Memorandum

To: All Team Members involved with the Universities Capital Plan

From: Planning and Design & Construction

Date: August 6, 2024

Subject: Design and Construction Guidelines Updates Effort

Purpose - We are in the process of simplifying our design and construction guidelines to enhance clarity and usability. Our objective is to create a document that is both clear and concise, moving away from the current format that resembles detailed specifications.

Current Situation - Our existing guidelines are extensive and often difficult to navigate due to their volume and complexity. This complexity is compounded by numerous issuance dates mentioned within the document that lack context, further adding to the confusion.

Goal - Our primary goal is to streamline the guidelines to make them more accessible and easier to follow. We aim to eliminate unnecessary complexity and provide clear, straightforward instructions that will be easy for all team members to understand and apply. By doing so, we hope to reduce confusion and improve the overall efficiency of our design and construction processes. The guidelines will be reorganized to present information in a more logical and sequential manner, focusing on clarity and ease of use.

Contextual Dates - The current Design and Construction Guidelines found on our website have been locked and consolidated into one PDF document with a current issue date of July 1, 2024 and are to be treated as the “official” copy to use. This change should not impact any projects.

Going forward, revisions to the guidelines will be rolled out in phases, with initial drafts available for review and feedback. We encourage all team members to provide input during this process to ensure that the final document meets everyone’s needs.

We appreciate your cooperation and patience as we work through this process. Our goal is to improve the usability of our guidelines to support more efficient and effective project execution.

For any questions or additional information, please do not hesitate to contact me directly.

Thank you for your attention to this important update.

MEMORANDUM

Date: **April 15, 2020**

To: **All interested parties**

From: **Stephen B. Lafferty, AIA PMP MBA LEEDap – Director, Design and Construction**

Re: **Parking Displacement Costs**

Effective this date, Projects being planned or implemented for construction shall utilize a per parking space cost of $15,000 for existing parking spaces that are permanently removed or displaced as a part of a construction project.

Designated Disabled Parking spaces shall utilize a cost of $22,500 per space, which accounts for the spatial differences.

This cost is not a direct "cost of replacement;" it is a payment to USF Parking and Transportation Services to allow for future replacement of parking spaces that are removed from the campus inventory.

The value of Parking Displacement Costs may be evaluated annually. The value above shall be in effect until superseded.

MEMORANDUM

Date: **April 30, 2020**

To: **All interested parties**

From: **Stephen B. Lafferty, AIA PMP MBA LEEDap – Director, Design and Construction**

Re: **Potential Conflict of Interest for Utilization of Vendors**

The University of South Florida is dedicated to protecting the integrity of the competitive selection processes for the procurement of goods and services. All contractor and vendor selection processes shall promote fair and open competition and shall be conducted in accordance with USF Regulations and Florida Statutes. All contractor and vendor selection processes shall be free of conflict of interest, undue influence and favoritism so that contracts are awarded equitably and economically.

Competitive Selection processes at the University of South Florida are governed by various Florida Statutes, Regulations and Guidelines from the FL State University System Board of Governors, Policies and Regulations from USF – each aimed at providing direction and reinforcing the provision of fair and transparent procurement and contracting processes.

Project managers are required to act in the best interest of the university at all times and to avoid any activities that may create a conflict of interest. Specifically, project managers may not use contractors currently under contract or being considered for a contract with the university for personal gain or on properties where they have a direct or indirect financial or personal interest. If a conflict of interest is suspected, the project manager must notify their supervisor immediately and seek guidance on how to proceed. In situations where there is a potential conflict of interest, the project manager must recuse themselves from the selection process and allow another individual to make the selection.

This policy is intended to ensure that project managers act in the best interest of the university and maintain the highest level of integrity in the selection of contractors for projects. It is the responsibility of all project managers to adhere to this policy to prevent conflicts of interest and to maintain the trust of the organization and its stakeholders. Any project manager who violates this policy may be subject to disciplinary action, up to and including termination of employment.

USF UNIVERSITY OF SOUTH FLORIDA
FACILITIES MANAGEMENT – DESIGN & CONSTRUCTION
4202 E. FOWLER AVENUE, OPM 1000 | TAMPA, FLORIDA 33620-7550

PHONE: (813) 974-2845
WEBSITE: **usf.edu/fm-dc**

DESIGN & CONSTRUCTION GUIDELINES (DCG)

DCG MASTER LIST

DESIGN & CONSTRUCTION GUIDELINES

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DESIGN & CONSTRUCTION GUIDELINES

DIVISION 01 GENERAL REQUIREMENTS
(MAJOR PROJECTS)

DIVISION 01 GENERAL REQUIREMENTS

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SECTION 01 11 00 SUMMARY OF THE WORK

1.1 GENERAL DESCRIPTION

A. General description of all elements of the project, including exterior work and any other related work, is required. This description, though brief, should be complete enough to 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. Some parts of this description can be derived from the Facilities Program or Scope of Work description.

B. Selected sections of the USF Design & Construction Guideline (USF-DCG) are provided as a reference document only and is not a substitute for project specification. The Architect/Engineer (A/E) is responsible for adding, deleting, and modifying the sections as required in providing a complete project specific specifications.

1.2 SEPARATE CONTRACTS

A. List the separate contracts, if any, under which the work will be accomplished and outline the scope of work included in each contract.

1.3 WORK ON OTHER PROJECTS

A. If other work, outside the scope of contract(s) for this project, will be performed simultaneously with the work on this project, explain how contractors must cooperate with other outside contractors and with the University to avoid interference with each other's work.

1.4 SCHEDULING THE WORK

A. Fully describe all job conditions, which will affect phasing and scheduling of the work. Particular attention must be given to scheduling remodeling work in buildings, which will remain in operation during remodeling. Examples of some problems encountered are:

1. PROVIDING AND MAINTAINING MEANS OF INGRESS AND EGRESS: Temporary entrances and exits must meet code requirements.
2. MAINTAINING SECURITY: Areas, which are being operated by the User/Occupant Group, must be secured from the construction area and vice versa.
3. USE OF DOCKING FACILITIES: Sometimes these facilities must be shared between the University and the contractors. Only construction personnel shall receive, sign for, and unload construction materials. University personnel will "not" perform these functions.
4. STORING OF CONSTRUCTION MATERIALS: If adequate area is not available, adjust delivery schedule accordingly.
5. SCHEDULING FOR MOVES BY THE USER/OCCUPANT GROUP: If remodeled spaces must be ready for use or vacated by certain dates, name the spaces and give the dates.
6. MAINTAINING SERVICES: These requirements should be detailed in Section 01 57 00, Temporary Controls, and Section 01 14 00, Work Restrictions.
7. DUST CONTROL AND NOISE CONTROL: Temporary partitions required for control of dust and noise should be shown on the drawings. Construction of these partitions may be specified in the Section 01 57 00, Temporary Controls or in the section in which the partition materials are specified in Section 01 56 00, Temporary Barriers and Enclosures.
8. TEMPORARY PARTITIONS: Required to provide fire or smoke separation shall be built with tested assemblies. Temporary partitions shall not affect means of egress.
9. PROVISIONS REQUIRED FOR PROTECTION FROM WATER AND MOISTURE: Should be shown on the drawings as required for temporary construction to maintain integrity and protection of work, occupied space, etc. Refer to mold and mildew portion of the USF Cost Containment Guidelines (CCG) to emphasize prevention of mold and mildew as a potential health and safety issue.

1.5 ITEMS FURNISHED BY THE UNIVERSITY

A. If the University furnishes items to be installed by any of the contractors, list the items and briefly indicate the work required of each contractor. Do not give detailed installation instructions; save details for the applicable section of the specifications. Coordinate delivery

schedule with the contractor.

1.6 WORK COVERED BY THE CONTRACT DOCUMENTS

A. Project Description: [A/E to include a project description in the project specific specification].

B. Contract Documents: Contract documents are defined in the General Conditions of the Contract; and include the Construction Contract and associated conditions, the purchase order, the drawings, the specifications, addenda issued prior to bid, and changes issued subsequent to award of the contract.
   1. Project Manual: includes the bid requirements and forms, the contracting requirements and the specifications.
   2. Bid Requirements: includes the Invitation to Bid and bid forms; and are basis of awarding contract but is not part of the contract documents.

C. Type and Form of Contract:
   1. Except as otherwise indicated, all work under this contract will be under a single prime Contract between the Owner and the Contractor. Qualifying Contractor includes firms providing services in Construction Management at Risk and Design/Build, and acting as prime contractor.

END OF SECTION 01 11 00

SECTION 01 11 16 WORK BY OWNER

1.1 OWNER'S SEPARATE CONTRACTS

A. The Owner may concurrently perform construction work at the Project site. The Contractor is required to cooperate fully so as not to interfere with the work performed by the Owner under separate contracts.
B. When required by these documents, schedule and coordinate the work of the Owner's separate Contractors.
C. The Owner may furnish products indicated on the Contract Documents. Where noted, the Contractor is required to coordinate delivery times, handle, store, protect and install the products.
D. Unless otherwise specified, the Owner will perform the necessary tasks to vacate work areas in advance of construction, including removal of furniture and equipment except where such work is specified to be performed by the Contractor.
E. The Contractor is to allow three (3) days minimum, or as otherwise noted in these documents, for Owner move-out at the start of the Project and at the beginning of each phase.

END OF SECTION 01 11 16

SECTION 01 12 16 WORK SEQUENCE

1.1 CONSTRUCTION AND SEQUENCE SCHEDULING

A. Work limits and phasing of the Work, if applicable, is shown on the Drawings. Where multiple phases are required, the Contractor is required to achieve substantial completion of the preceding phase prior to beginning the next phase unless otherwise noted.
B. Make necessary provisions to allow the occupied portions of the facility to function during construction, including provisions for temporary utilities, temporary walkways, erection of temporary barricades and fencing, and the like.
C. Where it is not possible to complete certain mechanical and electrical services to make the work complete and ready for occupancy, temporary services may be approved to permit occupancy by the Owner at the earliest possible date.
D. Detailed construction scheduling is the responsibility of the Contractor. Schedules are to be updated and distributed to the A/E and USF-PM bi-weekly.
E. Provide schedules in CPM format in accordance with the Construction Contract. For less complex projects, a Gantt Chart may be used if approved by the USF-PM.

1.2 PROTECTION OF WORK AND ADJACENT PROPERTY

A. Buildings and adjacent areas may be subject to damage due to construction operations. At the completion of the project, the Contractor shall restore existing buildings, landscaping, turf, parking facilities, sidewalks, etc., to the same or better condition as prior to the start of the work.
B. In addition to requirements of the General Conditions of the Contract for Construction, the Contractor shall:
    1. Notify, in writing, the USF-PM when the Owner's equipment or property interferes with the Work.
    2. Provide coverings over inlets, area drains, drywells, etc. to prevent soil and construction debris from running into the storm system. In the event of a failure of a covering, the Contractor is required to clean the affected piping and structure(s) prior to substantial completion.
    3. Provide protection from rain, wind, and extreme temperatures to protect new work, materials, equipment, fixtures and adjacent areas from damage.
    4. Provide protection against stormwater back-ups when the storm system is affected by the work. Maintain flows as needed to avoid damage to the work and to surrounding areas.
    5. Provide temporary protection around openings through and at floors, roofs and other openings.
    6. Per the Florida Trench Safety Act, Section 553.60-64, F.S.: Provide and maintain proper shoring and bracing for excavations to prevent collapse or other damage until they can be properly back-filled upon completion of the new work.
C. The Contractor is required to photograph existing conditions related to existing conditions and to provide photographs in digital format to the A/E and USF-PM a minimum of seven (7) days prior to starting work on site. Sufficient photos with adequate detail to thoroughly document existing conditions shall be provided.

END OF SECTION 01 12 16

SECTION 01 14 00 WORK RESTRICTIONS

1.1 CONTRACTOR USE OF PREMISES

A. PREMISES: Use of the University's premises by Contractor will be limited to the area identified within the "Project Limits" as established within the Construction Documents, temporary facilities, and reasonable access thereto. Space for staging work and related operations of Contractor and Contractor's employees will be provided, subject to availability. Coordinate use of premises under direction of USF Facilities Management office/staff (USF-FM). Develop plan of staging of work, locations for storage areas, layout areas, and temporary offices and submit for approval by USF-FM within seven (7) calendar days prior to the Notice to Proceed.

B. PROETCTIVE BARRIER: Provide and erect before any work begins, and maintain during the progress of the Work, all necessary protective barriers, warning signals, signs and lights. The extent of this work and details of construction shall be in accordance with the requirements of all Federal, State, University and local ordinances, codes and requirements; and shall be to the approval of authorities having jurisdiction.

C. FENCING: Work and storage areas are to be fenced with 6 feet high temporary chain link fencing with green wind screen, unless otherwise noted on these plans or approved in writing, in advance of construction. Temporary fencing and barricades are to be maintained through substantial completion. The Contractor is responsible to ensure that work areas are secure, and to ensure the safety of students and staff.

D. AREA INSIDE FENCING: The area inside of the construction fence is to be maintained by the contractor for the duration of construction and restored to the same or better condition at project completion. Mowing and trimming inside of the construction fence is the Contractor's responsibility

E. AREA OUTSIDE FENCING: Any work that must be done outside of the designated construction area or phase limit in order to accomplish the Work of the project or phase of the project must be prior approved by the USF-PM and must be scheduled so as to avoid disrupting Owner operations.
   1. In the event of an emergency at the job site that may affect students and staff outside of the construction area, the jobsite superintendent is to communicate the concern to on-site staff, and immediately contact the USF-PM.

F. WORK HOURS: Contractor will have limited use of premises during course of work during designated work times (7:00 AM to 5:00 PM), Monday through Friday; and must coordinate use of surrounding building areas with the USF-FM. Work performed outside of designated work hours require prior notice to and approval of the USF-PM. Use of other nearby floor or site areas for staging or other purposes must be pre-approved by USF-FM.

G. PRESENCE OF SUPERINTENDENT: Work may not be performed, and materials may not be delivered to the job site except during times when the Construction Superintendent is present on site. The Construction Superintendent is defined as a direct employee of the Contractor. This role may not be delegated to a subcontractor.

H. COMMUNICATIONS: Construction Workers and delivery personnel are prohibited from communicating with staff and students at the work site. All communication is to be routed to the A/E or the USF-PM.

I. SMOKING: Smoking is prohibited in all ares of the campus, including within the construction site.

1.2 WORK RESTRICTIONS AND OCCUPANCY

A. CAMPUS: The University will occupy the surrounding premises during the entire period of the Work of this Contract to conduct its normal operations. Cooperate with University in all construction operations to minimize conflict, and to facilitate University usage.

B. WORK HOURS IN OCCUPIED AREAS: Work in occupied areas are to be secured at the end of each work day and made safe for occupancy prior to 7:00 AM the following weekday.

C. DEMISING WALLS: Where temporary barriers and partitions are shown separating the work area from the occupied areas of the building, they are to be constructed using nominal 2 x 4

wood or 3-5/8 inches metal studs with 1/2 inch plywood or 5/8 inch gypsum wallboard on the occupied side.

D. STUDENT AREAS: The Contractor is advised that if the project site(s) are in active University student living and/or learning areas, all necessary provisions shall be taken to assure the safety of the students, University employees, visitors, and other contractors day and night. The Contractor shall at all times conduct his operations as to insure the least inconvenience and the greatest amount of safety and security for the students, the University's use of other nearby areas, University employees, and the general public. No disruptive work is permitted to start prior to 10:00 AM.

E. RESIDENCE HALLS: The Contractor will not be allowed to work within occupied University residence halls and/or teaching buildings during the week of University established "Finals Week" unless with prior written approval of the USF-FM. This scheduled stoppage of the Work has been included as a part of the Contract Time and no further adjustment of Contract Time shall be allowed.

F. EGRESS & ACCESS ROUTES: If Contractor makes arrangements for closure of a corridor, hallway, egress route, etc. that provides access to other floor areas, Contractor shall make provisions for alternative access to such other nearby areas which are acceptable to the USF-FM and the USF Housing & Residential Education (USF-HRE), when applicable.
   1. The Contractor will not interrupt access to any building, or interfere with the use of any facility, road, sidewalk or parking area outside of the area of construction, except as permitted by the Owner.
   2. Keep all corridors, walkways, emergency exits, gates, and ramps free of obstructions, tools, equipment and debris. Provide temporary directional signage when necessary.

1.3 WORK RESTRICTIONS AND PHASING OF THE WORK

A. DISRUPTIONS: The Contractor must plan the work so to avoid disrupting the University's operations. The Contractor will schedule the work with the input of the USF-PM. USF may require that potentially disruptive activities be performed after hours.
   1. Contractor requests to work on weekends and holidays will be accommodated at USF's discretion.
   2. Disruptive activities include those which generate odor, vibration, dust or noise which can be heard in adjacent buildings.

B. WORK BY OTHERS: refer to the Drawings for information related to Work being performed concurrently under separate contracts and work by the Owner.

C. BUILDING & UTILTITIES SERIVCES: Exercise the utmost care to protect from damage to existing equipment, furniture, building finishes, trees to be preserved, etc.
   1. Any portion of the existing buildings or existing utility services not included as part of the Work of this Contract or any portion of the Work damaged because of failure to provide the protection required, shall be removed and replaced with new materials and construction at the Contractor's expense. The work shall be accomplished subject to the University's approval.
   2. The Contractor will not interrupt power, lighting, low voltage systems, safety systems, and plumbing, telephone, or HVAC services in an occupied facility without advance written Owner approval.

END OF SECTION 01 14 00

SECTION 01 14 16 OWNER OCCUPANCY

1.1 BENEFICIAL OCCUPANCY

A. The Owner reserves the right to temporary or early beneficial occupancy and to install equipment in completed areas of the building prior to the Substantial Completion, provided that such occupancy does not interfere with completion of the work. Such occupancy shall not constitute acceptance of the work.

B. Upon Substantial Completion of the project or portions thereof, the Owner will take beneficial occupancy. The Contractor is required to adjust work hours as needed in occupied areas so as to avoid disrupting Owners operations.

1. Access to the facility and work area will be controlled by the Owner beginning at Substantial Completion. Refer also to the Close-out Procedures section.

END OF SECTION 01 14 16

SECTION 01 21 00 ALLOWANCES

1.1 RESTRICTED USE

A. Allowances are generally prohibited, however, if circumstances warrant, the USF–PM will approve the use of allowances for certain items. Remainder of this section apply when use of allowances are approved for the project.

1.2 RELATED REQUIREMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 specification sections, apply to this section.

1.3 SUMMARY

A. This section includes administrative and procedural requirements governing the use of allowances.
B. Allowance amounts are included in the Base Bid unless specifically stated otherwise in the bid documents.
C. Allowance amounts are to be entered on the Bid Proposal Form in the space provided.
D. Types of allowances may include the following:
   1. Contingency allowance: lump sum amount which is established for the Owner's discretionary use. Contingency allowance amounts are typically established on the Bid Proposal Form.
   2. Unit Cost allowance: total amount for specific work as may be necessary, when the extent of such work is hidden and cannot be determined prior to bid. Bidders are to establish a total allowance amount for the estimated quantity set forth in this Section with the understanding that the final cost will be calculated using the original unit cost x the actual quantity of work.
E. Unless stated otherwise, Unit Cost allowances are to include all costs necessary to accomplish the work in accordance with the Contract Documents, including equipment, materials, tax, labor, overhead, profit, insurance, supervision, shipping and freight, storage and protection, close out documentation, warranty, and any other incidental costs necessary to complete the work.
F. Unit Cost allowances, if accepted, are binding for the duration of the Construction Contract.

1.4 PROCESS

A. Contingency Allowances: expenditures from the Owner's Contingency Allowance will be approved by the Owner in writing on an as-needed basis.
B. Unit Cost Allowances: As soon as possible, the Contractor is required to establish the extent of the work to be funded with the unit cost allowances.
   1. Proceed with the work only after the A/E has issued written approval. The approval will be based on the A/E's verification of the quantity of work to be performed. Approval may be issued in phases, as the work progresses, and as existing hidden conditions are revealed.
   2. During construction, provide photographs sufficient to document the quantity and extent of the work performed under the Unit Cost Allowance.

1.5 SUBMITTALS

A. Provide shop drawings, product data, samples and other submittals for work performed under allowance pricing in the same manner as other work performed under this Contract.
B. Prior to beginning the work, submit inspection request(s) to the A/E to verify the extent of work to be performed under Unit Cost Allowances.
C. Submit photographs at regular intervals, sufficient to document quantities of materials replaced under allowance pricing.
D. Upon completion of the work performed under Unit Cost Allowances, submit documentation of actual quantities installed, including delivery tickets, photographs, invoices, inspection reports and other documentation sufficient to document the actual quantity of work performed.

1.6 COORDINATION

A. Coordinate work performed under allowance pricing with other trades.
B. Update the project schedule as needed to accurately reflect the time allocated to performing the work. Scheduling requirements are specified elsewhere in these documents.

1.7 ADJUSTMENT OF ALLOWANCES

A. Contingency Allowances:
   1. Expenditures require written Owner approval in advance of any work being performed.
   2. Upon completion of the work, refund unspent amounts to the Owner by Change Order.
B. Unit Cost Allowances:
   1. Expenditures require written approval by the Owner based on the A/E's verification of the actual quantity of work performed.
   2. Upon completion of the work, the allowance amount will be adjusted by Change Order. The amount of the adjustment will be based on a unit cost calculated from the original allowance.
   3. The Owner reserves the right to establish the fair value of the work by other means, in accordance with the General Conditions of the Contract.
   4. Unspent amounts will be refunded to the Owner by Change Order.

1.8 GENERAL

A. Requirements for work performed under allowance pricing are identical to the requirements for work performed under the base scope of the Project, as specified elsewhere in these documents.
B. Coordinate materials and their installation with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.
C. Document the extent of the allowance work on the red-marked field drawings, for incorporation into the final Record Documents.

END OF SECTION 01 21 00

SECTION 01 23 00 ALTERNATES

1.1 PURPOSE OF ALTERNATES

A. A limited number of alternates may be used as a means of insuring base bids within the available construction funds. The Architect/Engineer (A/E) shall consult the USF-PM regarding priority of alternates. Additive alternates shall be used in preference to deductive alternates.

1.2 DESIGNATIONS

A. When alternates are described in the construction drawings, the designations for alternates shall indicate with the prefix "Alt" or "Alternate" and number, preceding the drawing labels and sheet titles.
   1. For all alternates, the affected substitutions, additions and/or deletions must be fully described in the drawing details, plans and/or dedicated alternates drawing sheets.
   2. For alternates affecting general conditions of the contract, use sheet numbers G-1, G-2, etc. (and prefix "Alt" or "Alternate").
   3. Comply with USF CAD Guidelines & Standards (USF-CAD) on sheet numbering and layer naming conventions.

B. Record Documents submitted at completion of project should represent work as installed/completed. No record of alternates should be included.

1.3 COORDINATION OF ALTERNATES

A. Care must be exercised to coordinate Plumbing, HVAC, and Electrical alternates with General Contract alternates, with each other, and to list alternates in consecutive order; when possible, alternates which are contingent upon one another should be given the same number, as: G-2, P-2, H-2, and E-2 (and prefix "Alt" or "Alternate"). Awards of alternates must be in priority sequence. Therefore, Alternate 1 is priority 1; Alternate 2 is priority 2; etc. Ascertain that alternates are listed in Section 01 32 00, Construction Progress Documentation.

END OF SECTION 01 23 00

SECTION 01 26 00 CONTRACT MODIFICATION PROCEDURES

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 specification sections, apply to this section.

1.2 SUMMARY

This section includes administrative and procedural requirements governing contract changes and clarifications.

1.3 CLARIFICATIONS

A. Definition: Clarification consists of additional information which further defines or which resolves conflicting information within the Contract Documents. The A/E will issue clarifications to the contract documents by one of the following means:
   1. Architect's Supplemental Instructions
   2. Written response entered into the Contractors Request for Information (RFI) form.

B. Clarifications, by definition, do not modify the Owner's Contract Documents.

1.4 CHANGES

A. Changes to the Contract Documents. Changes subsequent to the Award of Contract will be issued via one of the following means and are valid only when approved by the Owner:
   1. Change Order or Change Directive, including those issued for Direct Owner Purchase Order (DOPO) deductive changes.
   2. Requisition/Change Order Request for Work procured through Purchase Order
   3. Other written means as agreed

B. Changes made by any other means are invalid unless expressly approved by the Owner in writing, including but not limited to:
   1. Annotations by the A/E on submittals and shop drawings
   2. Approval by the A/E of submittals and shop drawings which do not conform with the requirements of the Owner's Contract Documents
   3. Response to a Contractor's Request for Information (RFI)
   4. Field directive or field report
   5. Verbal directive or verbal approval of proposed change
   6. Architect's Supplemental Instruction

C. Changes are to be incorporated into the Contractor maintained jobsite record set and the Record Documents.

1.4 PROCESS

F. Contractor initiated:
   1. Upon discovery that a clarification or change is needed to proceed with the work, the Contractor is required to submit a Request for Information (RFI) to the A/E. Requests for information are to include:
      a. Date, Project Name, Project Number, RFI number
      b. Requestor's name
      c. Originating party, if applicable - subcontractor or supplier
      d. Date by when the response is needed in order to avoid a delay to a critical path task. The RFI must be submitted a minimum of seven (7) calendar days prior to the response-needed date.
      e. Applicable references details and drawing sheet numbers, specification sections, and/or construction submittals as appropriate to convey the request.
      f. Sketches, photos, and other information as appropriate.
      g. The Contractors proposed solution.
      h. A statement as to whether the Contractor's proposed solution will impact the construction cost or schedule.
   2. A/E's Action: upon evaluation, the A/E will determine whether the Contractor's proposed solution is acceptable or will issue an alternate solution.

3. In the event that the RFI response involves a change to the Contract, and such change may impact the construction cost or schedule, the A/E will issue the RFI response to the Contractor along with a Proposal Request (PR).

B. Owner initiated:
   1. The Owner may elect to change the Work as provided for in the General Conditions of the Construction Agreement, with the Contract sum being adjusted accordingly.
   2. Upon request by the Owner, the A/E will issue a Proposal Request to the Contractor in order to establish the impact of the proposed change, if any, on the construction cost and schedule.

1.4 PROPOSAL REQUESTS

A. The Contractor is required to submit a Change Order Proposal within seven (7) calendar days of issuance of a Proposal Request.
B. Change Order Proposals are to include the following minimum information:
   1. Summary of costs, broken down into general costs and by trade
   2. Detailed breakdown as described in the General Conditions of the Construction Agreement
   3. Supporting proposals from subcontractors and suppliers
   4. Schedule impact as supported by a CPM schedule showing the effect of the change on critical path tasks
C. Unless the response time is extended by the Owner, the Contractor's failure to provide a proposal within seven (7) calendar days of receipt of a Proposal Request will indicate the Contractor's acceptance of the A/E's estimated value of the change.
D. In the event that the Contractor and the Owner do not agree on the cost and/or schedule impact of a proposed change, or when sufficient documentation cannot be provided within seven (7) days, the Owner may issue written direction to implement the change based on the A/E's estimate of the cost and/or schedule impact. Upon completion of the work, the Contractor may appeal the value as estimated by the A/E by following the procedures described in the General Conditions of the Construction Agreement.

1.5 CHANGE ORDERS and OWNER CONTINGENCY AUTHORIZATION (OCA) FORMS

A. Change Orders:
   1. The A/E will prepare and issue Change Orders to the Contractor for execution and transmittal to the Owner.
   2. In the event that the Contractor fails to execute and transmit the Change Order to the Owner within ten (10) days, the Owner may elect to process the Change Order in accordance with the General Conditions of the Construction Agreement.
   3. Change Orders are to include, at a minimum, the following:
      a. Description of the change
      b. Time extension, if appropriate, associated with the change
      c. Summary page listing each change and its associated value, numbered sequentially, with the total dollar amount shown at bottom
      d. Complete back up for each item, cross referenced by item number with the Summary page.
B. Emergency Field Change Order:
   1. The Owner may direct changes to the Work in the case of an emergency in accordance with the terms of the Construction Agreement. Such Emergency Field Change Orders shall be issued on the Owner's form and will include an estimated adjustment in the Contract Sum and Time to the extent that the adjustment can be estimated at that time.
   2. Emergency Field Change Orders are effective immediately upon issuance. The conditions of the Construction Agreement provide for detailed documentation and accounting of costs as the work progresses.
   3. Emergency Field Change Orders will be processed by standard Change Order at such time that the final adjustment is determined.
C. Owner Contingency Authorization:
   1. The Owner may issue written authorization to make changes to the Work which will be funded with the Owner Contingency allowance.

2. When the dollar value of a change is based on a not-to-exceed estimate in lieu of a lump sum proposal, the Contractor is required to provide detailed documentation and accounting of costs upon completion of the work in order to establish the final value. In the event that detailed documentation is not provided, the Contractor agrees to accept the A/E's estimate of the final value.

END OF SECTION 01 26 00

SECTION 01 31 19 PROJECT MEETINGS

1.1 PRECONSTRUCTION MEETING

A. The Contractor shall schedule and furnish the agenda for a preconstruction meeting after award of contract, no less than 3 business days prior to the scheduled meeting. Attendance shall be required for the USF-PM, A/E and other successful bidders as identified by the Contractor and USF-PM. Other attendees may include representatives of the User Group (UG), USF facilities staff, and Owner direct contracted vendors and contractors. For projects required to obtain Leadership in Energy and Environmental Design (LEED) certification, include the USF-LEED Coordinator. Among items to be discussed are provisions specified in this division of the specifications.

1.2 PROGRESS MEETING

A. Include the following in the specifications; edit and revise to suit job conditions. The General Contractor (Contractor) shall schedule a weekly job progress meeting with other prime contractors and major subcontractors and shall notify the A/E and the USF-PM of the time and place of the meeting. The Contractor job progress meetings may occur concurrently with weekly OAC (Owner/Architect/Contractor) meeting, which shall be scheduled in coordination with the USF-PM and the A/E. Other OAC meeting attendees may include representatives of the User Group (UG), USF facilities staff, and Owner direct contracted vendors and contractors. Subsequent meetings shall be held on the same day and hour of the week for the duration of the construction period; except, upon instructions of the A/E, the scheduled meetings may be increased or decreased as required by the progress of the work. Notes shall be taken by the Contractor on discussions and decisions made at each meeting. Typed copies of the notes shall be distributed to all concerned parties and the USF-PM.

END OF SECTION 01 31 19

SECTION 01 32 00 CONSTRUCITON PROGRESS DOCUMENTATION

1.1 CONSTRUCTION SCHEDULE

A. Include the following paragraph (or a paragraph similarly worded) in the specifications: Immediately following contract award, the Contractor shall prepare a construction progress schedule covering all divisions of the work and shall submit copies of this schedule to all other prime contractors. Schedules, as received from other prime contractors, with necessary revisions, shall be incorporated into the original schedule. Schedules shall incorporate the work to be provided by USF-IT, FM-OPS and other USF agencies; and time required for necessary inspections, review and approval of submittals, etc. The final schedule, bearing the approval signature of all prime contractors, shall be submitted in quadruplicate to the A/E. Following approval by the USF-FM, copies of the final schedule shall be distributed to all interested parties. The schedule shall be broken down to a degree, which will permit proper and complete coordination of all trades in each division of the work. Tentative dates for interruption of utilities services shall be incorporated.

