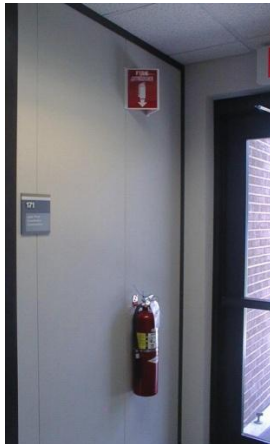
TYPE	DESCRIPTION
B	Road Sign
D	Interior Room Identification
H	Directory Sign
J	Conference Room Sign with Slide
K	First Aid Sign
L	"In Case of Fire..." Sign
M	Symbol Signs (wheelchair, restrooms)

Specialty Signage

Specialty signage must be presented to the UCF Project Manager and must be approved by the Associate Vice President of Administration and Finance (Facilities and Safety).

Fire Extinguisher Signs

Provide signs at all fire extinguisher locations as pictured below with white letters on red background including arrow and symbol. The sign shall be minimum one-eighth (1/8) inch thick rigid white acrylic in a V-shape (70 degrees), approximately six (6) inches tall, nine (9) inches wide and five (5) inches deep. Mounting type with a minimum of one (1) screws per side edge at a height of eighty-four (84) inches A.F.F. the bottom of the sign, or higher as coordinated with area finishes for the best visibility.



General Life Safety Signage

Each building must be provided with the following safety signage:

"**No Parking Fire Lane**" signage at all locations deemed necessary by the State Fire Marshal including but not limited to at the FDC, the fire department route\lane, area hydrants, BFP, PIV, etc.

The letters "**FDC**" must be mounted in addition at the location of the FDC above or below the "No Parking Fire Lane Sign" closest to the FDC.

The emergency disconnects to each must be separately labeled as "**Main Shunt**" or "**Emergency Shunt**". The numerals 1 of 3, 2 of 3, etc. to be added as appropriate for each situation. Where disconnects are within and enclosed room "**Disconnecting Means Within**" must be provided in large letters adjacent to the room.

Each FDC, backflow or PIV must be provided with a permanent hangtag denoting the building served numbers "**###**" and "**abbreviated name**" where it can easily fit.

Each building must be provided with minimum six (6) inch numerals denoting the matching building "**###**" and located so it can be seen from the fire lane and FDC. More than one sign may be required on larger buildings.

Exterior and Interior Signage - Health Sciences Campus at Lake Nona

Signage Standards for the Health Sciences Campus at Lake Nona are [available in PDF format](#).

Signage

Any building or roadside signage will be subject to the review and approval of the Associate Vice President of Administration and Finance (Facilities and Safety). Signage design must meet the standards and be compatible with the building and the landscape area where it is to be located. Roadway signage must be designed in accordance with the Florida Department of Transportation (FDOT) and the Manual of Uniform Traffic Control Devices (MUTCD) standards as required.

Building Signage

The University has established a uniform building signage program for all main campus buildings. The Associate Vice President for Administration and Finance (Facilities and Safety) must approve all exterior signage.

Letter-Light signs for building names and the Pegasus Logo must be provided on all major campus buildings. Both the Letter-Light signs and the “Pegasus” Logo must be back-lighted and must also use PMS 874 “Metallic Gold” for color. All Letter-Light signs must be in “Garamond Bold” with Upper and Lowercase letters. Letter-Light signs are to be designed proportional to the space in which they are to be installed. The “Pegasus” must ALWAYS face to the right.

Information regarding the “Pegasus” can be found on the UCF Marketing website at: http://www.umark.ucf.edu/images/pdf/Graphic_Standards81507.pdf. Pages 6 and 7 contain Pegasus information and page 10 contains design information.



Fire Extinguishers

Units must be located in common or corridor spaces in recessed cabinets. Key-locked or break-glass type fire extinguisher cabinets are not permitted. If the cabinet door is adequately labeled, viewing glass is not necessary. Specify only hook and eye (J-Type) or strap-in type mounting design for all extinguishers not in cabinets. Extinguishers must have all metal head assemblies. Plastic is not allowed. All extinguishers shall be five (5) pound or ten (10) pound sized as needed to adequately cover the area unless code or specific hazard requires larger. Carbon dioxide (or approved equivalent) extinguishers must be used where clean agent is needed. Halon is not approved for use.

Approved manufacturers: Amerex, Badger or J. L. Industries Inc.

Units must be tagged within three (3) months of the certificate of occupancy date. All fire extinguishers must be provided with an identification sign mounted above the unit.

Pallet Racks

Pallet rack must consist of teardrop style, 2" adjustable, 192" high by 42" deep uprights with a minimum weight capacity of 18,000 pounds; 96" or 120" beams with a minimum weight capacity of 5,400 pounds. The top beam must have full width welded open wire decking; all remaining beams must have front-to-back safety crossbars (4 per beam).

Pallet racking must have post protectors at the upright on both ends of each row, bolted securely to the floor. All pallet racks must be securely fastened to the floor, and back-to-back rows must be tied together with steel row spacers for stability. Beams must be securely attached to uprights, and have a safety lock. Each rack location must have three (3) pairs of beams (spacing will be determined based upon individual products to be stored).

All uprights and beams must have labeling which clearly indicates the maximum rack load capacity in compliance with Rack Manufacturers Institute (RMI) specifications. Labels must include weight limits, RMI caution, and RMI compliance statement.

Recycling

A two (2) feet by five (5) feet setback must be provided to accommodate recycling bins in the hallway of each floor^{10.4}

A 200-square foot recycling room must be provided within close proximity to the loading dock. The room must have seamless vinyl flooring with seamless cove base with a floor drain in the center of the room.

A screened area outside of the building must be provided for trash and recycling totes.

Trash and Custodial

Custodial equipment and supply storage rooms must be provided as outlined in the charts below. If building is multiple stories, provide one area per floor. Each room must be square in shape without pass through rooms. Power must be provided in all closets.

Data connections must be provided in all first floor closets. A Traka key-type security box and Kronos time clock must be provided.

Each room must have seamless vinyl flooring with seamless cove base, wall shelving space, and a floor mop sink, which must be precast, corner splash pans with a maximum four (4) inch front curb (as pictured), hot and cold water service, and trap drains.



Custodial Room Mop Sink Arrangement

Requirements for Central Custodial Room

One per Building; First Floor Only

Equipment Description	Qty.	Dimensions	Space Required (sq. inches)
Janitor's Cart	1	24" x 54"	1296
Locker	1	24" x 20"	480
Wet & Dry Vacuum	1	27" x 31"	837
Blower	1	24" x 24"	576
Desk	1	24" x 30"	720
Utility Sink	1	20" x 24"	480
Mop Bucket	1	22" x 22"	484
Buffer	1	26" x 22"	572
Shampoo Extractor	1	36" x 36"	1296
Floor Burnisher	1	36" x 27"	972
Vacuum Cleaner	1	24" x 20"	480
Trash Barrel	1	36" x 36"	1296
Boxes of Paper Towels	1	16" x 29"	464
Boxes of Toilet Paper	1	16" x 29"	464
Trash Toter	2	39" x 36"	2808
Circulation Area	1	60" x 60"	3600
		Total (sq. in.)	16,825
		Total (sq. ft.)	117

Requirements for Central Custodial Room

Every Floor except for the First Floor.

Equipment Description	Qty.	Dimensions	Space Required (sq. inches)
Janitor's Closet	1	24" x 54"	1296
Locker	1	24" x 20"	480
Utility Sink	1	20" x 24"	480
Mop Bucket	1	22" x 22"	484
Buffer	1	26" x 22"	572
Vacuum Cleaner	1	24" x 20"	480
Trash Barrel	1	36" x 36"	1296
Boxes of Paper Towels	1	16" x 29"	464
Boxes of Toilet Paper	1	16" x 29"	464
Trash Toter	2	39" x 36"	2808
Circulation Area	1	60" x 60"	3600
		Total (sq. in.)	12,424
		Total (sq. ft.)	87

Requirements for Central Trash Room

One per building.

Primary Building Function	Container Type	Qty.	Dimensions	Space Required (sq. in.)
Administrative / Office	Trash Toter	7	39" x 36"	9828
	Recycle Material Toter	5	39" x 36"	7020
			Total (sq. in.)	16,848
			Total (sq. ft.)	117
Offices / Classrooms	Trash Toter	7	39" x 36"	9828
	Recycle Material Toter	5	39" x 36"	7020
			Total (sq. in.)	16,848
			Total (sq. ft.)	117
Science Labs / Offices	Trash Toter	5	39" x 36"	7020
	Recycle Material Toter	5	39" x 36"	7020
			Total (sq. in.)	14,040
			Total (sq. ft.)	97.5
Computer Labs / Offices	Trash Toter	5	39" x 36"	7020
	Recycle Material Toter	15	39" x 36"	21060
			Total (sq. in.)	28,080
			Total (sq. ft.)	195

Division 11 – Equipment

Loading Dock Equipment

All buildings must be provided with grade-level vehicular access.^{11.1}

All exterior roll-up doors must be insulated and manually operated with an integral locking device.^{11.2}

Lifting Equipment

Equipment installed for purposes of removing or installing building systems must be identified in CD's and details must include weight limits, static and dynamic load parameters. Weight test certification must be delivered to Facilities Operations at document turnover and must be signed for by the Repair Shop Supervisor.

Waste Handling Equipment

Trash Disposal

Buildings three (3) or more stories high must be designed with a trash receiving room with an insulated roll-up door not less than 10' X 10'.

Central Vacuum Cleaning System

Central Vacuum Cleaning Systems are not permitted.^{11.3}

Laboratories

Eyewash and Safety Shower

All areas where handling substances damaging to human tissue and/or infectious agents are planned must be provided with emergency eyewash and shower equipment. The eyewash and shower must be a combination unit for simultaneous use and located in a well-lighted area in accordance with current ANSI standards. Each unit must be identified with a highly visible sign. Coordinate the location of the unit to provide adequate clearances to area electrical hazards and provide Ground Fault Circuit Interrupter (GFCI) protection. Adjacent surfaces are to be suitably water repellent.

Floor Drains

A three (3) inch floor drain with a trap primer must be provided at each eyewash and shower location. Adjacent floor must be sloped to drain.^{11.4}

Compressed Gases

Areas utilizing free-standing gas cylinders must be provided with equipment to properly secure typical container types. Gas rooms and enclosures with appropriate construction and ventilation must be provided for proposed inventory quantities. Special ventilation must be provided for hazardous gases.

Chemical Storage

Cabinetry for chemical and flammable storage must be provided and sized for anticipated use with no less than one separate unit for each material type planned. Cabinetry is to provide secondary containment, be listed as required, be appropriate for the material, and be clearly identified. Cabinet must be provided with ventilation upon owner request. Cabinetry built into fume hood bases is preferred. See Division 12 for additional laboratory casework requirements.

Laboratory Air

All laboratory work areas with chemical, biological, or similar hazards must be provided with 100% exhausted air without recirculation. Air filtration units are not permitted.

Areas in which hazardous materials are present must maintain a continuous airflow at an air-pressure that is negative relative to adjacent spaces and corridors at all times. Floor plans must be arranged to maintain an overall positive air pressure for the building envelope.

Design to include means for energy conservation when laboratories workspaces are unoccupied and hazards are not present. Provide details on equipment, sensors, fail safes, air changes per hour at all settings, etc.

Fume Hoods

All laboratory workspaces using chemicals must be equipped with fume hoods permanently ducted to the exterior. A Class II B2 biological safety cabinet may be used in biological hazard areas with limited chemical applications.

Fume hoods must be Variable-Air-Volume (VAV) type capable of maintaining the required minimum face velocity of 100 fpm for standard fume hoods and 60 fpm for high performance low volume exhaust, +/- 5% of design with the sash set at working height of 18". Non-By-Pass Constant Volume and Ductless type fume hoods are prohibited.

Factory installed, permanent sash stops must be incorporated into all new laboratory fume hoods at eighteen (18) inches from the working surface. A sash must be provided with chain driven counterweight movement components. The front must contain a full view vertical sash for total visual access of the hood interior. Internal lighting and utilities connections are to be included as needed for the application with consideration given to accessible placement.

Special purpose hoods must be identified for the intended application with visible signage such as "FOR PERCHLORIC USE ONLY" or "FOR RADIOACTIVE ISOTOPES".

Utility service fixtures for gas, air, water, and vacuum must be remote controlled with valves identified by index button. Outlets must have serrated tips for line connections. All outlets to be color-coded with the valve controls and color key must be consistent within the same work area and building where possible. Water service must also have integral vacuum breaker, turret with six (6) inch swivel gooseneck, and be PVC, epoxy, or similarly coated as required for the application.

Biological Safety Cabinets (BSC)

All cabinets must be National Science Foundation (NSF) listed, UL approved, and installed in accordance with the manufacturer's requirements. Equipment must be clearly identified as to the type of service it provides, especially where more than one (1) appliance is available.

Biosafety cabinets must be vented from the building if toxic, radioactive, flammable, corrosive or malodorous chemicals are used. Bio-safety Level 2 laboratories or higher also using chemicals must be equipped with a Class II-B2 type cabinet unless a separate fume hood is also available in the same lab. Venting to external ducts must be monitored with a flow monitoring system with both audible and visual annunciations that alert the cabinet users of loss of external ventilation. Alternatively, thimble connections or canopy mini-enclosures in cabinets must be fitted with a ribbon streamer or equivalent attached at an edge through which air enters the device to indicate the airflow direction.

BSC locations must be sited so as to neutralize any interference or disruptions in airflow and must be away from doors and other high traffic areas, at least ten (10) feet from autoclaves, remote to HVAC vents, and not directly across from other BSC's. At least six feet between cabinets is preferred. A 12-inch minimum maintenance clearance must be provided behind and on each side of the cabinet. When the BSC is hard-ducted or connected by thimble unit to the ventilation system, adequate space must be provided so as not to interfere with airflow.

Each BSC must be tested, certified, and tagged before it is placed into service, after it has been repaired, relocated, or after the HVAC configuration has been changed. An NSF certified technician must perform this test.

Fume Hood and BSC Monitoring

All laboratory fume hoods and biological safety cabinets must be equipped with manufacturer approved integral visual and audible airflow alarms. Safety alarm consoles must be factory tested and field verified to be within acceptable calibration limits. Additional alarms for sash position must be provided. All hoods must have signage stating “Hood sash must be closed when not in use”.

Local Exhaust

Local exhaust must be provided for equipment storage and for applications involving processes with hazardous materials or materials producing excessive heat.

Fume Hood Field Performance Testing

Fume hoods, ducted cabinets, and exhaust drops must be tested and adjusted after installation and prior to occupancy in coordination with the building test and balance report. Performance tests on hoods must be in accordance with the latest edition of ANSI/ASHRAE 110 Method of Testing Performance of Laboratory Fume Hoods. Testing must be witnessed by the Owner. An inspection tag must be provided indicating all NFPA 45 parameters.

Laboratory hoods and associated exhaust or supply system must be tested and balanced again six (6) months after the date of occupancy. The report must include adjustments made or recommended, fan curve performance efficiency, vortex behavior, and face velocity.^{11.5}

Laboratory Ductwork

Laboratory exhaust ducts must be liquid tight, welded, seamless, and ground with no internal projections. SS 304 must be used unless special exhaust conditions warrant alternative methods. Duct sprinklers must be avoided.

Ductwork must be field tested using smoke or similar means to verify containment.

Emergency Shut-Off Valves and Shunt Trip

All laboratory spaces must be equipped with emergency shut-off valves for fuel gas and shunt trip for electric service. Electrical shunt buttons must be located adjacent to the primary exit path within each lab. Fuel gas valves must be provided for individual labs located just outside the door i.e. a ball valve behind a clear cover. A fire alarm solenoid for automatic supply shut off of fuel gas must be provided. Additional shut-offs for specialty items must be provided.

Kitchen Exhaust

Kitchens are only permitted in UCF Residence Halls. All approved kitchen exhaust hoods must be vented to the exterior.

Permanent access and maintenance clearance must be provided for all kitchen exhaust fans. Fans must be hinged on their bases. Lightning protection must not interfere with hinged components. Grease traps must be provided with rain resistant covers. All cooking operations with heat and or grease-laden vapors must be provided with a wall-mounted exhaust system.

Division 12 – Furnishings

Equipment needed to provide facilities operational support to the building will take priority in funding over general building furnishings and equipment.^{12.1}

General

Fixed equipment must be included in the general construction contract. Fixed items are defined as those items, which are secured in place by fastening devices or by rigid piping including conduit.

Furniture and loose equipment such as desks, chairs, filing cabinets, etc., are purchased from Owner's furniture and equipment funds.

Samples must be provided by the Architect and approved by the Owner.

Laboratory Casework

Bases for all casework, hoods, or similar border areas at fixed laboratory furnishings must be provided with liquid tight seal at floor to prevent spills from seeping under adjacent surfaces.^{12.2}

Plastic Laminate Casework must conform to the Architectural Woodwork Institute's (AWI) custom grade standards.

Particle board composite type materials are strongly discouraged from laboratory casework applications and must not be set directly on floor surfaces where there is potential for spills or other similar fluid exposure.

Furnishings placed in vicinity of wet areas, including sinks, safety showers, etc. must be water-resistant.^{12.3}

Countertops

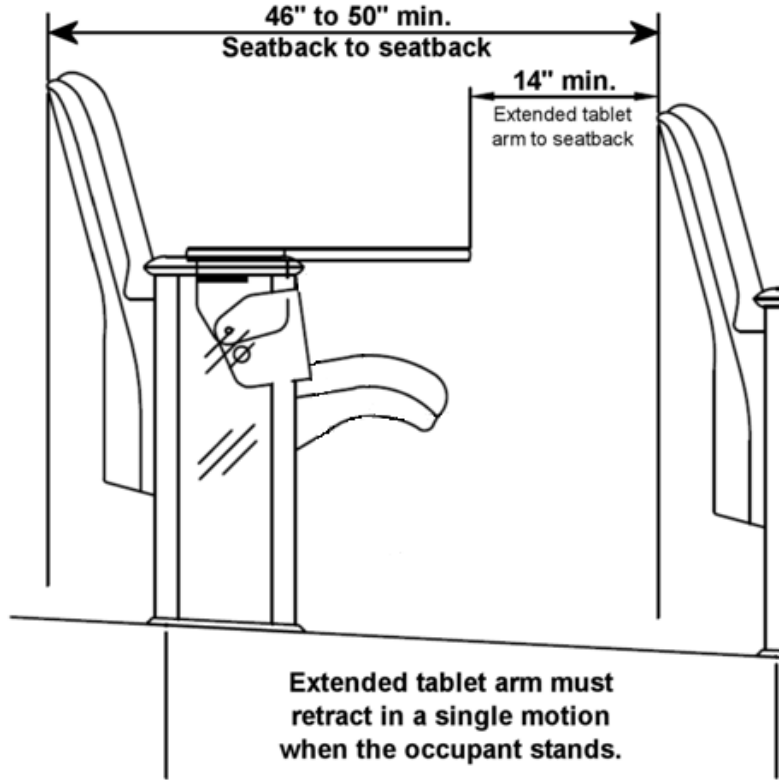
Epoxy countertops are required for all laboratory surfaces.

Auditorium and Theater Seating

The university preference is American Seating Company Style #675-2 or equal. Seating shall be a **minimum width** of twenty-two inches (22") center-to-center of the armrests.

Seatback to seatback minimum measurement is to be between 46" and 50". The extended tablet arm to seatback is to be a minimum of 14" as shown below. Extended tablet arm must retract in a single motion when the occupant stands.

Typical Auditorium Layout



Division 13 – Special Construction

Instructional Resources

General

If windows are present in conference rooms, auditoria, or classrooms, the windows must include coverings or treatments that will keep any light from spilling on any included projection screens at any time of the day or year.

Media Equipment

All classrooms, meeting rooms, lecture halls, and auditoria require appropriate media equipment. This includes, but is not limited to, smartboards and walltalkers.

The projection screens must be front projection with high-gain, reflective surface.

Screens for rooms seating less than 75 must be manually operated. Screen must be DRAPER *Luma 2* or an equivalent product of similar heavy-duty construction. Rooms seating 75 or more must be equipped with motorized screens. Motorized screens must be DRAPER *Rolleramic* or equivalent product of similar heavy-duty construction. Motorized screen controls must be located near the teaching console and must be controllable by an AMX room control system.

In areas where computer data projection is used, screens must be upgraded to the *tab-tensioned* design, which provides a flat, wrinkle-free surface.

A typical classroom must be supplied with a video-format screen (i.e. one with a height-to-width ratio of 3 to 4); however, traditional classrooms require a square-format screen (i.e. one with a height-to-width-ratio of 1 to 1) to accommodate projection of either vertical or horizontal overhead transparencies. In larger classrooms and auditoria where document cameras are used instead of overhead projectors, the screen must be supplied in video format (i.e. height-to-width-ratio of 3 to 4).

The minimum screen size is determined using a formula where the height of a video-format screen for any room is at least one-fifth (1/5) as high as the distance from the screen to the last row of seating. (e.g. in a classroom where the last row of seats is 30 feet from the screen, the screen would need to be 6-foot high by 8-foot wide.) The distance from the floor to the bottom of the screen should be four feet (4'-0"). The distance from the screen to the first row of seats should be two times (2x) the screen height. The required distance to the first row of seats, coupled with proper screen size and placement, dictates minimum ceiling height.

The viewing angle should be between 90° and 110° to assure that those seated at the front sides of any room are able to properly see a projected image. There must not be any obstructions (i.e. columns, teaching console, furniture, etc.) between any seat and the screen.

Teaching Consoles

Teaching consoles are part of the Furnishings and Equipment Budget. All classrooms, meeting rooms, lecture halls, and auditoria seating 30 or more must be designed to accommodate a teaching console. The console will provide a station for faculty and/or presenters plus any permanently-installed equipment such as computers, video decks, or control panels. The console will require floor boxes with appropriate electrical, CATV, and telecommunication connections, as well as cable paths and conduit to other locations. The console will be located to audience-left of the screen, without obstructing the view of the screen.

Electrical Service and Connectivity

A multi-purpose floor box must be provided under each console. Each floor box must include at least one (1) duplex 110-VAC electrical outlet, current approved telecommunication cabling for connectivity to both telephone and computer networks, and one (1) empty continuous conduit running from the console to the wall, then inside the wall to an over-the-ceiling stub-out. The floor boxes must be AMP Corporation or equal.

Separate continuous conduit must be provided as follows:

From the console location to a stub-out above the ceiling. This conduit must be at least 1.5-inches in diameter with a *pull-tape* accessible from both ends.

From the console to the location of telephone and computer equipment room.

From the appropriate electrical panel to the console to accommodate electrical service.

From the cable television (CATV) distribution system to the console.

In venues where a control booth or audio equipment cabinet is required, multiple conduits of appropriate quantity and diameter will be provided from such locations as *home-runs* to the console. This will be identified during Design Development Workshops.

Use of audiovisual equipment will require standard 110VAC electrical outlets in specific locations:

All classrooms, meeting rooms, and lecture halls must have at least one (1) single floor-mounted electrical outlet located approximately eight (8) feet off the center of the screen wall to allow for portable equipment.

All classrooms, meeting rooms, lecture halls, and auditoria seating 30 or more must have at least one (1) floor-mounted duplex outlet under the teaching console. Rooms seating 50 or more must have one (1) ceiling-mounted outlet at a distance of approximately 1.5 times the screen width off the center of the screen wall for ceiling-mounted equipment.

Miscellaneous

Doors equipped with an opening device must be in full compliance with current ANSI and ADA requirements.^{13.1}

A telecommunications panel tied in to the University Police Department must be specified.^{13.2}

Division 14 – Conveying Systems

Elevators

All elevator specifications must be reviewed and approved by UCF Facilities Operations prior to inclusion in the construction documents.

For buildings where equipment must be moved from floor to floor, one (1) elevator must have a minimum inside cab dimension of seven (7) feet in one direction.

New installations must be geared traction elevators driven by AC electric motors.^{14.1}

Dedicated rooms must be provided for each of the following: electrical, telecommunications, mechanical, elevator, and custodial. Each room's access must be located directly off a main corridor or common area with no spaces in between.

As-built submittals for both new and renovated elevators and lifts must include two (2) sets of laminated as-built wiring diagrams, block diagram, and diagnostic data, along with complete service manuals. Provide one (1) diagnostic test device, Miprom-HS&ST Reference Guide, Fault Codes and Service tools when applicable. All special tools needed to perform the proper maintenance must be provided.

Non-Proprietary Control Equipment

The equipment must be provided with on-site capability to diagnose faults of all components, parts, circuit boards, etc. of the solid-state controls. If the equipment requires a separate, detachable device or tool for fault diagnosis or adjustments, that device or tool must be incorporated as a permanent part of the equipment and provided to the Owner as a part of the installation.

The device or tool will become property of the Owner and must be provided with complete trouble-shooting guides. All technical information including passwords, addresses, etc. required to completely adjust and perform the necessary tests required by the governing authority must be provided. The device or tool must be of the perpetual type (never to need recharging or reprogramming).

The equipment manufacturer must agree to sell all parts, printed circuit boards, programmed chips, transducers, controller power supplies, etc. to any maintenance contractor providing services to the Owner for this location.

Equipment installed not meeting these requirements must be removed and replaced with equipment as specified at no cost to the Owner.

Elevator Machine Rooms

All elevator machine rooms must be conditioned and maintain a temperature range of 75-80F at all times.

The HVAC equipment for conditioning elevator machine rooms must be part of, and connected to, the building's infrastructure system(s).

The use of non-proprietary subsystems and parts is required.

Machine room floors must be smooth, level, sealed, and epoxy painted.

Only elevator equipment will be installed in elevator machine rooms.

Elevator Cabs

Elevator doors must have infrared safety strips equal to Janus Pana 40. The use of photo eyes is not permitted.

Support rails on three (3) walls of the elevator cab are required.

All exposed screws inside the cab must be tamper proof.

Lighted, vandal proof, stainless steel buttons are required.

Standard four (4) feet, T8 or T5 fluorescent fixtures for cab lighting are required.

All elevators must be equipped with automatic leveling devices.

Rubberized nonporous flooring must be installed in all elevator cabs.

Center parting doors or two speed doors are required for all openings 36" or greater in width.

Finishes

Cab interiors, walls, doors, and frames must have a stainless steel finish.

All safety edges furnished in connection with the car doors must be either metal or extruded vinyl plastic.

Operating Features

Top and side emergency exits must have contacts, which will stop the cab and ring a bell.

Side emergency exits must be key locked from inside the cab and will not open from outside the cab.

The emergency stop switch must have an alarm bell connected to it that includes a bell mounted under the platform and a bell located at the main floor lobby.

The cab control panel must include no buttons other than the alarm, open door (and hold open), close door and floor buttons. Any other switches required for operation of the elevator must be either key operated or contained in a separate cabinet having a locked door, including light and fan switches.

In addition to the load-weighing device, provision must be made to ring a bell and light a light if the cab is overloaded beyond 120% of normal capacity.

Verify that the Fireman's Recall feature is compatible with the building Fire Alarm system.

Elevators in Health Science Center facilities must have an emergency intercom with call button, mounted in accordance with Florida Accessibility Code requirements, connected to the Centrex/UPD Monitoring Center in lieu of an emergency phone.

Emergency power for each passenger elevator must be provided.

Disabled (Wheelchair) Lifts

Acceptable Manufacturers: American Stair-Glide, National Wheel-O-Vator, and Dover Accessibility Products

Elevator Hoist-ways

Conduit or plastic pipe must not be installed in the pit, hoist-way, or machine room. Only metal sump pump discharge lines are allowed in pits and hoist-ways.

Elevator pits 4'-0" deep or more must be provided with a metal ladder, permanently installed, extending at least 30" above the access floor and have a rung at the top for a hand grip.

A moisture proof light must be provided in each pit with a light switch located so that it is accessible from pit entrance and adjacent to pit stop switch. Two (2) sealed four (4) foot fluorescent bulb watertight fixtures must be installed in all elevator pits; one (1) fixture per side.

Beams, floor slabs or other building construction must not project more than 2" inside the general line of the hoist-way unless the topside of the projection is beveled at an angle of not less than 75 degrees.

Hoist-ways of elevators serving more than three floors must be vented to outside air to prevent accumulation of smoke or gases. The area of the vents must not be less than three and one-half (3-½%) percent of the area of the hoist-way, nor less than three (3) square feet for each elevator, whichever is greater. Vents and frames must be of noncombustible material. All vent openings must reject a ball two (2) inches in diameter and may be covered with a screen.

All nails, snap-ties, form straps and wood must be removed from hoistway, machine room walls, and ceiling.

Electrical Requirements

Provide duplex receptacles of the grounded type in machine rooms and pits.

Main line switches for elevators must be of the fused type and must provide means of locking the switch in the open position. Fuses in the main line disconnect switch must be “Class K5” or “Class R”. Fuses must be properly sized for the load and rating of the disconnect switch.

Main line feeder wires must be phase identified in the main line switch and also at terminals of controllers.

Buildings having emergency power generators must have generators operable at the time of initial inspection by State Elevator Inspector.

All elevator equipment must include solid state power control systems.

Elevator Manufacturers

Acceptable Manufacturers: Thyssen-Krupp, Kone, and Otis.

Training

The Constructor must provide four (4) hours of training, contained in one session, to University maintenance personnel on the proper operation and maintenance of the installation.

Certificates

Certificates must be provided before the building can be occupied.^{14.2}

Warranty and Service

The warranty period will begin when the University accepts and occupies the building.^{14.3}

Service must be for twelve (12) months starting at the date of Final Completion and must comply with the Facilities Operations' preventive maintenance program.

A fireman elevator recall key and elevator key must be provided. The two keys must be secured within the elevator machine room per NFPA by means of a lockable key cabinet or box. If elevator room is located on the roof two (2) sets of keys must be provided.

Division 15 – Mechanical Equipment

General

A 25 year Life Cycle Cost Analysis (LCCA) must be provided for the mechanical systems for each project as required by Florida Statutes and the Florida Building Code. At least three (3) schemes must be included in the analysis. One (1) of the schemes considered must be a central system, such as the campus district cooling loop. The three schemes must be presented to the UCF Director of Sustainability & Energy Management for review. The scheme having the lowest total life cycle cost will usually be installed.^{15.1}

Typical UCF mechanical HVAC design includes at least one centralized air handler unit located on each floor. The air handler must be served by the campus chilled water district loop. The chilled water pressure must be boosted by a variable volume chilled water booster pump sized for N+1 redundancy located within the building. Air distribution and control must be accomplished by variable air volume (VAV) terminal units. Reheat must be provided by a centralized high efficiency, condensing, boiler located within the building. Classrooms must be serviced by one or more VAV terminal units. Offices must be grouped with no less than two (2) and no more than five (5) per each VAV terminal unit. All ventilation must be provided by one or more dedicated outside air system (DOAS) with energy recovery. Building exhaust must be headered and located adjacent to the DOAS.

The university building system scheduling requires mechanical systems to be reset allowing energy savings, during partial or non-occupancy times. All spaces requiring continuous cooling e.g. server room, electrical room, must have dedicated fan coil unit.

Butterfly valves are not permitted in potable water or fire suppression systems.^{15.2}

For HVAC equipment installations inside main chiller plant or satellite plants, provide galvanized rigid electrical conduit. Electrical Metallic Tubing (EMT) is not permitted.

Design Conditions

Temperatures:

- Summer outdoor: 95°F dry bulb (db) and 76°F wet bulb (wb)
- Summer indoor: 74°F db and 50% relative humidity
- Winter outdoor: 32°F
- Winter indoor: 70°F
- Chilled water coil maximum entering temperature: 46°F
- Chilled water coil leaving temperature: 61°F

Chilled Water Systems

Chilled Water Piping

Underground chilled water branches must be sized for no greater than six (6) feet per second water velocity and no greater than ten (10) psi total pressure drop from the connection point to the building.

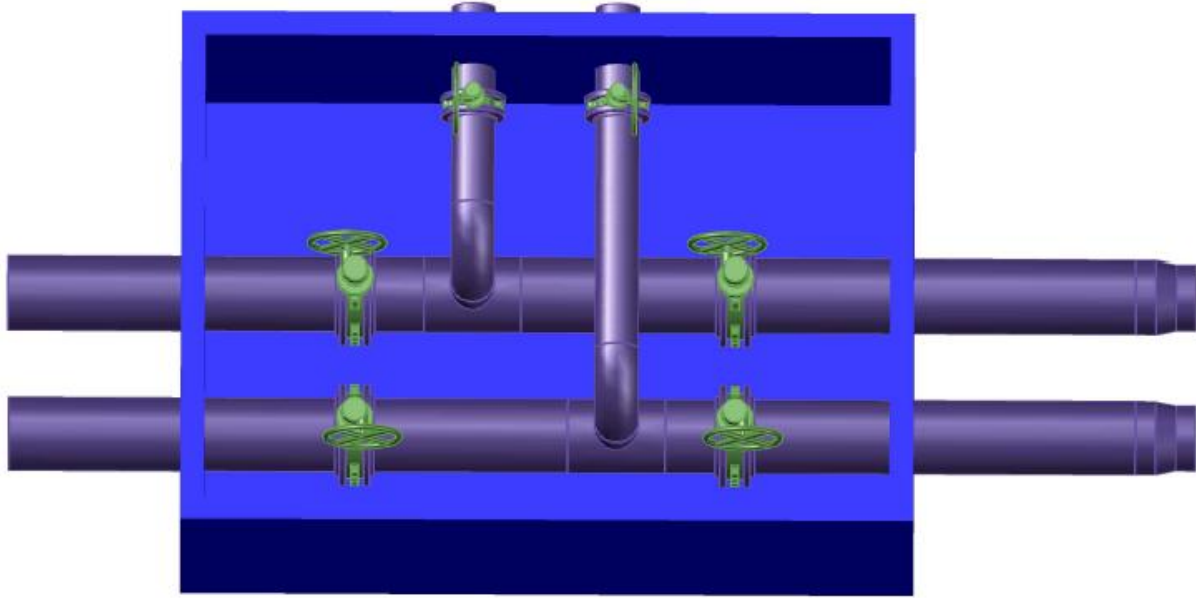
A pressure gauge must be provided on all building chilled water return lines downstream of all coils where the chilled water return exits building.

A bypass with check valve (and isolation valves for check valve servicing) must be provided to allow flow through building with tertiary pumps off.

Underground Chilled Water Valve Vaults

All new underground chilled water valve vaults must have the following:

- Valve configuration per the schematic below.
- Water proofing of walls and floor.
- Expandable EDPM seals around pipe penetrations through walls.
- Access ladders are required for manholes greater than three feet in depth.
- Welded ladder construction with non-slip ladder rungs and hot dipped galvanized finish.
- Clearance around ladders must meet OSHA standards for maintenance access.
- 18 inches clearance from outside diameter of piping insulation to walls and ceiling.
- 24 inches clearance from outside diameter of piping to floor.
- 18 inches service clearance around valves for operation and maintenance.
- Isolation valves: lug style butterfly valves with EDPM peroxide cured seat, manual gear hand wheel operator with indicator and polyester or epoxy coating for corrosion resistance.
- Cast iron access cover with "CHW" stamped, engraved, or cast into cover. Tags are not permitted.
- Minimum diameter of access cover must be large enough to allow removal and replacement of the largest valve inside the vault.
- $\frac{3}{4}$ " drains must have schedule 80 pipe nipples with gate valves on supply and return mains.