1.2 PROJECT INSPECTION REPORTS

A. Instruction for preparation and submittal of these reports will be given at the preconstruction meeting.

1.3 SHOP DRAWINGS AND SAMPLES

A. A separate section is required. This section should be written to include submittals of all prime contracts so that no separate section nor article need be written in the specifications for these contractors; however, each section in the technical provisions should contain a reference to this section together with a list of items for which shop drawings or samples are required. Attention should be called to the fact that this section is a supplement to the General Conditions. Amplify with a statement that the handwritten signature of the contractor is required, in addition to his stamp of approval.

1.4 DRAWINGS REQUIRING CHECKING BY CONSULTANTS

A. The A/E shall determine the requirements for submittal of drawings pertaining to work done by consultants and shall stipulate the number of copies required; electronic submission of approved drawings are required for resubmittal to the USF-FM. If required, USF-FM will specify number of printed sets of approved drawings.

1.5 SAMPLES

A. After consultation with the USF-PM, the A/E shall indicate the items for which samples are required and shall stipulate the number of each required. Samples and color chips must be approved by the USF-FM.
   1. SAMPLES FOR INCLUSION IN THE WORK: If samples are expensive or are complete assemblies suitable for inclusion in the work, e.g., precast concrete panels, locksets and door closers, laboratory or other equipment, state that approved samples may be installed in the work, provided the location of these items is made known to the A/E.

1.6 MODELS AND PATTERNS

A. Specifications for ornamental work which requires models or patterns, shall specifically stipulate that models and patterns become the property of the University after the ornamental work has been installed.

1.7 EXTERIOR MATERIALS/FINISHES/SAMPLE MOCK-UP/WALLS

A. In addition to mockups specified elsewhere, the Contractor shall provide a mock-up, minimum size of 12 X 12 feet, of all exterior materials, finishes, components, assemblies, surfaces, trim, accessories, etc. Included, but not limited to, brick, stucco, window and door framing, glazing, exterior trim, pre-cast items, expansion/control joints, sealants, roofing materials, and any and all other visual items. Provide mock-up in full range of all colors and finishes proposed.
B. No exterior material, finish, component, assembly, surface, trim or accessory shall be

approved for purchase, order or installation until the completed mock- up has been approved by the USF-FM. The approved mock-up shall be used as a quality standard for materials, finishes, and construction, and shall remain in-place until substantial completion. Mock-up shall not be a part of the building(s). Confirm location with the USF-FM.

1.8 CERTIFICATION REQUIRED FROM SUPPLIERS AND INSTALLERS

A. The following is a sample list of certifications and other submittals required, in addition to guarantees, to assure quality materials or workmanship, or both. Some of these requirements, are to be incorporated in the technical sections. See also Section 01 78 00, Closeout Submittals.

B. GENERAL CONSTRUCTION (Sample List - Edit as required)

SYSTEMS	CERTIFICATIONS / SUBMITTALS
1. Soils	Geotechnical Report
2. Demolition	Schedule
3. Sewers	Test Reports
4. Reinforcing Steel	Mill Certificate
5. Insulating Concrete	Manufacturer's Certificate Roof Decks
6. Structural Steel	Erector's Affidavit, Welder's Certificate
7. Face Bricks	Results of Efflorescence Tests
8. Masonry Restoration	Experience Record of Contractor or Subcontractor doing the Work
9. Steel Joists	Manufacturer's Certificate
10. Metal Decking	Manufacturer's Certificate
11. Rough Carpentry	Wood Treatment Data, Certificate by Treatment Plant
12. Sealants	Experience Record of Contractor or Subcontractor doing the Work
13. Metal Doors & Frames	Manufacturer's Certification
14. Wood Doors	Manufacturer's Certification
15. Metal Windows	Performance Test Reports
16. Low & Reflective Glass	Performance Reports Insulating Glass
17. Carpeting Materials	Test reports and Manufacturer's Certificate
18. Resilient Floors	Test Reports and Resilient Floor Manufacturer's Certificate Materials
19. Painting	Statements by Paint Manufacturer and Applicator
20. Fire-Resistive Coatings	Manufacturer's Certificate Coatings
21. Laboratory Equipment	Financial Statement of Manufacturer, Experience and Qualifications, Manufacturer's Certificate
22. Library Equipment	Financial Statement of Manufacturer, Experience and Qualifications
23. Kitchen Equipment	Financial Statement of Manufacturer, Experience and Qualifications
24. Radiation Protection	Qualifications of Installer
25. Elevators	Maintenance Service, Certificate of Inspection

C. PLUMBING

SYSTEMS	CERTIFICATIONS / SUBMITTALS
1. Soil, Waste, and Vent Piping	Inspection Certificate
2. Underground Service Piping	Test Reports
3. Interior Piping	Test Reports
4. Welders	Copy of Certification
5. Water Lines	Sterilization Test Report

SYSTEMS	CERTIFICATIONS / SUBMITTALS
6. Gas Service & Interior Piping	Charts for Purging and Pressure

D. FIRE PROTECTIONS

SYSTEMS	CERTIFICATIONS / SUBMITTALS
1. Fire Department	Certification that pipe thread connections are suitable for use with local hydrants and fire department equipment.
2. Inspection	National Automatic Sprinkler agreement and Fire Control Association standard inspection and maintenance form.
3. Fire Lines & Fire Pumps	Test Reports
4. Welders	Copy of Certification
5. System	Fire Marshal's Certification of Inspection and Acceptance

E. HEATING, VENTILATING, AND AIR CONDITIONING

SYSTEMS	CERTIFICATIONS / SUBMITTALS
1. Balancing of Air & Water Systems	Balance Reports
2. Boilers	Tests for Safety and Function, Inspection and Other Certificates
3. Dampers: Fire & Refrigerant Lines	Contractor's Certification of Smoke Operation. Proof of Testing in compliance with ANSI (American National Standards Institute) Standard, and Reports.
4. Fan Ratings	Test Performance Seals, Performance Curves
5. Air, Water & Steam Lines	Test Reports
6. Welders	Copy of Certification
7. BTU Meters	Type and Manufacturer's Specs

G. ELECTRIC

SYSTEMS	CERTIFICATIONS / SUBMITTALS
1. Primary Cable Installations	High Voltage d-c Proof Tests
2. Cable Splicing	List of Proposed Cable Splicers and Sample Splice, either part of Project or simply a Sample, must be made to determine eligibility for Approval of Splicing
3. Lightning Protection	Underwriters Laboratory (UL) Master Label
4. Fire Alarm	Inspection and Test Report
5. Electric Meters	Type and Manufacturer's Specs

1.9 CONSTRUCTION PHOTOGRAPHS

A. The A/E shall furnish at least ten high resolution digital images in .pdf format to the USF-PM each month. Photographs shall show progress, work which will be concealed, problem areas, etc. The digital images or the digital files will be identified with: project name, date photograph taken, exact location (such as Footing for Column B-9), and, if not obvious, the top of the orientation of the photograph shall be marked. Contractor provided photographic images shall not be substituted for this requirement.

END OF SECTION 01 32 00

SECTION 01 35 00 SPECIAL PROCEDURES

1.1 OSHA CONDITIONS

A. The Contractor shall comply with all applicable Occupational Safety and Health Administration (OSHA) and other safety requirements during this project.

1.2 QUALITY ASSURANCE

A. Promptly upon award of the Contract, notify all pertinent construction related personnel regarding the requirements of this Section.

1.3 WORK SEQUENCES

A. Work shall be executed to minimize disruption of activities at the project site(s) or building. Contractor shall submit to the Consultant and USF-FM a written plan for staging of work, material staging areas, dust prevention, tree preservation barricading, and any required outages within seven (7) calendar days from the Notice to Proceed date. The Plan shall be reviewed, revised as required, and approved by USF-FM prior to initiation of work at site.

B. 48-hours prior to any utility, communication device(s), and building HVAC system cut-off, to all or any portion of the project site and/or adjacent University sites, required by the progress of the Work, the Contractor shall notify the USF-FM in writing. The notification shall include, but not be limited to, service(s) to be cut-off and the anticipated duration of the cut-off.

1.5 STAGING

A. When staging material in or on the structure and during applications, the Contractor shall ensure that overloading of the staging area and/or structure does not occur. Keep all premises free from accumulation of waste material and rubbish, and remove it from the project site daily. Maintain all open areas of the construction site to minimize pests and vermin by mowing and weeding as necessary. Temporary or extended staging use of parking spaces, roadways and sidewalks shall be avoided or minimized whenever possible.

B. All areas of the University campus and within the project are designated as NO SMOKING areas. The Contractor shall not allow any workers, vendors, visitors, or other persons, to smoke within University building(s).

C. If any utilities, local and University provided, are required which are not readily available at the project site, the Contractor shall pay for the temporary installation of such utility. Contractor shall provide an estimate of the temporary utilities consumption cost to USF-FM at the time of the bid or Guaranteed Maximum Price (GMP) submission; the cost of temporary utilities charges shall be paid with the Owner project contingency.

D. The Contractor shall at all times guard against damage or loss to the property of the University or other contractors or vendors working at the University; and shall be held responsible for replacing or repairing any such loss or damage. The University may withhold payment or make such deductions as deemed necessary to insure reimbursement or replacement for loss or damaged property through negligence of the Contractor or its agents. Replace, at no cost to the owner, any trees, shrubs, lawns or plantings damaged by the Contractor or its agents during the Work of this project within two (2) weeks of occurrence. Grassed and planting areas generally have irrigation systems below grade; verify location of these systems and all other underground utilities in Work or staging areas prior to the start of construction. Repair and pay all costs associated with damaged utilities. Any existing irrigation affecting adjacent areas must be kept operating during construction and may not be left in shutdown condition for more than two (2) days, without USF-FM approval.

1.6 TOOLS AND MATERIALS

A. Contractor shall endeavor to introduce only necessary tools into the project site, and in the least possible number.

B. Construction companies and their employees are requested to secure all property as much as feasible to reduce theft or damage to equipment or property.

C. Do not give or loan tools or supplies to students. Do not accept anything from students. Do not permit students' access to Construction Documents and related papers. Report thefts

immediately.

1.7 LIFE SAFETY SYSTEMS

A. Any life safety, security system, energy management system, etc., that has been de-energized, disconnected or disabled due to the construction process shall be re- energized, reconnected or enabled prior to the Contractor leaving the site at the end of the day.

1.8 HAZARDOUS MATERIALS PROCEDURES

A. The USF-PM shall be notified IMMEDIATELY of Contractor's intent to handle other materials, which are considered hazardous such as asbestos, mercury, flammable fuels, explosive chemicals, etc. Refer to the Environmental Health and Safety portion of the Appendices.

END OF SECTION 01 35 00

SECTION 01 35 53 SECURITY PROCEDURES

1.1 SECURITY

A. UNIVRSITY POLICE DEPARTMENT: Any construction site located on any of the University of South Florida campuses fall under the jurisdiction of the University of South Florida Police Department (USF-UPD). Any incident requiring police service should be reported immediately to the USF-UPD or 911 (for emergencies).

USF-UPD non-emergency phone numbers	
Tampa Campus	(813) 974-2628
St Petersburg Campus	(727) 873-4444
Sarasota Manatee Campus	(941) 487-4210

1. Campus Police are state certified law enforcement officers and as such are authorized to take appropriate search actions as may be dictated by the specific probable cause and necessary in the judgment of the officer.
2. The University may seize items that may pose a danger to the safety and security of faculty, staff, or students.

D. CONTRACTOR CONSTRUCTION FENCING: Contractor shall be responsible to install and maintain all fencing in a secure manner. Contractors shall supply all locks and chains. USF will provide one USF Master Lock for accessibility.
1. Restrict the access of all persons entering upon the University's property in connection with the Work to the agreed upon access route and to the actual site of the Work.
2. Restrict activities of employees to authorized areas. Employees shall not be allowed to mingle in student or public areas. Do not enter other University buildings unless it is directly related to the Work of this project.
3. Provide USF-PM and the USF Facilities Management- Operations (FM-OPS) keys to all construction gates and building entrances.
4. Post project contact list, to include 24-hour telephone numbers, for all key project staff members. Post list at major access points to the project site(s) and outside at the project office. Update as necessary.

1.2 PERSONNEL RULES

A. Identification of Personnel
1. Provide all construction related personnel Photo Badge Identification and/or uniform with company and employee names easily identifiable. Photo identification badges must be worn in plain sight at all times.
2. All Contractors shall provide the USF-UPD and the USF-PM with a list of the names and mobile phone numbers of supervisors of construction at the project site(s).

B. Association with students, staff and faculty:
1. Association with students, staff and faculty is not permitted. In case of inappropriate conduct offenders shall be removed from job site.
2. Trafficking or trading in goods with students is not permitted.
3. Students, staff, and faculty of the University are not to be disturbed or in any way disrupted in their pursuits. Construction employees are to refrain from unsavory or unwanted comments or gestures towards students, staff, or faculty.

C. Do not bring items which are not required for performance of work; neither in personal vehicles nor on one's person. Pets are not permitted on construction site.

D. Alcoholic beverages, weapons of any kind, and controlled (or scheduled) drugs are not allowed on site, in vehicles, on person, or in trailers. Persons caught introducing illegal or banned items onto the University grounds will be prosecuted.

E. Construction employers are required to take adequate measures to ensure that the employees they send to the project site on campus are not wanted for criminal offenses. All contractors who employ WORK RELEASE employees shall notify the USF-UPD of such practice and provide the names of all person employed under the Work Release Program.

F. Contractors and their employees are to obey all Federal, state and local laws as well as rules

of the University of South Florida when they are on University property.

G. Meals
   1. Workers should bring their lunch, use Contractor provided services or leave the University to obtain meals. Food service for construction workers will not be provided at the University, unless approved by the USF-PM.
   2. If vending machines are available in construction area, they will be identified at the Pre-construction meeting.

H. Visitors: On-site visitors of construction workers are prohibited. Persons not working on the Project are required to first seek approval of the USF-PM before visiting site.

END OF SECTION 01 35 53

SECTION 01 41 00 REGULATORY REQUIREMENTS

1.1 CODES AND REGULATIONS

A. Representative Regulatory Requirements that are commonly used for USF projects are listed below. Depending on the use of the building, other codes and regulations may also apply. This list is provided as a convenience to the Contractor and is not to be considered all-inclusive of codes and regulations that may apply. The Contractor shall comply with all pertinent codes, standards, regulations and laws.

DOCUMENT
1. Current editions Florida Fire Prevention Code in effect at time of permitting.
2. Current edition of the Florida Building Codes in effect at time of permitting.
3. Florida Elevator Safety Code, As currently adopted by the state in FAC 61C-5 at time of elevator permit.
4. State Trench Safety Act, F.S. 553.60-64.
5. OSHA Regulations (Title 29, Code of Federal Regulations).
6. FLEET, Florida Life Cycle Energy Evaluation Technique, Department of General Services.
7. Asbestos Surveys, Operations & Maintenance, and Abatement.
8. Rules of the Florida Department of Labor and Employment Security.
9. Asbestos management requirements of Section 255.551-565 and 455 F.S.
10. Rules of the Department of Environmental Protection, Southwest Florida Water Management District (SWFWMD) and local County acts, rules, and final orders.
11. Regulations of US Environmental Protection Agency (Title 40, Code of Federal Regulations).
12. Current licensing requirements per the Florida Department of Business & Professional Regulation (Florida DBPR) for Asbestos Consultants and Contractors and all applicable local, state, and federal regulations regarding surveying building prior to renovation/demolition and proper methods of handling of asbestos-containing materials.
13. US Environmental Protection Agency's Renovation, Repair, and Painting Rule in "Child Occupied Facilities" and the use of "lead safe work practices" identified therein for maintenance, renovation, and demolition projects where lead-based paint has been identified in USF building/facilities.

B. Other codes and regulations are listed below. This list is provided as a convenience to the Contractor and is not to be considered all-inclusive of codes and regulations that may apply. The Contractor shall comply with all pertinent codes, standards, regulations and laws.
   1. The University of South Florida is a member of Sunshine State One-Call of Florida, Inc. (SSOCOF), Sunshine 811. All excavation work shall be preceded by contacting Sunshine 811, 48-hours prior to actual excavation work. Comply with F.S. Chapter 556, Underground Facility Damage Prevention and Safety Act.
   2. University of South Florida, Facilities Management-Operations (FM-OPS) responds to "Dig Permit" requests. Contact FM-OPS for approval and coordination of all utilities locate, outages and tine-in.
   3. USF Cost Containment Guidelines (CCG).

1.2 USF BUILDING CODE ADMINISTRATION PROGRAM

A. PURPOSE: The purpose of this Program is to implement Building Code Administration for the University of South Florida Capital Improvement Program. Such regulated practice of building code compliance is necessary, in the interest of public health and safety, which shall be provided through compliance of all adopted codes and standards. The Program is administered by the Building Code Administrator (BCA), through documents reviews and construction inspections.

B. AUTHORITY: USF Building Code Administration Program is established under USF Policy 6-019, USF Building Code Administration Program, as required by Florida Statues and Board of

Governors Regulation.

C. POLICY: Florida law and regulations require that all new buildings constructed and modifications to existing buildings be reviewed and inspected for compliance with adopted codes and standards. The policy requires that all University entities, conducting building construction, repair, or modifications, submit construction documents (drawings and/or specifications) for review, obtain a building permit for construction, which, after proper inspection and completion, is certified for occupancy or re-occupancy.

D. DEFINITIONS:
   1. Modification: any new addition to or renovation of an existing building or any part thereof.
   2. Construction Documents: Drawings and/or Specifications.

E. RESPONSIBILITIES
   1. A construction permit must be issued by the Building Code Administrator (BCA) prior to start of any construction activity. Only the BCA has the authority to determine whether the scope of work warrant a construction permit or require further review and permitting. Only the BCA has the authority and the sole discretion to authorize the early start of limited scope of work pending final issue of a construction permit. No other University representative may authorize or direct the Contractor to start any construction activity. The BCA issues the construction permit directly to the Contractor, no other University representative may convey, or issue construction permits.
      a. Notice to Proceed issued to the Contractor is a contractual requirement, not an approval to begin construction activity which requires a construction permit issued by the BCA. USF Facilities Management office/staff (USF-FM) will reiterate the authority of the BCA in construction permitting matters in any communications to the contractors; and ensure that permits are issued prior to contractor mobilization.
      b. Prior to start of any construction activity (the Work), including, but not limited to; site development, site fencing, demolition, wall construction etc., an application for permit must be made to the Building Code Administration office and permit issued.
      c. The BCA is the only person empowered to make the determination as to permit requirement of any Work, not the owner representative or the contractor. The permit is issued to the contractor, and only the contractor may start the Work under the permit.
      d. The Florida Building Code (Code) and Florida Statutes requires the project representative to apply for and pay the permit fee prior to issuance of the permit. The Code authorizes the BCA the authority and discretion to approve start of Work prior to issuance of a permit when schedule impact necessitates earlier start of Work; however, under no circumstances can Work began without the submittal of an application for permit and approval of the BCA to start the Work.
      e. Under the Code, the BCA may levy a fine of double the application fee when Work is started without prior approval of the BCA.

F. USF BUILDING CODE ADMINISTRATOR (BCA)
   1. A qualified Building Code Administrator has been appointed to manage the Building Code Administration Program. The Building Code Administrator is certified by the Council of American Building Officials and licensed by the Department of Professional Regulation as a Building Official. The Building Code Administrator administers, code compliance, the documents review and construction inspection process.
   2. USF-FM Quality Management staff (USF-QM) reviews construction documents for compliance with adopted codes and standards. After reviewing the documents, comments, if any, are returned with appropriate references. A 'letter of code compliance' is issued after final review and approval of 100% construction documents and upon resolution of all outstanding comments.
   3. The University Project Manager (USF-PM) or the General Contractor (Contractor) or the Construction Manager (CM) shall submit to the BCA a request for a building permit. A building permit shall be issued to the USF-PM or Contractor upon satisfactory completion of the application process and receipt and review of all necessary documents.
   4. The BCA, in conjunction with the Contractor, shall develop a 'construction inspection schedule' to facilitate appropriate inspections, to coincide with the project construction schedule. The Building Inspector (BI) shall perform construction inspections in

accordance with the established inspection schedule.

5. Prior to occupancy of a new building or re-occupancy of a renovated building or portions thereof, the BCA shall issue a certificate of occupancy or re-occupancy. The certificate of occupancy or re-occupancy shall state that the new or renovated building or portions thereof are complete, constructed in accordance with the construction documents, and meet the minimum code requirements at the time of issuance of the building permit. The USF Fire Code Official (USF-FCO) and other required University entities must inspect and certify that the new or renovated building or portions thereof are substantially complete, prior to occupancy or re-occupancy.
6. Fees for these services shall be borne by the project and will be billed directly to the appropriate construction account. The fee schedule shall be based on Current Fee schedule and the location of the project in Tampa Campus or other campuses.

G. DESIGN PROFESSIONALS (A/E)
1. Design professionals shall be responsible for the design of the project in accordance with the appropriate adopted codes and standards. USF-QM shall review the project documents at the completion of the following phases for major projects: Program, Conceptual Schematic Design (CSD), Advanced Schematic Design (ASD), Design Development (DD), 50% Construction Documents (50% CD), 100% Construction Documents (100% CD). A major project shall be defined as a project with a construction cost greater than $2,000,000. All other projects shall be reviewed at the 100% CD but prior to Signed and sealed; the “first step” meeting with the BCA is required to determine code implications at the earliest conceptual design. A ‘letter of code compliance,’ stating that the building plans comply with all current adopted codes requirements, shall be issued by the design professionals, after all outstanding comments have been resolved, and prior to the issuance of Permit Signed & Sealed documents.
2. If the level of work requires the involvement of a design professional as described in Chapter 471 and Chapter 481 of the Florida Statutes, and modified by the Florida Building code and FS 1013, the construction documents must be signed and sealed by the A/E of Record.

H. GENERAL CONTRACTORS/CONSTRUCTION MANAGERS
1. The Contractor, USF-PM or a representative of a University Department/Division shall apply for the permit. At the time of application for a permit the Contractor (or other qualified applicant) shall provide two sets of sealed and signed construction documents and specifications, a list of all subcontractors with appropriate license numbers, and the letter of code compliance indicating the documents have been reviewed by the BCA and USF-QM staff and all outstanding items have been resolved. A building permit shall be issued after these items have been reviewed and approved by the Building Code Administrator. One of the submitted sets of plans and specifications shall be returned with the building permit and shall be stamped “Reviewed for Code Compliance.” This set of documents shall be kept on site for use by the inspectors.
2. The Contractor shall meet with the Building Code Administrator to develop a building inspection schedule. The Contractor shall be responsible for scheduling all required inspections in accordance with the plan developed. At substantial completion the Contractor shall request a certificate of occupancy or re-occupancy.

I. UNIVERSITY DEPTS. PROVIDING CONSTRUCTION/MAINTENANCE SERVICES
1. Any University Department/Division providing construction/maintenance services for either themselves or another University entity shall be required to obtain a building permit, and pay a fee, as specified herein.

J. BOARD OF APPEALS
1. The Board shall review timely submitted appeals.

K. PROCEDURES
1. Design professionals prepare construction documents in accordance with all applicable Codes.
2. USF-QM reviews such documents for code compliance and returns comments or a letter of code compliance as applicable.
3. The Contractor or USF-PM or University Department/Division applies for a building permit

with the proper fee.

4. The BCA reviews the building permit application and issues a permit, if all information submitted is acceptable and complete.
5. The BCA and the Contractor develop a construction inspection schedule.
6. The Contractor requests and USF-QM performs inspections, in accordance with the inspection schedule.
7. When construction is substantially completed and all required inspections performed, the BCA issues the appropriate certificate of occupancy or re-occupancy.

END OF SECTION 01 41 00

SECTION 01 45 00 QUALITY CONTROL

1.1 SERVICES BY SPECIALISTS

A. In addition to the field inspections required by the A/E's contract and by State agencies, the following services by specialists, including but not limited to, will be required on major projects. Fees for specialists' services will be handled by the A/E as an additional A/E service expense. While these services will be performed, the A/E shall supervise the specified operations; the specialist shall furnish required reports directly to the A/E and the USF-PM. Details of the type of services required, methods of investigation, frequency of investigations or tests, number and type of reports required, and method of payment for specialists' services shall be included in the applicable technical sections of the specifications. Unless expressly exempted by the USF-FM, the following services, including but not limited to, shall be performed by qualified independent testing agencies:

1. GENERAL CONSTRUCTION
   a. Soils compaction tests.
   b. Piling and caissons, inspections and tests.
   c. Compaction grouting.
   d. Concrete sampling and tests.
   e. Sound transmission tests.
   f. Radiation testing Roofing inspection.
2 PLUMBING CONSTRUCTION
   a. Pressure test for leaks by gas utility company.
   b. Supervision of purging of gas piping.
   c. Testing of completed installations, prior to inspection by BCA or his Code Inspectors.
3 HVAC CONSTRUCTION
   a. Systems testing.
   b. Soil corrosion analysis for cathodic protection.
4 ELECTRIC CONSTRUCTION
   a. Testing of communications systems.
   b. Testing of signaling systems.
   c. Testing of fire protection equipment and alarm system.

END OF SECTION 01 45 00

SECTION 01 51 00 TEMPORARY UTILITIES

1.1 UTILITIES

A. Requirements are generally as stated in the Project Manual with modifications regarding payment for water, fuel, chilled and hot water, and power consumed. Contractors must arrange for and pay for all temporary utilities required for execution of the work. Specifications shall be written to stress this point. The University owns and operates the utilities throughout most of the Tampa campus. Peripheral areas and regional campus buildings may have service connections directly from the public utilities. The A/E will determine type and scope of each utility needed during construction document phase and, after discussion with the USF-FM, provide specific direction to the contractors in the project specifications regarding the arrangement for such utilities.

1.2 UTILITY COMPANY INSTALLATIONS

A. Plans for running temporary lines through University property shall be reviewed by the A/E in conference with the USF-PM.

1.3 CONNECTIONS TO EXISTING UTILITIES

A. If connections to University utilities are permitted, the A/E shall obtain drawings of existing utilities and shall consult the USF-PM regarding services available and points of connections to services. All services shall be metered through meters furnished by the contractors and the University shall be reimbursed for water, fuel, chilled and hot water, and power consumed. The specifications shall contain instructions to the contractors to make requests for these services through the USF-PM.

1.4 COST

A. Costs for providing temporary services shall be included in the contractors' bids. Specifications shall clearly identify each 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.
   1. GENERAL CONTRACTOR shall pay for the water, chilled water, hot water, sewer, stormwater, fuels, and electric power; and all associated utilities tie-in and metering. University provided utilities consumption charges will be estimated in the bid, but paid from Owner contingency.
   2. PLUMBING CONTRACTOR shall install and maintain water supply lines and make changes in lines as necessary by conditions at the site. In all instances the Cross-Contamination Control must be adhered to. Any connections intended for potable use must be disinfected in accordance with Rule 62-555.340, F.A.C. and applicable Department of Health guidelines.
   3. HVAC CONTRACTOR shall install and maintain heating systems and make changes as required.
   4. ELECTRICAL CONTRACTOR shall install and maintain electrical installations and make changes as required.

1.5 DURATION OF SERVICES

A. The specifications shall clearly identify each contractor's responsibility for providing continuous utility services until date of Substantial Completion, including operation of permanent equipment and services.

END OF SECTION 01 51 00

SECTION 01 52 00 CONSTRUCTION FACILITIES

1.1 CONSTRUCTION ACCESS AND FACILITIES

A. Construction access path, contractor parking area(s), dumpster locations, temporary office location, and material storage/staging areas are to be provided as indicated on the construction drawings or if not shown, shall be approved by the USF-PM in advance of starting work. Construction access and facilities may not adversely impact University operations.

1.2 FIELD OFFICES AND SHEDS

A. The A/E shall review with the USF-PM, the project need for field offices, tool sheds, and other temporary facilities. Field offices are typically not required for minor projects, but exceptions may be approved by USF PM with proper coordination among stakeholders.

B. FIELD OFFICES: Each prime contractor shall provide and maintain a clean, weathertight office at the site suitable for his own use, and for use of his subcontractors. All expenses including the installation cost, and the use of telephone, heat, light, water, and janitor service shall be borne by the contractor.

C. GENERAL CONTRACTOR'S OFFICE shall be of size suitable for the use of the Contractor, his subcontractors, the USF-PM, and the A/E's representative. Office shall be supplied with HVAC, be lighted, have doors with locks, and private line telephone service. One space in the office shall be provided for use of the A/E's representative; space shall be equipped with plan table, filing cabinet, and telephone. The Contractor or his authorized agent shall be present at the office, or elsewhere on the site, at all times while the work is in progress.

1.3 STORAGE AND PROTECTION

A. Specify that each contractor shall provide suitable weather tight storage sheds 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 shall be confined to the areas within the construction fence and not under the canopies of trees to be preserved and protected by barricades. No signs except small identification signs are permitted on sheds. Indoor storage shall be confined to unused spaces in the building. Corridors, stairs, and other public spaces shall not be used for storage. Special care must be exercised to protect electrical and HVAC equipment.

B. STORAGE OF UNIVERSITY EQUIPMENT: Prior to completion of a building, large rooms at, or near, grade level with docking facility access shall be made available to the University for the secure storage of equipment. Details shall be arranged with the USF-FM.

END OF SECTION 01 52 00

SECTION 01 54 00 CONSTRUCTION AIDS

1.1 CONSTRUCTION HOISTS AND ELEVATORS:

A. With concurrence from the USF-PM and after obtaining the State Elevator Certification, one new elevator may be used for construction purposes, with concurrence from the USF-PM and after obtaining the State Elevator Certification. Facilities shall be made available to all contractors and subcontractors; all costs associated with use shall be assigned to the Contractor. Written arrangements must be made with the USF-PM and must include:
   1. Installation of protective covering of car interior doors and entrance.
   2. Weekly cleaning and servicing by the elevator installer at the Contractor's expense.
   3. Complete restoration of all elevator system components to like new condition ready for turnover to the USF-FM.

A. The repair and warranty period required by the contract will not be diminished by authorizing this use.

B. EXISTING ELEVATORS shall not be used during construction without permission of the USF-PM.

C. PROTECTIVE PADS and hooks for hanging the removable pads shall be furnished and installed in the elevator which is most suitable for furniture and equipment moving for use by the University.

END OF SECTION 01 54 00

SECTION 01 55 00 VEHICULAR ACCESS & PARKING

1.1 ACCESS TO SITE

A. Unless specified elsewhere, access is normally restricted in residence buildings to the period from 9:00 AM to 5:00 PM every day. No disruptive work is permitted to start prior to 10:00 AM. USF-FM representatives may vary these hours at their discretion.
B. Contractor shall access site through a single point approved by the USF-FM. Random access to and from site will not be permitted. Fixed times for arrival and departure of most construction forces as a group should be established by mutual agreement between Contractor, USF-FM, and the USF Housing & Residential Education (USF-HRE) representative. Changes and additions to normal working schedules shall be communicated to the University representative, when applicable, 72-hours in advance through the USF-FM.
C. The University will endeavor to notify Contractor as soon as possible if a situation exists which may preclude timely access to or use of the project site.
D. The Contractor shall not work at the project site on any day the University of South Florida is officially closed, unless the USF-UPD is made aware of such construction and a USF-FM representative is on call to handle any emergencies.

1.2 TRANSPORTATION FACILTIIES

A. Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the project site(s). Record and provide photographic documentation of existing conditions prior to mobilization. Repair/replace all damaged areas joint to joint, at no cost to the Owner, barricade the dripline area of existing trees to be preserved. No parking under dripline/canopy of trees.
B. Contractor's Vehicles
    1. Parking permits are required for all personnel and business vehicles, except when parked inside Contractor's construction fencing.
    2. Do not permit such vehicles to park on any street or other area of the University's property except in the area(s) so designated by the USF-FM and the University's Parking and Transportation Services (USF-PTS) Division.
    3. Secure all required Parking Decals and/or permits as required by the USF-PTS.
    4. No off-site parking will be provided as part of this contract, except as provided by permit in designated University parking areas.