Typical Vault Configuration

Valves, Fittings, and Strainers

Ductile iron epoxy coated gate valves must be provided for all ~~underground and~~ above ground exterior chilled water isolation valves. ~~Isolation valves must be installed in concrete valve pits with epoxy painted steel hinged access covers with non-slip finish. Cast in labeling denoting chilled water must be provided.~~

All pipe flange-bolts must be ASTM A307 grade B hex head bolts.

Liquid filled pressure gauges with four and one-half (4-½) inches face, one-quarter (¼) inch National Pipe Thread (NPT) bottom connection, black scale with white background must be provided.

The operating pressure of the pressure gauges must be at the mid range of the scale.

Wells for all temperature gauges must be provided.

Construction strainers and final strainers must be provided once construction is complete.

Triple duty valves are not permitted.

Route all safety relief-valve piping to floor drains.

Suction and discharge isolation valves for all pumps must be provided.

Threaded bronze full port ball isolation valves with quarter turn lever handle for all interior piping for pipe sizes from one-quarter ($\frac{1}{4}$) inches to two (2) inches in diameter must be provided. Needle valves are not permitted.

Ductile iron epoxy coated butterfly valves with lever handles for all interior piping over two (2) inches in diameter must be provided.

Piping Insulation and Jacketing

Cellular glass insulation with a minimum sixteen-thousandth (0.016) inch thick smooth finish aluminum jacketing with integral vapor barrier for all exterior above grade chilled water piping must be provided. Jacketing bands must be one-half ($\frac{1}{2}$) inch wide with spacing of twelve (12) inches or less between bands.

PVC jacketing must be provided over cellular glass insulation within mechanical rooms.

Labeling and flow arrows must be provided every twenty-five (25) feet for all piping (includes mechanical room chilled water piping and concealed areas).

Chilled Water Piping Cleaning

All new or replacement chilled water piping systems must be chemically cleaned prior to connection to the main chilled water system.

The following procedure must be followed by the contractor and witnessed by the UCF Construction Project Manager. Five (5) days notice in advance of the start of testing must be provided. Testing must not proceed until all concrete thrust blocks are in place and cured or other restraining devices are installed. While piping is being filled all air must have been purged from the test section with additional release valves provided if required.

Piping must be cleared of debris and rinsed with clean water for four (4) hours.

Blow down any piping system dead legs and low points.

A hydrostatic test must be performed at 150 psi for a twenty-four (24) hour period to ensure a tight piping system. The test must be witnessed by the Chilled Water Production Unit Head both prior and post test. Documentation of this test must be provided to the Owner.

Information on the detergent currently used for cleaning of the chilled water piping systems must be requested from the UCF Construction Project Manager. The detergent must be circulated for forty-eight (48) hours.

UCF Environmental Health and Safety (EH&S) and the Chilled Water Production Unit Head must be notified of the total amount of detergent and water mixture to be drained. Documentation of the measurement of the pH of the mixture must be provided to the Owner. Prior to discharge, Materials Safety Data Sheets (MSDS) for the detergent must be provided to the Owner.

Blow down piping system dead legs and low points.

Rinse piping again for four (4) hours.

Blow down piping system dead legs and low points.

The UCF Chilled Water Production staff will take a water sample to the UCF approved water treatment vendor for testing. The total iron level must be less than one (1) part per million (ppm) and conductivity must be equivalent to the city water system.

Upon receipt of water testing results, the UCF Chilled Water Production Unit Head will determine if the piping connection can be made or if further cleaning is necessary. **No connections to the University chilled water piping system will be made without prior written approval from the UCF Chilled Water Production Unit Head.**^{15.3}

Only chemicals approved by the University will be introduced into the University chilled water piping system. Raw or potable water must not be introduced into the campus chilled water piping system.^{15.4} The UCF approved water treatment vendor will perform a final test to verify that the chemical levels are in range. The UCF approved water treatment vendor will prepare a written report to be turned over to the UCF Chilled Water Production Unit Head.

If the final piping connections will not be made immediately after cleaning, all open ends of the piping must be capped.

Chilled Water Booster Pumps

Ten (10) pipe diameters of straight pipe must be provided upstream of all chilled water pump suction flanges.

Strainers must be provided upstream of all chilled water booster pumps.

Two (2) chilled water booster pumps sized for N+1 redundancy must be provided.

Removable insulation box with aluminum jacketing and quick release latches for chilled water pump bodies must be provided. Elastomeric sheet insulation glued to pump body is not permitted.

A manifold pressure gauge must be provided for reading pump suction and discharge. Two (2) additional fittings with bronze ball valves for temporary instrumentation must be provided.

Constant volume pumps must have impeller size recommended by test and balance contractor. Impeller trimming, static, and dynamic balancing must be performed by pump manufacturer. Pump nameplate data must be updated to reflect new pump operating conditions.

Flexible piping connectors and vibration isolation are required for all pumps. Inertia base for all pad-mounted pumps must be provided.

Expansion Tanks

Expansion tank schedules on drawings must contain the following information:

- Pre-charge air pressure
- Piping system water volume (including equipment)
- Min/max system temperatures
- Expansion tank size
- Acceptance volume

Air Separators

All air separators must include bottom blow-down with three-quarter (3/4) inch bronze ball valve and garden hose fitting.

Mechanical Rooms

Dedicated rooms must be provided for each of the following: electrical, telecommunications, mechanical, elevator, and custodial. Each room's access must be located directly off a main corridor or common area with no spaces in between.

Mechanical rooms must not be used as return air plenums.

All chilled water lines must enter the building through the mechanical room floor.

All vertical pipe sleeves must extend three (3) inches above floor level.

Mechanical rooms must have at least one exterior wall.

When a mechanical room is located in close proximity to classrooms or offices, soundproofing is required.^{15.5}

All grade level mechanical rooms must have double doors that swing out to the exterior of the building. Mechanical rooms with equipment wider than 60 inches must have an insulated roll-up door.

All mechanical rooms must be supplied with conditioned air.

Mechanical room floors must be epoxy coated with non-slip finish.

Three (3) feet of clearance or the manufacturer's required clearance, whichever is greater, must be provided on all four sides of mechanical room equipment.^{15.6}

Individual floor mechanical rooms for multi-story buildings must be stacked vertically.

Air Distribution Systems

Diffusers and Grilles

Perforated diffusers or return grilles are not permitted in office spaces.

Factory insulated backs on all ceiling diffusers must be provided for ducted return applications.

All diffusers must be rated for a noise criterion index (NC) of twenty-five (25) or less.

Balancing Dampers

Spin-in butterfly dampers with two (2) inches handle standoff located at main trunk upstream of flexible duct connection to diffuser must be provided. Scoops are not permitted.

Opposed blade type balancing dampers must be provided for all rectangular sheet metal ductwork.

Outside Air Dampers

All outside air dampers must be constructed of stainless steel.

Bearings must be constructed of synthetic or other non-stick material such that seizing of dampers does not occur.

Actuators

Weather-tight enclosures for all outdoor mounted actuators must be provided.

Flexible Ductwork

Un-insulated flexible ductwork is not permitted.

Flexible duct length from branch to diffuser must be less than ten (10) feet supported so that no kinking of ductwork occurs.

Metal Ductwork

Exposed ductwork in areas such as classrooms and office spaces must be double wall insulated construction.

All ductwork other than flexible ductwork must be galvanized sheet metal construction. Rigid duct board used in place of insulated sheet metal ductwork is not permitted.

Fume Hood Ductwork

All fume hood ductwork must be stainless steel construction with seamless welded liquid tight joints ground smooth with no internal projections.

Turning Vanes

Turning vanes must be installed in all tees and mitered ninety (90) degree elbows for all supply and return ductwork.

Ductwork Insulation

All outside air ductwork must be externally insulated.

Rigid duct board insulation must be used in all mechanical rooms. Duct wrap insulation is not permitted in exposed areas.

Glass fabric tape and mastic must be used for all insulation joints. All other tapes are not permitted.

Interior lined ductwork is not permitted.

Duct Access Doors

Duct access doors must have double wall insulated construction.

Access doors in outside air ducts must be provided.

Size of all access doors must be the entire width of the longest duct dimension minus two (2) inches and must be located for unobstructed access.

Filters

The following filter types must be provided:

- Research Facilities: Thirty percent (30%) efficient pre-filters and eighty-five (85%) cartridge filters must be provided.
- Classrooms and Office Spaces: Two (2) inch thick mini-pleat mid performance (initial efficiency MERV 11) filters with one-hundred percent (100%) synthetic electro-statically charged media and integral gasket must be provided.
- Direct Expansion Units: Thirty percent (30%) efficient pleated filters must be provided. Fiberglass filters are not permitted.

Filter Installation Requirements

During the construction phase, filters must be replaced when the pressure drop exceeds 1/2" of water column.^{15.7}

Final Filter Installation Requirements

All filters will be replaced on the day of final completion. Two (2) additional sets of filters must be provided.^{15.8}

Final Belt Requirements

Two (2) additional sets of belts must be provided for each unit.^{15.9}

Final Air Handling Unit and Ductwork Cleaning

Final cleaning of all air handling units, including coils and ductwork, must be completed immediately preceding final filter installation.^{15.10}

All DX equipment, including evaporator and condenser coils, must be cleaned immediately preceding final filter installation.^{15.11}

Louvers

All louvers must be extruded anodized aluminum louvers with horizontal drainable blades and bird screen. Louvers must be standard frame construction with extended sill.

Minimum louver depth must be four (4) inches.

Flanged louvers are not permitted.

Color must match exterior metalwork.

Fire Dampers

All fire dampers must be curtain style with blades located out of the air stream in the open position. An integral sleeve must be provided.

Access doors must be provided for all fire dampers.

Combination Fire and Smoke Dampers

All combination fire and smoke dampers must have air-foil style blades with blade seals.

Access doors must be provided for all smoke dampers.

Server Closets and Server Rooms

Server closets are not permitted.^{15.12}

All server rooms must have dedicated chilled water fan-coil units with one-hundred percent (100%) redundancy. Chilled water piping must not be routed directly over server equipment.

Ceiling Return Air Plenums

Ceiling return air plenums are not permitted.^{15.13}

Ceiling Insulation

Insulation installed on the top of suspended ceilings is not permitted. Insulation must be integral to the roof structure.

Toxic and Hazardous Materials

Asbestos, or any building material containing asbestos, must not be used. If asbestos will be disturbed during renovation activities, abatement of such materials must be coordinated with the Department of Environmental Health and Safety.

All electrical transformers, switches, ballasts, or other electrical equipment which contains polychlorinated biphenyls (PCB) or other equipment which has come in contact with PCB must be properly disposed of in coordination with the Department of Environmental Health and Safety.

Any hazardous or toxic material, such as asbestos or PCB, which is discovered during the course of a project must be reported **immediately** to the UCF Project Manager. All Work involving suspected asbestos, hazardous, or toxic materials must halt immediately and must not resume until the notice to resume Work has been issued by the UCF Project Manager.

The Architect and Engineer must contact the University's Department of Environmental Health and Safety prior to the commencement of a renovation project with regards to asbestos.

Equipment

Chilled Water Air-Handling Units

All chilled water air-handling units must have the following:

- Insulated stainless steel drain pan
- Modulating two-way pressure-independent control valves
- Pressure and temperature gauges on coil inlet and outlet
- Modular construction
- Double wall-insulated construction with no metal to metal conduction paths from interior to exterior
- Hex keys must be provided for all applicable modular air handling units
- Coil access sections on the entering and leaving sides of the coil
- Fan access doors on both sides of unit
- The units must be sized and located so that the coils can be easily removed
- Integral internal structure for motor removal and replacement, or appropriate portable motor removal equipment must be provided by the contractor
- Centrifugal airfoil fans
- Separate factory installed differential pressure gauges for pre-filters and final filters
- Interior lights for walk-in air handling units

Electrical conduit, controls, or any other non-factory auxiliary equipment must not be mounted on air handling units.

Static on site air pressure test for all modular air-handling units must be witnessed by the Owner.

Condenser Coils

All condenser coils for chillers and direct expansion units must have a factory applied coil coating.

Louvered panel style hail guards on all air cooled chillers and condensing units must be provided.

Refrigerant Lines

All straight runs of refrigerant lines must be hard drawn ACR copper tubing with soldered or brazed fittings. Soft copper is permitted within twenty-four (24) inches of unit connections.

Aluminum jacketing must be provided over all exterior installed elastomeric piping insulation.

Condensate Lines

All condensate lines installed in interior conditioned and unconditioned spaces must be insulated with elastomeric insulation.

All condensate drain traps for cooling coils must have removable caps or plugs in accessible locations.

Direct Expansion (DX) Condensing Units

When multiple condensing units must be installed, the manufacturer's recommended clearances between units, walls, etc. must be followed.

All split system condensing units must be installed with compressor and electrical access panels facing out for ease of maintenance.

Six (6) inch thick reinforced concrete pad must be provided for all grade level installation.

All split system condensing units must be securely anchored to the equipment pad.

Hood or louvered panel style hail guards on all packaged DX units must be provided.

Evacuation of all DX units down to 500 microns for five (5) minutes (with valve shut and vacuum pump off) or per manufacturer recommendation (whichever is more stringent) is required.

Extended compressor warranty (including labor, parts, and travel) must be provided.

Direct Expansion (DX) Air Handling Units

Installation of DX air handling units above ceilings is not permitted.

Mechanical rooms for all DX air-handling units must be provided and appropriately sized for the servicing of equipment.

Return air plenums for DX air handling units located in mechanical rooms must be fully enclosed on all sides (including bottom) and sealed. Return air plenums, utilizing the floor and or an exterior wall as sides of the enclosure are not permitted.

Chilled Water Fan-Coil Units

Installation of fan coil units above ceilings is not permitted.

Mechanical rooms for all fan-coil units must be provided and appropriately sized for the servicing of equipment.

Return air plenums for fan-coil units located in mechanical rooms must be fully enclosed on all sides (including bottom) and sealed. Return air plenums utilizing the floor and or an exterior wall as sides of the enclosure are not permitted.

High Entrainment Fume Hood Fans

Direct drive motors must be provided.

Where a manifold exhaust system is installed, $n+1$ redundancy must be provided.

Plumbing Systems and Toilet Rooms

Each facility must be evaluated for Family Type restrooms based on use and user group needs.

The Contractor must furnish water meters, meter boxes, and taps. On sizes above two (2) inches, a by-pass line and gate valve of the same size as the main line must be provided.

Waterless urinals are not permitted.

All water closets must be equipped with a dual flush valve.

All restroom sinks must be provided with hardwired touch-free controlled faucets.

Cutoff valves and access panels must be provided at each floor level. Each restroom must have a cutoff valve and labeled access panel.

All "wye" strainers must be equipped with valves for blow-down cleaning.

Drains for water systems must consist of gate valves and hose nipples.

Key-operated hose bibs must be provided in mechanical rooms and at (100) foot intervals on exterior wall areas for maintenance use. There will be a hose bib located on each roof area (North, East, South, and West) parapet wall if the roof membrane is a single ply material. If the roof membrane is a modified bitumen material and there is HVAC equipment on the roof, a hose bib will be located within close proximity to the equipment for maintenance. Key operated hose bibs must be used in all public areas.

All water supply pipes must be type "L" copper. Plastic piping is not permitted for potable water service inside buildings.

Floor drains with trap primers must be provided in all toilet rooms, janitorial closets, mechanical equipment rooms, and at safety showers.

Clean-out plugs in piping must be set with Teflon sealer or other approved lubricant.

Metal access doors must be provided in walls and ceilings for all valves, regulators, and clean-outs. A piping chase must be provided.

All exterior valves must be fitted with a concrete one-piece valve box unit having an attached metal cover.

Lavatory and Custodial Closet Exhaust Fans

A single ducted exhaust system must be provided for all multi-story buildings.

HEPA Filter Systems

For HEPA filter systems with booster fans, direct drive fans must be provided.

All HEPA filters must be replaced on the day of final completion. Two additional sets of filters must be provided.

Laboratory Air Supply and Exhaust Valves

Pressure independent venturi style air valves must be provided with all laboratory HVAC systems for supply air, fume hood exhaust air, and general exhaust air.

Pneumatic valves are not permitted.

Proprietary valve controllers are not permitted. Valves must be fully integrated into the building direct digital control (DDC) control system.

Variable Air Volume (VAV) and Fan Terminal Units

VAV and fan terminal units must be installed in an easily accessible location with a minimum of three (3) feet service clearance. Install all terminal units with the bottom of the unit no higher than twelve (12) feet above the floor. Accessible location for terminal units serving spaces with high ceilings must be provided.

Where electric heat is used, one heater re-string replacement kit with each VAV or fan terminal unit that is installed with electric heat must be provided.

Foil faced or double wall insulation must be provided for all terminal units. Interior insulation with exposed fibers or rough coating is not permitted. The units' interior must be cleanable.

Cooling Towers

Induced draft counter flow cooling towers with fan motor located out of the air stream must be provided.

Cooling towers must be approved by the Owner.

Air Cooled Chillers

For multiple compressor applications, independent refrigerant circuits for each compressor must be provided.

Louvered panel hail guards for condenser coils must be provided.

Factory applied condenser coil coating must be provided.

One spare matching condenser fan and motor assembly must be provided.

Water Cooled Chillers

Dual oil filter canisters for changing oil filters with unit in operation must be provided.

Redundant oil pumps must be provided.

Marine water box style end plates with hinges or gantry for access to evaporator and condenser tubes from each end of the chiller must be provided.

Refrigerant cooled hermetic compressor motors must be provided.

Boiler Systems

Heating must be provided at each individual building.

Hot water systems must be provided with a combination sediment and air eliminator.

Steam system condensate return units must be above grade with dual pumps and mechanical seals.

Fire tube steam boilers must be fitted with hinged access end plates.

Hot water boilers must be fully modulating gas-fired condensing type.

Natural Gas Systems

Gas meters must be billable grade with telemetry and consistent with the type already installed on campus. Meters must be accessible and installed on the exterior of the building. Meters must be equipped with pulse output capability for energy monitoring.

A fire alarm activated solenoid cutoff valve must be provided.

Controls

Chilled Water Monitoring Station

An Onicon System 10-LON chilled water energy meter must be standalone and be capable of measuring chilled water flow rate, chilled water supply and return temperatures, chilled water usage in ton-hr, total chilled water consumption in gallons, and total chilled water energy consumption in BTU. The unit must have digital display and be calibrated and operational prior to start-up of HVAC during construction.

Monitoring station must be equipped with LON-talk capability for energy monitoring.

Thermostats

Mercury bulb thermostats are not permitted.

Digital programmable hard-wired thermostats with auto changeover capability and key pad lock-out feature must be provided.

Sensors used for controlling BAS-type equipment, must be provided with configurable user adjustable temperature range and occupancy override capabilities.

Motor Starters

Solid state overloads must be provided with all motor starters.

Building Pressure Monitoring System

Multi-story buildings must have a means of monitoring the differential air pressure of each floor (with the exception of the first floor) relative to the exterior when floors have no direct door to the exterior. Stairwell doors are not considered direct to the exterior. Accessible low pressure side tubing with bug screen must be provided.

Variable Frequency Drives (VFD)

One (1) spare VFD must be provided for each installed HVAC VFD.

Integral factory bypass is not required.

VFD's must be configurable to accept both 0-10V and 4-20mA analog input signals.

Hardwired feedback control signal must be provided.

Appropriate signal filters when load side wiring exceeds maximum recommended length must be provided.

Disconnect switches mounted on the load side of the VFD between the drive and the motor are not permitted.

VFD's must be installed in a conditioned space.

A network card compatible with the building automation system must be provided.

Smoke Control and Air Pressurization Systems

Smoke Control and Stair Pressurization Systems must be provided where required by the FFPC. The main building FACP must be used for controls where at all possible, avoiding additional specialty panels. All control panels must be located in a main lobby adjacent to the fire department accessible entrance. Passive air bypass vents and dampers are preferred over complicated HVAC reversal and door operator controls. Individual components must be evaluated for the need for UPS backups. Conduit and controls must be identified. A system summary with diagram, test and balance, comprehensive sequence of operations and routine testing manual must be provided. A checklist provided by the Owner must be completed by the designer for permanent record.

HVAC System Smoke Detection

If the building served has a fire alarm system, the HVAC smoke detection must be a part of the system and function as outlined in this Standard. If the building served does not have a fire alarm system, a single station duct smoke detector must be installed. A remote control station must be provided in the main lobby and must be mounted no higher than five (5) feet above finished floor. The station must indicate alarm visually and audibly, must indicate troubles visually or audibly, and must be identifiable as to its function. The station must include remote means to reset and test with keyed switch. Acceptable model is System Sensor SSK451 stand-alone remote indicating station to be installed with compatible Duct Detector DH100ACDCP or similar approved equal as manufactured by SS, FCID or Notifier. Installation must include all code required accessories, sampling tubes, housing, sensitivity testing, SFM witness testing, and permanent labeling at station of sensing device location and unit served.

Direct Digital Control (DDC) Systems

Room temperature sensors with thumb wheel or slide adjustability for limited range adjustment must be provided.

Building HVAC DDC control systems must be on emergency power circuit.

Supply air static reset capability must be provided.

Demand-controlled ventilation must be provided.

New construction projects must be provided with (2) two laptops with all required service tools to install, configure, address, and replace controllers and devices. Additionally (1) one desktop computer, monitor, printer and peripherals are to be provided and located in the main building automation control center. All laptops and desktops shall be loaded with a licensed copy of required graphical software to view, command, and monitor BAS. Hardware specification is to be provided by the owner at time of construction to ensure latest operating system and equipment specifications

Building Automation System

All BAS equipment must comply with latest published standard of ASHRAE 135 – BACnet.

Network Requirements

Only Tier-1 Building controllers shall reside on the IP level. Tier one is defined as BC-C type controller or higher. Hubs, routers, gateways, etc are not allowed unless provided through the owner. All other controllers and devices must communicate with BACnet approved communication protocol.

IP addresses, Network Numbers, and Device ID's shall be requested through the Owner and provided by the Department of Sustainability and Energy Management.

Submittal Requirements

In addition to requirements in the project specifications, the controls submittal must include the following for owner approval:

- PICS (Performance Interoperability Conformance Statements) for each type of equipment being supplied
- System Architecture including network level requirements (IP addresses, locations, etc)
- Sequence of Operations
- Point Lists by controller

- Sample graphics
- Sample Point naming convention

Hardware Requirements

All equipment shall be BTL certified.

Controller Requirements

All controllers must meet the listed requirements for the type of controller being installed as specified in AHSRAE 135.

Building automation panels must be fed from a dedicated emergency power circuit.

Graphics

System shall implement a drill down presentation. Each graphic shall be 2D and include all set-points for controlled systems clearly indicated. Each graphic shall indicate the current desired status of the displayed system (run, stop, enable, disable, etc). Drill down should proceed from the building level, floor level, system level, equipment level and finally to the component level.

Building level graphics shall indicate the layout and division of the automation system.

Floor plans shall indicate through colored zones, areas served by VAV box/FCU supply system. Each zone shall also indicate approximate location of controlling sensors (temp, RH, CO₂). Additionally if divisions are required for the floor plan, each split shall not require view of a different floor plan to view systems, components, or equipment from the previous floor plan.

Equipment Level Graphics must be provided at a minimum for the following:

- AHU
- VAV
- FCU
- Pump
- Boiler
- Chiller

Trending, Alarming, Notification, Etc to be specified by the Owner.

Electrical

Equipment Arc Flash Rating

Arc flash calculations must be provided, properly labeled, and displayed.

Partial Renovations

For partial mechanical renovations where only a space or group of spaces is renovated, the Architect and Engineer must evaluate the entire system with a complete test and balance and field verification of existing conditions to ensure that the capacity is adequate to offset any increase in heat gain to the spaces, ventilation, outside air, etc. This evaluation must be documented on the drawings. Final test and balance with an outside certified contractor is required for the HVAC system after any modifications as directed by the Owner.

Training

Training including video documentation, with a certified factory technician, must be provided for at least two (2) HVAC mechanics for the following systems:

- DDC controls – minimum 24 hours training
- Pumps – minimum 4 hours
- Fume hoods – minimum 4 hours
- Laboratory air valves – minimum 8 hours
- Variable frequency drives – minimum 4 hours
- Boilers – minimum 4 hours
- Water softening systems and reverse osmosis water systems serving boilers – minimum 4 hours

A training agenda and schedule must be provided to the Owner for approval four (4) weeks prior to the requested training date.

Plumbing Systems

Sanitary Sewer

The building sanitary drainage must be piped by gravity to a point five (5) feet outside the building. Site plumber must connect to the site sanitary system.

Storm Water Drainage

The building storm drainage must be piped by gravity to a point five (5) feet outside the building. Site plumber must connect to the site storm water drainage system.

Domestic Water Service

A separate water line must run into the building for domestic service and a minimum six-inch (6") line must be run into the building for fire protection. Integral type for above-ground meters and pit-type for below-ground installations must be provided.

Water lines must be metered at each facility. All meters used by the university must be manufactured by Badger and must be equipped with a transponder.

The positive displacement type meter, in sizes from 3/4" to 2", must be used for buildings only. The Turbo elliptical type meter must be used in sizes of 1-1/2" and 2" for irrigation, and the Turbo round type meter must be used in sized from 3" to 8" for both building and irrigation.

The Contractor must install the required water meter and backflow prevention devices on the site.

Plumbing Fixtures and Fittings

All plumbing fixtures must be "First Quality" as defined and set forth in the current Commercial Standard as promulgated by the U.S. Department of Commerce. Fixtures must be white vitreous china unless otherwise indicated.

Fixtures and fittings must be from one manufacturer and of similar character in any room or location. Escutcheons, handles, etc., on the different fixtures must be of the same design. All fixtures and fittings must be submitted for approval with cut sheets and full description. All exposed metal not otherwise specified must be polished chromium on brass or bronze. All water supplies to fixtures must be provided with stops. Cast brass P-trap with cleanouts for each lavatory and sink must be provided.

Concealed Carriers

A cast iron or steel concealed wall mounted carrier must be provided. Carriers must have adjustable support plates, alignment truss, and mounting fasteners.

Public Drinking Fountains

Drinking fountains must be semi-recessed and mechanically cooled. One (1) ADA accessible drinking fountain must be provided at each location.

Slip-resistant tile flooring must be provided under the drinking fountain area.

Floor Drains

The strainer size must be recommended by the manufacturer. The strainers must be nickel alloy or polished brass. Tapped boss and trap primer floor drains where required must be provided.

Cutoff and Isolation Capability

The design of the water distribution system on multi-level buildings must provide an easily accessible capability of cutting off all water supplies on each floor level and each restroom, independently of the other floors and restrooms.^{15.14}

The Architect and Engineer must provide isolation and bypass valves on all pumps and strainers to facilitate maintenance and repair operations.

All high density water use areas such as laboratories must be equipped with easily accessible isolation valves.

Hot and Cold Water Supply

Facilities must be supplied with cold water only. Custodial rooms, showers, and specified laboratories must be supplied with hot and cold water.

Fire Protection

General

Installation of any system in no way implies continued maintenance service contracts by the installing Contractor. All system components, pumps, controls, etc. must be non-proprietary in that replacement parts are readily obtainable and can be serviced by a third party licensed vendor which is Owner selected by separate bid process. Such service must not have an effect on warranties.

Where special fire protection such as Preaction Sprinkler Systems are provided at Departmental request for equipment protection, the Department will be responsible for extra costs associated with upkeep of the system above normal building sprinkler maintenance. The Department must also designate appropriate personnel for response to special system alarms and post emergency contact information by the area main entrance.

Design

In determining the adequacy of the existing water source to meet the required fire flow, it is the responsibility of the system designer to perform the necessary site flow tests coordinated with the UCF Project Manager and witnessed by the Owner's. Timing must be coordinated at peak demand to reflect typical conditions and a suitable factor of safety included. Historic data is not acceptable.

Each sprinkler or standpipe system must be dedicated to the building it serves. Separate buildings only joined by a breezeway type canopy must have separate systems. Design must allow the entire building to be operated as one system and monitored by one fire alarm. Where additions are planned, provisions must be made to unify the system upon completion of all phases.

All threads must be in accordance with local responding fire department specifications.

System main riser must be located in a mechanical space, stairwell, or other maintenance accessible area preferably with a door to the building exterior. All control valves, drain valves, and components requiring access for routine testing, maintenance and inspection must not be located in laboratories, office, storage, and instructional or similar spaces used by building occupants. Dedicated closets or a location in common areas must be provided. An inspector's test valve (with sight glass where needed) and drain to the exterior of the building must be provided at a remote point in the system to facilitate air bleed off and verification of water flow throughout.

Systems must be provided with control valves to accommodate individual isolation for each floor of the building at a minimum. Additional valves must be provided as needed for isolation of special areas as determined by the Owner. Fire alarm monitored flow switches must be provided at a minimum to identify flow by floor, with additional ones as needed for special area zones.

All exposed wet pipe must be insulated or provided with means for freeze protection including roof hydrants, FDC's, and backflow preventers where dedicated to fire protection use.

Antifreeze type systems are not permitted.

All pre-action, dry, or similar special systems controls must be provided within a dedicated closet type space located off the main corridor with adequate access at all times. Housekeeping rooms or user storage spaces are not permitted locations. Wall surfaces adjacent to special system controls and drains, must be water resistant.

Where roof standpipe flow testing requires a fire department pumper truck, testing must be included in the contractor's scope of Work.

Fire pump rooms must be located on an exterior wall with a door to the outside. The room must be dedicated to fire protection equipment without penetrations for non-related services. Ventilation and freeze protection is required. The fire pump controller must be located directly adjacent to the exterior room door for direct access to the emergency disconnect.

Installer Qualifications

The installing contractor must have a minimum of five (5) years work experience on systems of a similar size and components installed. Where specialty items are used, additional certificates showing manufacturer training are required.

Materials and Installation

All materials must be manufacturer's standard, new equipment, free from defects, and listed.

All new and renovated piping for fire protection systems must be rigid metal pipe. Non-metallic tubing and "flex" type connections are not permitted.

Butterfly valves are not permitted in any portion of the fire suppression system under or above ground. Open stem and yolk (OS&Y) type valves with tamper switches and flow switches for all lines two (2) inch or larger must be provided.

Dedicated, metered, backflow preventers with freeze protection must be provided for each new and renovated fire suppression system.

All system control valves including backflow preventer on fire protection system supply mains and PIV must be monitored by the building fire alarm system. Valves (including backflow and PIV) located outside or in common building areas must also be provided with a chain and lock. The locks provided must be Master #2425.

All exposed fire suppression piping in finished areas must be specified with:

- a finish consistent with the area including painted risers in stairwells
- chrome finish on the full FDC and ring
- red paint on the backflow preventer and PIV
- concrete pads for yard equipment with bollards

Test headers should be provided with a finish matching the FDC or building wall as appropriate for the location.

Fire Pumps (where installed) must be electric drive and as manufactured by Fairbanks, Patterson, or Alice Chalmers. A remote annunciator must be provided capable of monitoring all points required by NFPA 20, located in proximity to the fire alarm control panels, adjacent to a Fire Department accessible exit, and in a common area of the building. The pumps must be tested in accordance with NFPA 20 and witnessed by the authority having jurisdiction. Backup fire alarm system monitoring the pump controller dry contacts must be provided where possible.

All gauges must be new and permanently labeled with the date of installation.

Automatic sprinkler heads must be standard automatic closed type. Temperature ratings of fusible links must be in accordance with NFPA 13 unless a special application is requested.

Sprinkler heads must be specified and installed with a date of manufacture not more than one (1) year prior to the date of installation.

In ceiling applications, semi-recessed pendent sprinkler heads must be provided. Brass upright or sidewall sprinkler heads will be considered in other applications. Sprinkler heads must be located in the center of the tile and the center of the area of coverage where possible.

Renovated spaces must adjust sprinkler head locations to provide optimal coverage protection.

Sprinkler head coverage must be provided behind all ceiling mounted projection screens where the distance off the adjacent wall exceeds eight (8) inches.

Sprinkler system piping must not be used for electrical grounding.

All system drains and test connections must be hard piped to a termination point outside of the building at grade, away from public view or access ways, and arranged to avoid damaging landscaping.^{15.15} Special System drains must be sized and provided to allow for system testing and resetting without additional attachments or causing area flooding.

Extra Materials

The contractor must provide the Owner with additional sprinkler heads and escutcheons totaling no less than two (2) of each type or five percent (5%) of the installation whichever is larger, in addition to the NFPA spare cabinet stock. Where concealed heads are used no less than ten (10) cover plates of each color type, must be provided. A minimum of one (1) spare new gauge of each size and type must be provided.

A spare cabinet with wrenches must be placed at the main riser. Where a remote mechanical area is preferred for security, all risers must have signage indicating the location of stock.

Identification

All components must be provided with labeling including but not limited to: Riser Room, Control Valve, Inspectors Test, and Drains. Where controls are hidden, additional labeling must be provided on the closest door, grid, access panel, etc. The FDC and exterior control valves must be identified with the building number of the facility served. Colors must be coordinated with the Owner.

Where areas have special system coverage such as preaction or dry systems, all entrances to special protected areas must be identified with UCF Standard style signage to indicate “Room XXX, Praction Protected Area Within, Controls Located Room YYY”. Corresponding separate rooms housing controls for special systems must be provided with signage to indicate “Room YYY, Controls for Praction Protected Area Room XXX Protected Area Located Within”.





Training

Training sessions must be provided by the qualified installers for each special system installation and others where requested by the Owner. Multiple sessions, a minimum of one per work shift with at least three (3), must be made available to department representatives. The Trainer must complete the UCF standard training form available on the EH&S website. Additional guides and materials must be provided as needed. A reproducible training-presentation format must be recorded and provided.

Approval, Testing, Documentation, and Warranty

Detailed shop drawings and calculations must be submitted to the State Fire Marshal for approval and the approved set must be available prior to inspection. The State Fire Marshal or his designated representative must witness all final acceptance hydrostatic tests. All new fire protection piping must be hydrostatically tested as required per NFPA 13, 24, and these Standards.

The installing contractor must pretest all installations, have the system at the minimum 200 psi (or greater as required by code), and be ready at the test pressure for the inspector at the scheduled inspection time. The test must run for a minimum of two (2) hours. All required testing and certification forms and tags must be completely filled out by the responsible parties upon test completion.

Where portions of systems will not be visible at final testing, a partial hydrostatic test may be requested prior to enclosure to accommodate the construction schedule. Scheduling of partial hydrostatic tests will be at the fire marshal's discretion. For final acceptance, the entire system must be hydrostatically tested regardless of intermittent sectional tests.

For renovations and additions where a separate room, area or zone with existing coverage has been substantially reworked, the area must be isolated and pressure tested at 200 psi for two

(2) hours. Where isolated by an installed blank, upon reconnection to the system, the remaining last joint and contiguous piping must then be tested at fifty (50) psi above normal static pressure for two (2) hours. Where only minor rework (as determined by the Owner) is done in an area, it must be tested at fifty (50) psi above working pressure for two (2) hours.

Prior to final acceptance the Owner must be provided with reproducible accurate system "As-Built" package in electronic and hardcopy form. Drawings must be compatible with AutoCAD and contain conduit layout and wiring diagrams including wire color code and tag number. Submittals must include a minimum of two (2) hard copies of composite "Operation and Shop Maintenance Manual," including a digital media (disk, USB drive, or CD) copy of the program for each system or facility.