1.3 ACCESS, PARKING AND TRAFFIC

A. CONSTRUCTION AREA MAINTENANCE AND ACCESS: If existing parking lots and/or roads on campus must be used for construction area access or staging, a detailed plan of the areas to be used must be worked out in cooperation with USF-FM and USF-PTS. In case of parking lots being used, the plan should include the number of spaces impacted and duration. The final approved plan shall be shown on the project drawings, and specifications must stipulate that no other areas be used.
    1, CLEAN-UP ENFORCEMENT: Specifications shall contain provisions that Contractors must remove mud and spillage from public and University streets without delay. Failure to clean streets promptly could result in streets being cleaned by the University or other public agency at the Contractor's expense.
    2. REPAIRS OF DAMAGES TO FACILITIES: Specifications shall also contain provisions that damage to roads, sidewalks, parking lots, lawns, or other facilities on University property, resulting from hauling, storage of materials, or other activities in connection with the work, shall be repaired or replaced, at no expense to the University, by the Contractor causing the damage. Repairs or replacement shall be made to the satisfaction of the University unit responsible for maintenance of the particular damaged item (i.e., USF-PTS for parking lots).
    3. WEED CONTROL: Specify that the Contractor must cut the weeds inside and along the construction fence as often as necessary to maintain a neat appearance at the project site. USF prohibits the use of weed killers by Contractors on USF property.
B. MAINTENANCE OF TRAFFIC FLOW

1. PLANNING FOR TEMPORARY CONTROL: The USF-UPD must be notified at least two (2) weeks in advance of any anticipated work affecting traffic flow. To assure maintenance of flow and to safeguard all parties involved in planning temporary routing, a field inspection should be made jointly by the A/E, the University, and Contractor personnel prior to performing any work, which would interrupt normal traffic patterns. Rerouting of traffic shall be planned as to route and direction, in cooperation with the USF-UPD and as approved by the USF-PM.
2. CONTRACTOR'S RESPONSIBILITIES: The Contractor, whose work requires interruption of traffic, shall be required to post signs in all affected areas, in sufficient numbers and with appropriate messages, to warn motorists entering the construction zone and to alleviate conflicts and confusion among motorists or pedestrians at intersections, crossings, turns, and other obstructions to normal traffic flow. Contractor must make special consideration to accommodate USF's students, staff, and faculty with disabilities. Temporary signs shall comply with the standards of the Florida Department of Transportation. Temporary lanes shall be well marked, and obstructions, barriers, lane changes, or detours shall be indicated by appropriate signage at each point of potential confusion, as well as at each change in direction of a temporary route. USF-UPD shall be notified in advance of the anticipated time of return to normal traffic patterns. Upon completion of construction affecting streets or traffic flow, but before temporary control devices and lane markings are removed, the area shall be restored to receive traffic in the normal pattern. The USF-UPD shall be notified of the actual time of completion of restoration.
3. PROVISIONS FOR SPECIAL DUTY POLICE OFFICERS: If it is evident that traffic will become hazardous or restricted in any manner, uniformed special duty police officers must be provided by and at the contractor's expense. These officers shall be employed by contacting the USF-UPD at least two (2) weeks before officers' services are required. The contractor shall also forward a copy of the request to the USF-PM. Specifications should be written to alert contractors to the possibility that special duty police officers might be needed at times other than, or in addition to, the contractor's normal work hours.
4. PARKING: Parking at all campuses is subject to regulations established by USF-PTS, and all employees of contractors and subcontractors must comply with these regulations. Employees of contractors and subcontractor must secure parking permits from the USF-PTS and must park cars in areas assigned to them. Parking on streets or in restricted areas or under tree canopies with protective barricades is prohibited. Before beginning of the work, each contractor shall report to the USF-PTS the approximate number of parking permits which will be required for all employees, including employees of subcontractors. Copies of parking guidelines will be provided upon request and with permits. Each contractor shall provide the USF-PM with a copy of his letter of application for parking permits. Parking within a construction-fenced area does not require permits. Any trees within construction-fenced area must have protective barricades installed to prohibit parking under tree canopy as directed by the USF-PM.
5. ACCESS TO FACILITIES: While the University of South Florida is a publicly owned institution; its function and facilities are dedicated to serve specific operations and programs. Therefore, contractors' personnel may be barred from using existing toilet, food service, or other facilities.

END OF SECTION 01 55 00

SECTION 01 56 00 TEMPORARY BARRIERS AND ENCLOSURES

1.1 BARRIERS

A. INGRESS AND EGRESS FOR BUILDINGS: During joint occupancy of buildings, entrances and exits for public use must meet code requirements.

B. BARRIERS FOR EXCAVATION OF UTILITIES: 40-inches height high visibility yellow safety fencing, on 2 X 4 posts, a minimum of 48-inches from excavation. Caution tape and re-bars are not allowed. Provide 2 X 4 top rail where excavations/trenches cross or run adjacent to pedestrian/bicycle pathways.

1.2 CONSTRUCTION FENCE

A. Six feet high chain link fence with gates shall be erected around the project site. Fence and location shall be subject to the approval of the USF-FM. Show fence location on drawings.
   1. Provide green wind screen.
   2. Barbed wire used on any part of the fence is prohibited. Re-bars are prohibited as posts.
   3. "No Trespassing" signs, which meet OSHA requirements, shall be specified.

1.2 TREE AND PLANT PROTECTION

A. Provide 40-inches height, high visibility yellow safety fencing, on 2 X 4 posts and top rail, at tree canopy drip edge. Consult with USF Landscape Architect (USF-LA) all tree protection plans. Refer to Section 01 55 00, Vehicular Access & Parking for additional protection required for tree protection.

1.4 SECURITY

A. EXISTING BUILDINGS SECURITY: During construction, one exterior door of any enclosed structure shall be provided with a lockset with security core. The Contractor shall obtain security core from and return same to the USF-FM.

B. FENCE GATES: Except during working hours, gates shall be kept locked by the Contractor at all times.
   1. All gates shall be double locked with a USF-FM security padlock and the contractor's padlock in a manner that will allow access by unlocking either padlock. Other prime contractors may install their own padlocks if it is determined that they will require access to the area at a time other than regular working hours. The USF-FM security padlock shall be obtained from, and returned to, the USF-PM.

END OF SECTION 01 56 00

SECTION 01 57 00 TEMPORARY CONTROLS

1.1 NOISE AND DUST CONTROL

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

1.2 WATER AND MOISTURE PROTECTION FOR BUILDING

A. Provisions required for protection from water and moisture should be shown on the drawings as required for temporary construction to maintain integrity and protection of work, occupied space, etc.

1.3 DRAINAGE

A. The Contractor shall provide temporary drainage trenches, drains, sumps, pumps, or other items required to afford satisfactory working conditions for the execution and completion of the work of all contractors and to protect all work. Water shall be diverted to or shall be pumped from the work areas without causing a nuisance to surrounding areas or potential regulatory non-compliance. Specifications shall stipulate appropriate use of stormwater management systems, define erosion control measures to be employed, and shall prohibit direct transport of sediment to storm sewerage system.

1.4 STORM WATER RUN-OFF

A. Include the pumping of tunnels, elevator pits, and other structures, which collect storm water and wastewater run-off from construction operations.

END OF SECTION 01 57 00

SECTION 01 58 00 PROJECT IDENTIFICATION

1.1 PROJECT SIGN

A. The Contractor shall provide a project sign. The location shall be approved by the USF-FM and location and details shown on drawings. Specify that Contractor provide the sign and a shop drawing showing layout of text. The A/E accompanied by the USF-PM must inspect and approve the finished sign before installation. Include a drawing of the sign in the specs.

1.2 TEMPORAY SIGNAGE

A. The design and dimensions of the USF required signage shall be included the construction documents and shall be provided by the Contractor. On the exterior perimeter of the construction fencing and/or gates, in compliance with USF Policy 6-028, Events, Signage & Space Management and USF Policy 3-008, Temporary Signage, the attachment or display of following temporary signage is approved.
   1. USF No Smoking Sign: in dimensions not to exceed 200 square inches the words: "No Smoking. USF is a smoke free campus. Smoking is prohibited in all areas of the campus and the construction site. USF Policy 6-026, Tobacco & Smoke Free Policy"
   3. USF No Harassment Sign: in dimensions not to exceed 200 square inches the words: "No Harassment. Sexual harassment by any vendor against any faculty member, staff or student is prohibited, and complaints of such conduct must be filed with the Office of Diversity and Equal Opportunity. USF Policy 0-004, Sexual Misconduct/Sexual Harassment"
   4. USF No Solicitation Sign: in dimensions not to exceed 200 square inches the words: "No Solicitation. Distribution or placement of commercial material or advertisement in all areas of the campus and construction site is prohibited. USF Regulations 6.026, Distribution of Materials & Solicitation on Campus"
   5. USF No Trespassing Sign: In dimensions not to exceed 200 square inches the words: "No Trespassing. Access to campus and facilities are restricted for the purpose of conducting authorized University business only. Violations will be subject to No Trespass Order. USF Regulations 4.0140, No Trespass & Loitering"
   6. Contractor No Trespass Sign: When required, trespass and security signs.
   7. Contractor Safety Signs: When required, OSHA, National Fire Protection Association (NFPA), US Department of Transportation (DOT) safety signs.
   8. Movement of Traffic (MOT) Signs: Comply with DOT requirements for vehicular signs. When the MOT plan impact pedestrian traffic, due to re-routing or closure of sidewalks, provide ADA compliant pathways & signage and ensure they are posted at access points prior to the closure or re-routing.
   9. Construction Site Entry Sign: the name of the General Contractor & emergency contact phone number in letters no larger than 6 inches height, and the words: "Construction Entry" no larger than 12-inches height and directional arrow. Letter typeface & field color of the sign may match Contractor's logo. Dimensions of the signage shall be sufficient to include all required information.

B. Prohibited Signs: no other signage affixed to or on any surface outside the exterior perimeter of the construction fencing is permitted. In particular, following signage are prohibited at all times:
   1. Political and/or campaign signs.
   2. Advertisements of any type.
   3. Any identifying signs of subcontractors, vendors or suppliers.

C. Special Signs: Request for special or non-compliant signage may be submitted through USF Space Impact process for USF review and approval.

END OF SECTION 01 58 00

SECTION 01 71 23 FIELD ENGINEERING

1.1 LAYOUT DATA

A. A licensed engineer or surveyor shall be employed to layout structure coordinates, site improvements, and utilities, to determine all lines and elevations, and to verify same from time to time as the work progresses.
   1. GRADE LINES, LEVELS, AND BENCH MARKS shall be established and maintained by the Contractor.
   2. BUILDING LAYOUT DATA: The Contractor shall provide and maintain well-built batter boards at corners of buildings. As work progresses, the Contractor shall establish benchmarks at each level and shall establish exact locations of partitions on rough floors as guides to all trades.

END OF SECTION 01 71 23

SECTION 01 78 00 CLOSEOUT SUBMITTALS

1.1 CLOSE-OUT CONSTRUCTION DOCUMENTS (Project Record Documents)

A. CONTRACTOR'S RESPONSIBILITIES: The Contractor shall maintain at the construction site a set of printed Original Contracted Construction Documents (drawings and specifications) for the purpose of documenting, with a red pencil or red ink pen, the actual location of any work not included in the original documents and/or any work constructed and/or installed differently than indicated in the original documents. The Contractor's monthly payment will not be approved by the University's representative, if such documentation does not take place in the opinion of the University's representative on a monthly basis. At the completion of construction, such set of red-marked printed documents shall be known and noted as the Record Construction Documents Set. After final acceptance of the project, the Contractor shall submit the as-built set to the Consultants.

B. A/E CONSULTANT'S RESPONSIBILITIES: After final acceptance of the project, the Consultants (Architects and Engineers) shall revise the Original Contracted Construction Documents (CAD drawings and specifications) to accurately record all red-marks noted in the Contractor's record set (red-line set), all executed addenda, all executed bulletins, all executed change orders, all executed alternates, and any other executed change to the original documents. Such revised set of construction documents shall be known and noted as the "RECORD DOCUMENTS" (drawings and specifications). Submit one printed set of the Record Documents to the University's Representative for review and approval. If the University's Representative discovers that certain changes were not properly recorded, the Consultant will make the proper corrections and submit a final set of Record Documents, as follows: One set of prints (drawings and specifications), and electronic files (CAD drawings and specifications in .dwg and .pdf files). Note that Specifications and General Conditions shall be also modified by accurately recording any changes pertaining to such documents. Final payment will not be approved by the University's Representative, if acceptable Record Documents (drawings and specifications) are not submitted.

1.2 OPERATION AND MAINTENANCE DATA

A. Detailed requirements should be stipulated in the appropriate sections of the specifications. For items of General Construction, specify that information for care and maintenance be furnished for any item requiring more than ordinary custodial care. For mechanized equipment and electrical equipment, specify that operation manuals be provided, and for special equipment stipulate that, in addition to operation manuals, the manufacturer provide demonstrations and operation instructions by factory trained employees to designated University personnel who will be operating the equipment. The following are examples of the kind of data which might be required. The applicable data in printed and bound set(s) and in digital record .pdf files should be submitted to the USF-FM before or at Substantial Completion.

1. GENERAL CONSTRUCTION

ITEMS	DATA REQUIRED
1. Cut Stone	Dampproofing Treatment
2. Glue-Laminated Wood	Finishes
3. Wood Shingles and Shakes	Preservative Treatment
4. Fluid Applied Roofing	Instructions for Patching
5. Single-Ply Membrane	Maintenance and Repair Instructions
6. Aluminum, Bronze, S.S. Doors & Windows	Care of Finishes
7. Electronic Locking Systems	Wiring Diagrams and Operating Instructions
8. Special Flooring	Finishes and Maintenance Data
9. Chalkboards	Cleaning Instructions
10. Motor-Operated Chalkboards	Wiring Diagrams and Operating Instructions
11. Pedestrian Control Devices	Wiring Diagrams

ITEMS	DATA REQUIRED
12. Sun Control Devices	Wiring Diagrams
13. Equipment	Wiring Diagrams and any Special Instructions Required
14. Special Construction	Systems Diagrams and any Special Instructions Required
15. Elevators and Hoists	Operating and Maintenance Instructions

2. PLUMBING

ITEMS	DATA REQUIRED
1. Under-Slab Piping	As-Built Drawings, reflecting routing and installation depth
2. Piping Systems	Printed Diagrams - Valve Tag Directory
3. Pumps, Controls, & Special Systems	Wiring Diagrams, Operating Instructions, Parts Lists, Testing Procedures
4. Piping	Printed Diagrams - Valve Tag Directory
5. Pumps, Controls, & Special Systems	Wiring Diagrams, Operating Instructions, Parts Lists, Testing Procedures

3. HEATING, VENTILATING, AND AIR CONDITIONING

ITEMS	DATA REQUIRED
1. Control Systems	Printed Diagrams and Operating Instructions
2. Valves	Typewritten Valve Tag Directory
3. Pumps, Controls, & Special Systems	Wiring Diagrams, Operating Instructions, Parts List, Testing Procedures
4. BUT Meters	Certificate of Performance and Initial Reads from Manufacturer

4. ELECTRIC

ITEMS	DATA REQUIRED
1. Under-Slab Electric Conduit	As-Built Drawings, reflecting circuit routing and installation depth
2. Communications Systems	Point-to-Point Wiring Diagrams & Instruction Manuals
3. Motor Control Centers	Overload Heater Charts
4. Equipment	Operating Instructions
5. Fire Alarm Systems	Point-to-Point Wiring Diagrams
6. Electric Meters	Warranty, Manufacturer's Specs, Maintenance Requirements, Initial Read Multiplier

5. OPERATION AND MAINTENANCE MANUALS: The A/E shall review the contractor's submittals of manuals for correctness and sufficiency of data and, after approving the contents and format, shall obtain the number of copies required, including two (2) printed sets and digital record in .pdf files to the USF-PM, prior to substantial completion.
   a. FORMAT FOR MANUALS: Manuals shall consist of manufacturers' typed or printed operation instructions and maintenance data, shop drawings or catalog cuts, and other data listed herein; all bound in letter size hard-back binder. Material shall be assembled as follows:
      i. INSIDE COVER: Title of job, The University of South Florida, address, date of submittal, name of contractor and name of manufacturer.
      ii. SECOND PAGE: Index
      iii. THIRD PAGE: Introduction to first section containing a complete written description of the equipment or system
      iv. FIRST SECTION: Written description of system contents, where equipment is located in building, how each part functions individually and how system works as

a whole, concluded with a list of items requiring service and the service needed or reference to the manufacturer's data in the binder which describes proper service.

v. SECOND SECTION: A copy of each shop drawing with an index at the beginning of the section.

vi. THIRD SECTION: A copy of manufacturer's operating instructions with an index at the beginning of the section.

VII. FOURTH SECTION: A list of all equipment incorporated into job, contractor's purchase order numbers, supplier's name and address.

1.3 AFFIDAVITS, BONDS, AND GUARANTEES

A. 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) shall be included in the specifications. The A/E can save a duplication of work at time of completion of construction if the specifications writer prepares a list of required affidavits, bonds, and warranties as the specifications are prepared. Also see Section 01 32 00, Construction Progress Documentation. Submit to USF-PM printed and bound set and digital record in .pdf files at substantial completion.

1. AFFIDAVITS

ITEMS	AFFIDAVITS
1. Carpeting materials	Installer attests that correct materials were installed
2. Non-standard resilient floor materials	Installer attests that correct materials were installed

2. EXTENDED WARRANTIES

ITEM	WARRANTY LENGTH
1. Roofing	20-year maintenance warranty
2. Flashing & sheet metal work	20-year maintenance warranty
3. Membrane weatherproofing	3-year maintenance warranty
4. Sealants	5-year warranty
5. Metal windows	2-year warranty for windows; 5-year warranty for weather-stripping
6. Wood laminated plastic faced doors	Lifetime warranty
7. Tinted glass and insulating glass	10-year warranty
8. Chalkboards	20-year warranty
9. Water chillers and air cooled condensers	5-year warranty

3. WARRANTY PERIOD

1. Conditions of Warranty
2. Process to Respond to Warranty Items
3. Process if Warranty Item is not Resolved

END OF SECTION 01 78 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 01 GENERAL REQUIREMENTS (MINOR PROJECTS)

DIVISION 01 GENERAL REQUIREMENTS

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SECTION 01 10 00 INSTRUCTIONS

1.1 DEVELOPMNET OF PROJECT SPECIFICATIONS

USF Design and Construction Guidelines (DCG), including Division 01 General Requirements, can be found at: www.usf.edu/fm-dc webpage under the Guidelines and Standards tab. The Design Professional (Architect/Engineer) is responsible to include the applicable Division 01 (Major or Minor) sections in the Project Manual. The standard versions of Division 01 written for the Design Professional and are not suitable for publication and are not to be referenced in a bid document.

1.2 USF DESIGN & CONSTRUCTION GUIDELINES (USF-DCG)

The following sections have been partially edited for use by the Architect/Engineer (A/E). The A/E is responsible to add, delete, and modify these as needed to prepare a Project. Edited Division 01 specifications, which will be reviewed by the USF Project Manager (USF-PM) as part of the 100% Owner Review submittal.

END OF SECTION 01 10 00

SECTION 01 11 00 SUMMARY OF WORK

1.1 GENERAL DESCRIPTION

The project requirements are described in the project documents, including plans, specifications, and district guidelines.

1.2 WORK BY THE OWNER

A. The Owner may concurrently perform construction work at the project site. The Contractor is required to cooperate fully so as not to interfere with the work performed by the Owner under separate contracts. The work included being performed by the Owner is indicated elsewhere in these construction documents.
B. When required by these documents, schedule and coordinate the work of the Owner's separate Contractors.
C. Unless otherwise specified, the Owner will perform the necessary tasks to vacate work areas in advance of construction, including removal of furniture except where such work is specified to be performed by the Contractor. The Contractor is to allow three (3) days minimum, or as otherwise indicated in these documents, for Owner move-out at the beginning of each phase of construction. Contractor tasks during this period may not interfere with Owner move-out activities.

   NOTE: Items to be removed from the construction area which require the use of tools are the responsibility of the Contractor. The Contractor is required to evaluate existing conditions and to include costs to remove, store and reinstall such items.

1.3 WORK ON OTHER PROJECTS

If work of other projects will be performed simultaneously with the work of this project, the Contractor is expected to cooperate with other contractors and with the Owner to avoid interference with each other's work.

1.4 SCHEDULING THE WORK

Job conditions which will affect phasing and scheduling of the work are described in these documents. Particular attention must be given to remodeling work in buildings which will remain in operation during remodeling. Examples of some problems that may be encountered are:

A. MAINTENANCE OF INGRESS AND EGRESS: Temporary entrances and exits must meet code requirements.
B. SECURITY: Areas which are being operated by the User/Occupant Group, must be secured from the construction area and vice versa.
C. STORAGE: If adequate area is not available for storage of construction materials, adjust delivery schedule accordingly. The location of storage/staging areas on site must be approved by USF Facilities, and must be properly secured by the Contractor, and must be removed upon substantial acceptance.
D. MAINTENANCE OF UTILITIES, LOW VOLTAGE & OTHER SERVICES: These requirements are set forth in Section 011400 Work Restrictions and Scheduling.
E. DUST CONTROL AND NOISE CONTROL: The location and general description of temporary partitions required for control of dust and noise are indicated on the drawings or, if not indicated, are to be proposed by the Contractor and submitted for approval.
F. TEMPORARY PARTITIONS: The location and description of temporary partitions which are necessary to provide fire or smoke separation are indicated on the drawings or, if not indicated, are to be proposed by the Contractor and submitted for approval.
G. PROTECTION FROM WATER AND MOISTURE: The Contractor is required to take the necessary precautions to avoid water/moisture intrusion into the building during construction, including condensation resulting from failure to maintain the integrity of the building envelope.

1.5 ITEMS FURNISHED BY THE UNIVERSITY

Items to be furnished by the University furnishes to be installed by the Contractor are described in these documents. The Contractor is required to submit a written request for delivery of the

materials sufficiently in advance to avoid delaying the work.

1.6 WORK COVERED BY THE CONTRACT DOCUMENTS

A. PROJECT DESCRIPTION: As described in the Contract Documents.

B. CONTRACT DOCUMENTS: Contract documents are defined in the General Conditions of the Contract; and include the Invitation to Bid (when applicable), the Construction Contract and associated Conditions, the purchase order, the drawings, the specifications, addenda issued prior to bid, and changes issued subsequent to award of the contract.

C. PROJECT MANUAL: includes the bid requirements and forms, the contracting requirements and the specifications.

D. TYPE & FORM OF CONTRACT: Except as otherwise indicated, all work under this Contract will be under a single prime Contract between the Owner and the Contractor. "Contractor" is used interchangeably to refer to any entity providing construction services under a prime contract, including a General Contractor, Construction Manager at Risk or Design/Build firm.

END OF SECTION 01 11 00

SECTION 01 14 00 WORK RESTRICTIONS AND SCHEDULING

1.1 CONTRACTOR USE OF PREMISES

A. PREMISES: Use of the University's premises by Contractor will be limited to the area identified on the Construction Documents. Space for staging work and related operations of Contractor and Contractor's employees will be provided, subject to availability. Coordinate use of premises under direction of USF Facilities Management (USF-FM).
   1. Turf areas may not be used for construction staging or storage without prior approval from the USF Project Manager (USF-PM). Such approval will not be granted solely for the contractor's convenience. Staging and storage is to be performed on pavement except in special circumstances as determined by the Owner.
   2. Any use of pavement for construction purposes, including worker parking, requires a permit issued by the USF Parking and Transportation Services (USF-PATS) Department. Applications may be submitted on the USF-PATS web page.

B. PROTECTIVE BARRIER: Provide and erect before any work begins, and maintain during the progress of the Work, all necessary protective barriers, warning signals, signs and lights.

C. AREA INSIDE OF CONSTRUCTION FENCE: The area inside of the construction fence is to be maintained by the contractor for the duration of construction and restored to the same or better condition at project completion. Contractor is responsible to trim along the fence line during construction as needed to maintain a neat appearance.

D. AREA OUTSIDE OF CONSTRUCTION FENCE: Any work that must be done outside of the designated construction area or phase limit in order to accomplish the Work of the Project or Phase of the Project must be prior approved by the USF-PM.

E. WORK HOURS: Contractor will have use of the work area Monday through Friday 8:00 AM to 5:00 PM unless otherwise noted. Work to be performed outside of these hours requires approval of the USF-PM and seventy-two (72) hour prior notice. Approval is strictly reserved for disruptive activities; and will not be granted solely for the Contractor's convenience. The Contractor shall not work at the project site on any day the University of South Florida is officially closed, unless the USF Police Department (USF-UPD) is made aware of such construction.

F. PRESENCE OF SUPERINTENDENT: **Work may be performed and materials may be delivered to the job site only during times when the Construction Superintendent is present on site. The Construction Superintendent is defined as a direct employee of the Contractor. This role may not be delegated to a subcontractor**.

G. JOBSITE COMMUNICATIONS: Construction Workers and delivery personnel are prohibited from communicating with staff and students at the work site. All communication is to be routed to the A/E or the USF-PM except in the event of an emergency.

H. ELEVATORS: USF elevators shall not be used for construction purposes without permission of the USF-PM. When such use is allowed, the Contractor is required to provide protective pads to protect all surfaces of the elevator. Prior condition is to be documented and finishes are to be restored to like-new condition upon completion of the work.

I. PUBLIC RESTROOMS: USF public restrooms shall not be used by construction personnel without prior USF-FM permission.

1.2 WORK IN OCCUPIED AREAS

A. CAMPUS: The University will occupy the surrounding premises during the entire period of the Work of this Contract to conduct its normal operations. Cooperate with University in all construction operations to minimize conflict, and to facilitate University usage.

B. WORK HOURS IN OCCUPIED AREAS: Work in areas which have not been vacated for construction are to be restored for use by the University prior to 7:00 AM the following weekday.

C. TEMPORARY BARRIERS: Interior temporary barriers are required to separate the work area from the occupied areas of a building and shall be constructed using nominal 2 x 4 wood or 3- 5/8 inches metal studs with 1/2 inch plywood or gypsum wallboard on the occupied side. Barricades in exterior areas are to be weatherproof and sturdy, and designed to provide protection to staff/students, buildings, vehicles, landscaping and pavement. The Contractor is to propose an appropriate type of barricade based on individual project needs.

D. EGRESS & ACCESS ROUTES: If the Contractor prepares for closure of a corridor, sidewalk, egress route, etc. that provides necessary access to other floor areas; Contractor shall make provisions for alternative access to such other nearby areas which are acceptable to the USF-PM. Keep all corridors, walkways, emergency exits, gates, and ramps free of obstructions, tools, equipment, and debris. Provide temporary directional signage when necessary.
E. COMMON AREAS: The Contractor will not interrupt access, or interfere with the use of any facility, road, sidewalk, common area or parking area outside of the area of construction, except as permitted by the Owner.

1.3 DISRUPTIVE WORK

A. The Contractor is required to plan the work so to avoid disrupting the University's operations. The Contractor will schedule the work with the input of the USF-PM. Contractor requests to work on weekends and holidays will be accommodated at USF's discretion.
B. Disruptive activities include those which generate odor, vibration, dust or noise which can be heard in adjacent buildings.
C. The Contractor will not interrupt power, lighting, low voltage systems, safety systems, and plumbing, telephone, or HVAC services in an occupied facility without advance written Owner approval.
D. Where it is not possible to complete certain mechanical and electrical services to make the work complete and ready for occupancy, temporary services may be approved to allow for occupancy by the Owner at the earliest possible date.
E. STUDENT AREAS: No disruptive work is permitted between 10 PM and 10:00 AM in student residential areas.

1.4 PROTECTION OF WORK AND ADJACENT PROPERTY

A. Buildings and adjacent areas may be subject to damage due to construction operations. At the completion of the project, the Contractor shall restore existing buildings, landscaping, turf, parking facilities, sidewalks, etc., to the same or better condition as prior to the start of the work.
B. In addition to requirements of the General Conditions of the Contract for Construction, the Contractor shall provide the following before starting construction:
    1. Provide coverings over inlets, area drains, drywells, etc. to prevent soil and construction debris from running into the storm system. In the event of a failure of a covering, the Contractor is required to clean the affected piping and structures.
    2. Provide protection from rain, wind, and extreme temperatures to protect new work, materials, equipment, fixtures, and adjacent areas from damage.
    3. Provide protection against stormwater back-ups when the storm system is affected by the work. Maintain flows as needed to avoid damage to the work and to surrounding areas.
    4. Provide temporary protection around openings through and at floors, roofs and other openings.
    5. Per the Florida Trench Safety Act, Section 553.60-64, F.S.; provide and maintain proper shoring and bracing for excavations to prevent collapse or other damage until they can be properly backfilled upon completion of the new work.

1.5 SCHEDULING

A. Detailed construction scheduling is the responsibility of the Contractor. Schedules are to be updated and distributed to the Design Professional (Architect/Engineer) and USF-PM bi-weekly. An updated schedule is to be provided with each application for payment.
B. Provide schedules in CPM format in accordance with the Construction Contract. For less complex projects, a Gantt Chart may be used if approved by the USF-PM.

END OF SECTION 01 14 00

SECTION 01 21 00 ALLOWANCES

1.6 GENERAL

Allowances provide funding for corrective work that cannot be accurately quantified prior to bid, typically due to hidden conditions.

1.7 SUMMARY

A. This section includes administrative and procedural requirements governing the use of allowances.
B. Allowance amounts are included in the Base Bid.
C. Allowance amounts are to be entered on the Bid Form in the space provided.
D. Types of allowances may include the following:
   1. Contingency Allowance
   2. Unit Cost Allowances

1.8 CONTINGENCY ALLOWANCE

A. CONTRACTOR'S CONTINGENCY: Contractor's Construction Contingency is a Lump Sum allowance included in the construction contract sum (typically established on the Bid Form) for use by the Contractor for unforeseen conditions. Use of Contractor's Construction Contingency require Owner review and concurrence; however, Owner shall not unreasonably deny Contractor's use of its Construction Contingency.
B. OWNER'S CONTINGENCY: Owner's Contingency is typically excluded from the construction contract and remains confidential. If included in the construction contract, a Lump Sum amount which is established for the Owner's discretionary use. Owner's Contingency may include a combination or separate construction and design contingencies.
   1. Owner's Construction Contingency: An amount set aside to cover any unexpected costs that are result of unforeseen construction conditions that are not the fault of the Contractor.
   2. Owner's Design Contingency: An amount ser aside by the Owner to cover unexpected costs for unforeseen design changes that are not the fault of the Architect/Engineer (A/E).

1.9 UNIT COST ALLOWANCES

A. Unit Cost Allowances are total amount for a specific unit of work when the extent of such work is hidden and cannot be determined prior to bid. Bidders are to establish a total allowance amount for the estimated quantity set forth in this Section with the understanding that the final cost will be calculated using the original unit cost multiplied by the actual quantity of work.
B. Unit Cost Allowances are to include all costs necessary to accomplish the work in accordance with the Contract Documents, including equipment, materials, tax, labor, overhead, profit, insurance, supervision, shipping and freight, storage and protection, close out documentation, warranty, and any other incidental costs necessary to complete the work.
C. Unit Cost Allowances, if accepted, are binding for the duration of the Construction Contract.
D. As soon as possible after starting the Work, the Contractor is to establish the extent of the work to be funded with the unit cost allowances.
   1. Proceed with the work only after the A/E has issued written approval. The approval will be based on the A/E's verification of the quantity of work to be performed. Approval may be issued in phases, as the work progresses, and as existing hidden conditions are revealed.
   2. During construction, provide photographs sufficient to document the quantity and extent of the work performed under the Unit Cost Allowance.