For the warranty period of one (1) year from the date of final completion, the installing contractor must be responsible, at a minimum, for all NFPA 25 quarterly inspections, maintenance, and testing of the fire protection systems. Records of such activities must be maintained for the duration of the warranty period. Quarterly reports must be turned over to the Owner.

Clean Agent and Early Detection Systems

General

Where Clean Agent (CA) and Early Detection (ED) systems are chosen for optional equipment protection they must be designed and installed in full compliance with all sections of these Standards, the latest adopted editions of the applicable codes and standards including but not limited to NFPA 2001, 72, 70, and all manufacturers' recommendations.

The installation of a CA system does not substitute for building fire sprinkler systems but pre-action sprinklers may be used in lieu of wet pipe.

The design must also consider additional compliance with the NEC and NFPA 75 for Information Technology Equipment.

Departments requesting CA and ED Systems must be advised that all costs associated with these systems such as, but not limited to, routine maintenance, re-certification, refilling, upgrade, etc. are the responsibility of the *Department*. The *Department* must also establish local *departmental* personnel for general system management and to respond to all alarms and signals originating from these systems. This will also include performance of routine inspections as often as daily as outlined by the manufacturer, response and oversight of room ventilation, HVAC and equipment start-up after discharge, and coordination with Facilities where needed. Required maintenance by a certified vendor and any interface with the building fire alarm

system will be provided in coordination with Facilities at the *Department's* cost. CA and ED vendors are not authorized for building fire alarm system access.

Installation of any system in no way implies continued maintenance service contracts by the installing Contractor. All system components, pumps, controls, etc. must be non-proprietary in that replacement parts are readily obtainable and can be serviced by a third party licensed vendor which is owner selected by separate bid process. Such service must not have an effect on warranties.

Design

Doors exiting clean agent protected areas must have vision panels and swing in the direction of egress with panic hardware.^{15.16} They must be recessed so they do not project out into adjacent pedestrian paths.

Design must outline the complete system specific to the agent and manufacturer models to be installed with defined agent concentrations to cover Class A, B, and C fires, without substitution. Clearly detail the intended protected area with volumetric measurements, identify plenum spaces in drawings, and protection status.

For the specified system, all materials, equipment, accessories, and components must be supplied by one manufacturer of established reputation and experience who must have produced similar apparatus for a period of at least five (5) years and who must be able to refer to similar installation rendering satisfactory service. Consideration must be given to the availability of area qualified vendors (installers). They must be a direct sales division of, or the authorized and designated distributor for the manufacturer, must be able to provide support services in a timely manner, able to respond to emergency calls within two (2) hours, and must be able to provide non-stock parts for repair within 24 hours.

Agent tanks must be capable of being refilled or replaced within 30 days.

The system specification must require the vendor to provide a maximum price for the services below to be guaranteed for a minimum of five (5) years. The price quote is the Owner's option to exercise to the benefit of the University. The minimum quote must include the following:

- An all-inclusive fee for semi-annual and annual inspection services per system including all typical tags seals, and labor as needed to meet manufacturer and NFPA recommendations.
- Standard fee per system for manufacturer required 1, 2, and 5-year or similar maintenance with detail of services provided.

- Standard price per pound agent per refill.
- Standard hydrostatic test per tank including removal and return.
- Standard service fee per refill to include all labor, accessories, and system testing to place it back into certified service assuming no damage to the system components from normal discharge.
- Standard labor-hour for response calls to diagnose system troubles, provide detail for hourly rate types.
- Standard price per requested minimum one (1) hour training session on site for system operation and to review Owner required maintenance.

Design must include a contingency plan for ventilation of the protected area and restarting of HVAC after discharge.^{15.17} A built in exhaust system is required.

Suitable access, storage, operational sequence, and identification for all system equipment must be provided. Piping materials used in all applications must be specified.

Design must specifically address maintaining fixed barriers where lay in type ceilings are installed to minimize added debris from concealed spaces upon discharge. Where the space requires access, identifiable means of entry or operable restraints must be provided. Ceiling grids where tiles are secured, must be labeled.

Tank-securing detail and assembly for each tank location must be provided.

Additional requirements, spare parts, testing, and inspections, as outlined in other Divisions of this Standard, must apply for all components of the system. All system components must be in dedicated identified raceways and cabinets with Class A wiring. Where interconnection is required for monitoring by the building wide fire alarm system, final tie-ins to that system must be by approved contractors as outlined in the Fire Alarm Section of this Standard. For a minimum one-year warranty period, the installing contractor will be responsible for required annual and semiannual testing, maintenance, and log. Access will be coordinated with the *Department* Representative and Facilities Operations.

Installer Qualifications

The installing contractor must have a minimum of five (5) years work experience on the designed system of a similar size and components installed. Where specialty items are used, additional certificates showing manufacturer training are required.

Materials and Installation

All piping must be thoroughly cleaned, reamed, blown clear, and swabbed with suitable solvents to remove burrs, mill varnishes, and cutting oils before assembly. Prior to hanging the pipe, approval by the Owner is required.^{15.18} Do not install plastic piping exposed within plenum areas; aesthetics must be planned accordingly. Reducers must be installed after fittings.

Where Victaulic fittings are used, cut sheets for gaskets which are Nationally Recognized Testing Laboratory (NRTL) listed for the materials and pressures present must be provided.

An abort switch must be located by all major exits and for others as required for complicated layouts. A phone must be provided in direct proximity to each abort switch. A manual pull must override the abort switch.

Manual pulls must be enclosed in a see-through, tamper-resistant plastic cover and must be identified in such a way as to be obviously different from building alarm system devices. Small text alone is not sufficient.

The system must include a supervised disconnect switch. The switch must not be solely software driven but must interrupt the releasing circuit.

Control panels must be located by room exit doors and must provide remote annunciation outside the protected area when possible.

Appliances, detectors, and devices must be dedicated to the system served. Alarm system features must be specified in accordance with the alarm section of this standard. The building main fire alarm panel must monitor the systems for status as deemed appropriate by the engineer of record, the *Department*, and the Owner. Where the building system has the capability to indicate full descriptions, Clean Agent alarms must be fully identified and must be able to be transmitted to remote monitoring facilities. Specify interlocked and cross-zoned sequences as appropriate for the level of protection desired.

Where areas are also provided with preaction sprinklers, separate dedicated initiation devices must be installed. Identification methods to differentiate system components must be provided.

Photoelectric type devices in subfloor areas must be provided where smoke detection is requested to prevent false alarms. The smoke detector chamber must be installed at the top of the subfloor.

Agent tanks must be new and dated within six (6) months of system acceptance.¹⁵⁻¹⁹ Tanks must be located and maintained accessible for routine access, semi-annual weighing, and scheduled removal. The tank must be located by an area access door or main pathway.

Liquid level indicators for agent tanks must be provided when available for the specified manufacturer.

Identification

All entrances to protected areas must be identified with UCF Standard style signage to indicate "Room ### CLEAN AGENT Protected Area Within Controls Located at Room ###". Preaction sprinklers must be indicated where applicable. Separate rooms housing controls for systems must be provided with signage as "Room ### Controls for Clean Agent for Area ### Located Within" (See examples above in Fire Suppression). The *Department* must post additional emergency contact information for all areas.

Training

Training sessions must be provided by the qualified installers for each special system installation and others where requested by the Owner. Multiple sessions, a minimum of one per work shift with at least three (3), must be made available to department representatives. The Trainer must complete the UCF standard training form available on the EH&S website. Additional guides and materials must be provided as needed. A reproducible training-presentation format must be recorded and provided.

Approval, Testing, Documentation, and Warranty

A logbook and an appropriately sized wall cabinet must be provided by the primary panel for the CA and ED systems.

Miniature system locator maps must be provided in the logbook(s) and must be professionally framed and mounted at each control panel and annunciator. Additional maps and updates must be provided for the building wide fire alarm log and the maps must reflect these specialized areas of coverage.

A minimum of five (5) sets of complete plans, sequence of events, shop drawings, submittals, calculations, manufacturers manuals*, and recommended maintenance schedule must be provided for review to the UCF Building Code Office. Additional sets must be provided as requested.

*A minimum of three (3) **complete original manufacturers design, installation, and operation and maintenance manuals** with additional copies as needed must be provided to complete each set for review. Plans will be held until the University Building Code office receives the original manuals.

Installation must be tested and inspected in coordination with the Office of the State Fire Marshal. Checklists are available for inspection guidance. The designated representative must witness all pressure tests, flow tests, pneumatic piping tests, etc.

Division 16 – Electrical Equipment

An Arc Flash and electrical hazard analysis must be performed for all new and renovation construction projects. Documentation must be delivered to the Owner prior to final completion. Danger/Warning labels must be affixed to each piece of the following electrical equipment as indicated in NFPA 70 Art.110.16 and NFPA 70E. Switchboards, panel boards, industrial control panels, meter socket enclosures, motor control centers, fused and non fused disconnect that are likely to require examination, adjustment, servicing, or maintenance while energized. An example of the label with required information may be obtained at http://fo.ucf.edu/danger_label.pdf.

Sprinkler system piping must not be used for electrical grounding.

General Provisions

Exposed electrical conduit (including, but not necessarily limited to electrical, telecommunications and/or cable TV) on any exterior portion or in any finished interior portion of a new or remodeled building is not permitted. Industrial applications with exposed structural framework may be exempt from this requirement only if no uniformly contiguous surfaces are available for concealment. Final authority in such exemptions remains with the UCF Project Manager. A separate electric meter must be installed to service retail spaces within a building.

All conductors and pull wires must be stranded copper with the exception of lighting fixture internal wiring.

All conductors in cabinets must be carefully formed and harnessed so that each conductor drops off directly opposite to its terminal.^{16.1}

Primary Power Raceways

Underground primary wiring raceways must have a thirty-six (36) inch minimum covering from the top of the conduit, with a six-inch (6") steel reinforced, concrete cap.

All electrical panels must have easy access. All panels must have exterior identification, arc flash calculation signage, and all breakers must be numbered and identified as to room number served by a plastic covered index. Circuit breaker panels must be lockable, specification grade, with full size copper busses braced for maximum available fault current and have bolt-on breakers, ground bar, and isolated ground bar.

Where research operations require local or emergency disconnect, such means must be provided for easy access within or adjacent to the research space and separate from the building electrical panels and electrical rooms.

An additional watt per hour meter must be provided for each building from the construction budget. The meter and base must be ordered by Facilities Operations and delivered to the Contractor and will be installed by the electrical subcontractor. The form for requesting a meter is on the Facilities Operations website (<http://www.pp.ucf.edu>) under the drop down menu for miscellaneous forms and utility connections.

The connected electrical load in any building must be corrected to 95 percent power factor or above, using automatically controlled capacitors, where required.

An automatic starting diesel fueled generator to pick up the building emergency panel through an automatic transfer switch must be provided. The generator must have an hour-meter and an automatic "exerciser" in its control system. The electrical capacity must be sufficient to operate life safety equipment and at least one elevator. Building emergency generators must be connected to all building data gathering panels and all HVAC building automation control equipment.

Conduits into the buildings for telephone, instructional television, fire alarm monitoring, and HVAC control and monitoring must be provided. Two (2) two-inch empty spare conduits below grade for each major exterior wall with a pull string must be provided and capped for future use.

Reduced voltage starters must be provided for all motors that are 15 horsepower and larger.

High efficiency and high power factor motors must be used in all cases. Variable frequency drives with full bypass must be used for all motors over 10 horsepower.

Vending areas must be supplied with dedicated electrical and data outlets at 4'-0" on center intervals along walls against which vending machines will be located.

GFCI protection must be provided for all electrical outlet connections within 6' of wet sinks and other wet locations.

Office type spaces and large storage rooms must be provided with at least one duplex receptacle per useable wall. Lobbies and study areas must be provided with power access spaced 12' apart.

Corridors without room for seating must have receptacles installed at a maximum of every 50 feet. Receptacles must not be provided within stairwells.

Corridors with room for seating must have receptacles installed at a minimum of every 12 feet on center.

Outside utility receptacles are required at a minimum of one (1) per wall located thirty (30) inches above finished grade.

Receptacle access must be provided on roof landings accessible by fixed stairwells. Receptacles must be provided at 100 feet on center intervals on the roof area.

All common faceplates, switches, and receptacles must be Office White in color and unbreakable rayon.

Mechanical, electrical, and telecommunication rooms must have two (2) dedicated quad receptacles located in proximity to the main entry door with others located as directed. Electrical rooms require one (1) standard telephone jack located in proximity of the main entry door.

Floor service, electrical, telephone, or similar outlets must be of a flush mounted type with flush brass plates.

All dry type transformers must have 220 degree Celsius insulation or better and must have guaranteed sound levels of: 0-9 KVA - 40 Db; 10-50 KVA - 45 Db; 51-150 KVA - 50 Db; 151-300 KVA - 55 Db; 301-500 KVA - 60 Db.

All Main Distribution Panels and main subpanels must have Transient Voltage [Surge Suppression \(TVSS\)](#).

Direct burial electrical wiring must not be used.

Each building electrical main must be provided with a grounding system that is 5 ohms or less. A written record of the test results must be prepared and signed by the Contractor and UCF Project Manager and submitted to the Architect and Engineer.

All empty conduits must contain a polyolefin pull line-JET LINE #232 or approved equal, with engraved metal tag at each end indicating conduit designation.

Dedicated rooms must be provided for each of the following: electrical, telecommunications, mechanical, elevator, and custodial. Each room's access must be located directly off a main corridor or common area with no spaces in between.^{16.2}

Main disconnect emergency shunt buttons must be provided on the exterior of the building where the service disconnect is not directly accessible from the outside.

Basic Material and Methods

All lighting switches and wall outlets must have a lifetime warranty.

All switch plates, receptacle covers, and junction box covers must be identified by panel number and circuit number. Switch plates and receptacle covers must be marked on the reverse by indelible ink and junction box covers marked on the front with indelible ink.

Minimum size tubing must be 3/4" EMT metal conduit with compression fittings.^{16.3}

Flexible tubing is limited to eight (8) foot maximum length.

Metal conduit must be used in the interiors of all buildings.

All electrical service to roofs must be through the HVAC curbs or through the exterior walls. Roof penetrations are not permitted.

Occupancy sensing technology must be installed in all classrooms, offices, and hallways. In addition, automated light harvesting technology must be installed in all spaces which receive natural lighting.^{16.4}

A comprehensive identification system for all system's conduits, panels, rooms, and equipment must be provided.

All emergency and exit lighting fixtures must be identified and permanently labeled with an applied numbering system.

A detailed signage package, that includes disconnecting methods, must be provided where portions of a building remain energized independently.

Service and Distribution

Three pole breakers must be used only for machinery type equipment. All individual circuits must have a means of single disconnect (one (1) breaker) and each individual circuit must have its own neutral.

All service power must be 480/277v into the building main. Power must be distributed as follows: Lighting must be 277v and user power must be 120/208v.

Transient Voltage Surge Suppression

Category C3 for Service Entrance, 150,000A minimum total surge current/phase.

Category B3 for Distribution Equipment and panel boards.

General Lighting Considerations

Architectural lighting must be approved by the Owner.

Fluorescent fixtures for conference rooms and offices must be **RT5** Volumetric Recessed Lighting from Lithonia or equal with dual dimming switching feature. Classroom and hallway lighting must be fluorescent lay-in fixtures or indirect pendant type fixtures. Lighting must be LED or CFT. No incandescent lighting permitted. Lighting controls must be tied into the campus energy control system.

Light fixtures in stairways must be mounted above the landings and on the walls adjacent to the steps. All fixtures must be wired for emergency lighting.

Maintenance equipment for fixtures higher than 10 feet must be included in the furnishings and equipment project budget and turned over at final completion to the University.

The electrical system must be 277/480 V, 3 phase, 4 wire, with a 120/208 V, 3 phase, 4 wire sub-feeder. All mains and feeders must be protected by bolt-on circuit breakers. A neutral wire is required for all circuits.^{16.5}

Exterior Lighting

Lighting is categorized as follows: streets, parking lots, walkways, athletic areas, common areas around buildings, and building accent.

Site lighting and parking lot lighting must be included in the building design. Parking, building accent, and pedestrian lighting must be controlled by twist-lock type photo cell. Location will be determined by the Sustainability and Energy Management Department. Pedestrian lighting must utilize 10 feet, traffic lighting must utilize 20 feet, and parking lots must utilize 30 feet poles.

New and or replacement fixtures must conform to current standards. All exterior lighting must be 480V three phase load balanced with the exception of building accent lighting, which must be 277V.

When exterior lighting systems are designed as part of a building project or facility, power to that system must come from the respective building's load center. All exterior fixtures must be twist-lock photocell relay operated. Multiple lighting fixtures must be on a contactor that controls all lights within a specific area.

"PEMCO" type fixtures and associated poles must be installed in all areas within the Gemini Boulevard perimeter. "STERNER" shoe box type fixtures and poles must be installed in areas outside the perimeter. Ten (10) foot pole lights must be provided in pedestrian areas only.

All light poles must be brushed aluminum with a concrete base pedestal mount. Outdoor lighting must be HID with a hinged base pole. Each unit must be fused and grounded.

Light pole bases must be a minimum four (4) feet from the back of curb and a minimum of twelve (12) inches above landscape finish grade and twenty-four (24) inches above paved finish grade.

Interior Lighting

The finish and color of surrounding surfaces and equipment must be selected for reduced glare, increased reflectivity, and acceptable brightness balance. Lighting equipment and layout must be coordinated with other building design features.

Lighting Fixture Types

Fluorescent or incandescent can-type fixtures are not permitted.

LED or compact fluorescent lamps must be used with can-type fixtures.

Lighting must be provided in all service areas.

Lighting Controls

Control of interior lighting in classrooms, offices, utility closets, restrooms, and corridors must be distributed occupancy based control. Multi-level switching must be provided in classrooms and offices to allow two (2) lighting levels. Occupancy based control must be dual technology, at a minimum.

Fixtures designated for security purposes must be controlled by photocell on-off-bypass operation. All other exterior lighting must be controlled by photocell.

Where fluorescent dimming is required, a Lutron, Inc., RS-232 control systems must be used. Lighting systems in rooms that require switching systems must be controlled with UPC-20+ control switches. These units must be used with the Crestron control systems that are installed in multimedia classrooms and conference rooms.

Emergency and Exit Lighting

Emergency lighting and illuminated exit signage must be designed on dedicated circuits.^{16.6}

All exit signage fixtures must be LED type. Radioactive source signage is not permitted.

Emergency lighting must be provided at all emergency system control panels, main electrical and mechanical spaces, public restroom areas, classrooms, and conference rooms.

Emergency lights that remain on as “night lights” must be located to avoid interference with projection screens or must be installed with an automatic relay. The relay must permit darkening of the room when visual aids are being used and still initiate automatic lighting activation during emergency conditions. Where there is a stepped or tiered seating arrangement, minimal lighting levels must be maintained at floor level without dimming.

Emergency lighting in stairwells and areas with hazardous materials must be arranged to have minimal lighting at all times.

Classroom Lighting

All lighting switches and controls must be located adjacent to the Teaching Console as well as each doorway. The Master Control must be installed at the location of the Teaching Console.

Lighting systems must be zoned (i.e. switched) in rows positioned parallel to the screen. Multiple controls must allow lights to be switched-off near the screen with other lights remaining on away from the screen in addition to other settings as requested by the Owner.

In larger venues, Master Control Banks such as those manufactured by Lutron must be provided. These Master Control Banks must include multiple channels and presets plus be provided with an AV Interface Bus for connection to a Crestron control system. The Interface Bus must provide appropriate low-voltage feedback status to the Crestron system.

In addition to general room lighting, other systems may be required. A section of florescent lighting, (of the type used in the classroom) must be placed above the console to provide light for the document camera. This florescent light unit must be controlled via the UPC 20+ control device that is controlled via the Crestron system. This lighting must also provide general lighting for the Console area and presenter without spilling onto the projection screen.

In large venues, a pipe grid with theatrical lighting may be required to provide:

- Overall stage wash
- General lighting of the Console area plus an overall stage wash
- Specific lighting for special events.

See Division 13 – Special Construction for Instructional Resources requirements.

Lightning Protection

A complete lightning protection system with a UL Master Label must be provided.

All wiring must be copper.

Wiring below grade must be installed at a depth of eighteen (18) inches or deeper.

Air terminals must be ten (10) inches high, ½-inch in diameter with rounded points.

Connections must be exothermic weld.

Ground rods must be twenty (20) feet sectional copper-clad steel rods, ¾-inch in diameter.

The installation must include theft preventative coverings for all accessible exposed conductors.

Standby Power Generation Systems

Generators must be sized at less than 220 kW. Departments requesting generators in excess of 220 kW must be advised that all costs associated with these systems such as, but not limited to, permitting, additional maintenance, re-certification, etc. are the responsibility of the Department.

Proprietary equipment is not permitted.

A five (5) year warranty on parts and two (2) year warranty on labor must be provided.

The generator must have a KW rating as per design drawings of 277/480V, 3-phase, 4-wire, and 0.8 power factor. Engine must be 4-cycle, water-cooled with a standard mounted radiator, fan, water pump, and diesel fueled or natural gas.

Generator control panel must contain main circuit breaker, frequency meter, running time meter, voltage-adjusting rheostat, AC voltmeter with phase selector switch, and AC ammeter with phase selector switch.

The control panel must also include a network card that is compatible with the Building Automation System.

All generators must be equipped with a remote annunciator located next to the fire alarm control panel, in a common area of the building adjacent to a Fire Department accessible exit.

The automatic transfer switch must be mechanically held, electrically operated, rated for continuous duty, and double throw. Main contacts must be silver alloy wiping action type.

Voltage sensing relays, one-second time delay, test switch, engine starting contacts, adjustable time delay on re-transfer, five minute unloaded running time-delay after re-transfer, spare auxiliary contacts, exercising timer, and time delay for transfer to emergency must be provided.

The State Fire Marshal or his designated representative must be present to witness the on-site acceptance and load-bank testing.^{16.7} The generator must be tested under load, in conjunction with any UPS system installed in the building.

Acceptable Non-Proprietary Manufacturers: Katolite, Kohler, and Onan.

All diesel fuel tanks must be skid mounted, double-walled with self-containment capability, interstitially monitored, and fuel capacity for 24 hours of run time at 100% load. When the tank capacity exceeds 549 gallons, the registration must be coordinated with the Owner prior to filling.

The enclosure must be weather resistant and architectural bronze in color.

For the period of one (1) year from the date the building is finally accepted, the installing contractor must be responsible for all NFPA 110 quarterly required inspections, maintenance and testing of the emergency generator. Coordination and scheduling of the system inspections and tests must be done through the Owner. Records of such activities must be maintained for the duration of the first year, at which time copies must be turned over to the Owner.

Fire Alarm Detection Systems

General

Installation of any system in no way implies continued maintenance service contracts by the installing Contractor. The system installed must be non-proprietary in that replacement parts are readily obtainable and can be serviced by a third party licensed vendor which is Owner selected by separate bid process. Such service must not have an effect on warranties.^{16.8}

Any materials not specifically mentioned, but required for proper performance and operation must be furnished and installed. Coordination with infrastructure items such as telecommunications must be planned for and itemized as needed.

Design

The system in its entirety must be all new from a single manufacturer with a current Nationally Recognized Testing Laboratory Listing (NRTL) comprehensive of all components for the fire protective signaling purpose for which they are used. Alarm panels must be listed at a minimum to the most recent UL 864 edition standards.

Acceptable non-proprietary maintainable systems are Fire Control Instruments Inc. (FCI), Notifier, or Simplex.

The system must be a recent model for which replacement parts and local service are guaranteed to be readily available for a minimum of ten (10) years from the date of installation.
16.9

Systems must be designed and installed as one (1) unified system per building. Each building must operate independently. Where part of an existing building is being renovated or added on to, the existing Fire Alarm System must be upgraded to accommodate the new addition in a unified single system method with full annunciation (including microphone speaker) and controls throughout. If the old panel is expanded beyond its capability or listed connecting parts are no longer available, the entire system must be replaced with one of the approved manufacturers listed above. If more than 50% of an existing fire alarm system is affected or it is more than ten (10) years old, it must be upgraded to the current standard.^{16.10}

Each fire alarm system on the main campus must be connected to the UCF Campus Receiving Station for fire alarm monitoring at the Police Building. Building monitoring methods for sites not on the main campus will be determined by the Owner on an individual basis. Main Campus monitoring methods will be NRTL listed for NFPA 72 Proprietary Supervising Service. Currently this is via hardwired dry pair connection unless another Proprietary Listed method is accepted by the Owner and AHJ. Dialers, Ethernet, and similar technologies will be considered in accordance with their listings.

A dedicated ethernet connection must be provided for fire alarm system monitoring, fed from a main switch, and must not be subject to general building occupant access. Monitoring signal transmission devices must be located with similar fire alarm equipment in an area with smoke detection. The Ethernet line must be identified at all ports as "Fire Alarm Service Only".

All fire alarms must be equipped with a dialer and have telephone (copper) casting routed as a backup.

The fire alarm control panel must be located in a main lobby or common corridor near a fire department accessible exit. Additional remote annunciators must be provided as indicated by the Owner. All buildings where hazardous materials are handled must be provided with an external annunciator.

All system components requiring access for testing, maintenance, and inspection must not be located in office, storage, or instructional spaces used by building occupants. Maintenance intensive items such as batteries and sprinkler testing controls must be located for easy access at finished floor level.

Gas utility service must have an automatic closing fire alarm solenoid and testing bypass.

Building sound systems must be provided with a relay for automatic shut off upon activation of the fire alarm.

In addition to where required by code, all buildings meeting the following criteria must be designed with a fire alarm including voice evacuation throughout (EVAC), and must be connected to the campus Mass Notification System (MNS):

- Any Facility with 300 or more occupants or capable of being expanded to 300 or more;
- Any Facility with 50 or more occupants above or below the level of exit discharge;
- Any Facility with hazardous processes, materials, or laboratories;
- Any facility deemed so in need by the UCF Emergency Manager due to special circumstances.^{16.11}

Where a fire alarm system is not required but a Mass Notification System is deemed essential, a separate voice notification system must be provided. See the Mass Notification System section for further details.

Installer Qualifications

The installing Contractor for the fire alarm system must at a minimum be a Certified Alarm System Contractor I and a direct sales division of, or the authorized and designated distributor for the fire alarm system manufacturer with at least five (5) years of manufacturer certified work experience. Device installation, connection, terminations, final programming, testing, and certification must be performed by a NICET Level III or higher manufacturer certified trained technician.

Materials and Installation

The Fire Alarm Control Panel (FACP) must be in a unified enclosure, microprocessor-based, intelligent loop interfaced, modular in construction, and in a complete new cabinet. Each system must be capable of being expanded at any time for up to the predetermined capacity for known building additions or for a minimum of two (2) additional modules.

The FACP must at a minimum include: Walk Test, Positive Alarm Sequence (PAS), Alarm Verification, Voice EVAC where required, multi-level alarm processing, trouble reminder, dry contacts (zone, trouble, alarm, & supervisory), smoke detector sensitivity testing, and must be 24 VDC non-coded power limited.

The FACP must have a minimum eighty (80) character alpha-numeric LCD display with user defined character capacity. The display must indicate all system conditions and device locations with description, room number, and relative compass location within the building. The panel must have a steady "Power On" light and separate "Alarm" (red color) and "Trouble" (amber color) LED indicators.

The fire alarm control panel must contain a history buffer capable of storing up to 4000 system events. Each of these events will be stored, with time and date stamp. The history buffer must use non-volatile programmable memory, and must not be lost with system primary and secondary power failure.

The CPU must be capable of being programmed on site without requiring the use of any external programming equipment and must accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips, EPROMS, or similar.

The system must have the capability of networking with other Control Panels on single pair of copper wires, Ethernet, or fiber optic cables. The EVAC functions must include a microphone, control switches, and zoning as determined by the Owner (typical zone by floor minimum). Additional microphone and control modules must be placed at remote annunciators as determined by the Owner. Local microphone must take priority over all messaging systems. EVAC messaging must be appropriate for the facility served and a sample of the factory recorded message provided to the Owner for review and approval.

All initiation device (IDC), notification appliance (NAC), and signaling line (SLC) circuits must be Class A (NFPA Style Z) with no T-Tapping or spider-webbed type circuitry.^{16.12} A single ground fault or open circuit on the SLC must not cause system malfunction, loss of operating power, or ability to report alarm. Loss of any one (1) NAC circuit must not cause loss of any other NAC circuit in the system.

Each SLC and NAC must be limited to only seventy-five (75) percent of its total capacity during initial installation.

Dedicated HVAC control detectors must not sound general alarm unless required by code. Deviations for special circumstances must be discussed during design and outlined in the sequence of operations.

HVAC systems will shut down on general alarm in office and classroom type buildings in addition to duct detector controls.

HVAC in buildings with hazardous materials and associated exhaust will only shut down on duct detector control or as required for emergency exhaust operations to prevent areas from

becoming excessively negative. For buildings with hazardous materials, a separate control button(s) for remote individual area HVAC shutdown must be provided at the panel as one of the pre-programmed buttons outlined below.

Where a Smoke Evacuation system is provided, the FACP must have means for manual operation. Separate control panels are not preferred when the main panel is capable of listed controls. A "Manual Off" and "Manual On" switch or button position for the Smoke Evacuation System must be monitored as a Supervisory indication. Activation of the switch must include by program all associated functions required for proper operation such as damper closure, door opening, etc. Additional buttons must be provided for individual related functions as needed to facilitate routine testing.

Hold open devices for fire doors must be a sturdy, fixed magnet type mount.

The FACP must have the capability to be field-programmed for selective operations customary to the system as required by unique job conditions and must be capable of being programmed by keypad access by the Owner, secured via standard key and code without external computer interface. An individual monitored pre-programmed activation and bypass button or single pseudo-point must be provided for each category here: general alarm, HVAC detectors and shutdown, door hold-open devices, or others as determined by the Owner. Codes and addresses must be supplied to the Owner. The Owner must have programming capability for individual points and manual control. An "Alarm Silence" switch must be included. Each system must be capable of at least four (4) levels of password protection.

The FACP must perform continuous testing of analog sensors including sensitivity tests with compensation for age and environmental conditions. Problems must be indicated for each device with "Failed Test, Self Test Abnormal, Dirty, or Very Dirty" or similar, and must be recorded in the event log. Additionally, the LED on the sensor base must glow steady, giving a visible indication at the sensor location.

Initiating control modules must be dedicated to the type of component served for individual programming control. HVAC shutdown and other control functions must be accomplished from the FACP rather than by individual smoke detector relays.

The system must have a primary (main) power supply connected to dedicated branch circuit(s) and must also be connected to the building generator emergency system where provided. The circuit(s) disconnecting means must be provided with a breaker lock clearly marked "FIRE ALARM" labeled in red on both the legend and circuit breaker. Circuits serving individual panels must be clearly indicated inside the panel access cover with indelible ink.

There must be a secondary (standby battery) 24 VDC battery power supply to the complete system. Batteries must be placed at finished floor level working height and not above ceilings or in hard to reach spaces.

Surge protection must be provided and dedicated to the fire alarm control panel circuit feeds in addition to any general building protective systems. The device must be mounted at or in the main FACP or at the electrical panel with the FAS circuit breaker (s) and must be labeled. Additional devices must be provided to protect alarm circuits that extend to the exterior of the building (such as BFP, tamper, antennae). The device must incorporate a replaceable fuse design and failure indicator. Acceptable devices are manufactured by EDCO model number HSP121BT-1RU or Facilities Operations approved equivalent.

All system panels, controls, pull stations, and cabinets must be made tamper-resistant with lock keyed-alike to a standard key typical of the chosen manufacturer. A minimum of ten (10) keys of each type must be provided to the Owner plus one (1) spare set for the fire department access box.

The Annunciator Panel must be modular in design reflecting all status audible and visual indicators the same as the main FACP with a minimum eighty (80) character alpha-numeric LCD display. It must have review function capability and alarm reset/silence secured by key switch. The annunciator must be housed within a NEMA rated enclosure, where appropriate.

Manual Stations must be non-coded, single action, flush mounted, and on manufacturer's specified box. Break-rods are not permitted. System standard key is required for reset. All Housing and Residence Life manual stations must have an alarmed tamper-resistant cover.

Detectors and sensors must use point addressable bases, allowing detectors to be interchangeable via twist lock mounting. Each detector or detector base must incorporate a steady-state light to indicate if it is in alarm. The unplugged detector must be capable of normal handling without damage.

Smoke detectors must be primarily the photoelectric plug-in type. Ionization smoke detectors must be used as specified in special applications such as computer rooms or electrical rooms. Ionization smoke detectors must have two levels of sensitivity which can be easily set.

Thermal detectors must be a bimetallic, restorable type device.

Air duct, plenum, and under floor detectors must be installed in a manner that provides easy access for periodic cleaning and calibration. Where provided, remote alarm indicator light and test switch must be located in the nearest corridor or a public area and adequately labeled with the location and type of device monitored. The Contractor must measure air velocity (CFM)

across each duct to verify design and indicate CFM readings on the duct detector housing. All duct penetrations must be properly sealed.

Alarm indicating devices must have both audible (A) and visible (V) alarm signals. Visible signals must be the white strobe (flash discharge) type with a minimum intensity of seventy-five (75) candela. When installed in corridors, visible signal must be equipped with a side viewing lens. Devices must be combined AV where possible to reduce fixture counts.

Fire alarm devices must be red in color, where the option is available.

Audible indicating devices must produce area sound level signals 15 dB above ambient noise and not more than 100 dB where ambient conditions do not require it. The tone must be distinctive, but moderate in nature; "shrill" sounding horn type appliances are not permitted.

All sprinkler, standpipe, and similar fire suppression control valves must be provided with monitored tamper switches (including pumps, PIV and BFP). Water flow switch-monitoring must be provided at a minimum to identify flow by floor with an integral fifteen (15) second time-delay device to prevent nuisance alarms.

All systems must include tamper monitored fire department access boxes with locations determined by the Owner.

Fire pumps must be monitored by the FACP at a minimum for general trouble and "Pump Running" in addition to local fire pump annunciation.

A fire fighter's two-way telephone service communications as required by code or to match existing must be provided.

All panels must be mounted with sufficient clearance for observation and testing. Conduit (joints, through penetrations, and minimum 10' interval) and junction boxes must be identified as "Fire Alarm" and or painted and conduit taped red, unless in finished areas. All conduits, mounting boxes, junction boxes and panels must be securely hung and fastened with appropriate fittings to insure positive grounding throughout the entire system.

System wiring must be in conduit, minimum ¾" EMT. ^{16.13} All conduit fittings must be steel compression type (die cast type prohibited), marked with red tape or paint to distinguish it for fire alarm use only. Flexible connectors minimum ½" are only permitted for end sections less than six (6) feet in length between a box and a suspended or moveable device. No wiring other than directly associated fire alarm detection, alarm, or auxiliary fire protection functions will be permitted in fire alarm conduits. Wiring splices must be avoided other than in alarm devices,

terminal strip junction boxes, and will use crimp connection or other approved method. Power limited, non-power limited, and AC power conductors must be run in separate conduit paths.

In new construction, all conduits must be enclosed within building construction in all finished areas. In renovations and remodeling, conduit must be enclosed where possible. Any exposed conduit in finished areas must be approved by the Owner prior to installation.

Extra Materials

Spare parts must be provided as requested by the Owner during design and keys as noted above.