1.10 SUBMITTAL REQUIREMENTS FOR ALLOWANCE ITEMS

A. Provide shop drawings, product data, samples and other submittals for work performed under allowance pricing in the same manner as other work performed under this Contract.
B. Prior to beginning the work, submit inspection request(s) to the A/E to verify the extent of work to be performed under Unit Cost Allowances.
C. Submit photographs at regular intervals, sufficient to document quantities of materials replaced

under Unit Cost Allowances.

D. Upon completion of the work performed under Unit Cost Allowances, submit documentation of actual quantities installed, including delivery tickets, photographs, invoices, inspection reports and other documentation sufficient to document the actual quantity of work performed.

1.11 COORDINATION

A. Coordinate work performed under allowance pricing with other trades.

B. Update the project schedule as needed to accurately reflect the time allocated to performing the work. Scheduling requirements are specified elsewhere in these documents.

1.12 ADJUSTMENT OF ALLOWANCES

A. CONTINGENCY ALLOWANCE: Expenditures from contingency allowances require written Owner approval in advance of any work being performed.

B. UNIT COST ALLOWANCES:

1. Expenditures require written approval by the Owner based on the Design Professional's verification of the actual quantity of work performed.
2. Upon completion of the work, the allowance amount will be adjusted by Change Order. The amount of the adjustment will be based on a unit cost calculated from the original allowance.
3. The Owner reserves the right to establish the fair value of the work by other means, in accordance with the General Conditions of the Contract.

C. Upon completion of the work, refund unspent allowances to the Owner by Change Order.

1.13 GENERAL

A. Requirements for work performed under allowance pricing are identical to the requirements for work performed under the base scope of the Project, as specified elsewhere in these documents.

B. Coordinate materials and their installation with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

C. Document the extent of the allowance work on the red-marked field drawings, for incorporation into the final Record Documents.

SCHEDULE OF UNIT COSTS

Unit Cost No. 01: use table format to describe the work item, assign the estimated quantity, and identify the total cost, example below:

Description	Quantity	Unit Cost	Total Cost
Replace deteriorated 2x6 wood blocking at roof edge	100 LF	$3.00/LF	$300.00

[Note to Design Professional; ensure that all materials and execution requirements are specified elsewhere, such as fastener types, fastening patterns, preparation for painting, painting, etc.].

END OF SECTION 01 21 00

SECTION 01 23 00 ALTERNATES

1.1 SUMMARY

A. This section includes procedural requirements governing alternates to the base bid.
B. Alternate pricing will be required for specific work that may be added to or deducted from the base bid amount if the Owner accepts the corresponding change.
C. Each alternate bid is to include all costs necessary to accomplish the work in accordance with these contract documents, including equipment, materials, tax, labor, overhead, profit, insurance, supervision, shipping and freight, storage and protection, close out documentation, warranty, and any other incidental costs necessary to complete the work.
D. The cost or credit for each alternate is the net adjustment to the Contract Sum to incorporate the work of the alternate into the Contract. No other adjustments are made to the Contract Sum.
E. Alternates described in this section are to be incorporated into the Work only if accepted by the Owner and included in the Contract Sum.

1.2 PROCESS

A. The bidders are required to enter an amount for each alternate on the Bid Form. Failure to enter alternate pricing may result in disqualification of the bid.
B. Alternate pricing will be used by the Owner to evaluate the bids. Any combination of alternates and base bid may be used to establish the winning bid.
C. Parties may agree to defer consideration of the alternate bids for later incorporation into the Contract by Change Order. Upon acceptance of a deferred alternate, the Contractor is to update the project schedule and schedule of values to accurately reflect the added or deleted work.

1.3 SUBMITTALS

A. Provide shop drawings, product data, samples and other submittals as required for alternate work in the same manner as other work performed under this contract.

1.4 REQUIREMENTS

A. Requirements for work performed under alternate pricing are identical to the requirements for work performed under the base scope of the Project, as specified herein.
B. Coordinate materials and their installation with related materials and installations to ensure that the work of the alternate is completely integrated and interfaced with related work.
C. Record the alternate work on the red-marked field drawings.

SCHEDULE OF ALTERNATES

Alternate No. 01: [detailed description, referring to other sections where appropriate]

[Note to Design Professional; ensure that all materials and execution requirements are specified elsewhere, such as fastener types, fastening patterns, preparation for painting, painting, etc.].

END OF SECTION 01 23 00

SECTION 01 26 00 CHANGES & CLARIFICATIONS

1.1 SUMMARY

This section includes procedural requirements governing contract changes and clarifications.

1.2 CLARIFICATIONS

A. DEFINITION: Clarification consists of additional information which further defines, or which resolves conflicting information within the Contract Documents. The A/E will issue clarifications to the contract documents by one of the following means:
   1. Architect's Supplemental Instructions (ASI)
   2. Written response included in the Contractors Request for Information/Interpretation (RFI) form.

B. Clarifications, by definition, do not modify the Owner's Contract Documents.

Note: CSI convention assigns terms Request for Information for use in procurement phase and Request for Interpretation in construction phase. Both terms may be used interchangeably.

1.3 CHANGES

A. CHANGES TO THE CONTRACT DOCUMENTS: Changes subsequent to the Award of Contract will be issued via one of the following means and are valid only when approved by the Owner:
   1. Change Order for changes which modify contract documents (USF-FM does not approve use of Change Directives for USF projects)
   2. Use MPG-Exhibit D (Minor Projects Change Order) form or alternate Change Order form approved by Owner.
   3. Other written means as agreed.

B. Changes made by any other means are invalid unless expressly approved by the Owner in writing, including but not limited to the following:
   1. Annotations by the A/E on submittals and shop drawings
   2. Approval by the A/E of submittals and shop drawings which do not conform with the requirements of the Owner's Contract Documents
   3. Response to a Contractor's Request for Information (RFI)
   4. Field directive or field report
   5. Verbal directive or verbal approval of proposed change
   6. Architect's Supplemental Instruction (ASI)

C. Changes are to be incorporated into the Contractor-maintained jobsite record set and the A/E issued Record Documents.

1.4 PROCESS

A. CONTRACTOR INITIATED CHANGES:
   1. Upon discovery that a clarification or change is needed to proceed with the work, the Contractor is required to submit a Request for Information (RFI) to the A/E. RFIs and attachments are to be submitted as a SINGLE PDF document, via e-mail. Requests for information are to include the following.
      a. Date, Project Name, Project Number, RFI number
      b. Requestor's name
      c. Originating party, if applicable - subcontractor or supplier
      d. Date by when the response is needed to avoid a delay to a critical path task. The RFI must be submitted a minimum of seven (7) calendar days prior to the response-needed date.
      e. Applicable reference details and drawing sheet numbers, specification sections, and/or construction submittals as appropriate to convey the request.
      f. Sketches, photos, and other information as appropriate.
      g. The Contractors proposed solution.
      h. A statement as to whether the Contractor's proposed solution will impact the construction cost or schedule.

2. Design Professional's Action: upon evaluation, the A/E will determine whether the Contractor's proposed solution is acceptable or will issue an alternate solution.
3. In the event that the RFI response involves a change to the Contract, and such change may impact the construction cost or schedule, the A/E will issue the RFI response to the Contractor along with a Proposal Request (PR).

B. OWNER INITIATED:
1. The Owner may elect to change the Work as provided for in the General Conditions of the Construction Agreement, with the Contract sum being adjusted accordingly.
2. Upon request by the Owner, the A/E will issue a Proposal Request to the Contractor to establish the impact of the proposed change, if any, on the Contract sum and project schedule.

1.5 PROPOSAL REQUESTS

A. The Contractor is required to submit a Change Order Proposal within seven (7) calendar days of issuance of a Proposal Request.
B. Change Order Proposals are to include the following minimum information:
1. Summary of costs, broken down into general costs and by trade
2. Detailed breakdown as described in the General Conditions of the Construction Agreement
3. Supporting proposals from subcontractors and suppliers
4. Schedule impact as supported by a schedule showing the effect of the change on critical path tasks

C. Unless the response time is extended by the Owner, the Contractor's failure to provide a proposal within seven (7) calendar days of receipt of a Proposal Request will indicate the Contractor's acceptance of the Design Professional's estimated value of the change.
D. In the event that the Contractor and the Owner do not agree on the cost and/or schedule impact of a proposed change, or when sufficient documentation cannot be provided within seven (7) days, the Owner may issue written direction to implement the change based on the Design Professional's estimate of the cost and/or schedule impact. Upon completion of the work, the Contractor may appeal the value as estimated by the A/E by following the procedures described in the General Conditions of the Construction Agreement.

1.6 CHANGE ORDERS and OWNER CONTINGENCY AUTHORIZATION

A. CHANGE ORDER:
1. The A/E will prepare and issue Change Orders to the Contractor for execution and transmittal to the Owner.
2. In the event that the Contractor fails to execute and transmit the Change Order to the Owner within ten (10) days, the Owner may elect to process the Change Order in accordance with the General Conditions of the Construction Agreement.
3. Change Orders are to include, at a minimum, the following:
a. Description of the change
b. Time extension, if appropriate, associated with the change
c. Back-up documentation for each item.

B. EMERGENCY FIELD CHANGE ORDER:
1. The Owner may direct changes to the Work in the case of an emergency in accordance with the terms of the Construction Agreement. Such Emergency Field Change Orders shall be issued on the Owner's form and will include an estimated adjustment in the Contract Sum and Time to the extent that the adjustment can be estimated at that time.
2. Emergency Field Change Orders are effective immediately upon issuance. The conditions of the Construction Agreement provide for detailed documentation and accounting of costs as the work progresses.
3. Emergency Field Change Orders will be processed by standard Change Order at such time that the final adjustment is determined.

C. OWNER CONTINGENCY AUTHORIZATION:
1. The Owner may issue written authorization to make changes to the Work which will be funded with the Owner Contingency allowance.
2. When the dollar value of a change is based on a not-to-exceed estimate in lieu of a lump

sum proposal, the Contractor is required to provide detailed documentation and accounting of costs upon completion of the work in order to establish the final value. Failure to provide detailed documentation of cost within thirty (30) days after completion of the work indicates that the Contractor will accept the A/E's estimate of the final value.

END OF SECTION 01 26 00

SECTION 01 29 00 PAYMENT PROCEDURES

1.1 SUMMARY

A. This section includes administrative and procedural requirements governing the preparation and processing of Applications for Payment.
B. Payments will be made for work in place and, in some cases, for materials stored on site.
C. Application for Payment: The term as used herein includes the following:
   1. MPG-Exhibit E (Certificate of Contract Progress & Payment) or the latest version OR AIA G702 (Application & Certificate for Payment), when approved by the Owner.
   2. The latest AIA G703 (Schedule of Values) OR alternate form incorporating essential features of AIA G703, when approved by the Owner.
   3. Supporting documentation specified herein.
D. Schedule of Values: A breakdown furnished by the Contractor allocating the Contract Sum to various portions of the Work and used as the basis for reviewing the Contractors Applications for Payment.

1.2 APPLICATIONS FOR PAYMENT

A. Each progressive Application for Payment shall be consistent with previous Applications and shall accurately reflect previous payments. The initial Application for Payment, Application for Payment following Substantial Completion, and the Final Application for Payment invoke additional requirements as specified herein.
B. Submittal Requirements:
   1. Certification Page (MPG-Exhibit E or AIA 702):
      a. Complete every entry on form.
      b. Notarize and execute by a person authorized to sign legal documents on behalf of the Contractor
      c. Entries shall match the data on the Schedule of Values and shall coordinate with the construction schedule where applicable.
      d. Approved Change Orders shall be shown and accounted for. Pending and proposed change orders are **not** to be shown and, if shown, will delay processing.
   2. Supporting documentation:
      a. Schedule of Values, as described in detail elsewhere in this Section.
      b. For materials stored on site: proof of bonded and insured storage facility; and inspection report from the A/E verifying material, quantity, and proper protection of the materials for which payment is requested. The contractor is required to pay all costs for inspection and verification of stored materials.
      c. Subcontractor pay applications.
      d. Updated construction schedule in the format specified in these documents.
      e. Other supporting documents as listed below and as may be reasonably required by the A/E or Owner.
   3. Submit a complete and notarized copy of each Pay Application and back up documentation to the A/E.
C. Retainage shall be held and released in accordance with the General Conditions of the Contractor's Agreement. Failure by the Contractor to properly account for retainage may result in delayed processing of the Application for Payment. In the event of over-billing, the corrective adjustment is to be made on the Pay Application immediately following.
   1. Retainage will be maintained at 5% of contract value placed.
   2. Contractor may request reduction of retainage at 50% construction progress. Approval is at sole Owner discretion; and shall not unreasonably deny reduction of retainage.
D. Initial Application for Payment: In addition to the above requirements, include the following:
   1. List of subcontractors
   2. Construction schedule in the format required in these Contract Documents
   3. Schedule for Submittals
E. Application for Payment following Substantial Completion: In addition to the above supporting documentation, submit an accounting statement itemizing all changes to the Contract Sum.

F. Final Application for Payment: include the following:
   1. Updated schedule of values showing all approved changes to the Contract Sum.
   2. Written notice signed by the A/E verifying that all contractual obligations have been satisfied, including but not limited to completion of work on site and satisfaction of close out requirements.
   3. Final Consent of Surety, when required by these documents.
   4. Final and Unconditional Subcontractor releases, when required by these documents.
   5. Evidence that all claims have been settled.

   Note: in the event that the Final Application for Payment is received by the Owner before all project close out requirements have been met, including receipt of acceptable close out documents, the Pay Application will be returned without action.

1.3 SCHEDULE OF VALUES - FORMAT AND CONTENT

A. AIA G703 or alternate, approved Schedule of Values:
   1. Project Name and Project Number
   2. Name of Design Professional
   3. Name of Contractor
   4. Date of Submittal
   5. Date range covered by the Application for Payment

B. Break down costs as follows:
   1. FOR CM PROJECTS:
      a. Provide a subcontract-based schedule of values showing the actual approved subcontract value with detailed breakdown. Itemize sub-change orders and their funding source as the work progresses. Request specific format requirements from the USF-PM.
      b. List the buy-out balance (unawarded GMP dollars) as a lump sum balance, which will diminish as subcontracts are awarded.
      c. List the Owner and Contractor contingency each as a line item, showing an itemized accounting of expenditures from each account.
      d. List the General Conditions Staff cost as a single line item.
      e. List the approved CM fee as a single line item.
      f. List Reimbursable items individually
      g. List mobilization, bond cost and similar items s individual line items
      h. Provide back up for each item invoiced, in the form of invoices, subcontractor pay applications, etc.
   2. FOR ALL OTHER PROJECTS:
      a. Use the Project Manual table of contents as a guide to establish the line items for the Schedule of Values. Provide a section on the Schedule of Values for each specification section or subcontract.
      b. Further break down each section into specific items of work which may not progress concurrently and for which progress payments will be requested.
      c. Each item in the Schedule of Values shall be complete, including a proportionate share of general costs for each item, such as supervision, overhead, profit, and other general costs.

      Note: general cost items are to be shown as separate line items in the schedule of values when those items will be invoiced separately, such as costs for temporary facilities and surety bonds.

C. Each section of the Schedule of values is to show the following minimum level of breakdown to the extent that these apply to the specific item:
   1. Mobilization
   2. Cost of producing engineered signed/sealed drawings and calculations, when required by these specifications (delegated design)
   3. Materials
   4. Labor
   5. Equipment rental

6. Change Orders and directives

D. Round off amounts to whole dollars before entering amounts into the Schedule of Values and before calculating the total. Do not enter and then hide cents. The total of the displayed scheduled values shall equal the Contract Sum.
E. In addition to work completed during the period covered by the Pay Application, show as completed any work invoiced under previous pay applications, whether payment has been received or not.
F. Invoice only for work completed as of the end date of the Application for Payment period.
G. Show all approved Change Orders and directives issued before the end date of the Application for Payment period, whether these are being invoiced or not. Do not show proposed or pending change orders on the pay application as processing will be delayed.
H. Provide a separate line item in the Schedule of Values for each allowance; and itemize each approved adjustment to each allowance.
I. Record change orders and directives on the next Schedule of Values following issuance of the change order or directive.

1.4 SUBMITTAL TO DESIGN PROFESSIONAL:

A. Schedule a meeting time to review the work in place with the A/E, concurrently with reviewing the application for payment.
B. In accordance with the Architect/Engineer's Agreement with the Owner, after appropriate observation of the progress of the work, the A/E shall certify to the Owner the amount due and shall forward the Application for Payment and supporting documents to the Owner for processing. If the A/E is unable to certify all or portions of the amount requested due to the absence or lack of supporting evidence, the A/E shall advise the Contractor of the deficiency. If the deficiency is not corrected at the end of three (3) days, the A/E may either certify the remaining properly supported amounts to which the Contractor is entitled, or return the application for payment to the Contractor for revision along with a written explanation.
C. Payments may be withheld or reduced for reasons cited in the General Conditions of the Contractor's Agreement.
D. The A/E will take appropriate action to process the Pay Application within seven (7) days of receipt.

1.5 PROCESSING OF PAYMENTS:

The Owner will process and release amounts due within thirty (30) days after receipt of the certified Pay Application.

END OF SECTION 01 29 00

SECTION 01 31 19 PROJECT MEETINGS

1.1 PRE-CONSTRUCTION MEETING

The Contractor shall schedule the preconstruction meeting and shall furnish an agenda to the invitees in advance of the scheduled meeting. The meeting will be attended by the USF-PM, A/E, Contractor, and selected subcontractors as identified by the Contractor. Other attendees may include representatives of the User Group (UG), USF facilities staff, and Owner direct contracted vendors and contractors. Among items to be discussed are provisions specified in this division of the specifications.

1.2 PROGRESS MEETING

The Contractor shall schedule a weekly progress meeting with the A/E and the USF-PM and shall furnish an agenda for each meeting. Meetings shall be held on the same day and hour of the week for the duration of the construction period. Notes shall be taken by the Contractor on discussions and decisions made at each meeting. The Contractor shall distribute typed copies of the Meeting Minutes to the USF-PM and attendees.

END OF SECTION 01 31 19

SECTION 01 32 00 SUBMITTALS & DOCUMENTATION

1.1 CONSTRUCTION SCHEDULE SUBMITTAL

Immediately following contract award, the Contractor shall prepare and distribute a construction schedule covering all divisions of the work. The schedule shall be broken down in sufficient detail to allow proper coordination of all trades in each division of the work.

1.2 PRE-CONSTRUCTION PHOTOGRAPHS

A. The Contractor is required to thoroughly document existing conditions in the area of work prior to starting demolition or new construction and renovation activities. Digital images shall be identified with project name, date taken, and exact location or direction of view. Photographs are to be submitted electronically to the USF-PM and Design Professional.
B. Contractor is to photograph existing damage within the construction area, such as cracked sidewalks, marred finishes, discolored surfaces and the like. Contractor will be responsible to correct damage, which is discovered upon completion of the project, if such damage could have reasonably resulted from construction activities, if such damage was not properly documented prior to starting work.

1.3 SUBMITTALS AND SAMPLES

A. Submittals and samples are to be provided as specified in individual sections.
B. The Contractor is required to review submittals of subcontractors and to indicate corrections by hand-marking the documents. Contractor's review stamp is to be provided on the cover page of the submittal.
C. Submittals are to be sent via e-mail in .pdf format to the A/E and are to include a cover sheet provided by the Design Professional.
D. The Contractor will log submittals and will distribute copies of the updated submittal log at each Owner/Architect/Contractor (OAC) meeting for review. Log is to show each submittal and re-submittal and the dates received and sent.
E. The A/E will review and act on submittals within seven (7) days of receipt. In the event that the A/E requests additional information or clarification, the 7-day review period restarts when sufficient information is received by the A/E. Such additional information and clarifications are to be provided in writing.
F. Samples for the selection of colors and textures are to be provided in the size and color/texture range indicated in the individual sections. If color range is not specified, Contractor is to provide samples in the full range of available colors/textures.
G. Samples for ornamental work which include custom artwork or design work: the design and all associated rights shall become the property of USF after the ornamental work has been installed.

1.4 CERTIFICATION REQUIRED FROM SUPPLIERS AND INSTALLERS

To assure quality materials and workmanship, the Contractor is to provide Certifications, Test Reports, and other information as specified in the USF standard Division 1, in addition to such documents as may be specified within individual sections of this Project Manual.

END OF SECTION 01 32 00

SECTION 01 35 00 HAZARDOUS MATERIALS

1.1 Known hazardous materials have been identified in a report provided with these Construction Documents. When such materials will be disturbed by the work of the contract, USF will undertake abatement in advance of the start of work.

1.2 The Contractor shall notify the USF-PM immediately upon discovery of suspected hazardous materials within the construction area such as asbestos, mercury, flammable fuels, explosive chemicals, etc. Refer to the USF Environmental Health and Safety (USF-EHS) standards.

1.3 For suspect materials encountered during construction, the Contractor may be required to retain the services of qualified testing agencies to identify hazards and recommend appropriate action. Such testing services, if required, will be provided under a change order.

END OF SECTION 01 35 00

SECTION 01 35 53 SECURITY PROCEDURES

1.1 SECURITY

A. UNIVERSITY POLICE DEPARTMENT: Any construction site located on any of the University of South Florida campuses fall under the jurisdiction of the USF Police Department (USF-UPD) Any incident requiring police service should be reported immediately to the USF-UPD or 911 (for emergencies).

USF-UPD non-emergency phone numbers	
Tampa Campus	(813) 974-2628
St Petersburg Campus	(727) 873-4444
Sarasota Manatee Campus	(941) 487-4210

1. USF-UPD officers are state certified law enforcement officers and as such are authorized to take appropriate search actions as may be dictated by the specific probable cause and necessary in the judgment of the officer.
2. The University may seize items that may pose a danger to the safety and security of faculty, staff, or students.

B. CONSTRUCTION SITE SECURITY: Contractor shall be responsible for jobsite security. Contractor shall supply all locks and chains. USF may provide one USF Master Lock for accessibility.
1. Restrict the access of all persons entering the construction area to the agreed upon access route and to the actual site of the Work.
2. Restrict activities of workers to authorized areas. Workers shall not mingle in student or public areas.
3. Provide USF-PM with keys to all construction gates and building entrances.
4. Post project contact list, to include 24-hour telephone numbers, for all key project staff members. Post list at major access points to the project site(s) and outside at the project office. Update as necessary.

END OF SECTION 01 35 53

SECTION 01 41 00 BUILDING CODE ADMINISTRATION & REGULATORY REQUIREMENTS

1.1 CODES AND REGULATIONS

A. Representative Regulatory Requirements that are commonly used for USF projects are listed below. This list is not to be considered all-inclusive of codes and regulations that may apply. The Contractor shall comply with all pertinent codes, standards, regulations and laws.

1. Current edition of the Florida Building Codes in effect at time of permitting.
2. Current editions Florida Fire Prevention Code in effect at time of permitting.
3. Florida Elevator Safety Code, As currently adopted
4. State Trench Safety Act, F.S. 553.60-64.
5. OSHA Regulations (Title 29, Code of Federal Regulations).

B. The University of South Florida is a member of Sunshine State One-Call of Florida, Inc. (SSOCOF), Sunshine 811. All excavation work shall be preceded by contacting Sunshine 811, 48-hours prior to actual excavation work. Comply with F.S. Chapter 556, Underground Facility Damage Prevention and Safety Act.

C. University of South Florida, Facilities Management-Operations (FM-OPS) responds to "Dig Permit" requests. Contact FM-OPS for approval and coordination of all utilities locate, outages and tine-in.

1.2 USF BUILDING CODE ADMINISTRATION PROGRAM

A. PURPOSE: The purpose of this Program is to implement Building Code Administration for the University of South Florida Capital Improvement Program. Such regulated practice of building code compliance is necessary, in the interest of public health and safety, which shall be provided through compliance of all adopted codes and standards. The Program is administered by the Building Code Administrator (BCA) through documents reviews and construction inspections.

B. AUTHORITY: USF Building Code Administration Program is established under USF Policy 6-019, USF Building Code Administration Program, as required by Florida Statues and Board of Governors Regulation.

C. POLICY: Florida law and regulations require that all new buildings constructed and modifications to existing buildings be reviewed and inspected for compliance with adopted codes and standards. The policy requires that all Contractors undertaking construction, repair, or renovations/remodeling obtain a building permit. Permitted work requires inspection and certification for occupancy or re-occupancy.

D. PROCESS

1. The A/E prepares construction documents in accordance with applicable Codes.
2. The BCA reviews such documents for code compliance and returns written comments, if any, within twenty-one (21) days.
3. The Contractor submits an application for a building permit, with the proper fee.
4. The BCA reviews the application and issues a Permit, if all application is complete.
6. The Contractor requests and the BCA performs code inspections. The Contractor is required to be present at code inspections.
7. When construction is substantially complete, as determined by the USF-PM and A/E, Contractor will request a final code inspection. Within 48 hours of receipt of the inspection request, the BCA will inspect the work. Immediately upon inspecting, the Inspector will inform the USF-PM of any work that remains to be corrected prior to occupancy or re-occupancy of the construction area.

E. RESPONSIBILITIES

1. A construction Permit must be issued by the BCA prior to start of any construction activity. Only the BCA has the authority to determine whether the scope of work requires a Permit. Only the BCA has the authority to authorize the early start of work pending the issue of a Permit. The BCA issues the Permit directly to the Contractor.
2. Prior to start of any construction activity, including, but not limited to; site development, site fencing, demolition, wall construction etc., an application for Permit must be made by the

Contractor to the Building Code Administration office.

3. Upon receipt of a Notice to Proceed or Purchase Order the Contractor is solely responsible to ascertain the status of the Permit application. Work on site shall not begin until the Permit or authorization to start work in advance of the Permit has been issued by the BCA.
4. The Contractor is required to apply for and pay the Permit fee prior to issuance of the permit. The BCA has the authority to approve the start of Work prior to issuance of a permit; however, under no circumstances can Work begin on site without the application for permit and approval of the BCA to start the Work.
5. The BCA may levy a fine of double the application fee when Work is started without approval of the BCA.

END OF SECTION 01 41 00

SECTION 01 45 0 QUALITY CONTROL

1.1 CONSTRUCTION DOCUMENTS - CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with more than one standard is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the greater quantity or more stringent standard of quality. When the requirements of standards differ, but otherwise appear to be equivalent, defer to the A/E for a decision before proceeding with the Work.

B. Specified Requirements: If the plans and specifications cite different or conflicting requirements for minimum quantities or quality levels, comply with the greater quantity or more stringent standard of quality. When the requirements of the documents differ, but otherwise appear to be equivalent, defer to the A/E for a decision before proceeding with the Work.

1.2 REPORTS AND DOCUMENTS

A. Where specified: Manufacturer's Technical Representative's Field Reports shall include the following:
   1. Name, address and telephone number of the technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.

B. Other required items indicated in individual Specification Sections.

1.3 QUALITY ASSURANCE

A. Qualifications below establish the minimum qualification levels required. Additional requirements are specified in individual Specification Sections.
   1. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
   2. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
   3. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections.

1.4 QUALITY CONTROL

A. Owner Responsibilities: Where testing services and inspection services are specifically indicated as the Owner's responsibility, Owner will engage a qualified testing agency or third-party inspector to perform these services.
   1. Owner will furnish Contractor with contact information for the testing agencies and inspection provider.
   2. The Contractor is responsible to coordinate directly with the Owner to schedule testing and inspections. Payment for these services will be made by the Owner.
   3. Costs for retesting and reinspection of construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Design Professional Responsibilities: basic services include the following:
   1. Design Professional and each sub-consultant shall observe the Work at appropriate intervals and shall exercise due diligence to safeguard the Owner’s interests.
   2. Work shall be inspected by the design professional before it is covered up.
   3. Design Professional shall distribute field reports to the Owner and Contractor within seven

(7) days of each observation. Field Reports will note defects, deficiencies, noncompliance with the Contract Documents and/or unsatisfactory workmanship.

C. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Testing: Where testing services are specified, engage a qualified testing agency to perform these services.
   2. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
   3. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work, including participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installation, inspection of completed Work, and reporting.
   4. Retesting/Reinspection: Provide and pay for retesting and reinspection for construction that replaced Work which failed to comply with the Contract Documents.
   5. Testing Agency Responsibilities:
      a. Notify A/E and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
      b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
      c. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
      d. Submit a certified written report of each test, inspection, and similar quality-control service through Contractor.
      e. The Testing Agency may not: release, revoke, alter, or increase the requirements of the Contract, or approve/accept any portion of the Work.
      f. Do not perform any duties of Contractor.
   6. Coordination: Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1.5 TESTING AND INSPECTION LOG

Testing and Inspection Log: Prepare and maintain a record of tests and inspections. Provide access to testing and inspection log for Architect's reference.

1.6 REPAIR AND PROTECTION

General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control

1.7 SERVICES BY INDEPENDENT SPECIALIST AGENCIES

Unless expressly exempted by the USF-FM, including but not limited to the following services, shall be performed by qualified independent testing agencies:

A. Soils compaction tests.
B. Concrete and grout sampling and tests.
C. Weld Testing
D. HVAC Systems testing
E. Testing and Certification of communications systems.
F. Testing of signaling systems.
G. Testing of fire protection equipment and alarm system.

END OF SECTION 01 45 00

SECTION 01 51 00 TEMPORARY UTILITIES, CONTROLS, FACILITIES & SIGNAGE

1.1 TEMPORARY UTILITIES

A. General: Contractors is required to arrange, coordinate for and pay for all temporary utilities required for execution of the work.
B. Utility Company Installations: The Contractor is required to submit the proposed routing for temporary utilities to the A/E and USF-PM for review and approval.
C. Connection to Existing Utilities: If connections to University utilities are permitted, the A/E shall obtain drawings of existing utilities and shall consult the USF-PM regarding services available and points of connections to services. All services shall be metered through meters furnished by the contractors and the University shall be reimbursed for water, fuel, chilled and hot water, and power consumed.
D. Duration of Services: The Contractor is responsible for providing continuous utility services until date of Substantial Completion, including operation of permanent equipment and services.

1.2 NOISE AND DUST CONTROL:

A. Erect barriers as needed to contain fumes and dust to the construction area.
B. See Work Restrictions section for requirements related to disruptive activities.
C. Install adequate filters to prevent distribution of dust if HVAC systems are used during construction.

1.3 WATER AND MOISTURE CONTROL

The Contractor shall:

A. Prevent water intrusion and condensation in the building during construction. If water intrusion does occur, the Contractor shall take steps to immediately remove water/moisture and to prevent reoccurrence, including dehumidification.
B. Prevent entrapment of moisture with construction materials and components of construction.
C. Remove porous materials which are damaged due to water/moisture prior to growth of mold.
D. Respond immediately to conditions that provide a suitable environment for the growth of mold.
E. When dry-out operations are performed and the affected materials remain in place, the Contractor is to arrange and pay for periodic inspections by a qualified consultant as recommended by the USF-EHS Department. If mold is observed, the contractor shall be responsible to retain a qualified agency to treat mold. Treatment can include application of an agent, encapsulation and/or removal of material, suspect or damaged.

1.4 SITE DRAINAGE

The Contractor shall provide temporary drainage trenches, drains, sumps, pumps, or other items required to afford satisfactory working conditions for the execution and completion of the work of all contractors and to protect all work. Water shall be diverted to or shall be pumped from the work areas without causing a nuisance to surrounding areas or potential regulatory non-compliance.

1.5 FIELD OFFICES AND OTHER TEMPORARY STRUCTURES:

A. Field Offices, when required, shall be provided and maintained by the Contractor in a clean, weathertight condition. All expenses shall be borne by the contractor.
B. Temporary storage facilities, when required: Contractor shall provide suitable weather tight storage units 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 shall be confined to the areas within the construction fence and not under the canopies of trees.
C. Construction Stairs: Scaffold stairs are to be provided by the Contractor for projects requiring roof access except when a roof hatch is available.

1.6 TEMPORARY BARRIERS AND FENCING

A. Barriers for Excavation of Utilities: 40-inch high mesh safety fencing, on 2x4 posts, a minimum of 48-inches from excavation. Caution tape alone is not acceptable. Provide 2x4 top rail where excavations/trenches cross or run adjacent to pedestrian/bicycle pathways.

B. Construction Fence: Provide 6 feet high chain link fence around the construction site and around staging/storage areas. Fence location shall be as shown on the construction drawings or as approved by the Owner. Refer to the Work Restrictions & Scheduling section for approved locations for staging/storage.
   1. Provide green wind screen.
   2. Turn fence fabric so that barbed edge is at bottom. Turn wire ties so that cut ends face inward, towards the construction area.
   3. Provide "No Trespassing" signs, which meet OSHA requirements, shall be specified.
   4. Leave fence in place until the project or phase has achieved Substantial Acceptance.

C. Tree Barricades: Provide 40-inch high mesh safety fencing, on 2x4 posts and top rail, at canopy drip line. At his own expense, the Contractor will be required to replace safety fencing with wood post and rail barricade if construction activities occur within the drip line of the canopy.

1.7 TEMPORARY SECURITY MEASURES

A. Building Security: During construction, one exterior door of any enclosed structure shall be provided with a lockset with security core. The Contractor shall obtain security core from and return same to the USF-PM.

B. Gates and Temporary Doors: gates and temporary doors into the Construction Area shall always be kept locked by the Contractor. All gates and temporary doors shall be double locked with a USF security padlock and the contractor's padlock in a manner that will allow access by unlocking either padlock.

1.8 TEMPORARY SIGNAGE

The following signs are to be provided on the outside perimeter of the construction area:

A. Traffic Signs: See Section 015500 Vehicular Access, Parking and Traffic.
B. No Trespassing Signs
C. Contractor Safety Signs: When required, OSHA, NFPA, and DOT safety signs.
D. Construction Site Entry Sign: the name of the Contractor & emergency phone number in letters no larger than 6 inches height, and the words: "Construction Entry".

END OF SECTION 01 51 00

SECTION 01 55 00 VEHICULAR ACCESS, PARKING, & TRAFFIC CONTROL

1.1 ACCESS TO WORK SITE

Refer to the Section 011400 Work Restrictions & Scheduling. Existing parking lots, driveways and roads may be used for construction access and staging with advance approval and permitting.

1.2 PROTECTION AND RESTORATION OF USF TRANSPORTATION FACILTIIES

A. Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the project site(s). Record and provide photographic documentation of existing conditions prior to mobilization. Repair damaged areas to like-new condition or replace damaged section from joint to joint at no cost to the Owner.
B. Contractor is required to remove mud and spillage from paved areas without delay. Failure to clean pavement promptly could result in streets being cleaned by the University or other public agency at the Contractor's expense.
C. Damage to roads, sidewalks, parking lots, lawns, or other facilities on University property, resulting from hauling, storage of materials, or other activities in connection with the work, shall be repaired or replaced, at no expense to the University, by the Contractor causing the damage. Repairs or replacement shall be made to the satisfaction of the University unit responsible for maintenance of the damaged item (i.e., USF Parking and Transportation Services (USF-PATS) for parking lots).

1.3 CONSTRUCTION PARKING

A. Parking permits are required for all personnel and business vehicles.
B. Do not permit such vehicles to park on any street or other area of the University's property except in the area(s) so designated by the USF-PM and as approved by the USF-PATS.
C. Secure all required Parking Decals and/or permits as required by the USF-PATS.
D. No off-site parking will be provided as part of this contract, except as provided by permit in designated University parking areas.

1.4 TRAFFIC

A. Maintenance of Traffic Flow
   1. Planning: The USF-UPD must be notified at least two (2) weeks in advance of any work which will affect traffic flow. The Contractor is required to coordinate a field inspection with the A/E, the USF-PM, and the Contractor's field staff prior to performing any work which would affect normal traffic patterns.
   2. Any proposed plan for rerouting of traffic shall be approved by the USF-UPD and the USF-PM.
B. Interruption of Traffic Flow: The Contractor whose work requires interruption of traffic, is required to post signs in all affected areas, in sufficient numbers and with appropriate messages, to warn motorists entering the construction zone. Contractor must make special consideration to accommodate USF's students, staff, and faculty with disabilities. Temporary signs shall comply with the standards of the Florida Department of Transportation. Temporary lanes shall be well marked, and obstructions, barriers, lane changes, or detours shall be indicated by appropriate signage at each point of potential confusion, as well as at each change in direction of a temporary route. USF-UPD shall be notified in advance of the anticipated time of return to normal traffic patterns. Upon completion of construction affecting streets or traffic flow, but before temporary control devices and lane markings are removed, the area shall be restored to receive traffic in the normal pattern. The USF-UPD shall be notified of the actual time of completion of restoration.
C. Provisions for Special Duty Police Officers: If it is evident that traffic will become hazardous or restricted in any manner, uniformed special duty police officers must be provided by and at the contractor's expense. Such services must be requested at least two (2) weeks in advance.

END OF SECTION 01 55 00

SECTION 01 78 00 CLOSE OUT & INSPECTION PROCEDURES

1.1 SECTION INCLUDES:

Substantial Completion and Occupancy procedures Final Completion procedures
Final cleaning procedures
Close Out Documents and procedures

1.2 RELATED REQUIREMENTS:

A. Refer to Section 014100 Building Code Administration & Regulatory Requirements for Code Inspection Procedures.
B. Refer to the Construction Contract Terms and Conditions for general requirements related to Contract Close Out.
C. Refer to individual sections for specific requirements related to Contract Close Out.
D. Refer to individual sections for additional requirements, such as extra stock requirements.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

To achieve Substantial Completion status, the Project must be complete and useable for its intended purpose, including fully functioning mechanical, electrical, plumbing, communication, and other systems. Each component and system must be complete to the extent which will allow the Contractor and A/E to generate a list of specific deficiencies (Punch List).

A. Substantial Completion Inspection:
   1. Pre-Inspection Tasks: prior to requesting the Substantial Completion Inspection, complete the following, as applicable:
      a. Startup and testing of systems and equipment
      b. Replacement of lamps and HVAC filters used during construction
      c. Removal of temporary facilities and temporary utilities from the jobsite
      d. Final cleaning
      e. Touchup painting
   2. Submittals: A minimum of five (5) business days prior to the requested Substantial Completion Inspection date, submit the following to the Design Professional:
      a. Statement that work is complete, and request for inspection
      b. Contractor's Punch List, as described in this Section
      c. Water system bacteriological test result, if applicable
      d. Fire alarm system certification, if applicable
   3. Scheduling:
      a. Upon receipt of the above, the A/E will either notify the Owner that the Project, in their professional opinion, is ready for inspection or will advise the Contractor of unfulfilled requirements.
      b. When the Project is deemed ready for inspection, the A/E and Contractor will agree on a mutually acceptable date and time for the inspection and will notify the USF-PM a minimum of seven (7) days prior to the inspection date.
      c. The appropriate Subcontractors, as determined by the General Contractor, shall be present at the Substantial Completion inspection to demonstrate operation of systems to A/E and Owner.
      d. In the event that the Contractor has not met the requirements to achieve Substantial Completion status, reinspection is to be requested in accordance with the same procedures described above. Costs associated with reinspection will be borne by the Contractor.

B. Substantial Completion Acceptance:
   1. When the A/E has determined that the Work is Substantially Complete and that the Project is ready for occupancy, the A/E will issue the Certificate of Substantial Completion with Punch List attached and Certificate of Occupancy.

      Note: should any systems or areas of the Project be excluded from the Acceptance, those systems/areas shall be clearly noted on the Certificate and on the Punch List as "excluded". It is the responsibility of the A/E to ensure that those systems/areas are

inspected following the same procedures above and documented on a separate Certificate of Substantial Completion prior to issuance of the Certificate of Final Inspection.

2. Owner Occupancy: Beginning at Substantial Completion, the Owner will occupy and use the completed areas and access will be controlled by USF Staff. The Contractor is required to schedule punch list work so as to avoid disrupting Owner's operations.

C. Contractor's Punch List:
   1. The Contractor's Punch List is to encompass the entire project including but not limited to: new construction, remodeled and renovated areas, exterior building work, sitework, and close out requirements.
   2. Areas, systems and components of the Work which are incomplete are to be simply noted as "not ready" to call attention to the fact that a separate inspection is required when the item is complete.
   3. Organization and format of Contractor's Punch List:
      a. Submit Punch List to the A/E in MS Excel format.
      b. List items under their respective room numbers, and list each area affected by construction, including exterior areas. Describe each item needing correction in sufficient detail. If necessary, list areas disturbed by construction operations that are outside the limits of construction.

D. Beneficial Occupancy: The Owner reserves the right to occupy completed areas of the project prior to Substantial Completion, provided that such occupancy does not interfere with completion of the work. Such occupancy shall not constitute acceptance of the work.

1.4 FINAL COMPLETION PROCEDURES

To achieve Final Completion status, all contractual obligations must be 100% complete, including the submittal of Close Out Documents and resolution of accounting issues.

A. Final Completion Inspection
   1. Prior to the requested Final Completion Inspection date, the Contractor is required to submit the following:
      a. Statement that all work on site is complete.
      b. Close Out Documents.
      c. Specified extra stock materials.
   2. Scheduling:
      a. Upon receipt of the above, the A/E will either notify the Owner that the Project, in their professional opinion, is ready for inspection or will advise the Contractor of unfulfilled requirements.
      b. When the Project is deemed ready for inspection, the A/E and Contractor will agree on a mutually acceptable date and time for the inspection and will notify the Facilities Operations representative a minimum of seven (7) days prior to the inspection date.
      c. In the event the Contractor has not met the requirements to achieve Final Completion status, reinspection is to be requested in accordance with the same procedures described above. Costs associated with reinspection will be borne by the Contractor.
   3. Close Out Documents:
      a. Submit the documents and perform the related tasks listed on the attached standard Close Out Document Checklist.
      b. Review the individual specification sections carefully and submit any additional Project-specific Close Out documents and extra stock, and perform any additional Owner Training, whether listed or not on the attached Close Out Document standard checklist.

B. Final Completion Acceptance: When the A/E has determined that the work has achieved Final Completion status, the A/E will issue the Certificate of Final Inspection within seven (7) days of the Final Completion Inspection date.

1.5 FINAL CLEANING

A. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance

program. Comply with manufacturer's written instructions.

B. Complete the following cleaning operations before requesting inspection for Substantial Completion for entire Project or for a designated portion of the Project.
   1. Clean Project grounds in areas disturbed by construction activities, including landscape areas, of rubbish, waste material, litter, and other foreign substances.
   2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
   3. Use magnetic sweeper to remove all construction debris from grounds. Do not install sod and do not release paved areas to the Owner until all areas have been cleaned. Call for inspection of fine graded and raked areas prior to installing sod.
   4. Clean exposed exterior and interior hard-surfaced finishes to be free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   5. Clean concrete and masonry surfaces of excess mortar, grout, and splatter. Final appearance is to show no evidence of stains or the cleaning process.
   6. Clean metal railings, flashings and trim work affected by construction. Final appearance is to be like-new.
   7. Sweep concrete floors broom clean in unoccupied spaces.
   8. Vacuum floors, removing debris. Clean in accordance with manufacturer's instructions to restore finishes damaged by construction.
   9. Clean transparent materials streak-free, including mirrors. Remove glazing compounds and other noticeable, vision-obscuring materials.
   10. Remove labels that are not permanent.
   11. Wipe surfaces of mechanical and electrical equipment and similar equipment.
   12. Clean plumbing fixtures to a sanitary condition, free of stains.
   13. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   14. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

1.6 CLOSE OUT DOCUMENTS

A. Closeout Responsibilities & Submittal Requirements:
   1. Contractor's Responsibilities: The Contractor shall maintain at the construction site a set of printed Construction Documents (drawings and specifications) for the purpose of documenting, with a red pencil or red ink pen, any variances from the construction documents. At the completion of construction, the Contractor's printed red-lined documents shall be submitted to the A/E.
   2. Design Professional's Responsibilities: After final acceptance of the project, the A/E shall revise the Construction Drawings and Specifications to accurately record all changes noted in the Contractor's red-lined set, all addenda, all executed alternates, all options selected, and any other change to the original documents. Such revised set of construction documents shall be known and noted as the "RECORD DOCUMENTS" (drawings and specifications).
   3. Submit Record Documents to the USF-PM in .pdf format for review and approval. If any changes were not properly recorded, the Consultant will make the corrections and submit a final set of Record Documents, as follows: One set of prints (drawings and specifications), and electronic files (CAD drawings and specifications in .dwg and .pdf files). Note that Specifications shall be also modified by accurately recording any changes and selections made during construction.

B. Operation and Maintenance Manuals:
   1. Requirements for O&M Data is stipulated in the appropriate sections of the specifications. The items listed in the attached checklist are to be provided in .pdf format, unless otherwise noted, to the USF-PM in order to achieve Final Completion status.
   2. Format: Manuals shall consist of manufacturers' operation instructions and maintenance data, shop drawings or catalog cuts, and other data listed herein; all bound into a single BOOKMARKED .pdf document for EACH ITEM for which an O&M Manual is specified to be provided. Material shall be assembled as follows:
      a. Page 1: Project Name, Name of Contractor, Name of Installer, and Name of

Manufacturer.

b. Page 2: Table of Contents
c. Page 3: Overall description of the equipment or system
d. Written description of system contents, where equipment is located in building, how each part functions individually and how system works as a whole, concluded with a list of items requiring service and the service needed or reference to the manufacturer's data in the binder which describes proper service.
e. A copy of each shop drawing, stamped by the A/E.
f. Manufacturer's operating instructions with an index at the beginning of the section.
g. A list of all equipment incorporated into job, supplier's name and address.
h. Appendix: Close Out Document Checklist.

END OF SECTION 01 78 00

DIVISION 01 GENERAL REQUIREMENTS (MINOR PROJECTS)
APPENDIX: CONTRACTOR'S CLOSE-OUT DOCUMENT CHECKLIST

CONTRACTOR'S CLOSE-OUT DOCUMENTS
The Contractor is required to submit a .pdf copy of the documents listed below to the A/E. Complete documents must be submitted to achieve Final Completion status. The A/E will review and compile a list of deficiencies, if any, and forward the documents to the USF-PM for review.

A Prior to SUBSTENTIAL COMPLETION Contractor to submit the following to the A/E:

	Item	
	Red-lined field drawings, project manual for Design Professional's use in preparing Record Document	
	Fire Alarm Certification	
	Water system bacteriological test results	
	As-built survey, if applicable, signed / sealed in .dwg and .pdf files	

B Prior to FINAL COMPLETION Contractor to submit the following to the A/E:

	Item	
	Light Fixture list, including manufacturer name and model #	
	List of subcontractors including telephone numbers and contact names	
	Receipt showing quantities of the specified extra stock materials, signed by recipient	
	Test and Balance Report with Design Professional's approval letter	
	Updated Sequence of Operations if HVAC system is modified.	
	Updated UL Master Label if lightning protection system is modified.	

Warranties, Test Results and Certifications:

	Roof Bond with **building number(s) printed,** commencing on the date of Substantial Completion	
	Specified extended warranties, dated to commence at Substantial Completion	
	Others as specified (list:)	

Operation and Maintenance Manuals

	Electrical systems, including switchgear, panelboards, surge suppression, etc.	
	HVAC equipment	
	Other equipment as specified (list:)	

Accounting Data:

	For Bonded Projects: Original Consent of Surety to final payment	
	Documentation of cost of changes implemented on a not-to-exceed basis, if not previously submitted	
	For CM Projects – complete accounting of project costs, with required back-up.	

C A/E CLOSE-OUT DOCUMENTS Listed here for convenience.

Record Drawings in .**pdf and .dwg** format, meeting USF CAD standards	
Submittals and shop drawings with Design Professional's approval stamp	
Requests for Information (RFIs) issued by the Contractor, including attachments	
Certificate of Substantial Completion (AIA version)	
Certificate of Contract Completion (USF version)	

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 02 EXISTING CONDITIONS

DIVISION 02 EXISTING CONDITION
SECTION 02 00 00 GENERAL PROVISIONS 2
SECTION 02 06 00 SUBSURFACE INVESTIGATION 4

SECTION 02 00 00 GENERAL PROVISIONS

1.1 SITE DEFINITION

A. It is extremely important that the site limits be clearly understood and well delineated on the site plans. It is the intent that these limits be fenced during construction and that all construction activities be conducted therein. In defining the site limits, the Architect/Engineer (A/E) is to consult with the USF Project Manager (USF-PM) and USF Facilities Management (USF-FM) office/staff to ensure that not only programmatic needs will be met but that the entire site development will be in context with the University's Campus Master Plan framework for land use, open space, circulation, parking, the ongoing removal of barriers in compliance with Americans with Disabilities Act of 1990 as amended by the Americans with Disabilities Act Amendments of 2008, and building placement. Staging areas are to be defined and contained within the site limits if at all possible. The site's current integration with the existing campus is also to be evaluated so adjustments to pedestrian and vehicular circulation patterns can be well planned to mitigate any negative impacts after the site is fenced.

1.2 SITE SURVEYS

A. A site-specific topographic and utility survey of the property shall be conducted. Limits shall be the full extent of the site and beyond the site limits as necessary to ensure that the site design will fully and completely integrate with the existing surroundings. The A/E is to define the specific requirements needed for this effort, direct, and provide the site survey as an additional service to his contract services. The survey shall be prepared in accordance with 'The Florida Standards of Practice for Surveying and Mapping' and shall be signed and sealed by a Professional Land Surveyor (PLS) licensed in the State of Florida. The survey shall be based on the North American Vertical Datum (NAVD) of 1988, establish a minimum of two controlling benchmarks for the project, and be made a part of the Construction Documents. All surveys shall be conducted on a 25 foot grid or smaller and contain contour lines to adequately depict the nuances of the site topography. The survey should also field verify of the location and depth of the existing utility systems using nondestructive subsurface investigative techniques as necessary.

1.3 ACCESS

A. Points of ingress/egress shall be determined for the project site. Consideration should be given to minimizing the number of access points, preferably one controlled and lockable entry. Selection shall not be based solely on ease for delivery of materials and equipment, but should seek to minimize conflict with University patrons and services.

1.4 UTILITY NEEDS

A. The USF Facilities Management (USF-FM) will provide existing available utilities information. The A/E shall determine if additional data is required, which may be processed by the A/E through additional services. A/E should contemplate and determine utility services needed to the site. Further reference is made to Division 1 - Section 01 51 00, Temporary Utilities. Specific attention is to be directed to ensure ample notification is given, and safe, reliable, and sanitary connections are made to existing systems. The A/E shall determine and recommend for approval the points of connection to existing site utilities. See further in Division 33 Utilities.

1.5 FLOOD PROTECTION AND STORMWATER MANAGEMENT

A. A/E, through aid of the site survey, shall evaluate potential for localized flooding. Building elevations shall be established to ensure that the structure is protected from the 100-year base flood. Site design shall also ensure that site alterations do not artificially create a base flood threat to the building or other surrounding buildings.

B. Stormwater runoff is to be controlled and managed in accordance with applicable regulations (including, but not limited to 62-330, 62-620, 62-621, 62-624 F.A.C.) and Southwest Florida Water Management District (SWFWMD) requirements. The University's Campus Master Plan has designated the Greenway as the location of its master stormwater management facilities for compliance with SWFWMD rules. Site design is to ensure that any increases in stormwater

runoff are collected, conveyed, and managed in accordance with the University's Master Drainage Plan and MS4 permit requirements, where applicable.

1.6 SITE PERMIT REQUIREMENTS

A. The A/E is to be authorized through additional services to assist the Owner in acquiring all required permits. The A/E is to take the lead role in determining and advising the Owner of the permits, which are applicable to the project's activities. The A/E shall include the University Civil Engineer on *ALL* correspondence with the permitting agencies. The A/E is to consult with the various permit agencies through pre-application meetings to document both applicability and specific permitting criteria. The permits, which are normally required but not necessarily limited to, the following:
   1. Hillsborough County Department of Health (HCDOE) for a Specific Permit to Construct PWS Components.
   2. Hillsborough County Environmental Protection Commission (HCEPC) Construction/ Modification to a Wastewater Collection/Transmission System.
   3. SWFWMD Environmental Resource Permit (ERP). Note – if the proposed construction is outside the limits of the USF Master Drainage Plan a Joint ERP Application must be filed.
   4. State/County/City R/W Use Permits.
   5. Local utility supplier service commitments.
   6. Petroleum Storage Systems Above Ground Storage Tank (AST) greater than 550 gallons, Underground Storage Tank (UST) are not approved for use on campus. See Division 26, Section 26 32 13, Engine Generator for Regulatory Compliance of Fuel Storage Systems as applicable to ASTs for generator tank systems.

1.7 PERMIT APPLICATION

A. The A/E is to prepare the applications for Owner's signature, the supporting documents, make payment of fees where USF purchase order is not accepted (i.e., HCEPC), submit the application(s) on behalf of the Owner and respond to any agency inquiries. The A/E is to not allow any construction, requiring a permit, to commence in advance of the permit issuance. The A/E is to prepare and submit Certificates of Completion and assure that clearance letters are received prior to the placement of new systems into service, and prior to Certificate of Substantial Completion.

1.8 NPDES

A. National Pollutant Discharge Elimination System (NPDES) storm water management for construction activities
   1. The A/E shall provide in the drawings and specifications the requirements for the Contractor to develop and manage the construction storm runoff per the State rules and laws at the time of permitting as well as any special requirements within USF's Storm Water Management Program.
   2. Contractor shall submit all Storm Water Pollution Prevention Plans (SWPPP) and Notices of Intent (NOI) as required by State rules and laws. Copies of all applications and required monitoring & maintenance reports shall be given to USF-PM, USF Civil Engineer, and USF-FM Environmental Health & Safety (USF-EHS) on a weekly basis. The SWPPP must be reviewed and approved by USF prior to application and submission to the regulatory agency using the USF documents review procedure.

END OF SECTION 02 00 00

SECTION 02 06 00 SUBSURFACE INVESTIGATION

1.1 The University will normally furnish subsurface investigations as an Additional Service Authorization through the A/E. The A/E shall determine, direct and provide site subsurface investigations judged necessary for the design work as directed in the Professional Services Guide. This will include investigative work, selection of a testing laboratory, test borings, soil analysis including load bearing capabilities and required densities, ground penetrating radar, and other investigations/engineering analysis as may specifically be warranted.

1.2 Please note that due to the underlying karst topography of the University area there is potential for sinkhole occurrences that could pose a threat to the proposed and surrounding existing improvements. Where subsurface investigations determine that anomalous conditions exist, it is normal and customary that some form or combinations of structural and subsurface mitigation be ensued to reduce the risks. It is the University's experience that construction activities intended to improve the soil bearing capacity and shoring of excavations such as, but not limited to, vibratory compaction, vibro-flotation/displacement, subsurface grouting and sheet pile installation also elevate the potential for overburden collapse (sinkhole occurrence). It shall be noted in the contract documents that the effects of these activities can transcend considerable distances and that the contractor is being placed on notice to take measures to prevent, monitor the effects of and be responsible for any damage to University facilities and loss of services caused by construction induced subsidence within and 100 feet beyond the limits of the project.

1.3 In preparation of plans for boring locations, the A/E shall reference University records and the site survey for the locations of underground utilities. The boring locations shall be chosen to avoid conflict with these facilities.

1.4 Plan view of boring locations and sections through borings showing all soil conditions shall be shown on the drawings. Statements are to be made that the soil reports included in the specification and boring information shown on the drawings are provided for the contractor's use and that the University shall not be held responsible for the accuracy of the information or consistency throughout the project site. The offering of such information does not preclude the opportunity of the Contractor to seek other investigations and analysis of their own.

END OF SECTION 02 06 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 03 CONCRETE

DIVISION 03 CONCRETE
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DIVISION 03 53 00 CONCRETE TOPPINGS 7

SECTION 03 05 00 GENERAL PROVISIONS

1.1 FLY ASH

A. Use of fly ash in structural concrete requires USF Facilities Management (USF-FM) approval. A/E to coordinate the USF-FM review with the USF Sustainability Manager when fly ash is considered as admixtures in reinforced concrete work in order to pursue (Leadership in Energy and Environmental Design) LEED credit.

1.2 SLOPES & DIMENSIONS

A. The concrete floor on the inside and the outside of each doorway shall be level for a distance of not less than 5-feet in each direction. A 2% slope and cross slope is acceptable outside for drainage purposes and Americans with Disabilities Act (ADA) compliance.
B. Sharp inclines and abrupt changes in level shall be avoided at doorsills. Allow for drainage at the outside of exterior doors.
C. At an out-swinging door, the platform shall be not less than 5 X 5 feet and shall extend not less than 1-foot beyond each side of the door.
D. At an in-swinging door, the platform shall be not less than 3 X 5 feet, and shall extend not less than 1-foot beyond each side of the door.

1.3 TESTS

A. A minimum of four (4) test cylinders prepared in accordance with American Society for Testing and Materials (ASTM) C495 shall be taken during each day's placement and every 50 cu yd thereafter. Tests shall be made by a testing laboratory employed and approved by the Consultant. Written reports of the tests shall be sent directly to the Consultant with a copy to the University. Laboratory shall make tests for wet density, dry density, and compressive strength of each specimen.

1.4 CODES AND STANDARDS

A. Comply with provisions of the following codes.
   1. American Concrete Institute (ACI) 301, Specifications for Structural Buildings.
   2. American Concrete Institute (ACI) 318, Building Code Requirements for Reinforced Concrete.
   3. Concrete Reinforcing Steel Institute (CRSI), Placing Reinforcing Bars – Recommended Practices.
   4. American Concrete Institute (ACI) 305, Hot Weather Concrete.
   5. American Concrete Institute (ACI) 308, Standard Practice for Curing Concrete.
   6. American Concrete Institute (ACI) 309, Guide for Consolidation of Concrete.

END OF SECTION 03 05 00

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

1.1 TEST REPORTS

A. A copy of all concrete test reports shall be furnished to the USF-PM and USF Building Code Administrator (BCA).

1.2 MISCELLANEOUS REQUIREMENTS

A. STRENGTHS: All concrete designs strength shall be determined by the project A/E, however, in no case shall the compressive strength be less than 3,000 psi in twenty-eight (28) days; except that 2,500 psi concrete may be specified for filling over-excavations for footings.
   1. AIR ENTRAINED CONCRETE: An approved air-entraining admixture shall be used for all concrete exposed to weather. Minimum strength shall be 3,000 psi.
   2. HARDENER TREATMENT: All finished floors, which will be left exposed, shall receive hardener treatment applied when concrete is still green.
   3. PROTECTION FOR NOSINGS on concrete steps shall be provided by imbedded rounded metal cast nosing with non-slip surface.
   4. NON-SLIP SURFACING: Ramps, treads, and platform of stairs shall have non-slip surface when not covered with finish flooring materials.

1.3. ARCHITECTURAL CONCRETE

A. A sample 4 X 8 feet in size shall be erected at the site when cast-in-place architectural concrete is to be used. Panel shall be protected from construction operations, but shall be left exposed to the elements. Panel shall be left in place until all architectural concrete has been approved by the USF-FM. Include samples of exposed built-in materials and finished openings.

1.4 INSULATING CONCRETE ROOF DECKS

A. Concrete shall have the following characteristics:
   1. Wet Density: 40-60 lbs / cu ft
   2. Dry Density: 20-30 lbs / cu ft
   3. Compressive Strength: 125-225 psi

END OF SECTION 03 30 00

SECTION 03 38 00 CONCRETE CURING

1.1 CURING COMPOUNDS

A. Specify only non-staining type. It has been found that clear chlorinated rubber compounds cause staining, which cannot be removed. The Structural Engineer shall delineate specific methods of curing concrete.

END OF SECTION 03 38 00

SECTION 03 40 00 PRECAST CONCRETE

1.1 PRECAST STRUCTURAL CONCRETE

A. Base design and specifications on recommendations of the ACI/ASTM tests.

1.2 PRECAST CONCRETE PANELS

A. Base design and specifications on recommendations of the ACI/ASTM tests.

END OF SECTION 03 40 00

SECTION 03 51 13 CEMENTITIOUS DECKS

1.1 GENERAL RQUIRMENTS

A. Include the following general requirements in the specifications.

1. CERTIFICATE FROM MANUFACTURER OF MATERIALS: Upon completion of the installation, a certificate from the manufacturer of insulating materials used, stating that materials were installed by an approved applicator and that materials were installed in accordance with the drawings and specifications, shall be furnished to the Consultant.

END OF SECTION 03 51 13

DIVISION 03 53 00 CONCRETE TOPPINGS

1.1 GENERAL REQUIREMENT

This section includes concrete floor toppings applied over previously placed concrete slabs (hardened concrete).

A. Comply with requirements of Section 03 30 00, Cast-in-Place Concrete.
B. Cement and Aggregates
   1. Portland Cement: ASTM C150, Type 1
   2. Normal Weight Aggregate: ASTM C33
   3. Reinforcement: ASTM A185, Welded Steel Wire Fabric.

1.2 STANDARD TOPPING

A. Design mix to produce topping materials with the following characteristics.
   1. Compressive Strength: 3,000 psi at 28 days.
   2. Slump:
      a. 8-inches maximum with water reducing admixture.
      b. 3-inches maximum for other concrete.
   3. Use ready-mixed topping complying with ASTM C94

1.3 PERFORMANCE

A. Failure of concrete topping to bond to substrate, disintegration or other failure of topping to perform as a floor finish will be considered failure of materials and workmanship. The Contractor shall replace toppings in areas of such failures, as directed.

END OF SECTION 03 53 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 04 MASONRY

DIVISION 04 MASONRY
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SECTION 04 01 20 MASONRY RESTORATION AND CLEANING

1.1 EXPERIENCE CLAUSE

A. Subcontractor's record of ten (10) years of experience is required. Include the following paragraph in the specifications.

CERTIFICATION OF EXPERIENCE:
Work shall be performed by experienced and skilled mechanics. The General Contractor shall furnish evidence that the subcontractor for restoration work has been engaged in the business of masonry restoration for a period of at least ten (10) consecutive years prior to the date of these specifications. Evidence or certification of experience shall be in letter form which, in addition to statement of experience, shall contain a list of at least five (5) projects of comparable size and complexity which have been satisfactorily completed, a statement that proper equipment is available for use, and a statement that the work will be under the direct supervision of skilled mechanics only.