Identification

Transposing or changing color-coding of wires is not permitted. All conductors in conduit containing more than one wire must be labeled on each end with "E-Z markers" or equivalent. Color codes of wires must be consistent throughout the system and depicted in a legend on the inside of the respective control panel or terminal cabinet as well as on the system as-built drawings. Wherever possible, colors must remain consistent with similar systems already installed on the campus. All conductors in cabinets must be carefully formed and harnessed so that each conductor drops off directly opposite to its terminal.^{16.14} Cabinet terminals must be numbered and coded. All controls, function switches, etc., must be clearly labeled on all equipment panels. All wiring must be checked and tested to insure that there are no grounds, opens, or shorts.

A unique identification number, reflected on the shop drawings, must be assigned to each initiating device and be professionally marked on the unit base and readily visible from grade.

All controls and specific sequences of operations required to achieve reset, fan control, etc must be permanently labeled in a professional manner.

Training

A training session must be presented by a fully qualified and trained representative of the equipment manufacturer who is thoroughly knowledgeable of the specific installation for personnel selected by the Owner. Training, consisting of a minimum of two (2) sessions at three (3) hours each, must be scheduled with the Owner to accommodate a day and evening shift attendance and must be video recorded by the Contractor. Training is to cover, at a minimum, how the operator is to perform the basic duties such as resetting, activating, troubleshooting, bypassing, and testing. Presentation must include instructional handouts as needed and viewer participation and demonstration. The training is to utilize the Owner provided *UCF Minor Fire*

Alarm Service Personnel Training Overview Form and must cover all items outlined there-in and others as deemed necessary for the specific installation.

Approval, Testing, Documentation, and Warranty

Shop drawings, battery calculations, voltage drop calculations, wiring diagrams, sequence of operations for all programmed conditions, listings, and complete cut sheets-installation-program manuals must be provided for permit and Owner approval prior to installation. **The fire alarm system must be successfully inspected, demonstrated, and approved by the Engineer of Record prior to requesting inspection by the State Fire Marshal.**^{16.15}

In addition to standard test papers, local sensitivity test readings of the installed devices must be provided for all smoke sensing devices. Certification papers must be prepared in advance and provided to the inspector for approval at the final test. Final tests must include full performance of smoke evacuation, pre-action, and similar systems. All components, door operation, air flow, shut down, etc. must be verified on normal and standby power conditions. The design must include UPS power back up system for proper operation of required equipment under emergency power transfer conditions.

Prior to final acceptance, a hardback system log book with a copy of the final state fire marshal approved test papers, sensitivity reports, and two (2) copies of a simplified map of the building showing device locations and numeric address of each device must be provided. Additional framed copies of the system device map must be mounted professionally beside each FACP and annunciator.

Provide "As-Built" package as defined in Division 1.

Prior to final acceptance, the Owner must be provided a reproducible accurate system "As-Built" package in electronic and hardcopy form. Drawings must be compatible with AutoCAD and contain conduit layout and wiring diagrams, including wire color code and tag number. Submittals must include a minimum of two (2) hard copies of comprehensive "Operation and Shop Maintenance Manual", including a digital media (USB drive) copy of the program for each system and facility.

The Contractor must warranty all equipment and systems for a minimum period of one (1) year following the date of final acceptance. The warranty must include repair parts, labor, and prompt field service, pick-up and delivery as coordinated with the Owner for access. The Contractor must provide the first year of testing outlined by NFPA including a sensitivity test within one (1) year of installation. Such tests must be documented by the Contractor and included in the system log which is kept by the Owner.

Mass Notification Systems

All new facilities must be provided with a means of Emergency Mass Notification.^{16.16} Such Mass Notification System (MNS) must be fully compatible and completely integrated with the existing campus wide Cooper Notification System and must include all building based equipment, wiring, audio visual devices (AV), transmitters, receivers, visual display screens, network connections, conduit, power supplies, etc. When a new building is located adjacent to an outdoor area subject to frequent assembly, additional devices must be installed to transmit messages to the outdoor vicinity. When a building fire alarm system is used in conjunction with the messaging system, the fire alarm system must be installed with all necessary listed components for proper annunciation of the externally transmitted MNS signals. To ensure compatibility, all components, modules, interfaces, digital message repeaters, and amplifiers used in the MNS must be manufactured by Cooper Notification or an approved equal. Substitutions are not permitted.

The MNS must be compliant with UFC 4-021-01, OSHA 1910.165, the current Florida Fire Prevention Code, the current Florida Building Code, the National Fire Protection Association NFPA 72, the American's with Disabilities Act (ADA), the Common Alerting Protocol (CAP), and the Safety Act Certification from DHS.

The installation is subject to review by the UCF Building Code Office, the Florida State Fire Marshal (SFM), UCF Emergency Manager, and designated representatives of the UCF Offices of Facilities and Safety. Installations must meet all University Standards as outlined in other divisions of this document including aesthetic considerations reviewed by facilities managers and representatives of Facilities Operations.

Qualified installers must be a direct sales division, or a trained and authorized vendor that has demonstrated design, installation, sales, and service maintenance of the system with a minimum of three (3) years work experience. Installer must have a Fire Alarm Systems NICET Level IV qualified individual for project management, oversight, and final fire alarm connection. All installation personnel must have been trained and approved by the equipment manufacturer with proof of certificated manufacturer training provided upon request. Equipment must substantially come from one manufacturer of established reputation and experience. They must show proof of availability to provide replacement parts for key components within a 24 hour express order timeframe.

It is the general intent that the MNS must operate in conjunction with the separate building fire alarm voice EVAC system and must include all components necessary for that interconnection. At a minimum, the MNS system must be capable of capturing and making voice

announcements with the fire alarm appliances (where provided) or with a dedicated speaker system throughout the facility at levels sufficient for comprehension but at no less than the higher of 15 db above ambient noise or 50 dB in normally occupied areas. AV devices that are separate from building fire alarm systems must be installed in a like manner as outlined by the latest adopted edition of NFPA 72.

All buildings must be provided with no less than one (1) visual display board capable of showing alphanumeric script legible at fifty (50) feet away. Additional visual display device locations will be identified by the Emergency Management Coordinator and the University Police Department.

The design must include a clear description of the capturing sequence and priority for fire alarm activation. The joint fire alarm and MNS must be verified by the engineer of record for compliance with the applicable codes with details stated on the design documents. Local fire alarm microphone must take precedence over all remote messaging systems.

Each system must be provided with dedicated power and attached to the backup emergency generator, where provided. All system components for AV messaging and the common area type displays must be provided with an emergency power source. Such source must supply power in quiescent mode for not less than 24 hours and then must be capable of operating the system in active and emergency mode for not less than 15 minutes at a maximum connected load. Each system must be provided with surge suppression devices to the fire alarm, on all power supplies, and connections that extend beyond the building envelope (like antennae). Acceptable devices are manufactured by EDCO with indicator light or approved equivalent. Power supplies must be dedicated and provided with breaker clips. Backup power supplies must be as outlined for NFPA 72 fire alarm systems.

Prior to installation, each system must be submitted for plans review with description of function, complete shop drawings, wiring diagrams, parts list, and component specifications. The drawings must indicate the exact location of all installed components and wiring paths. Where the fire alarm system is employed in whole or part, this Standard's Fire Alarm Section will apply. Where visible components will have potentially undesirable effects in finished areas, it is the responsibility of the installer to ensure an aesthetically pleasing installation. Exposed conduit in finished areas is not acceptable. Equipment must be located in common corridors, facilities mechanical & electrical type spaces, or similar type common spaces. Departmental server rooms, private offices, and other similar user secured spaces must not be used. Stairwells must not be penetrated or used as chase-ways. All MNS wiring must be run in minimum conduit size of 3/4 inch EMT. All conduit fittings must be steel, compression type. Die cast type is prohibited. Wire pathways must be concealed in all finished areas where at all

possible. Exposed items and the manner of finish it must be approved by the Owner prior to installation. "MNS" label must be applied intermittently along conduit in unfinished areas and inside box covers.

Upon completion of the installation, the Contractor must complete performance testing (pre-testing) of the MNS for compliance with the manufacturers' guidelines and codes above. Performance results, including the required sound pressure levels and intelligibility values, must be documented with notation of any deficiencies and corrective actions submitted to the Owner. Upon successful completion of performance testing, the Contractor must complete a witnessed acceptance test with the AHJ to include the SFM, Building Official, and or designated University Representatives.

A training session must be presented by a fully qualified and trained representative of the equipment manufacturer who is thoroughly knowledgeable of the specific installation. Training, consisting of a minimum of 2 sessions at 3 hours each, must be scheduled with the Owner to accommodate a day and evening shift attendance and must be video recorded by the Contractor.

The Contractor must warranty all equipment and systems for a period of not less than one (1) year following the date of final acceptance. The warranty must include parts, labor, and prompt field service, pick-up, and delivery.

The Contractor must provide a complete set of record as-built drawings and operations and maintenance manuals for the MNS. Record drawings and operations and maintenance manuals must provide information for troubleshooting, preventive maintenance, corrective maintenance, and schedule of frequently required replacement parts. A procedure and checklist for no less than an annual re-certification of the system must be provided.

Prior to final acceptance, the Owner must be provided a reproducible accurate system "As-Built" package in electronic and hardcopy form. Drawings must be compatible with AutoCAD and contain conduit layout and wiring diagrams, including wire color code and tag number. Submittals must include a minimum of two (2) hard copies of composite "Operation and Shop Maintenance Manual," including a digital media (USB drive) copy of the program for each system and facility.

Controlled Access Systems

All areas must be accessible with a university great-grand master key.^{16.17}

Open Options (current UCF utilized version) is the only manufacturer that may be installed in addition to UCF mechanical cylinder lock system for UCF buildings.

Card readers must be used at each access point but additional proximity readers with keypads (two-stage authentication) may also be used.

Cards must be purchased through the University Card Office and must meet the sequencing protocol based on the last series issued for UCF.

Open Options Access Control must be installed through Facilities Planning and Construction for new construction and Facilities Improvement for existing buildings.

All electrical wiring must meet NEC and be in compliance with the Florida Fire Prevention Code.

A licensed fire alarm contractor in accordance with the fire alarm section of this Standard must perform connections to fire alarm systems. If connections to an existing system are required the work must be coordinated with the current Facilities Operations fire alarm vendors.

Connections to building back-up power systems must be provided where available.

All wiring must be encased in metal conduit EMT.

Power supplies must be on dedicated circuits.

The installation must be reviewed, approved, tested, and accepted by the Florida State Fire Marshal and the Owner.

Fire department access boxes are required for the installation of any new access control system.

Door Network Security Conduit for Classrooms and Conference Rooms

All classrooms must be provided with appropriate conduit and or wiring for security devices such as Smart Cards, motion detectors, video surveillance, or forcible entry alarms. All multimedia classrooms and conference rooms will be installed with current UCF access control system.

All doors to classrooms and conference rooms will have one-half inch conduit installed inside the door frames on the interior side of the door near the hinge to support an electronic, wired, centralized locking, and unlocking system. The conduit will home run to a security room or the MDF or IDF, depending on the floor. The location of the conduit home run will be determined by UCF Police. Pull tape must be placed in each conduit.

Video Camera Conduit for Classrooms and Conference Rooms

All hallways to multimedia classrooms and conference rooms will have one inch conduit installed to support Cat 5E cable to connect IP based video cameras at designated locations. All hallways and stairwells that open to exterior doors in buildings with multimedia classrooms and conference rooms will have one inch conduit installed to support category 5e cable to connect IP based video cameras at designated locations. The conduit will home run to a security room or the MDF or IDF. The location of the conduit home run will be determined by UCF Police. Pull tape must be placed in each conduit.

Telecommunications and Cable Television

Building telecommunication rooms must be dedicated to telecommunications and must be separate from departmental IT rooms or Facilities Operation's service rooms. Room access must be located directly off a main corridor or common area with no intervening spaces. The room environment must include sufficient HVAC and other systems controls. Penetrations of the telecommunications rooms by building drains and unnecessary water supplies must be avoided.

Tele-Data Design Standards

These Standards are for assisting the Architect / Engineer / Construction Manager Design Team (A/E/CM) in designing this project to UCF and Telecom Industry Standards. Tele-data Design Standards can be found at:

<https://publishing.ucf.edu/sites/itr/cst/Documents/Telecom/Design%20Guidelines%20for%20Teledata%20Rev.%206.1.pdf>

Summary of Critical Needs

Changes must not be made to the General or Special Conditions without written approval from the Owner.^{1.1}

Changes requested by the End User must be made prior to 50% Design Development Documents.^{1.2}

The Architect/Engineer must consult the Owner regarding priority of alternates. Only additive alternates must be used.^{1.3}

A quality control and quality assurance plan must be provided and implemented by the Construction Manager or Contractor.^{1.4}

Lock out/tag out regulations are required to be utilized in all campus facilities. For renovations to facilities, contact the UCF Construction Project Manager.^{1.5}

All Contractors or designees must attend a one-hour annual session covering UCF Environmental Management System construction specific components and to provide certification that the information has been transmitted to all affected employees and sub-contractors.^{1.6}

Fill soils kept on site during construction must remain covered at all times by covering or other means of containment.^{1.7}

The Contractor must remove mud and spillage from public and university streets on a daily basis. Failure to clean streets daily will result in streets being cleaned by the Owner at the Contractor's expense.^{1.8}

A detailed plan of the existing streets and roads on campus that will be utilized must be submitted to the UCF Construction Project Manager.^{1.9}

A detailed plan must be provided by the Contractor and approved by the university regarding the requirements for building systems start up. This is in addition to and separate from full commissioning.^{1.10}

The requirements contained in the UCF Professional Services Guide must be followed regarding final cleaning, adjusting of equipment, project record documents and close out procedures.^{1.11}

All projects must be documented using the Multi-Vista Program format or Owner approved equal.^{1.12}

An **ACCEPTABLE** record set of Construction Documents must be received and **APPROVED** by the University prior to Final Payment to the Architect/Engineer and Contractor.^{1.13}

For all field changes made during construction, the Architect/Engineer is responsible for the accuracy of information placed on the construction documents.^{1.14}

It is the responsibility of the Architect/Engineer to incorporate these Standards into the specifications or other contract documents, and to secure compliance of the Contractor with these Standards, including changes in design and specifications during construction incorporated into "record set" conditions.^{1.15}

In cases of multiple installation of identical equipment, only one manual submitted for the identical equipment is necessary, but model and serial numbers of the several pieces of equipment must be listed.^{1.16}

Manufacturers' maintenance instructions must include schedules showing proper time intervals for lubrication, adjustment, calibration or checking. Contractor must consolidate manufacturers' schedules with a single master schedule of required maintenance.^{1.17}

Systems that are known to be obsolete or are soon to obsolete must not be specified.^{1.18}

An all-inclusive Warranty Matrix that clearly identifies start and end dates of the Contractor's warranty and the Manufacturer's warranty must be provided by the Contractor for all equipment.^{1.19}

The roof system requires a twenty (20) year warranty. The remainder of the building envelope requires a minimum ten (10) year warranty against water intrusion to be provided by the Contractor at no additional cost to the Owner.^{1.20}

The Architect of Record is directed to work through the Office of Facilities Planning and Construction and simultaneously copy the Commissioning Authority for all communications and coordination of the project.^{1.21}

The approved Educational Plant Survey must be followed. Any modification in the approved Facility Program must be modified by written recommendation for approval to the President.^{1.22}

The university will not undertake a detailed technical review of the work. It will be the responsibility of the A/E, acting in a professional capacity, to ensure the accuracy, completeness and correctness of the cost estimate and all engineering concepts and details of the work, including the coordination of the various architectural, structural, mechanical, electrical, and other subdivision thereof with each other and with the specifications. The A/E assumes full responsibility for the technical accuracy and professional adequacy of all work.^{1.23}

Project drawings will be final and complete with all elements thoroughly checked and coordinated.^{1.25}

All construction specifications must be university project specific, based on the current UCF Design, Construction, and Renovation Standards.^{1.26}

All testing must be performed by the Contractor unless otherwise directed by the Owner.^{1.27}

The use of untried materials will be rejected. Materials must be used in a manner, which will afford the maximum service at the lowest comparable cost.^{1.28}

A project achieves “final completion” when:

- All building systems are complete, operating correctly, and approved by the Commissioning Authority and the Owner.
- All associated training is complete and approved by the Owner.
- All closeout documentation, including O&M Manuals, must be complete and have been approved by the Owner.
- As-builts of the completed project must be delivered to and accepted by the Owner.
- Utility cost responsibility is transferred to the Owner.
- The State Fire Marshal, the Building Official, and the University's Department of Environmental Health & Safety must have inspected, tested, and approved the facility.
- The entire facility can be occupied and used for the designed purposes intended.
- All Facilities and Safety Departmental Directors have signed the certificate of final completion (see Attachment 05 - Final Completion Building Approval Form).
- All warranties must be accepted by the Owner to begin upon the date of final completion.
- All punch-list items must be completed.^{1.29}

The Architect, with Owner approval, may issue the certificate of final completion only after all of the above conditions have been achieved. A certificate of occupancy cannot be applied for until Final Completion has been achieved.^{1.30}

All projects must abide by the University Energy Sustainability policy. A portion of the requirements of this policy require that all projects achieve a minimum LEED Silver certification and earn the required number of LEED credits.^{2.1}

All designs must be consistent with the University's Master Drainage Plan approved by the St. Johns River Water Management District (SJRWMD). The Architect and Engineer must comply with the design and installation requirements as established by the Florida Department of Environmental Protection.^{2.2}

Fire lanes must be provided to all structures.^{2.3}

Before any boring and digging can occur a dig permit must be applied for and approved. Dig permits must be obtained through the Owner.^{2.4}

Clean topsoil and other clean excavated soils must not be removed from the campus and will be stored at a site designated by Landscape and Natural Resources. All testing and transportation of excavated material is the responsibility of the Contractor. All soil and appropriate testing must be approved by Landscape and Natural Resources prior to transportation.^{2.5}