END OF SECTION 04 01 20

SECTION 04 05 00 GENERAL PROVISIONS

1.1 SPLIT COURSING

A. Only full coursing will be permitted at the head of any type of opening.

1.2 OVERHANGING MASONRY

A. Construction where the masonry units are suspended using mechanical devices, or where the units extend beyond lower courses and mechanical support devices are required, are not to be used. Buildings being renovated/restored, which have such overhanging structures, shall be examined for safety and a report of condition provided.

1.3 MARKING PENS

A. Use of ink marking pens on surfaces of any kind of material is prohibited. Experience has shown that such marks bleed through paint and other finishes.

1.4 ACID FOR MASONRY CLEANING

A. The cleaning solution must be included in applicable sections of the Specifications. Type of solution shall be approved by the USF Facilities Management (USF-FM) and USF-FM Environmental Health & Safety (FM-EHS) departments.

1.5 BRICK SURFACE TREATMENT

A. Treating of brick surface with stain or other surface treatment or simulation to obtain a color blend is prohibited.

1.6 CODES AND STANDARDS

A. Comply with provisions of the following codes:
   1. American Concrete Institute (ACI) 530, Building Code Requirements for Masonry Structures.
   2. American Concrete Institute (ACI) 530.1, Specifications for Masonry Structures.

1.7 QUALITY ASSURANCE

A. Engage a masonry work certified technical inspector to supervise, on a full-time basis, all masonry work.

END OF SECTION 04 05 00

SECTION 04 05 13 MORTAR

1.1 MORTAR FOR LAYING MASONRY

A. May be ready-mixed or job mixed. Specify by types listed in American Society for Testing and Materials (ASTM), ASTM C-270. Do not specify mortar which may corrode steel reinforcement or structure (i.e., Sara-bond). Use Type S Mortar for above grade and Type M Mortar for below grade.

1.2 POINTING MORTAR

A. Pointing mortar for clay facing tile masonry shall be made with white silica sand and white Portland cement.

END OF SECTION 04 05 13

SECTION 04 05 23 MASONRY ACCESSORIES

1.1 WALL TIES

A. Flex-O-Lok or equal stainless steel wall ties are approved for masonry veneer or facing installation. Install with stainless steel bolts and nuts and stainless steel washers for attachment to the metal studs; sheet metal screws and similar attachments are not acceptable.
B. Do not use galvanized steel brick ties.

1.2 JOINT REINFORCEMENT

A. Wire mesh type is prohibited.

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1.3 WEEP HOLES

A. Cell vents of size to fit head joints in brick work or plastic tubing are preferred over treated sash cord or rope. If cord or rope is specified, specify that the material be left in place and cut off flush with the joint.

1.4 PLUG ANCHORAGE

A. Plug anchorage by use of wood, lead, or plastic is prohibited.

END OF SECTION 04 05 23

SECTION 04 20 00 UNIT MASONRY

1.1 BRICK MASONRY

A. Color and blend of face brick shall generally be specified to match brickwork in a specific adjacent building. Consult the USF-Project Manager (USF-PM) regarding this requirement.

1.2 EFFLORESCENCE TEST FOR FACE BRICK

A. Submit to the USF-PM manufacturer's certification that bricks show no efflorescence when tested in accordance with ASTM Method C67.

1.3 SAMPLE PANEL

A. Include the following paragraph in the specifications: Before starting work, build one sample panel for inspection and approval. Build panel on a firm foundation, in location indicated by the Consultant. Panel shall be F-shaped, with long side a minimum of 5 feet-4 inches long by 3 feet-4 inches high, with one corner return at least 2 feet long and with one intersecting 6 inches thick concrete block wall 2 feet long. Construct long side and return of 8 inch concrete block and face brick. Panel shall show color range and texture of masonry units, bond, mortar joints, and workmanship. Completed masonry work in the building shall be equal to that shown in the approved panel. Do not remove panel until masonry work is completed or until removal is authorized. Panel to include sample of openings.

1.4 COURSING

A. Brick shall be laid with modular coursing, three courses to 8 inches, unless otherwise required to match existing coursing.

1.5 DESIGN

A. Face brick elevations shall include structural considerations for division of such elevations into panels to accomplish structural support of the brick face and expansion joints for control of thermal expansion damage. Provide masonry control joints and expansion joints in accordance with Brick Industry Association technical guidelines.

1.6 NON-STANDARD BRICK

A. Non-standard brick is prohibited. Brick shall be standard size.

END OF SECTION 04 20 00

SECTION 04 28 00 CONCRETE UNIT MASONRY

1.1 INTERIOR PARTITION

A. Concrete block shall be used wherever feasible for interior wall finish in student areas. ASTM tests shall be indicated on all materials used below per ACI requirements.

1.2 CINDER BLOCK

A. The use of cinder block is prohibited.

1.3 CONCRETE BLOCK, TYPES AND USES

A. LOAD-BEARING: normal weight, standard size.
B. NON-LOAD-BEARING: normal weight, standard size.
C. EXPOSED EXTERIOR: washed crushed limestone coarse aggregate and washed limestone sand, only, shall be used.
D. CONTROL JOINTS: to control cracking, follow recommendations of the Concrete Masonry Handbook published by the Portland Cement Association (PCA).
E. SPLIT FACE BLOCK: Single wythe split face block wall construction shall not be used in the exterior envelope where adjacent interior space is mechanically conditioned.

END OF SECTION 04 28 00

DESIGN & CONSTRUCTION GUIDELINES

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DIVISION 05 METALS
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SECTION 05 10 00 STRUCTURAL METAL FRAMING

1.1 STRUCTURAL STEEL

A. Include a complete section in the specifications for this part of the work, in addition to the Structural Consultant notes on the drawings. The Consultant is responsible for complete coordination of statements in the specifications and the notes on drawings. Structural steel shall comply with the American Institute of Steel Construction (AISC), "Code of Standard Practice for Steel Buildings and Bridges."

1.2 AFFIDAVIT FROM ERECTOR

A. The General Contractor shall be required to provide an affidavit, at the completion of the job, to the effect that the structural steel frame is plumb and level within the normal tolerances specified in the code.

END OF SECTION 05 10 00

SECTION 05 20 00 METAL JOISTS

1.1 MANUFACTURER'S CERTIFICATE

A. Manufacturer's certificate of compliance with Steel Joist Institute (SJI) Specifications is required.

1.2 PAINTING

A. Prime coat and touch-up painting complying with SJI Specifications will be considered adequate for joists, except where subjected to moisture or where exposed to view.

END OF SECTION 05 20 00

SECTION 05 30 00 METAL DECKING

1.1 MANUFACTURER'S CERTIFICATE

A. Manufacturer's certificate of compliance with SJI Specifications is required.

1.1 PAINTING

A. Prime coat and touch-up painting will be considered adequate for metal deck, except where subjected to moisture or where exposed to view. Use galvanized metal deck for all roof applications.

1.2 VENTED METAL DECKING

A. Vented metal decking shall be used, when topped with insulating concrete roof decks.

END OF SECTION 05 30 00

SECTION 05 40 00 COLD-FORMED METAL FRAMING

1.1 COLD-FORMED METAL STUD SYSTEM

A. "C" shaped load bearing steel studs and furring strips shall be spaced 16 inches on center, maximum. Wind load calculations by a State of Florida registered structural engineer is required for exterior wall application. Wire tying of framing components is not permitted. Use qualified welders and comply with the American Welding Society (AWS).

END OF SECTION 05 40 00

SECTION 05 50 00 METAL FABRICATIONS

1.1 WELDER CERTIFICATION

A. The General Contractor or Construction Manager is responsible for obtaining and retaining welder certifications for any person performing on-site welded steel fabrication or erection. The certifications must be current and validated by welding logs or certification test(s) conducted with the last two (2) years.

1.2 GALVANIZING REQUIREMENTS

A. All exterior ferrous metals shall be hot-dip galvanized after fabrication.

1.3 MISCELLANEOUS METAL FRAMING FOR ELECTRICAL SUPPORT SYSTEMS

A. If electrical equipment is attached to support framing, the Electrical Contractor will provide and install that metal framing.

1.4 USE OF INK MARKING PENS ON SURFACES

A. Use of ink marking pens on surfaces of any kind of materials is prohibited. Experience has shown that such marks bleed through paint and other finishes.

1.5 LINTELS FOR PLUMBING, HVAC, AND ELECTRICAL INSTALLATIONS

A. The General Contractor shall furnish lintels for all openings through walls when openings are shown on the architectural or structural (General Contract) drawings. Note all such lintels and openings require coordination of work and exact locations, by affected contractors. All such plumbing, HVAC, electrical, and sprinkler openings must be coordinated and shown on the Architectural and/or Structural Drawings.

END OF SECTION 05 50 00

SECTION 05 51 00 METAL STAIRS

1.1 STAIR TREADS

A. Stair treads for public access stairways shall be concrete with cast metal nosing.
B. USF prohibits the use of concrete filled metal stair pans for stairs located on the exterior of buildings.

END OF SECTION 05 51 00

SECTION 05 52 00 HANDRAILS AND RAILINGS

1.1 AMERICANS WITH DISABILITIES ACT

A. Refer to Americans with Disabilities Act of 1990 as amended by the Americans with Disabilities Act Amendments of 2008, and as adopted by the latest edition of the Florida Building Code.

1.2 HANDRAILS

A. Handrails to be of aluminum construction.

1.3 GRATINGS

A. Ferrous gratings shall be hot-dip galvanized. Galvanized hardware cloth shall be installed under all areaway gratings.

1.4 STAIR TREADS AND NOSINGS

A. Steps shall conform to existing step formulas but shall not have risers that exceed 7 inches or treads that exceed 11 inches. Nosing shall not extend past the face of the riser.

END OF SECTION 05 52 00

USF UNIVERSITY OF SOUTH FLORIDA
FACILITIES MANAGEMENT – DESIGN & CONSTRUCTION
4202 E. FOWLER AVENUE, OPM 100 | TAMPA, FLORIDA 33620-7550

EDITION: SEPTEMBER 17, 2018
PHONE: (813) 974-2845 | WEBSITE: **usf.edu/fm-dc**

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 06 WOOD, PLASTICS & COMPOSITES

DIVISION 06 WOOD, PLASTICS & COMPOSITES
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SECTION 06 13 00 HEAVY TIMBER CONSTRUCTION 3
SECTION 06 17 53 PREFABRICATED STRUCTURAL WOOD 4
SECTION 06 20 00 FINISH CARPENTRY 5
SECTION 06 40 00 ARCHITECTURAL WOODWORK 6

SECTION 06 05 73 WOOD TREATMENT

1.1 PROTECTION AGAINST DECAY

A. Wood used in conjunction with roofing installations and wood which is installed in contact with concrete or masonry shall be pressure treated with an approved preservative to meet Architectural Woodwork Institute Standards (AWPS). Other installations shall receive prime coats suitable for finishes specified as soon as installations are completed. Back prime where dampness or warping is anticipated.

END OF SECTION 06 05 73

SECTION 06 13 00 HEAVY TIMBER CONSTRUCTION

1.1 GENERAL REQUIREMENT

A. Use only if approved by the Owner.

1.2 TIMBER TRUSSES

A. With the shop drawings, a complete design analysis of structural components shall be submitted. Data shall bear the seal and signature of a professional Architect or Engineer (A/E), registered in Florida, attesting that the design of trusses meets requirements of applicable codes and design loadings.

END OF SECTION 06 13 00

SECTION 06 17 53 PREFABRICATED STRUCTURAL WOOD

1.1 GENERAL REQUIREMENT

A. Use only if approved by the Owner.

1.2 WOOD TRUSSES

A. Same as Section 06 13 00, Heavy Timber Construction.

END OF SECTION 06 17 53

SECTION 06 20 00 FINISH CARPENTRY

1.1 MATERIALS AND FABRICATION

A. Conform to Architectural Woodwork Institute (AWI) specifications for Custom quality work.

1.2 USE OF INK MARKING PENS ON SURFACES

A. Use of ink marking pens on surfaces of any kind of materials is prohibited. Experience has shown that such marks bleed through paint and other finishes.

END OF SECTION 06 20 00

SECTION 06 40 00 ARCHITECTURAL WOODWORK

1.1 CABINET WORK

A. Materials and fabrication shall conform to AWI specifications. For plastic laminate finish, specify "Custom" quality, for laboratory casework specify "Premium" quality.

1.2 CABINET HARDWARE

A. Hardware for cabinetwork shall be furnished and installed by the installer of cabinetry. Comply with American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA), ANSI/BHMA A156.9, American National Standards for Cabinet Hardware. Use AWI standards for hinges.

END OF SECTION 06 40 00

DIVISION 07 THERMAL & MOISTURE PROTECTION

DIVISION 07 THERMAL AND MOISTURE PROTECTION
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STANDARD PRACTICE FOR ROOFING SYSTEMS AT UNIVERISTY OF SOUTH FLORIDA 16

SECTION 07 01 00 WATERPROOFING

1.1 MEMBRANE WATERPROOFING

A. The following are the minimum requirements to assure adequately designed waterproofed floors for machine and equipment rooms and other areas subject to flooding from equipment failure or seepage from exterior sources:

1. DRAWINGS shall fully detail the installation of the membrane. Continuous membrane risers shall be provided above the finished floor surface at vertical walls, pads, curbs, pipes, and ducts through the slab. Risers shall be at least as high as the lowest curb and shall be bonded to the vertical surface. Concrete foundation walls around elevator pits and around basements, from grade to footings, shall be treated with 60 mil minimum membrane waterproofing. When elevators open into areas subject to flooding, opening sills must be above the membrane riser height to keep flood water out of elevator shaft. If water is present, construction of work slab (mud slab) is recommended to receive water proofing membrane.
2. SPECIFICATIONS shall provide for a heavy duty, permanent waterproofing type of membrane capable of adjusting to building movements without breaking the membrane seal. When rubber or plastic membranes are specified, a ten (10) year installer experience clause with written documentation shall be required by the specification.
3. TIMING OF INSTALLATIONS: When surface applied membrane waterproofing is specified, the specification must prohibit scheduling of installation until after the majority of work of all other trades has been completed. Inaccessible surfaces under equipment and housing foundations, pads, and curbs may be waterproofed in advance of floor areas. Surface membrane must be protected until acceptance of the space by the University. Surface applied membrane, except under equipment, must be accessible for repair.
4. TESTING: Specifications shall provide for the testing of waterproofed membrane floors by flooding. Floors shall be filled with water to within 1/4 inches of top of lowest curb for a period of 6 hours and closely inspected for leaks; tests shall be witnessed by designated representatives of the University. The test shall not relieve the contractor of maintaining a leak free floor until the end of the warranty period.
5. MAINTENANCE GUARANTEE: The General Contractor, manufacturer and installing subcontractor shall furnish a written three (3) year guarantee on the complete membrane waterproofing installation. Submit the guarantee in triplicate. The guarantee shall begin at substantial completion and accepted for use by the Owner. The guarantee shall cover, at no cost to the Owner, all labor, materials, and equipment required for repair or replacement to correct leaks, faulty materials or workmanship, and reestablishing all conditions and finishes equal to condition prior to repair.

END OF SECTION 07 01 00

SECTION 07 11 00 DAMPPROOFING

1.1 BITUMINOUS TYPE

A. Surfaces of exterior cavity walls shall be primed and applied with self-adhering bituminous damp proofing prior to installation of furring. Liquid applied bituminous damp proofing is approved only for brick cavity walls with appropriate brick anchors and ties, and no other penetrations. Surfaces of exterior walls below grade, shall be primed and coated with bituminous damp proofing.

END OF SECTION 07 11 00

SECTION 07 18 00 TRAFFIC COATINGS

1.1 THIS SECTION INLCUDES

A. Pedestrian and vehicular traffic coatings for application to the specific type of deck indicated on the drawings.

1.2 DESCRIPTION OF SYSTEM

A. The pedestrian and vehicular deck coatings shall be a complete system of compatible materials including cold liquid applied elastomeric coatings supplied by an approved manufacturer to create a seamless waterproof membrane.

1.3 QUALITY ASSURANCE

A. The pedestrian and vehicular traffic coatings shall be rated Class "A" by American Society for Testing and Materials (ASTM E108) / Underwriter Laboratories (UL790); containers to bear Underwriters label.

B. Materials used in both coating systems shall meet applicable Volatile Organic Compound (VOC) regulations.

1.4 PREPARATION

A. Apply coatings over previously cleaned, etched surfaces. Treat cracks and joints as directed by the manufacturer's written instructions.

1.5 APPLICATION

A. Apply primer, base coat, wearing surface coat, and previously graded, broadcasted, hard aggregate at the rates recommended by the manufacturer's written instructions. Provide the required system's dry film thickness.

END OF SECTION 07 18 00

SECTION 07 21 00 INSULATION

1.1. BUILDING INSULATION

B. Meet Florida State Energy Code Requirements and submit calculations to the University. Do not use loose fill type insulation.

1.2 ROOF DECK INSULATION

A. Meet Florida State Energy Code Requirements. Submit calculations to the University All insulating materials shall be non-hygroscopic. Protect roof insulation with roofing manufactured recommend cover board.

B. Gypsum cover board must have primed glass facer.

END OF SECTION 07 21 00

SECTION 07 31 00 SHINGLES AND ROOFING TILES

1.1 GENERAL REQUIREMENTS

A. Follow Standard Practice for Roofing Systems at University of South Florida (USF Roofing Standard) at the end of Division 7, Thermal & Moisture Protection.

1.2 ASPHALT ROOF SHINGLES

A. Specify only wind resistant type. Fire-resistant rating shall be UL Class A.

END OF SECTION 07 31 00

SECTION 07 40 00 PREFORMED ROOFING AND SIDING

1.1 GENERAL REQUIREMENTS

A. Follow USF Roofing Standard, included at the end of this Division 7, Thermal & Moisture Protection.

1.2 PREFORMED WALL AND ROOF PANELS

A. Finish materials and colors for roof structures and rooftop equipment screens are subject to the approval of the USF Facilities Management (USF-FM).

END OF SECTION 07 40 00

SECTION 07 50 00 MEMBRANE ROOFING

1.1 GENERAL REQUIREMENTS

A. DESIGN REQUIREMENTS FOR MEMBRANE ROOFING: Follow USF Roofing Standard, included at the end of this section. Roof decks or tapered insulation must provide a minimum slope of 1/4 inch/foot toward drains; crickets shall be minimum 1/2 inch/foot. Dead level roofs are prohibited. Scupper openings shall be provided through parapet walls. Insure that drains are truly at low points of roofed area. Install "crickets or saddles" to divert water flow around curbs so as to avoid interference with designed drainage system. Reroofing projects will require individual assessment for design to provide adequate drainage slope. Drain sumps should be 8' x 8'.

B. OBSERVATION OF INSTALLATION BY UNIVERSITY PERSONNEL: The University shall be given two (2) weeks advance notice of intent to start installation of roofing materials. Designated University personnel must be permitted to perform a pre-installation inspection of roofing materials and equipment, to be present throughout roofing installation to observe installation techniques for compliance with specifications, and to participate in final inspection. A pre-roofing conference should be included in specifications.
   1. CUTTING OF TEST PANELS: The University reserves the right to cut test panels from the finished roof in order to determine that minimum requirements have been met. The roofer shall repair, at his own expense, the roof where test panels were taken.
   2. Pull Test may be requested to verify system performance according to specified uplift by a certified third-party testing agency.

C. COORDINATION OF INSTALLATIONS: The roofer shall install all flashings required to make a complete waterproof installation. For this reason, it is preferred that specifications for roofing, flashing, and sheet metal work be combined into one section. Although certain counter-flashings or similar materials may be provided by other contractors, the roofer shall be made responsible for their proper installation.

D. ROOFING AND FLASHING WARRANTY: The General Contractor, Roofing Subcontractor and the manufacturer(s) of materials used shall jointly furnish a written twenty (20) year warranty on the complete roof installation. Submit the warranty in triplicate and in an electronic format. The warranty shall begin when the project is completed and accepted by the Owner. The warranty shall cover, at no cost to the Owner, all labor and materials required to repair or replace roofing, flashings, sheet metal and copings as necessary to fully correct leaks, faulty workmanship or defective materials.

E. STORAGE OF MATERIALS: Roofing felts, membranes and insulation are to be stored in a dry trailer or inside a dry building when available; or stored on skids fully covered under tarpaulin strapped against wind. Asphalt or coal tar pitch may be stored outside if kept under a tarpaulin or plastic film. All materials are to be stored on appropriate dunnage. When stored on a roof properly protect the roof membrane and avoid concentrated loading on roof.

F. WET MATERIALS: Roofing felts or insulation which became wet before or after installation must be removed and replaced. Wet materials shall not be dried or used. Wetted membrane materials must be thoroughly evaluated to determine the effect on adhesion, lap seals or blister potential. Remove any such material if there is any possibility of failure.

G. ROOF MOISTURE SURVEY: Conduct infrared scan before and after completion of existing membrane reroofs. Infrared scan at completion of job is to be completed by a certified third-party agency and submitted as part of the close out documents.

H. CLEAN UP: Emphasize that debris not be allowed to accumulate on roof during construction. All debris to be totally removed at completion of project.

I. METAL DECKS: When securing at end of work day: use expanding foam insulation to plug all metal deck flute/voids; and overhang base sheet minimum of 3' from the edge of installed insulation boards.

J. CONCRETE DECKS: When securing at end of work day: use expanding foam insulation to seal bottom edge of insulation boards against the concrete deck; apply roof cement/adhesive on all exposed edges of the insulation boards and overlap base sheet minimum of 3' beyond the edge of installed work; adhere 6" of base/cap sheet directly to concrete deck; and weigh down the loose end of base sheet.

1.2 PERFORMANCE REQUIREMENTS

A. ROOFING SYSTEM SHALL COMPLY WITH THE FOLLOWING:
   1. National Roofing Contractors Association (NRCA) Manual for Low-Slope Roofing Construction Details (Last Edition).
   2 Sheet Metal & Air Conditioning Contractors' National Association (SMACNA) Manual (Latest Edition).
   3. American Society of Civil Engineers (ASCE) 7 and Safety Equipment Institute (SEI) Standards, Chapter 6.

1.3 SUBMITTALS

A. SHOP DRAWINGS: Include plans, sections, details in compliance with above referenced Performance Requirements and attachments to other work, for the following:
   1. Base flashings, cants, and membrane terminations.
   2. Cellular insulating concrete, including slopes.
   3. Crickets, saddles, and tapered edge strips, including slopes.
   4. Engineering calculations must be submitted for taper design, curbs, support stands and lightning protection system.

1.4 QUALITY ASSURANCE

A. MANUFACTURER: Manufacturer shall provide inspection services with written reports provided in assurance of warranty issuance.
B. Photographic record of existing conditions, anomalies observed, exemplars of each phase of work during progress (minimum weekly), completion of each phase of roof installation, and record of final completion shall be provided to the USF Project Manager. Photos must be of high resolution; and document location and day recorded.
C. Wireless Weather Stations should be used to monitor and record weather events and account for rain days. If not used the Project Manager will rely of NOAA weather reports.

1.5 MULTI-PLY MODIFIED BITUMEN ROOFING

A. Multi-ply system shall consist of 160 mil APP dual reinforced (polyester-fiberglass) base ply and a minimum 180 mil APP dual reinforced granulated cap sheet. Cap sheet shall be cool-roof granule meeting an initial Solar Reflective Index (SRI) of 92 per ASTM.
B. Torch Applied and Cold Process are acceptable methods of installation. Design team must review job conditions to recommend the best solution.
C. A peel and stick base sheet is to be used on combustible substrates if torch applied.

1.6 TOTALLY ADHERED MEMBRANE ROOFING

A. Shall not be installed directly over lightweight concrete decks.

1.7 METAL ROOF

A. Consult USF-FM before designing such roofs. Written USF-FM approval is required.

1.8 FLUID APPLIED ROOFING

A. Consult USF-FM before designing such roofs. Written USF-FM approval is required.

1.9 THERMOPLASTIC ROOFING

A. Specifying Thermoplastic Roofing (TPO) roofing require written USF-FM approval. If TPO is approved for use:
   1. Use of pre-molded inside and outside corner flashing is required; use pre-molded flashing of next higher mil thickness (when available) than specified for the roof membrane.
   2. Provide textured (or embossed) TPO walkway pad of contrasting color.

1.10 KETONE ETHYLENE ESTER ROOFING

A. Specifying Ketone Ethylene Ester (KEE) roofing require written USF-FM approval. If KEE is approved for use:
   1. Use of pre-molded inside and outside corner flashing is required; use pre-molded flashing of next higher mil thickness (when available) than specified for the roof membrane.

2. Provide textured (or embossed) KEE walkway pad of contrasting color.

1.11 SINGLE PLY MEMBRANE ROOFING, GENERALLY

A. With the exception on Thermoplastic Olefin (TPO) and Ketone Ethylene Ester (KEE) roofing, on project specific basis; all other thermoset and thermoplastic membrane roofing systems are prohibited. Prohibited single ply membrane roofs to include, but not limited to:
   1. Chlorinated Polyethylene (CPE)
   2. Chlorosulfonated polyethylene (CSPE)
   3. Copolymer Alloy (CPA)
   4. Epichlorohydrin (ECH)
   5. Ethylene Interpolymer (EIP)
   6. Ethylene Propylene Diene Terpolymer (EPDM)
   7. Neoprene (CR)
   8. Nitrile Alloys (NBP)
   9. Polyisobutylene (PIB)
   10. Polyvinyl Chloride (PVC)
   11. Tripolymer Alloy (TPA)

END OF SECTION 07 50 00

SECTION 07 60 00. FLASHING AND SHEET METAL

1.1 GENERAL REQUIREMENTS

A. MAINTENANCE WARRANTY: Warranty requirements apply to this work. Refer to Section 07 50 00, Subparagraph 1.1.D, Roofing & Flashing Warranty.

1.2 MATERIALS

A. METAL FLASHING AND COUNTER FLASHING: Copper, soft temper stainless steel or aluminum. Galvanized steel is prohibited.
B. JOINTS. Continuously welded joints are preferred over riveted or crimped joints. Submit full scale mocked up of alternate joints and splices, if used, for approval by USF-FM and Designer.
C. COPING. Continuous cleat coping with concealed splice and internal gutter system is preferred. Submit full scale mocked up of alternate coping, if used, for approval by USF-FM and Designer.
C. GUTTERS AND DOWNSPOUTS: Copper, stainless steel or aluminum. No galvanized steel.
D. CLEATS. Provide continuous cleats (FM 1-49) of same material as associated sheet metal.
E. EXPOSED FASTNERS. Use stainless steel screws with neoprene washers. Apply dollop of caulk over screw head and washers.
F. FASCIAS AND GRAVEL STOPS: Copper, stainless steel or aluminum. Aluminum sections, if used, must be extruded, to be used for appearance and not function as part of the weatherproofing. Use of aluminum is prohibited due to excessive expansion rate.
G. PITCH PAN OR POCKETS: Use of pitch pans or pockets is prohibited.
H. PRE-FABRICATED CURB FLASHINGS: Pre-fabricated polymer curb flashings are prohibited.
I. REINFORCED FLUID APPLIED FLASHINGS: All fluid applied flashing must be reinforced. A secondary rain collar with caulk tray or counterflashing is required.
J. LEAD OR RUBBER PIPE BOOT FLASHING: Use of lead or rubber pipe flashing is discouraged. USF-FM approval is required for exception.
K. ROOF VENT PIPE EXTENSIONS: Solid-wall PVC fitting consisting of pipe and splice sleeve inserts, configured for insertion and sealing to existing plumbing vent piping, sized to fit inside diameter of plumbing vent piping, enabling extension of piping to field-determined height. (Basis of design TUBOS)

1.3 SHEET METAL FABRICATION

All sheet metal design and fabrication shall conform with Architectural Sheet Metal Manual of the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA),

END OF SECTION 07 60 00

SECTION 07 71 00 ROOF SPECIALTIES AND ACCESSORIES

1.1 WALKWAYS

A. Provide walkways from roof access point to all roof top equipment that requires regular maintenance; extend walkways to all maintenance access points of each equipment. Install additional three 3-feet wide adhered layer of roofing (in contrasting color) as walkway. The walkway layer may be segmented to allow for improved drainage.

1.2 LIGHTNING PROTECTION SYSTEM

A. Lightning Protection system is required for all new construction and addition in compliance with the Section 26 4113, Lightning Protection for Structures. For renovations and additions, Lightning Protection System Engineer may modify the original UL Lightning Protection System Master Label.

B. Required installation of sacrificial pad and conductors:

1. Place and adhere an adhesive base (cable hold down clip) underneath every buckle, clamp, splice, cable ends, etc. for added protection against abrasion and puncture. Ensure all threaded ends of bolts are turned up to protect against puncture.
2. Provide sacrificial pad under each adhesive base (cable hold down clip / cable fasteners), turnbuckle, clamp, splice connector, ends of conductors, etc. resting on roof membrane. The sacrificial pad should be cut from the cap sheet and fully cemented in place. Minimum 4 times the size of the adhesive base.
3. Do not suspend conductors in clothesline style, ensure it is fully rested on horizontal surfaces or fully attached in vertical surfaces using sufficient number and location of adhesive base cable fasteners.

END OF SECTION 07 71 00

SECTION 07 84 00 FIRESTOPPING

1.1 PENETRATIONS

A. Provide rated through-penetration firestop systems with ratings indicated by ASTM E814.

1.2 JOINT SEALANTS

A. Provide fire-resistive joint sealants with fire-resistance ratings as determined per ASTM E119.

END OF SECTION 07 84 00

SECTION 07 92 00 SEALANTS

1.1 GENERAL REQUIREMENTS

A. The following conditions shall be included in the specifications:
   1. WARANTY: Provide written warranty that the General Contractor and sealant installer jointly guarantee to replace, at no cost to the University, any or all joints which fail within five (5) years after acceptance.
   2. QUALIFICATIONS OF APPLICATOR: Sealants shall be applied by specialists in the application of sealants; minimum five (5) years of experience required. Applicator is subject to the A/E approval.
   3. RESPONSIBILITY FOR SATISFACTORY APPLICATION: Inspect work of other trades prior to application of sealing material. If any joint or space cannot be put into proper condition to receive the material by specified methods, immediately notify the A/E in writing, or assume responsibility for and rectify unsatisfactory results.
   4. TIME AND TEMPERATURE REQUIREMENTS: Apply sealants as late as possible in the construction, preceding painting, and following cleaning operations. Do not apply sealants when air temperature is below 40 degrees F.
   5. DO NOT SPECIFY CAULK OR CAULKING: Caulks are limited to interior application only.
   6. QUALITY ASSURANCE:
      a. Joint sealants are required to maintain permanent airtight and waterproof seal of joints.
      b. Perform Adhesion Field Test ASTM C1521 in quantities and locations as directed by the A/E of Record and USF-FM.
      c. Horizontal sealant joints are not to be exposed to weather; provide weather shield (e.g. metal cap flashing).
      d. Horizontal sealant application on precast or metal panel joints exposed to weather is not permitted; provide weather shield (e.g. unit or continuous metal cap flashing).

1.3 SEALANTS

A. Provide schedule indicating type of joints to be sealed. (i.e., precast panel to precast panel, masonry joints, etc.)
   1. INTERIOR: Use acrylic type suitable for application of paint.
   2. EXTERIOR: Use two-part polyurethane, or as approved.
B. Substrate preparation must be in accordance with manufacture published guidelines and be free of contaminates.

END OF SECTION 07 92 00

SECTION 07 95 00 EXPANSION CONTROL

1.1 EXPANSION JOINTS

A. Carefully design and locate to prevent surface damage due to expansion and contraction of building materials.
B. Provide areas of intense solar exposure with joints over and above number required by standardized tables and industry standards.
C. Provide joints through parapet walls near corners.
D. Provide additional joints in exterior wythe of masonry cavity walls and secure to substrate with flexible anchors. Recommend aligning interior wythe joints with exterior joints whenever possible.
E. Provide horizontal joints for steel shelf angles in masonry walls.
F. Separate partitions at top and bottom with expansion joint material in structures where deflection might cause damage to partition.
G. Provide expansion joints in long linear building elements such as:
    1 Handrails.
    2. Fascia.
    3. Gravel stops.
    4. Gutter System.
    5. Plate glass window walls.
    6. Paving.
    7. Where low mass meets high mass of building.
    8. At wings and intersections of “L”, “T”, and “U” shaped buildings.
    9. At long buildings, maximum length between joints 200 feet.
    10. Back-prime dissimilar materials in contact with each other.
H. Avoid “bridging” over expansion joints with railing, window framing, or other rigid construction.

END OF SECTION 07 95 00

STANDARD PRACTICE FOR ROOFING SYSTEMS AT UNIVERISTY OF SOUTH FLORIDA

1.1 Roof System Components

The roof system includes the following basic components: roof deck or substrate, insulation, waterproofing membrane, protective surfacing, flashing, counter flashing, roof cants where applicable, caps and copings, perimeter fascia/gravel stops, sealants, roof expansion and control joints, roof walkway systems, roof hatches, skylights, roof drains, emergency overflow protection, roof drain flashing, scuppers, gutters, downspouts, and ballast material where applicable. These components and all types of roofing material, including metal and tile, are subject to the requirements of this USF Roofing Standard (Standard). Patios and decks constructed on roofs require special design consideration and shall not violate the roofing requirements of this Standard.

1.2 Approved roofing materials

The selection of roofing materials shall be limited to those manufacturers with a 15 year history of satisfactory manufacture and installation of at least 250,000 squares of their roof system, and who provide a minimum 20 year unlimited warranty for labor and materials, including metal finishes.

1.3 Registered Architect or Engineer Required

All new, repair, and replacement roofing projects shall have plans and specifications developed by a registered Architect/Engineer (A/E) licensed by the State of Florida. The engineer shall be a professional engineer, with a minimum of ten (10) years direct experience in design and analysis of roof systems.

1.4 Steep Slope Roofing

Steep slope roofing includes slate, tile and metal roof systems. Steep slope roofing shall not be utilized on University facilities on slopes less than 4 inches/foot unless a waterproof underlayment system is utilized beneath the steep roofing components. Under no circumstances shall slate or tile be installed at slopes less than 2 inches/foot.

1.5 Energy Management

Roof system design shall be consistent with energy management requirements of the State University System, Florida Statutes, and applicable Codes. Insulating values of the finished roof system shall be designed on the basis of economic life cycle return on investment when evaluated against fuel costs.

1.6 Roofing Work Carried Out By University Personnel

Roofing projects carried out by University personnel shall be performed in a manner approved by the roof system manufacturer or one of its licensed roofing contractors. Repairs to low slope roofs shall be accomplished in accordance with the National Roofing Contractors Association (NRCA) Repair Manual for Low-Slope Membrane Roof Systems or manufacturer's requirements to maintain warranty.

1.7 Roof Membrane Penetrations

All penetrations of the roof membrane shall be detailed according to the recommended procedures provided in the latest National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual and installed per manufacturer's instructions. The details in the permit documents shall show standard and existing conditions which should be adapted to suit each individual project.

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1.8 Expansion Joints

Structural expansion joints occurring in new construction shall be located at high points in the structure or roof insulation to the maximum extent practicable to allow water to flow away from them on the roof surface. Under no circumstances are expansion joints to be placed such that roof water must flow across them to reach drains.

1.9 Utility Supply Lines

Utility supply lines (electrical, water, gas, etc.) to roof-mounted equipment shall be installed within the supporting curb of that equipment. All conduit must be ridged and minimum 12 inches in length.

1.10 Through-Wall Flashings

Architects/Engineers designing new facilities shall be cautioned to carefully locate through-wall flashings at sufficient elevation above anticipated finished roof level to ensure minimum base flashing heights, as defined herein, can be met. Elevations and accessibility of other components shall also be considered for their impact on roofing installation, including re-roofing of the facility. Such components as siding, window sills (above roof level), equipment supports, stucco facades, etc. can greatly hamper appropriate installation of roofing components and thus have a significant impact on the costs and feasibility of reroofing. Do not flash directly to stucco, if needed install 3/4" minimum plywood.

1.11 Emergency Overflow Protection

All roof systems shall have a secondary means of evacuating water from the surface of the roof in the event the primary drainage system is blocked. The secondary system shall be totally independent of the primary system and may consist of overflow scuppers through walls, an independent internal overflow drainage system, or other suitable means. The structural components of a roof system shall be reviewed by a licensed professional structural engineer to ensure that any water, which accumulates on a roof system in the event of failure of the primary system, will not overstress the structure. Water shall not be allowed to accumulate to a depth greater than 4 inches. Must provide engineering calculations.

1.12 Internal Gutters

Internal gutters are prohibited on new facilities. Internal gutters on existing facilities shall be eliminated during reproofing projects to the extent practicable.

1.13 Roof Access.

All roof areas shall be permanently equipped with a reasonable means of access for purposes of maintenance of the roof system and any roof mounted equipment. Access can be in the form of internal roof scuttles. External wall mounted ladders may only be considered if no other means of access is available and only where safety and security can be maintained. Exterior ladders shall be provided with ladder guard with latch for security locks.

1.14 Roof-Mounted Equipment

Roof-mounted equipment is not acceptable if other locations for replacement can be found. All roof-mounted equipment shall be provided with roof surface walkway access to allow ease of maintenance and minimize roof surface damage. Roof-mounted antenna, lightning protection anchorage, lab equipment, or scientific devices shall be located in areas specifically designed for that purpose. Roof loads, walking surfaces, anchoring devices, mounting pads, curbs, or utility needs shall be designed and provided using appropriate details, adapted as required, from the NRCA Roofing and Waterproofing Manual.

A. No Unistrut or all thread rod to penetrate directly through roof.
B. All guy wire tie-downs must be welded steel tubing.
C. All penetrations are to be a minimum 12" apart from each other and wall flashings.

1.16 Roof Coatings

Specific roof coatings shall be considered for re-roofing projects only where the A/E and the USF-FM demonstrates that their use is appropriate and when specific and acceptable monitoring and control measures are carried out throughout the design and construction periods. When replacement of a roof is required, criteria for the replacement roof shall be in full compliance with this Standard.

1.17 Minimum Slope

A minimum slope of 1/4 inch/foot shall be required on all areas of a new roof system before final acceptance of that roof system by the University. On existing roofs where it is impractical to attain the required 1/4 inch slope, a minimum slope of 1/8 inch may be permitted if other provisions are made to ensure that the integrity of the roof and drainage systems are maintained. Overflow protection shall be provided.

1.18 Base Flashing

All base flashing shall extend a minimum of 10 inches up the vertical surface of curbs, walls, or roof penetrations. The dimension is from the top of the membrane (or ballast) to the top of the base flashing. All flashings will have a counter flashing installed. The use of a termination bar alone is unacceptable regardless of roof system.

1.19 Cants

Reinforced APP modified cant strip shall be required around all vertical interruptions of the roof system, such as curbs or walls. Basis of design: Derbigum Derbicant. Any substitution must have written approval by USF FM.

1.20 Access Door Thresholds

Access door thresholds to the roof or roof hatches shall be 12 inches above the adjacent roof surface. An acceptable walking surface shall be installed immediately outside the access door threshold on the roof system.

1.21 Roofing Contractors

All roofing contractors working on University facilities shall have a current State of Florida license and be certified/approved as a roofing contractor by the manufacturer for the system being installed or repaired. Roofing contracting firms shall have a minimum of 5 years of experience installing the type of system specified. Experience shall have been earned by the firm proposing the work, not by individual employees. In addition, the job site superintendent shall have a minimum of 5 years of experience installing the type of system specified.

1.22 Roofing Over Existing Roofs

The application of new roof materials over an existing roof will not be permitted until an infrared scan (or other acceptable method of moisture detection) has been completed. All wet areas detected by that scan/method shall be removed. After the new roof is installed, roof scans are to be made to record the condition of the new roof and compliance with specifications. Scan is to be performed by a certified third-party agency.

1.23 Roof Scans

All new roofing projects shall require acceptable infrared roof scans to ensure satisfactory compliance with specifications. Scan is to be performed by a certified third-party agency.

1.24 Insulating Light-Weight Concrete

Insulating light-weight concrete over vented (perforated) metal roof decking is permitted. Insulating light-weight concrete over structural concrete slabs as part of the roof system or over existing roof assemblies is acceptable provided:

A. Insulating light-weight fill thickness (over substrate or insulation board) is a minimum 1 inch, not to exceed 1-1/2 inches;
B. Insulating light-weight concrete is aggregate based and has a minimum compressive strength of 300 PSI;
C. Roof vents through the membrane will be acceptable provided they are insulated, spun aluminum roof vents having a one-way valve design. Roof vents constructed of PVC are not acceptable.
D. Tested by Underwriters Laboratories in accordance with the procedures of ASTM E 119 and listed in the most recent Underwriters Laboratories Fire Resistance Directory;
E. Tested by Factory Mutual Research (FM) and listed in the most recent FM Approval Guide as non-combustible or Class 1; and,
F. Tested by FM for windstorm classification I-120 and listed in the most recent Factory Mutual Approval Guide.

1.25 Restaurants

Restaurants are not acceptable for rejuvenation of an existing built-up roofing system.

1.26 Galvanized Metal Flashing

The use of galvanized metal flashing is not acceptable. Must have written approval by USF FM.

1.27 Asbestos

A Florida Department of Business and Professional Regulation (FL DBPR) licensed roofing contractor may move, remove, or dispose of asbestos-containing roofing material as long as at least one (1) trained supervisor (e.g., foreman or management-level worker) employed by the roofing contractor company is present at any site where regulated asbestos-containing roofing material is stripped, removed, or otherwise disturbed by renovation or demolition activities. Required supervisor training to perform roof asbestos work includes completion of a FL DBPR approved On-Site Roofing Supervisor course. Evidence of course completion must be made available at the roof renovation/demolition site and On-Site Roofing Supervisor refresher training must be completed every two (2) years. Removal of asbestos-containing roofing material must be conducted in accordance with the Environmental Protection Agency's Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP), Florida Statutes, Florida Department of Environmental Protection regulations, and current applicable requirements of the Florida Department of Business and Professional Regulation. It is also the FL DBPR licensed roofing contractor's responsibility to ensure Occupational Safety and Health Administration (OSHA) compliance at all times while on-site.

1.28 Codes and Standards

The University shall ensure that all architects, engineers, specifiers, consultants, inspectors, installers, and University maintenance personnel utilize the following resources: the latest edition of all applicable Building Codes, the Underwriters Laboratory (UL) Building Materials Directory; the UL Fire Resistance Directory; the American Society for Testing and Materials (ASTM) Board of Standards Volume for Roofing, Waterproofing and Bituminous Materials; the Architectural Sheet Metal Manual by the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA); recommended standards and technical details of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual. The USF Project Manager (USF-PM) shall emphasize to the A/E the need to design roof systems to resist extreme wind forces. Structural analyses shall be required to verify the integrity of all roof components. Wind uplift design shall comply with the most stringent requirements of applicable codes and the latest edition of American Society of Civil Engineers (ASCE) – Minimum Design Loads for Buildings and Other Structures (ASCE 7-10). The A/E shall also be required to consider long-term serviceability in the design of all roof systems.

1.29 Plan Review

The USF Facilities Management (USF-FM) shall review plans, specifications, and shop drawings for compliance with USF Roofing Standard and ensure that the requirements of this Standard are met.

1.30 Alternative Roof Systems

If the A/E proposes a specific alternative roof system, i.e. a unique or non-traditional system, the USF-FM shall conduct a preliminary evaluation of the system. A request to install an alternative roof system shall be in writing and include justification data. The USF-FM will respond whether or not the request is approved.

1.31 Pre-Construction Conferences

The USF-PM shall ensure that a roofing preconstruction conference is conducted for all new and re-proofing projects at which the USF-FM staff, A/E, General Contractor, roofing contractor, roofing manufacturer's representative, and other related trades representatives are present.

1.32 Protection Plans

The University shall require a specific protection plan for all new and re-roofing projects to describe the means of maintaining the building in a safe and watertight condition throughout the construction period. Existing and newly installed roof systems shall be considered in the protection plan to

ensure roofing operations do not damage them. Areas where the roof deck/structure are (or may be) damaged or deteriorated shall only be re-roofed when the occupied spaces below are unoccupied. Other potential phases of re-roofing operations can be hazardous to the facility and its occupants and shall be carefully reviewed with the A/E during design, with prospective contractors during bidding, and at appropriate phases during construction.

1.33 Inspection of Installation

A. USF Staff Roofing Inspection:
   1. USF provides FBC required code inspections and quality management (QM) inspections for new and replacement roofing construction. The USF QM inspector(s) will conduct daily inspections in accordance with USF Roofing QM Inspection Guide.
   2. The roofing contractor shall prepare and document the daily construction activities using the USF Roofing Inspection Form.

B. Roofing Inspection Consultant:
   1. Under the direction of USF-FM, a project is approved or required to provide independent Roofing Inspection Consultant (Roofing Inspector) services, provide full-time inspection whenever the roof system is being installed (roofing, flashing, coping, etc.).
   2. The Roofing Inspector shall be knowledgeable in roofing specifications and appropriate installation or repair procedures. The inspector shall be required to issue written reports on a daily basis which include, at a minimum: the name, address, and phone number of the roofing contractor, the name of the roofing foreman/superintendent, description of the day's weather, number of roofers/sheet metal mechanics on project, location of the day's work, description of work accomplished, deficiencies observed in the work requiring correction, a description of materials incorporated into the work and those stored for later use, and a quantitative summary of unit price items incorporated into the day's work. Roof system installation inspection may be acquired as professional services. The USF-FM shall require the A/E to include in the project specifications the requirement that the roof membrane manufacturer make a minimum of three (3) visits during application and one (1) visit at the time of the substantial completion inspection with a written report of each visit to the A/E and Owner. Manufacturer inspections shall be accomplished by technical representatives with a minimum of 5 years direct working experience with the technical department of that manufacturer. It is the contractor's responsibility to schedule the manufacturers inspections. USF FM and the A/E will be notified of the schedule and copied in on all reports.

1.34 Warranties

The University shall maintain copies of all roof warranties/guarantees and records of all roof maintenance work. The effective date of warranties is the date of substantial completion by Owner.

1.35 Comprehensive Roof Management Program

The University shall establish a comprehensive roof management program for each facility to include:

A. **Historic Records and Roof Asset Information:** Listing the A/E, General Contractor, roofing contractor, manufacturer and supplier, type of roof system including all individual components, warranty/guarantee dates and data, history of repairs, regular surveys and inspections data, preventive and planned maintenance procedures, projected replacement and budget needs.

B. **Periodic Roofing Inspections and Checklist:** At least one inspection per roof area per year by qualified independent roof technicians who are not affiliated with roofing contractors, roof system manufacturers or suppliers including descriptions of roof related defects in the surfacing, membrane, membrane flashings, metal flashings, penetrations, equipment, walls, etc.

C. **Action Required:** Itemized descriptions of remedial work requirements with itemized cost estimates for each necessary to restore the integrity of the defective area to the service level of the overall roof system. A roof plan for each roof area or group of roof areas indicating the precise location of each remedial action necessary and the non-destructive testing results. A cumulative summary of all maintenance and repair costs.

D. **Projected University Cost Summary:** An overall repair/replacement budget in tabular form summarizing the derived repair costs per facility. As part of this summary, maintenance costs are to be projected five (5) years from date of each inspection to provide anticipated budget requirements well in advance. Costs for roof replacement versus roof repair shall be included with respective costs by year.

END OF STANDARD PRACTICE FOR ROOFING SYSTEMS AT UNIVERISTY OF SOUTH FLORIDA

DIVISION 08 OPENINGS

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SECTION 08 10 00 DOORS & FRAMES

1.1 REFERENCE STANDARDS

A. USF Cost Containment Guideline (CCG) latest edition.
B. Particular attention is called to STANDARDS PUBLISHED by the following with regard to work associated with this Section.
   1. Steel Door Institute (SDI)
   2. National Association of Architectural Metal Manufacturers (NAAMM) / Hollow Metal Manufacturers Association (HMMA)
   3. Architectural Woodwork Institute (AWI)
C. Compliance with all codes and ordinances applicable to the particular project is mandatory. The Architect and/or Engineer shall be responsible for all such compliance matters.
D. Install fire doors and windows according to National Fire Protection Association (NFPA) 80.

1.2 QUALITY ASSURANCE

A. DOORS
   1. Doors shall generally have a minimum width of 3 feet and a minimum height of 7 feet. Medical, research, storage and access needs may require doors of larger sizes.
   2. Exterior doors shall be anodized aluminum or galvanized steel.
   3. All exterior doors shall be insulated.
   4. Material and finish of interior doors must also be suitable for the particular project.
   5. Plastic laminate doors with appropriate metal edge protection may be used on interiors.
   6. Tops and bottoms of wood doors must be sanded and sealed.
   7. All doors shall be of a type to withstand the abuse to which they will be subjected. Architect shall coordinate with USF Project Manager (USF-PM) and the User, to establish and determine usage characteristics for doors throughout the project.
B. FRAMES
   1. Exterior door frames shall be standard rectilinear profiles of anodized aluminum or galvanized steel are preferred. All exterior frames must be weather-stripped.
   2. Interiors shall be paintable hollow-metal frames.
   3. Knocked down frames: Acceptable only when welded frames are not practicable.
   4. All frames shall be adequately constructed to receive the hardware being used and to withstand abuse.
C. MINIMUM CLEARANCES REQUIRED FOR INSTALLATION OF AUTOMATIC DOOR OPENERS
   1. Clear space above door frame, below overhead dropped soffit: Maintain 12 inches minimum from top of frame to underside of ceiling or soffit to accommodate future installations of automatic door openers.
   2. Clear width, door and adjacent perpendicular walls to allow for automatic door openers: In addition to required ADA clearances, maintain 40 inches total clear width to accommodate future installations of automatic door openers.
D. SUBMITTALS. See Division 1, General Requirements.

1.2 PROHIBITED MATERIALS AND INSTALLATIONS

A. Sliding, bi-fold doors, pocket and hollow-core wood doors are prohibited.
B. Mineral Core Doors are prohibited.
C. Use of ink marking pens on surfaces of any kind of materials is prohibited. Experience has shown that such marks bleed through paint and other finishes.
D. Reconditioned or used wood doors is prohibited.
E. Narrow stile and narrow top and bottom rail aluminum doors are prohibited.

END OF SECTION 08 10 00

SECTION 08 13 00 METAL DOORS AND FRAMES

1.1 STEEL DOOR AND FRAMES

A. STEEL DOORS
   1. EXTERIOR DOORS shall be not less than 16 ga galvanized metal. The top channel of each metal door shall be turned web up, to avoid a dirt pocket or moisture trap. Louvered doors and full glazed doors shall have 12 inches bottom rails.
      a. Do not expose exterior door to direct western solar exposure to.
   2. INTERIOR DOORS shall be not less than 18 ga metal. Louvered doors and full glazed doors shall have 12 inches bottom rails.

1.2 STEEL FRAMES

A. STEEL FRAMES shall be one-piece, welded frames of not less than 16 ga metal for interior doors, 14 ga for frames over 3 feet-6 inches. Frames in interior walls through 8 inches thickness shall be full width of wall. Knock-down frames are generally prohibited; however, such frames may be used in movable partitions. In remodeling work, permission will be granted by the USF-PM to use knock-down frames if conditions justify their use.

B. Frames for exterior doors shall be one-piece, welded frames of 14 ga or heavier metal. All frames shall be heavily reinforced at hinge, strike and closer locations. Exterior frames shall be galvanized to prevent rust and corrosion.

END OF SECTION 08 13 00

SECTION 08 14 00 WOOD DOORS

1.1 WOOD DOORS

A. WOOD VENEERS: Judicious selection of face veneers shall be exercised. The A/E shall be required to make a grain selection, subject to the approval of the USF-FM.
B. INTERIOR WOOD DOORS shall be flush type solid core, hardwood.
C. GUARANTEE: Wood doors shall have lifetime guarantee. Guarantee to include rehanging of doors at no cost to the University.

END OF SECTION 08 14 00

SECTION 08 41 00 ENTRANCES AND STOREFRONTS

1.1 GENERAL DESIGN CONSIDERSATIONS

A. Protect exterior door assemblies from rain and wind driven rain.
B. No porous type flooring material, such as wood shall be installed at exterior doors directly exposed to rain and wind driven rain.

1.2 ALUMINUM ENTRANCES AND STOREFRONTS

A. Doors shall be aluminum and glass. All glass installed in hazardous locations shall be fully tempered safety type.
B. DIMENSIONS of components shall be at least:
   1. Metal thickness: 1/8 inch
   2. Head rail size: 4-1/2 X 1-3/4 inches or 4 X 2 inches
   3. Jamb size: 4-1/2 X 1-3/4 inches or 4 X 2 inches
   4. Bottom rail size: 6-1/2 X 1-3/4 inches or 6 X 2 inches
   4. Hardware reinforcement: 1/4 inch thick metal material
   6. Architectural hardware should be included in the specifications.

1.3 ALUMINUM ENTRANCE AND STOREFRONT FRAMES

A. DIMENSIONS of components shall be at least:
   1. Metal thickness: 1/8 inch
   2. Head size: 4-1/2 X 1-3/4 inches or 4 X 2 inches
   3. Jamb size: 4-1/2 X 1-3/4 inches or 4 X 2 inches
   4. Hardware reinforcement: 1/4 inch thick metal material

1.4. EXTERIOR DOORS SUBJECT TO HIGH WIND CONDIITONS

Exterior Doors subject to high wind conditions shall be balanced type.

1.5 REMOVABLE MULLIONS

Pairs of double doors shall have a removable mullion with lock strike unless approval is given by the USF-FM to deviate from this requirement.

1.6 GLAZING

Glass in entrances and storefronts shall be fully tempered (FT) safety type.

A. EXTERIOR GLAZING. Coordination with HVAC design is required. Consideration should be given to the solar orientation, use of high performance and tinted glass, sun-shade materials, and other devices which wall prevent excessive solar gain. Location of glazing on east and west elevations should be kept to a minimum. Review opportunity to utilize daylight in coordination with interior lightning. Window frames shall be water–tight.
B. WHERE TEMPERED GLASS IS USED: When required by code, glazing stops covering mill marks in the glass shall be provide. Tempered glass which passes testing requirements of ANSI Z97.1 shall be used in all fully glazed doors as well as any entrance or exist doors having over 6 square feet of glass.
C. GLAZING FOR INTERIOR PARTITIONS. Shall have a minimum thickness of 1/4 inch.
D. SPECIAL GLAZING. Required when transmission of radioactivity is to be shielded.
E. INSULATING GLASS GUARANTEE. Provide manufacturer's written guarantee for ten (10) years from the start of building completion stipulating a replacement will be provided for any unit which develops edge separation r other defects which materially obstruct vision through the glass or safety or affects the insulating qualities. Exception: guarantee shall not cover glass breakage from physical abuse, earthquakes, storm or similar causes.
F. PARTIAL SHADING OF INSULATING GLASS can cause stress breakage. Manufacturers consider this to be a design error and will not replace glass broken by temperature differential stresses. Avoid partial shading of large panes.

END OF SECTION 08 41 00

SECTION 08 51 00 METAL WINDOWS

1.1 REFERENCE STANDARDS

A. USF Cost Containment Guidelines (CCG) latest edition.
B. Flat Glass Marketing Association (FGMA)"Glazing Manual".
C. Sealed Insulating Glass Manufacturers Association (SIGMA) Standards/Specifications.
D. Metal windows shall meet the requirements set forth by the Steel Windows Institute (SWI).

1.2 QUALITY ASSURANCE

A. PERFORMANCE REQUIREMENTS: The manufacturer shall submit copies of test reports, made or witnessed by an independent testing laboratory, which show conformance to the specified performance standards.
   1. Careful coordination is required between the materials being specified for the various types of flashing. In each instance, the Architect shall follow the requirements of the Cost Containment Guidelines, and ensure that when questionable materials are specified, such as aluminum, especially when being used in a salt environment, meets the "40-year-lifecycle" test, and shall obtain supporting data from manufacturers.
   2. When flashing materials are used in conjunction with roofing systems, roofing manufacturers must also verify that specified materials are compatible with their materials, and that combined systems will not void required guarantees and warranties.
   3. A window mock-up is required for each type of window. In addition to window mock-ups, it will be required that after the first window has been installed by the regular work crew, it shall be inspected and tested to ensure full compliance with approved shop drawings, and with all related standards and specified requirements, before the remaining windows are installed. The Architect, General Contractor, Sub-Contractor, and related trades, together with the window manufacturer's representative will be required to be present at this first installation, and be expected to give a written report of approval before proceeding further.
B. Such standards shall be specified by the A/E.
C. WARRANTY. Provide a written warranty, guaranteeing that all parts of the installation will meet specified performance requirements and will be free from defects in materials and workmanship for a period of two (2) years following acceptance. Weather-stripping shall be guaranteed for a period of five (5) years. Warranties shall certify that all work is in accordance with the Contract Documents and shall contain a statement that should any defect develop during the warranty period, caused by improper workmanship or materials, such defects will be repaired or windows will be replaced at no expense to the University.

1.3 ALUMINUM WINDOWS

A. WINDOW FRAMES AND SASHES in new construction shall generally be of anodized aluminum. Only commercial grade "C" or heavy commercial grade "HC" are acceptable. Family of paints, such as the Fluoropolymers, offering a five (5) years warranty for Southern Florida exposure, should be also considered.
B. ENERGY CONSERVATION must be given thorough consideration when incorporating fenestration into the building design.
C. FOR MAINTENANCE PURPOSES it is preferred that all windows be arranged, manufactured and installed so that complete maintenance can be accomplished from the room side, including glazing, washing, screening and normal repairs. Windows with fixed sashes should be designed to allow the "fixed" sash to be operable only for cleaning and maintenance, thus indicating the use of sliding, pivoted or tilting sashes at such locations.
D. CERTIFICATION (signed and sealed) drawings shall be provided by a Florida registered engineer on anchorage method of windows and openings.
E. Performance requirements per Section 08 51 00, Subparagraph 1.2, Quality Assurance.

1.4 GLAZING

A. EXTERIOR GLAZING. Coordination with the HVAC design is required. Consideration should also be given to the use of tinted glass, sun-shade materials, and any other devices which will prevent excessive solar gain. Location of glazing on east and west faces should be kept to a

minimum. Review opportunity to utilize natural daylight in coordination with interior lighting. Window frames shall be weather-tight.

B. WHERE TEMPERED GLASS IS USED, when required by code, glazing stops covering mill marks in the glass shall be provided. Tempered glass which passes testing requirements of USAS Z97.1 shall be used in all fully glazed doors as well as any entrance or exit doors having over 6 square feet of glass.
D. GLAZING FOR INTERIOR PARTITIONS shall have a minimum thickness of 1/4 inch.
E. SPECIAL GLAZING is required when transmission of radioactivity is to be prohibited.
F. INSULATING GLASS GUARANTEE: Provide manufacturer's written guarantee that, for 10 years from date of building completion stipulating a replacement will be provided for any unit which develops edge separation or other defects which materially obstruct vision through the glass or safety or affects the insulating qualities. Exception, guarantee shall not cover glass breakage from physical abuse, earthquake, storm, or similar causes.
G. PARTIAL SHADING OF INSULATING GLASS can cause stress breakage. Manufacturer's consider this to be a design error and will not replace glass broken by temperature differential stresses. Avoid partial shading of large panes.

END OF SECTION 08 51 00

SECTION 08 60 00 SKYLIGHTS

1.1 SKYLIGHTS

A. Skylights are prohibited.

END OF SECTION 08 60 00

SECTION 08 70 00 FINISH HARDWARE

1.1. REFERENCE STANDARDS

A. USF Cost Containment Guidelines (CCG), latest edition.
B. All doors, hardware, closers hardware adjustments, etc., shall provide means for easy access and use by the physically disabled, (paying special attention to Americans with Disability Act (ADA) Standards, and to the Florida Accessibility Code).

1.2 ITEMS INCLUDED

A. SPECIFICATIONS FORMAT: It is preferred that this section include all items of finish hardware, including items listed in the CSI MASTERFORMAT, with the exception of window operators, which should be included with section in which windows are specified. Such a format will facilitate the writing of hardware specifications in the form usually used by Architectural Hardware Consultants. It is also preferred that storefront entrances include hardware.

1.3 QUALITY ASSURANCE

A. QUALITY AND DESIGN. Hardware must be adequate for the intended use and must satisfy code requirements, but shall not be excessively sophisticated nor unnecessarily expensive. Specifications for finish hardware shall be reviewed with the USF Project Manager (USF-PM), the using agency, and the FM-OPS Locksmith prior to completion of construction documents. Make submittal at a time which will allow for adequate review and for making required changes before final printing.
B. STANDARDS AND OTHER MANUFACTURERS MEETING THE REQUIREMENTS. For each item, specify and schedule products of one manufacturer as the standard and, whenever possible, name two other acceptable manufacturers meeting the requirements. Lock set shall be Sargent with no substitutions.
    1. A complete list of items proposed as the standards, together with manufacturers' names and with the names of manufacturers whose products meet the requirements must be included in the outline specifications for the Design Development Submittal. Approval of the items must be obtained before their inclusion in the hardware schedule in final documents.
C. For renovation projects, all door hardware shall match existing, unless directed otherwise by the USF-PM.
D. The Architect must verify, for function and finish, the compatibility of proposed hardware with that already in use at the University. This is particularly critical on renovation projects. All submittals must be accompanied by manufacturers' cut sheets and sufficient related data to ensure a thorough evaluation. Door and hardware assemblies in the University, Residence Halls, and the Health Sciences Center frequently experience extreme stress and heavy usage. Therefore, all door assemblies (doors, hardware, frames, anchors, etc.) shall be designed as appropriate to the specific use and location. It is recommended that hardware installations be designed by a properly qualified member of the American Hardware Consultants Association. All hardware on fire doors shall comply with the applicable codes.
    1. To avoid expensive stockpiling of an extensive variety of repair parts and replacement items and to help the Owner to achieve cost effective maintenance, it is required to standardize brands, types, styles, and finishes of all hardware products.

1.4 SUBMITTALS

A. Simultaneous hardware and wood, steel and aluminum door submissions are preferred, in order to promote closer coordination.
B. HARDWARE SCHEDULES
    1. USF-FM will provide project construction documents to USF Facilities Management-Operations Key Shop (FM-OPS Key Shop) locksmith to review and identify format for Key Schedule.
    2. FM-OPS Key Shop locksmith and USF Project Manager will coordinate meeting with departments to review process for developing Key Schedule.

3. A complete parts list for all finish hardware shall be included in the final close-out documents prior to Substantial Completion.
4. HARDWARE FOR ENTRANCE DOORS: Aluminum entrance manufacturer to provide door hardware except cylinders.

1.5 PROHIBITED MATERIALS AND INSTALLATIONS

A. THRESHOLDS RAISED ABOVE FLOOR LEVELS at doors to trash and receiving rooms and over 1/2 inch high at doors intended for use of disabled persons.
B. FLOOR MOUNTED DOOR STOPS.
C. DOOR KNOBS OR LEVERS CONTAINING LOCK CORES OR KEYING DEVICES.
D. FLOOR CLOSERS AND CLOSERS CONCEALED IN DOOR HEADS.
E. DOOR CLOSERS WITH INTEGRAL SMOKE DETECTORS. Smoke detection systems must be made a part of the documents for fire protection work.