Soil that is compromised with debris, organic and inorganic, as determined by testing must be removed from the campus.^{2.6}

All plant species will comply with Florida Friendly™ Standards.^{2.7}

Flushing and testing of piping systems must be performed by the Contractor and witnessed by the Facilities Operations University Utility Supervisor.^{2.8}

All valves must be of American manufacturer.^{2.9}

The assembly must be the reduced pressure type, with shut-off gate valves provided at each end, and must comply with the applicable provisions of AWWA Standard C506, "Backflow Prevention Devices--Reduced Pressure Principle and Double Check Valve Types". Backflow preventers must be manufactured by Wilkins. Provide type RPZ, model 975 XL for 2" lines smaller, or model 975 for 2 1/2" lines or larger for building installations. Provide type 350DA on fire mains, and type DC, model 950 XL of irrigation systems. For 2" or smaller, the pipe supporting the device must be copper. For 2 1/2" and larger, the pipe supporting the device must be ductile iron.^{2.10}

The Owner's Representative will schedule, witness, and approve fire flow tests prior to the design of the fire protection systems.^{2.11}

The location of fire hydrants must be determined by FFPC and approved by Owner.^{2.12}

All internal parts on tapping machines, such as cutting heads, etc., will be disinfected in compliance with AWWA C601 and C900, prior to making any tap. The cutout must be provided to the Owner.^{2.13}

Lift station alarm systems must match existing campus SCADA Reporting System.^{2.14}

Each pumping station control system must match existing campus infrastructure.^{2.15}

Landscape plan submissions must include tree protection plans both within the construction area and outside lay down areas.^{2.16}

Any existing tree(s) indicated to remain (per approved construction plans) that are damaged or removed during construction must be replaced with new tree(s) of similar size.^{2.17}

All exterior seating and retaining walls must be designed with integral anti-skateboarding devices.^{2.18}

The entire site must be graded to provide positive drainage away from the building.^{2.19}

Roof drainage must be tied into the underground storm water system unless a local cistern is incorporated into the project. If a cistern is used, overflow must be directed to the campus storm water system.^{2.20}

Cast-in place stair systems must not be used.^{3.1}

Tinted or colored mortar must not be used.^{4.1}

Weep systems must be installed as required.^{4.2}

Glass Unit Masonry must not be used on building exteriors.^{4.3}

Acid solutions must not be used.^{4.4}

All primed iron and steel items must be corrected at the jobsite.^{5.1}

All handrails and posts must be brushed aluminum pipe. Painted handrails are not permissible.^{5.2}

Wood materials must not be used for any structural elements.^{6.1}

Wood handrails must not be used.^{6.2}

The Architect, Engineer, and Construction Manager must coordinate with the university's building envelope consultant.^{7.1}

The Architect and Engineer must adhere to the latest State University System Standard Practice for Roofing.^{7.2}

Implementation of a modular green roof and associated storm and condensate water capture must be considered and evaluated for all University buildings. The decision to proceed with the design and development of the green roof, including additional requirements, will be made at

the Advanced Schematic design level. Costs associated with the green roof must be reviewed by the Facilities and Safety AVP.

The evaluation must include the following requirements:

The energy model must be updated periodically throughout the design phase to reflect the specific benefits of the green roof, including enhanced insulation values and proportional and projected energy saving.

The cost for the enhanced structure and roof membrane required for the green roof and associated walkways and safety features.

The cost for the actual green roof system, apart from the other building elements, including installation.

The effects of the green roof on the building's roofing and drainage system, especially the roof warranty.

The cost for any associated storm water system, which may be required.

The cost for the long-term maintenance of the green roof.

A detailed summary of all costs for the proposed green roof system to quantify a total cost.

Using the total cost and the total energy savings, compute a life cycle cost analysis.^{7.3}

Interior gutter systems are not permitted.^{7.4}

Traditional skylights are not permitted.^{7.5}

All sealants must have a thirty (30) year warranty.^{7.6}

The utilization of curb-mounted roof equipment is not permitted.^{7.7}

Single ply membranes are to be used on roofs with minimal equipment and traffic. All other roofs must be modified bitumen with Energy Star compliant cap sheet.^{7.8}

All roofs must have three (3) feet wide continuous walking pads from equipment to egress and must be of the same material type as the roof membrane.^{7.9}

Within a period of three (3) to six (6) months after Final Completion, an aerial infrared scan of the roof must be performed by the Contractor and the results must be transmitted to the Owner.^{7.10}

All roofing details must be reviewed and approved by the Owner, prior to the pre-installation conference.^{7.11}

Hot mop applied roof products are not permitted in roof applications.^{7.12}

All thermal insulation must be installed at the roof deck. Insulation laid on suspended ceilings is not permitted.^{7.13}

Regular side hinged type doors requiring minimal annual maintenance shall be specified for all applications.^{8.1}

Wood doors must not be used on exterior of the building.^{8.2}

Operable windows must not be used.^{8.3}

The university will provide the consultant with the finish hardware schedule, standard locking, and keying system prior to the 50% Design Development phase.^{8.4}

The types of glass and locations used must be reviewed by the University Building Envelope Consultants and approved by the Owner.^{8.5}

The selection of materials must be assessed for long range, life-cycle cost analysis.^{9.1}

The Architect must provide a non-returnable detailed interior color board, which demonstrates all color selections in the form of an over-all project color palette, to the Owner and it must be approved by the Owner.^{9.2}

The Architect must coordinate all color and material color selections prior to the product being ordered with the University Project Manager.^{9.3}

Color schedules must be reviewed with the Owner at the 50% set of construction documents phase.^{9.4}

Sheetrock must not be installed until the building is adequately dried-in to prevent sheetrock from developing mold and mildew issues.^{9.5}

Samples of ALL finishes and finishing material must be submitted to the Owner for approval PRIOR TO ORDERING.^{9.6}

Exterior stucco finishes are not permitted.^{9.7}

All carpet must be direct glue down.^{9.8}

Stairways must not be carpeted.^{9.9}

Toilet partitions must be mounted to the structure with independent overhead reinforcements and wall brackets.^{10.1}

Soap Dispenser, Toilet Tissue Dispenser, and Towel Dispenser will be Owner provided and Contractor installed.^{10.2}

All assigned rooms must have University standard signage denoting the room number.^{10.3}

A two (2) feet by five (5) feet setback must be provided to accommodate recycling bins in the hallway of each floor^{10.4}

All buildings must be provided with grade-level vehicular access.^{11.1}

All exterior roll-up doors must be insulated and manually operated with an integral locking device.^{11.2}

Central Vacuum Cleaning Systems are not permitted.^{11.3}

A three (3) inch floor drain with a trap primer must be provided at each eyewash and shower location. Adjacent floor must be sloped to drain.^{11.4}

Laboratory hoods and associated exhaust or supply system must be tested and balanced again six (6) months after the date of occupancy. The report must include adjustments made or recommended, fan curve performance efficiency, vortex behavior, and face velocity.^{11.5}

Equipment needed to provide facilities operational support to the building will take priority in funding over general building furnishings and equipment.^{12.1}

Bases for all casework, hoods, or similar border areas at fixed laboratory furnishings must be provided with liquid tight seal at floor to prevent spills from seeping under adjacent surfaces.^{12.2}

Furnishings placed in vicinity of wet areas, including sinks, safety showers, etc. must be water-resistant.^{12.3}

Doors equipped with an opening device must be in full compliance with current ANSI and ADA requirements.^{13.1}

A telecommunications panel tied in to the University Police Department must be specified.^{13.2}

New installations must be geared traction elevators driven by AC electric motors.^{14.1}

Certificates must be provided before the building can be occupied.^{14.2}

The warranty period will begin when the University accepts and occupies the building.^{14.3}

A 25 year Life Cycle Cost Analysis (LCCA) must be provided for the mechanical systems for each project as required by Florida Statutes and the Florida Building Code. At least three (3) schemes must be included in the analysis. One (1) of the schemes considered must be a central system, such as the campus district cooling loop. The three schemes must be presented to the UCF Director of Sustainability & Energy Management for review. The scheme having the lowest total life cycle cost will usually be installed.^{15.1}

Butterfly valves are not permitted in potable water or fire suppression systems.^{15.2}

No connections to the University chilled water piping system will be made without prior written approval from the UCF Chilled Water Production Unit Head.^{15.3}

Only chemicals approved by the University will be introduced into the University chilled water piping system. Raw or potable water must not be introduced into the campus chilled water piping system.^{15.4}

When a mechanical room is located in close proximity to classrooms or offices, soundproofing is required.^{15.5}

Three (3) feet of clearance or the manufacturer's required clearance, whichever is greater, must be provided on all four sides of mechanical room equipment.^{15.6}

During the construction phase, filters must be replaced when the pressure drop exceeds 1/2" of water column.^{15.7}

All filters will be replaced on the day of final completion. Two (2) additional sets of filters must be provided.^{15.8}

Two (2) additional sets of belts must be provided for each unit.^{15.9}

Final cleaning of all air handling units, including coils and ductwork, must be completed immediately preceding final filter installation.^{15.10}

All DX equipment, including evaporator and condenser coils, must be cleaned immediately preceding final filter installation.^{15.11}

Server closets are not permitted.^{15.12}

Ceiling return air plenums are not permitted.^{15.13}

The design of the water distribution system on multi-level buildings must provide an easily accessible capability of cutting off all water supplies on each floor level and each restroom, independently of the other floors and restrooms.^{15.14}

All system drains and test connections must be hard piped to a termination point outside of the building at grade, away from public view or access ways, and arranged to avoid damaging landscaping.^{15.15}

Doors exiting clean agent protected areas must have vision panels and swing in the direction of egress with panic hardware.^{15.16}

Design must include a contingency plan for ventilation of the protected area and restarting of HVAC after discharge.^{15.17}

All piping must be thoroughly cleaned, reamed, blown clear, and swabbed with suitable solvents to remove burrs, mill varnishes, and cutting oils before assembly. Prior to hanging the pipe, approval by the Owner is required.^{15.18}

Agent tanks must be new and dated within six (6) months of system acceptance.^{15.19}

All conductors in cabinets must be carefully formed and harnessed so that each conductor drops off directly opposite to its terminal.^{16.1}

Dedicated rooms must be provided for each of the following: electrical, telecommunications, mechanical, elevator, and custodial. Each room's access must be located directly off a main corridor or common area with no spaces in between.^{16.2}

Minimum size tubing must be 3/4" EMT metal conduit with compression fittings.^{16.3}

Occupancy sensing technology must be installed in all classrooms, offices, and hallways. In addition, automated light harvesting technology must be installed in all spaces which receive natural lighting.^{16.4}

All mains and feeders must be protected by bolt-on circuit breakers. A neutral wire is required for all circuits.^{16.5}

Emergency lighting and illuminated exit signage must be designed on dedicated circuits.^{16.6}

The State Fire Marshal or his designated representative must be present to witness the on-site acceptance and load-bank testing.^{16.7}

Installation of any system in no way implies continued maintenance service contracts by the installing Contractor. The system installed must be non-proprietary in that replacement parts are readily obtainable and can be serviced by a third party licensed vendor which is Owner selected by separate bid process. Such service must not have an effect on warranties. ^{16.8}

The system must be a recent model for which replacement parts and local service are guaranteed to be readily available for a minimum of ten (10) years from the date of installation. ^{16.9}

If more than 50% of an existing fire alarm system is affected or it is more than ten (10) years old, it must be upgraded to the current standard. ^{16.10}

In addition to where required by code, all buildings meeting the following criteria must be designed with a fire alarm including voice evacuation throughout (EVAC), and must be connected to the campus Mass Notification System (MNS):

- Any Facility with 300 or more occupants or capable of being expanded to 300 or more;
- Any Facility with 50 or more occupants above or below the level of exit discharge;
- Any Facility with hazardous processes, materials, or laboratories;
- Any facility deemed so in need by the UCF Emergency Manager due to special circumstances. ^{16.11}

All initiation device (IDC), notification appliance (NAC), and signaling line (SLC) circuits must be Class A (NFPA Style Z) with no T-Tapping or spider-webbed type circuitry. ^{16.12}

System wiring must be in conduit, minimum ¾" EMT. ^{16.13}

All conductors in cabinets must be carefully formed and harnessed so that each conductor drops off directly opposite to its terminal. ^{16.14}

The fire alarm system must be successfully inspected, demonstrated, and approved by the Engineer of Record prior to requesting inspection by the State Fire Marshal. ^{16.15}

All new facilities must be provided with a means of Emergency Mass Notification. ^{16.16}

All areas must be accessible with a university great-grand master key. ^{16.17}

Attachment 01 - Design Phase Submission Report

(To be completed by the Architect of Record)

I herby certify that all of the requirements listed in Professional Services Guide Article #4 for the current phase have been met and the project is ready to advance the next phase. The completed Professional Services Guide Exhibit #2 is attached along with the Critical Needs documentation for this design phase.

Current Design Phase _____

Architect of Record

Printed Name _____ Signature _____ Date _____

Approved by the UCF Design Project Manager

Printed Name _____ Signature _____ Date _____

Approved by the UCF Construction Project Manager

Printed Name _____ Signature _____ Date _____

Once this document has been executed with all of the required signatures above, it is to be given to the Standards Committee Coordinator, who will review this report with the Standards Committee for recommendation to the Associate Vice President of Administration and Finance (Facilities and Safety).

Recommended for approval by the UCF Design, Construction, and Renovation Standards Committee

Printed Name _____ Signature _____ Date _____

Attachment 02 - Sub Contractor List Requirement

Sub-Contractor List (Submitted by the UCF Construction Project Manager)

Printed Name _____ Signature _____ Date _____

The following documentation has been provided to the Standards Committee Coordinator for review and approval by the Standards Committee.

Exceptions to the subcontractor list must clearly stated with specific reasons detailed in writing attached to this document.

Reviewed and approved by the UCF Design, Construction, and Renovation Standards Committee

Printed Name _____ Signature _____ Date _____

Attachment 03 - Change Order Requirement

Change Order # _____ (Submitted by the UCF Construction Project Manager)

Printed Name _____ Signature _____ Date _____

The following documentation has been provided to the Standards Committee Coordinator for review and approval by the Standards Committee.

If deemed necessary, the UCF Construction Project Manager will be asked to describe the change order directly to the Standard Committee.

Reviewed and approved by the UCF Design, Construction, and Renovation Standards Committee for compliance with the UCF Standards.

Printed Name _____ Signature _____ Date _____

Attachment 04 - Final Completion Building Approval Form

Project Description: _____

Date of Completion: _____

Final Completion Checklist (Submitted by the UCF Construction Project Manager)

Printed Name _____ Signature _____ Date _____

The following documentation has been provided to the Standards Committee Coordinator for review and approval by the Standards Committee.

- All building systems are complete, operating correctly, and approved by the Commissioning Authority and the Owner.
- All associated training is complete and approved by the Owner.
- All closeout documentation, including O&M Manuals, are complete and have been approved by the Owner.
- As-builts of the completed project must be delivered to and accepted by the Owner.
- Utility cost responsibility has been transferred to the Owner.
- The State Fire Marshal, the Building Official, and the University's Department of Environmental Health & Safety have inspected, tested, and approved the facility.
- The entire facility can be occupied and used for the designed purposes intended.
- All Facilities and Safety Departmental Directors have signed the certificate of final completion.
- All Warranties must be accepted by the Owner to begin upon the date of final completion.
- All punch-list items must be completed.^{1.29}

Standards and Warranty Coordinator

Printed Name _____ Signature _____ Date _____

The Architect, with Owner approval, may issue the certificate of final completion only after all of the above conditions have been achieved. A certificate of occupancy cannot be applied for until Final Completion has been achieved.^{1.30}

Departmental Approval (Signifies that the requirements of the departments have been met)

Energy and Sustainability Director

- Approve _____
 - Disapprove _____
- Printed Name _____ Signature _____ Date _____

Environmental Health and Safety Director

- | | | | |
|-------------------------------------|--------------|-----------|-------|
| <input type="checkbox"/> Approve | _____ | _____ | _____ |
| <input type="checkbox"/> Disapprove | Printed Name | Signature | Date |

Facilities Planning and Construction Director

- | | | | |
|-------------------------------------|--------------|-----------|-------|
| <input type="checkbox"/> Approve | _____ | _____ | _____ |
| <input type="checkbox"/> Disapprove | Printed Name | Signature | Date |

Landscape and Natural Resources Director

- | | | | |
|-------------------------------------|--------------|-----------|-------|
| <input type="checkbox"/> Approve | _____ | _____ | _____ |
| <input type="checkbox"/> Disapprove | Printed Name | Signature | Date |

Facilities Operations Director

- | | | | |
|-------------------------------------|--------------|-----------|-------|
| <input type="checkbox"/> Approve | _____ | _____ | _____ |
| <input type="checkbox"/> Disapprove | Printed Name | Signature | Date |

Public Safety Director

- | | | | |
|-------------------------------------|--------------|-----------|-------|
| <input type="checkbox"/> Approve | _____ | _____ | _____ |
| <input type="checkbox"/> Disapprove | Printed Name | Signature | Date |

Emergency Management Director

- | | | | |
|-------------------------------------|--------------|-----------|-------|
| <input type="checkbox"/> Approve | _____ | _____ | _____ |
| <input type="checkbox"/> Disapprove | Printed Name | Signature | Date |

Building Codes

- | | | | |
|-------------------------------------|--------------|-----------|-------|
| <input type="checkbox"/> Approve | _____ | _____ | _____ |
| <input type="checkbox"/> Disapprove | Printed Name | Signature | Date |

Please return the completed form to the Associate Vice President's office for signatures.
Questions call 407-823-3812

Associate Vice President

- | | | | |
|-------------------------------------|--------------|-----------|-------|
| <input type="checkbox"/> Approve | _____ | _____ | _____ |
| <input type="checkbox"/> Disapprove | Printed Name | Signature | Date |