1.6 HINGES

A. BUTTS: Five-knuckle, wrought-steel. Specify ball bearing butts for doors equipped with closers. Butts shall be heavy duty, with four (4) bb for exterior doors and interior doors over 3 feet wide; use standard weight butts with two (2) bb for interior doors up to 3 feet wide. Specify non-bb for all doors without closers.
B. STAINLESS STEEL BUTTS with non-removable pins shall be used on exterior doors.

1.7 LOCKS

A. LOCKS: Specify heavy duty, mortise locks only, stainless steel 3/4 inch one-piece reversible latch bolt with anti-friction piece for quiet operation and to prevent scratching of strike plant. Locks shall be reversible and shall have capability for changing function within any one case. Lock sets shall be Sargent Series 8200 lever type, LL trim, 26D finish, on interior doors and 26D finish on exterior doors, with no substitutions.
B. FUNCTIONS: Unless instructed otherwise by the USF-PM, select lock sets and latchsets having the functions shown on the following page. Specifications or door schedules shall show both the Federal Specification Numbers and the manufacturer's numbers to aid checking of documents and reduce the opportunity for error in function.

	DOOR LOCATION OR USAGE	FED. SPEC. NUMBER	FUNCTION
1	High Security	LC-8247-LL-26D	Key and thumbturn both retract & project deadbolt. Trim outside is locked by toggle or projecting deadbolt. Trim outside is unlocked by toggle only. Key retracts both latchbolt and deadbolt, trim outside remains locked. Trim inside retracts latchbolt only, deadbolt is retracted manually & trim outside remains locked. ANSI F08/F10.
2	Normal Office	LC-8205-LL-26D	Key outside retracts latchbolt, also locks & unlocks outside trim. Trim inside always retracts latchbolt, trim outside remains locked. Thumbturn inside locks & unlocks outside trim. Auxiliary deadlatch. ANSI F04.
3	Mech./Ele./ Equip. Rooms, Storage Closets	LC-8204-LL-26D	Key outside retracts latchbolt. Trim outside locked at all times. Trim inside always retracts latchbolt. Auxiliary deadlatch. ANSI F07.
4	Classroom Door	LC-8237-LL-26D	Key outside retracts latchbolt, also locks & unlocks outside trim. Trim inside always retracts latchbolt. Auxiliary deadlatch. ANSI F05.
5	Communicating /Passage Doors	LC-8215-LL-26D	Trim from either side retracts latchbolt at all times. ANSI F01.
6	Privacy Restroom Door	LC-8265-LL-26D	Lever outside retracts latchbolt except when locked by thumb turn inside. Lever inside retracts latchbolt and unlocks outside lever. Emergency Release locks/unlocks

			lever outside – by coin, screw driver or key. Thumb turn locks and unlocks lever outside. Closing the door will unlock lever outside. ANSI 22.
7	Doors with Card Access or Electromechanical Function	8271-LL-26D 24V RX	Solenoid activated mortise lock. Key outside retracts latchbolt. Lever outside retracts latchbolt except when locked. Lever outside can only be locked electronically. Lever inside always retracts latchbolt. Auxiliary deadlatch.
8	Pipe Chase	475-26D or 4875-26D	Key outside operates deadbolt. Thumb turn inside operates deadbolt.
9	Outside Entrance Door	Von Duprin 98/99 with Night latch outside trim operation	Outside by key only; pull handle outside with no thumb piece; panic bar; latch bolt, no vertical rod.
10			Lever Handles shall be Sargent L Lever Design With L Rose Design.
11			Residence Halls - coordinate with USF-PM

1.8 KEY WAYS

A. Keys and one bitted cylinders to be by Sargent for all facilities on the Tampa Campus.
1. INTERIOR AND EXTERIOR DOORS: Sargent "LA" series key way, one bitted.
2. INTERIOR DOORS: Key way series to be assigned for building during FM-OPS Key Shop.
B. PROVIDE TWO BLANK KEYS PER CYLINDER. Contractor shall install key way series as per contract documents (construction cores).
C. HEALTH SCIENCES CENTER (College of Medicine, College of Nursing, and College of Public Health) shall be Best "M" series keyway, with 7-pin interchangeable core (IC) cylinders.
D. RESIDENCE HALLS coordinate with USF-PM.
E. FMHI shall be by Yale "Y" series keyway, with 6-pin interchangeable core (IC) cylinders.

1.9 CLOSERS

A. Closers shall be LCN 4040XP series surface mounted, non-handed, and full rack and pinion hydraulic action. Open pressure of 5 pounds maximum for interior doors, 8.5 pounds maximum for exterior doors. Covers shall be of clean line design, high impact, with aluminum enamel finish and shall be type which DOES REQUIRE removal to make adjustments. Final selection and approval of closers must be coordinated with FM-OPS.
B. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder. Cylinder body shall be 1-1/2 inches in diameter, and double heat treated pinion shall be 11/16 inch in diameter with double D slab drive arm connection.
C. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to –30 degrees F.
D. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed, and backcheck.
E. All closers shall have solid forged steel main arms (and forged forearms for parallel arm closers).
F. All surface mounted mechanical closers shall be certified to exceed ten million full load cycles by a recognized independent testing laboratory.
G. Powder coating finish to be certified to exceed 100 hours salt spray testing by Electrical Testing Lab (ETL), an independent testing laboratory used by Builders Hardware Manufacturers Association (BHMA) for American National Standards Institute (ANSI) certification.
H. Refer to door and frame details and furnish accessories such as drop plates, panel adapters, spacers and supports as required to correctly install door closers. State degree of door swing in the hardware schedule.
I. Use concealed or minimum profile paralleled arm closers.
J. INTERIOR DOOR CLOSERS shall not be visible from corridors, lobbies, and other public spaces. Room side visibility is desirable.

K. OVERHEAD CLOSERS shall be mounted so that they are not exposed to the weather and so that they do not hit walls or other surfaces when doors are opened to full swing (minimum full swing: 90 degrees). Closers shall be mounted to doors with through bolts.

1.10 STOPS

A. Overhead stops are preferred on exterior doors. They shall be coordinated to stop the door simultaneously with the door closer check mechanism, when provided. Hold-open or select-hold-open features on overhead stops of exterior doors are not permitted, except where the building function requires such, in which case the select-hold-open type is to be used.
B. INTERIOR DOORS
   1. Wall mounted convex rubber bumpers, with concealed fasteners shall be used. Provide blocking in wall as required for bumper installation.
C. EXTERIOR DOORS
   1. Specify extra heavy-duty door checks or some other means of protection from wind damage.

1.11 KICK PLATES: Kick plates shall extend the full door width.

1.12 POWER DOOR OPERATORS

A. DISABLED ACCESS
   1. On new buildings and renovations, at least one entrance door shall be electrically operated door, to facilitate access.
B. DOOR OPERATORS may be surface-mounted or concealed in door head.
C. ELECTRIC OPERATOR SWITCHES may be wall-mounted or post-mounted.
D. INSTALLATION AND EQUIPMENT shall be provided by a factory authorized and trained distributor.
E. MAINTENANCE MANUALS in triplicate shall be included in the close-out documents showing templates, wiring diagrams and full maintenance instructions.
F. AUTOMATIC RESET is required. If the door is locked or if the door encounters an obstacle when the operator is activated, the operator system will do one of the following:
   1. Continue to push gently on the door until the time delay period expires, then close.
   2. Sense the resistance, shut off power and close.
G. OPERATOR SYSTEMS shall have:
   1. Adjustable time delay period (opening time plus hold-open time) shall be approximately 20 seconds, adjustable from at least 40 seconds to 7 seconds minimum.
   2. Adjustable opening speed (time from activation until door is fully open) shall be approximately 7 seconds, adjustable from at least 11 seconds to 5 seconds minimum.
   3. Slow closing speed of approximately 7 seconds. Adjustability is desirable but not mandatory.
   4. Full compliance with ANSI A117 and Life Safety Code.
   5. Weatherproof controls and circuitry.
   6. Low voltage current from operators to controls.
   7. Heavy-duty “supermarket” quality.
   8. Easy manual door operation. In event of power failure or pedestrian impatience, pressure on strike side of door equal to that required to open a conventional 36 inches wide door with closer shall be adequate to open the door manually.
   9. Easy access for maintenance. Access covers, if provided, must also have vandal resistant screw attachment.
   10. Operation must be smooth and quiet.
   11. Closers shall be spring type which functions with power on and off.
   12. Suggested operators are Gyro-Tech “System 500”, LCN “Senior-Swing” electro-mechanical unit, Besam “Econo-Swing” Model 350, or Besam “Electra” Model 150.

1.13 PANIC DEVICES

A. Doors required by code to have Panic Devices: Panic devices shall be Von Duprin 98/99 series with L trim or QEL+98/99 Series for Electric Latch retraction with push pad type, lever type function. Thumb-piece trim are not acceptable. All emergency exits must be equipped with

panic devices. Panic devices shall be through-bolted where possible. Vertical rod devices shall be used at double doors. Emergency Exit alarm locks may be key-operated from the inside, the outside or both, as directed by the USF-FM.

B. Exit devices shall be touchpad style, fabricated of brass, bronze, stainless steel, or aluminum, plated to the standard architectural finishes to match the balance of the door hardware.
C. All exit devices shall incorporate a fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with exit device operation. Touchpad shall extend a minimum of one half of the door width. All latchbolts to be deadlatching type, with a self-lubricating coating to reduce wear.
D. End-cap will be sloped to deflect any impact from carts and they shall be flush with the external mechanism case. End caps that overlap and project above the mechanism case are unacceptable. End cap shall utilize a two-point attachment to the mounting bracket.
E. Touchpad shall match exit device finish, and shall be stainless steel for US26, US26D, US28, US32, and US32D finishes. Only compression springs will be used in devices, latches, and outside trims or controls.
F. Plastic templates shall be included with each exit device to facilitate a quick, easy and accurate installation.
G. Strikes shall be roller type and come complete with a locking plate to prevent movement.
H. All rim and vertical rod exit devices shall have passed a 5 million cycle test based on ANSI A156.3, 1994, Grade 1 test standards and certified by an independent testing lab. All mortise lock exit devices shall have passed a 10 million cycle test based on ANSI A156.3, 1994, Grade 1 test standards and certified by an independent testing lab.
I. Exit devices shall be UL listed panic exit hardware. All exit devices for fire rated openings shall be UL labeled fire exit hardware.
J. Lever trim for exit devices shall be vandal-resistant type, which will travel to a 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
K. RESIDENCE HALL PANIC HARDWARE: Coordinate with USF-PM.

1.14 MISCELLANEOUS

A. THRESHOLDS: Thresholds shall be set in full bed of mastic and thoroughly anchored to concrete floors. Expansion shields of any kind are generally not acceptable, particularly at construction joints.
B. SILENCERS: Silencers or mutes shall be provided at all door frames, at a minimum of three per door.
C. CLOSERS: Closers and/or magnetic hold-open devices shall be specified in accordance with all applicable codes. They shall be integral, the one with the other, when possible.
D. PUSH/PULL: Push/pull finishes shall match other hardware used. Where both a push and pull are used, they shall be through-bolted to each other.
E. PULLS: Pulls on exterior doors shall be of a design that will not create a lever action at the point of attachment to the doors; i.e., mountings shall be made with two-point connections to the door.
F. FINISHES: USP finish may be specified for butts on exterior hollow metal doors which are not exposed to public view. Closers shall be finished to suit room decor. For all other hardware, specify US-10 or US-26D. Other finishes may be used only where necessary to match materials to which hardware is applied.

1.15 HOLD OPEN DEVICES

A. Magnetic hold-open devices should be specified in areas where automatic door closers are required, but traffic patterns force the doors to be normally open. The hold-open devices shall automatically release the doors upon activation of the fire alarm system or power failure.

1.16 PROVISIONS FOR NOISE CONTROL

A. Refer to the Program of Requirements for possible special requirements. On machine room doors and other doors where excessive noise is anticipated, weather stripping at heads and jambs and surface applied automatic door bottoms shall be specified.

1.17 AREAS OF RESCUE

A. Doors shall have closers and have a tight fitting.

1.18 HARDWARE

A. FM-OPS Key Shop locksmith will cut keys and prepare cylinders per Key Schedule.
B. FM-OPS Key Shop locksmith will replace key-way (construction core) series installed by contractor with different key-way series per Key Schedule.
C. Door closers shall be adjusted prior to Substantial Completion so that doors shall be operable by a maximum required pressure of 8 pounds.

END OF SECTION 08 70 00

SECTION 08 80 00 GLAZING

1.1 GLAZING

A. Use of tinted, mirrored, fritted, translucent glass, and/or spandrel panels is subject to approval of the USF-FM.

1.2 DESIGN FOR ENERGY CONSERVATION

A. A/E shall evaluate energy conservation considerations in design (location, size, shading, etc.) and selection of glazing. Energy model to include data for specified glazing assembly.

1.3 LAMINATED GLASS

A. Shall be 1/4 inch thick laminated safety glass, or an approved equal.

1.4 INSULATING GLASS

A. The following paragraph shall be included in the specifications; edit the heading to apply to the particular type of glass specified.
   1. INSULATING AND REFLECTIVE INSULATING GLASS, GUARANTEE: Provide manufacturer's written guarantee that, for 10 years from date of building completion, a replacement will be provided for any unit which develops edge separation or other defects which materially obstruct vision through the glass or safety or affects the insulating qualities; except, that guarantee shall not cover glass breakage from physical abuse, earthquake, storm, or similar causes.
   2. PARTIAL SHADING OF INSULATING GLASS can cause stress breakage. Manufacturers consider this to be a design error and will not replace glass broken by temperature differential stresses. Avoid partial shading of large panes.

1.5 MIRROR GLASS

A. Framed mirrors for toilet and shower rooms should be included in Division 10, Specialties. Large mirrors unframed, or in custom made frames, should be included in this division.

END OF SECTION 08 80 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 09 FINISHES

DIVISION 09 FINISHES
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SECTION 09 00 00 MISCELLANEOUS REQUIREMENTS

1.1 PROHIBITED CONSTRUCTION PRACTICES AND MATERIALS

A. ANCHORAGES. Suspensions for ceiling runners must be secured to the structure above by toggle, molly bolts, self-drilling anchors, cast-in inserts, or bolts in expansion shields. The use of wood, lead, or plastic plugs is prohibited.
B. ASBESTOS. Use of this material, in any form, is expressly prohibited.
C. ACOUSTIC TILE. The use of acoustic tile or lay-in panels at less than 8 feet above floor is prohibited unless approved by USF Facilities Management (USF-FM).
D. FIRE-RATED CEILINGS. Provide as required for floor/ceiling and roof/ceiling assemblies.
E. RESILIENT TILE. The use of resilient tile in front of urinals is prohibited.
F. USE OF INK MARKING PENS ON SURFACES of any kind of materials is prohibited. Experience has shown that such marks bleed through paint and other finishes.
G. NON-STANDARD SIZES OF RESILIENT TILE are prohibited.

1.2 FIRE-RATED CEILINGS

A. Finish materials for fire-rated ceilings will generally, but not necessarily, be limited to gypsum board.

1.3 REMODELING

A. In buildings requiring remodeling, patched materials and surfaces must be made to look as much like new as is economically feasible. It is the intent to avoid a patched appearance. Where patching is required, finish material should be applied to an apparent transition (change in elevation).
    1. TRANSITIONS. In areas where partitions must be removed to create new areas, careful planning is required to ensure that finishes of the newly created surfaces are homogeneous. If new materials butt against existing materials in any one plane, existing and new materials must be finished to match each other, not only in color but also in patterns and surface texture. If such a match is impossible to achieve and the budget is such that existing materials cannot be replaced, the consultant shall show, by detailed drawings, and specify that existing materials be blended with the new in such a manner that the transitions from one material to another cannot be readily observed, OR that the different materials be arranged in a pleasing design at the juncture of the materials.
    2. SURFACE PREPARATION. Existing surfaces with several old coats of paint or varnish, to which paint, vinyl covering or other thin finishes will be applied, must have old finishes stripped off, down to the substrate. Deteriorated areas of substrate must be removed and replaced with suitable filler; voids and gouged areas must be patched. A skim coat of veneer plaster shall be applied to previously plastered areas and troweled to a true, smooth surface. Wood surfaces shall be spackled and sanded smooth.

1.4 COLOR SELECTIONS

A. Color selections must be approved by the USF-FM before finish schedules are furnished to the contractor.

END OF SECTION 09 00 00

SECTION 09 20 00 LATH AND PLASTER

1.1 EXTERIOR PORTLAND CEMENT PLASTER STUCCO:

A. Use integral color, or paint. Comply with American National Standards Institute (ANSI) Portland Cement and Plastering Standards ANSI A42.2 and ANSI A42.3.

END OF SECTION 09 20 00

SECTION 09 30 00 TILING

1.1 CERAMIC AND PORCELAIN TILE

A. The use of the word "mosaics" is prohibited on drawings or in the specifications because of the connotation of this word implying pictorial work. If tile mosaics are actually used, specify by giving tile sizes and fully dimensioned graphic plan.
   1. FLOOR TILE. Ceramic tile is not approved for use in high traffic and wet areas. Porcelain tiles are preferred where tile is specified for toilet room floors. A/E to specify price group. Provide tile base with tile flooring.
   2. WALL TILE. Where wall tile is specified in wet areas (shower stall, back splash, etc.), provide glazed ceramic or porcelain tile.
   3. Request installer to furnish extra box of tile for maintenance purposes.

1.2 SHEET MEMBRANE

A. Crack isolation sheet membrane substrate is required for all floor tile installation. Provide lifetime warrantied, highest performance crack isolation and waterproofing sheet membrane substrate for tile flooring in high traffic and wet areas.

END OF SECTION 09 30 00

SECTION 09 51 00 ACOUSTICAL TREATMENT

1.1 ACOUSTIC MATERIALS

A. Mineral fiber lay-in type acoustic ceilings shall be specified. Panels shall be a minimum of 5/8 inch thick and maximum panel size shall be 2 X 2 feet. Other size panels may be used subject to review and approval by the USF-FM. Edge treatment shall be Tegular, unless otherwise specified. All ceiling panels shall be non-directional fissured.

1.2 COORDINATION WITH WORK OF OTHER TRADES

A. Ceiling panels may be laid only after ALL work, including cabling, has been completed above the ceiling.

1.3 FIRE RATED CEILINGS

A. When fire rated ceilings are required, an alternate solution for obtaining fire separation must be developed.

1.4 SUSPENSION SYSTEMS

A. Ceiling suspension systems shall be supported directly from the building structure and shall be supported at all four corners of fluorescent light fixtures. Installations require coordination with electrical layouts. Separate safety supports for light fixtures must be specified in Division 26, Electrical.

1.5 EXTRA MATERIALS

A. Furnish quantity of full size units equal to 3% of amount installed, for each type, composition, color, pattern, and size.

END OF SECTION 09 51 00

SECTION 09 53 00 METAL SUPPORT SYSTEMS

1.1 CEILING SUSPENSION SYSTEMS

A. SUPPORTS IN MOIST LOCATIONS. Stainless steel hanger wires must be specified for canopy suspension systems and for other systems in locations subject to moisture penetration or condensation.

B. SUPPORTS FOR CEILINGS. Ceiling grid systems shall not be supported from ductwork, electrical conduit, heating or plumbing lines, and vice versa. Each utility system and the ceiling grid system shall be a separate installation and each shall be independently supported from the building structure. Where interference's 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 appurtenances requiring servicing.

C. The requirements for independent supports for ceiling grid systems shall be repeated in the applicable sections of the specifications. If patented ceiling suspension systems are required for plaster, gypsum board, and acoustic ceilings, a separate section may be written for the systems; or each separate system may be specified in the section for the particular ceiling material. However, it is preferred that suspension systems for acoustic ceilings be specified with the ceiling materials to avoid divided responsibilities.

END OF SECTION 09 53 00

SECTION 09 58 00 INTEGRATED CEILINGS

1.1 COORDINATION OF INSTALLATION

A. It is preferred that integrated ceilings be made a part of the General Contract and the General Contractor be required to coordinate the complete installation, including the work of the HVAC and Electrical Contractors. If the Consultant feels that such ceilings should be installed by either of the other contractors, he should discuss the matter with the USF-FM during the review conference for Basic submittal. The Consultant's HVAC and electrical consultants shall be present at this discussion.

END OF SECTION 09 58 00

SECTION 09 65 00 RESILIENT FLOORING

1.1 MATERIALS:

A. RESILIENT TILE FLOORING: Vinyl composition tile, 1/8 inch thick. Non-standard sizes are prohibited.

B. OTHER RESILIENT FLOORING MATERIALS: In some instances the consultant may feel that the use of rubber tile, vinyl tile, luxury vinyl tile (LVT), sheet vinyl, or materials other than vinyl composition tile may be advantageous. Approval by the USF-FM is required prior to specifying such materials.

C. WALL BASES: 1/8 inch thick with coved toe, rounded top edge and four 4 inches minimum height; preformed internal and external corners shall be used when available. Terminal ends of base shall be beveled and toes rounded.

1.2 SUBMITTALS

A. EXTRA MATERIALS: Furnish not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern, and size of resilient floor installed.

B. NON-STANDARD RESILIENT FLOOR OR BASE MATERIALS required to submit evidence of their resistance to flame propagation and smoke development as well as production of toxic gases. 4 copies of test results from a recognized laboratory and four copies of a notarized statement, signed by an officer of the manufacturing company, confirming that the flooring or base products proposed for use are those which have passed flammability, smoke, and toxic gas tests selected.

C. AFFIDAVIT BY INSTALLER: If test reports and certification shall be required, the installer shall submit four 4 copies attesting that materials actually installed are the same as those certified by the manufacturer as meeting specified requirements.

1.3 CLEANING:

A. Resilient flooring and base shall be totally cleaned and waxed with one layer of commercial grade wax.

END OF SECTION 09 65 00

SECTION 09 66 23 RESINOUS MATRIX TERRAZZO FLOORING

1.1 EPOXY TERRAZZO

A. Minimum 3/8 inch thick poured-in-place epoxy based terrazzo is approved for use in high traffic, public spaces. Cement based epoxy is approved for restoration of existing Cement Terrazzo flooring only.
B. Epoxy based terrazzo tile system is approved for use where porcelain floor tiles are normally specified.
C. Integrate into the overall design and align terrazzo flooring contraction and isolation joints with the substrate construction and expansion joints; and provide dividers with elastomeric joint filler at all contraction/expansion and isolation joints.

END OF SECTION 09 66 23

SECTION 09 68 13 MODULAR CARPET TILE

PART 1 – GENERAL

1.1 SUMMARY DEFINITION

A. Modular carpet tile. Fibers with a post-consumer content preferred. Mill extruded nylons will not be accepted. Carpet shall be tufted and have a manufacturer's standard vinyl or hard-back backing system which provides a non-permanent installation application, using pressure sensitive, releasable adhesive or a pre-adhered adhesive system, meeting or exceeding requirements for certification according to the Carpet and Rug Institute (CRI) Green Label Plus IAQ Test Program. Carpet tile shall be recyclable meeting Leadership in Energy and Environmental Design (LEED) Rating System requirements and shall have third party certification.

1.2 APPLICATION

A. Intended Use:
   1. This Design Criteria shall be used in determining and specifying modular carpet tiled walk-off mats at USF facilities. It is not intended to be an all-inclusive specification in and of itself, in that, it is supplemental to other specifying tools such as MasterSpec.

1.3 SELECTION CRITERIA

A. Industry standards and tests
   1. National Fire Protection Association (NFPA), NFPA 253
   2. Floor Covering Installation Board (FCIB)
   3. Carpet and Rug Institute (CRI)
   4. Floor Covering Installation Contractors Association (FCICA)

B. Applicable Publications
   1. CRI 104 Standard for Installation of Commercial Carpet

C. Sustainable Compliance: USF prefers those carpet tile manufacturers with an operational carpet tile-recycling program for 100% of the carpet product (at the end of its useful life). Third party certification shall be required.

1.4 QUALITY ASSURANCE

A. Contractor Qualifications:
   1. Employ only experienced Contractors (Installers) skilled in the successful installation of the specified materials and accessories on similar projects for a minimum of 5 years, acceptable to the carpet tile manufacturer in writing to Owner/USF.

B. Manufacturer(s) Qualifications
   1. Utilize only manufacturers making the specified materials as a current and regular production item.
   2. Manufacturers of specified carpet tiles shall have a minimum of fifteen (15) years of production experience with carpet tiles of similar types and whose published product literature clearly indicates compliance of their product with a particular carpet tile specified.
   3. Manufacturer shall provide verification of registration to International Standards Organization (ISO) 9001/9002, Quality Management System and ISO 14001 Environmental Management System.
   4. Manufacturer to provide three (3) references of installations in similar facilities.
   5. Manufacturer must provide Chain of Responsibility that states they will take back their product for recycling at the end of its useful life.

C. Preparation/Field Verification
   1. Examine substrates to verify conditions are satisfactory for carpet tile installation and that they comply with the requirements identified in the Project Specifications.
   2. Check concrete slabs to ensure that alkalinity and moisture content are within tolerances specified by the manufacturer and the Project Specifications. Verify slab substrates are clean, dry and free of curing compounds, sealers, hardeners and other materials that may interfere with adhesive bond, all acceptable to Carpet Tile Manufacturer's instructions

and recommendations.
3. Verify that substrates are free of cracks, ridges, depressions, scale and foreign deposits.
4. Proceed with installation of items only after unsatisfactory conditions have been corrected.

D. Source Limitations: Unless specifically noted otherwise, provide carpet tile of the same manufacturer for each type of carpet specified.

1.5 SUBMITTALS

A. Manufacturer's Product Data sheets shall be required for each type of tile carpeting, adhesives and accessories specified.
B. Full size samples shall be required for each type of tile carpeting specified.

1.6 WARRANTY

A. Project Warranty shall be as stated in Division 01, General Requirements of the Specifications.
B. Special Modular Tile Carpeting Warranty: Written warranty, non-prorated, signed by carpet tile manufacturer agreeing to remove and replace tile carpeting installation that fails in materials and workmanship within the specified warranty period.
   1. Warranty does not include deterioration or failure of tile carpeting due to unusual traffic, failure of substrate, vandalism, or abuse.
   2. Failures include, but are not limited to, more than 10% loss of face fiber/yarn loss by weight in normal use, edge raveling, runs, loss of tuft bind strength, dimensional stability, excess static discharge, delamination and stain resistance.
   3. Warranty shall not require the use of chair pads.
   4. Warranty Period: fifteen (15) years from date of Order.
   5. Manufacturer shall warranty that dye lots are mergeable.
   6. Warranty shall identify the following: Pattern name; pattern color; square yards used. In case of multiple buildings where tile carpeting has been used, identify building name/number and pattern, pattern color, square yards used.
C. Installer's Warranty: The Contractor (Installer) shall fully guarantee the installation against defects in workmanship, seaming and loss of adhesion to floor for a period of one (1) year from the date of Substantial Completion. Upon written notice, the Installer shall repair or replace the affected area at no cost to USF.

1.7 OPERATIONS AND MAINTENANCE

A. Cleaning
   1. The tile carpeting and walk-off tile manufacturer shall provide instructions to designated USF personnel on the proper methods and procedures for cleaning tile carpeting material furnished utilizing the above method.
   2. Tile carpeting and walk-off manufacturer shall provide a representative to demonstrate cleaning and stain removal processes to USF maintenance personnel at: 1). Thirty (30) days prior to Substantial Completion; 2). Six (6) months from date of Substantial Completion and; 3). Eleven (11) months from date of Substantial Completion.

PART 2 – PRODUCT

2.1 CARPET TILE COMPONENT CHARACTERISTICS (Minimum)

A. Fiber Content: 100% nylon Type 6 or 6, 6 with Modification Ratio of less than 2.5.
B. Fiber Type: Branded type, Aquafil Struttura, Invista, Solutia
C. Dye Method: Minimum of 65% Solution dyed.
D. Mergeability: Tile carpeting that is of the same style/color, but from different dye lots and/or manufacturing dates, may be merged and used interchangeably, both at initial installation and at later selective replacement, to create a continuous carpeted surface with no tile appearing out of place.
E. Color and Pattern: Selected by A/E and approved by USF-FM.
F. Pile Density: 5400 minimum.
G. Gauge: 1/12 inch minimum.
H. Surface Pile Weight: 17 oz./sq. yd. minimum.
I. Size: Approximately 18 X 18 inches to 40 X 40 inches square.

J. Stitches per Inch: 8.00 inches minimum.
K. Backing System: Manufacturer's standard vinyl or thermoplastic hard-backed backing system, 39% minimum total recycled content, maintaining a 100% true moisture barrier between secondary backing and the floor substrate below, passing the British Spill Test, Method E.
L. Critical Radiant Flux Classification: Not less than 0.45 W/sq.cm.
M. Colorfastness to Crocking: Not less than 4, wet and dry, per American Association of Textile Chemists and Colorists (AATCC), AATCC-165, per AATCC-165.
N. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) per AATCC-16.
O. Stain Resistance: AATCC-175, must pass Acid Red 40 spot test with an 8 or better.
P. Antimicrobial Treatment: Must have low water solubility and not be metallic or halogen based. Not less than 2 mm halo of inhibition for gram-positive bacteria; not less than 1 mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC-174, Part II, AATCC 138 Washed; AATCC 174 Parts 2 & 3. (If requested, provide USF with independent test certification(s), i.e. EPA, etc., that states use of antimicrobial treatment is in compliance with all governmental regulations, including the AATCC specifications stated in this paragraph, regarding its use within the complete carpet tile construction/assembly). Antimicrobial preservative should be incorporated into primary backing of the product during manufacturing and not topically applied to the fiber.
Q. Dimensional Stability: Aachen Method Din 54318, 0.2% or less per ISO 2551.
R. Smoke Density: less than or equal to 450 flaming.
S. Static Generation: AATCC 134 w/neolite less than or equal to 3.5 kv at 20% RH.
T. Flame-Spread and Flammability:
    1. Carpet flammability shall meet federal Flammability Standards CPSC FF 1-70, when tested in accordance with American Society for Testing and Materials (ASTM), D2959-70T (Methenamine Pill Test).
U. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement based formulation provided by carpet tile manufacturer.
V. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and recommended by carpet tile manufacturer for releasable installations.
W. Indoor Air Quality Control: Carpet tile and adhesive shall be CRI Green Label Plus certified by published class (product type) and certification number.
X. Water intake for Manufacturing and finishing purposes must not exceed 1 gallon/square meter.
Y. Climate Neutral: Product shall be Climate Neutral as certified by a Third Party Entity ensuring that all greenhouse gas emissions associated with the life cycle of the product have been offset.

2.2 ALLOWABLE SUBSTITUTIONS

A. From time-to-time, USF Design may approve other products and additional items meeting both Design Criteria and Specifications when submitted in accordance with the Substitution provisions contained in Division 01, Genera Requirements.
B. Tile carpeting other than those specified may be substituted when in conformance with all of the individual requirements stated in Component Characteristics and approved by USF Design, ten (10) days in advance of the Bid Opening. It shall be the responsibility of the A/E to review all of the proposed substitution carpet tile specifications in that it meets all minimum criteria of this guideline before forwarding to USF-FM for final approval.

PART 3 – EXECUTION

QUALITY ASSURANCE DURING EXECUTION

3.1 INSTALLATION ENVIRONMENTAL CONDITIONS

A. Tile carpeting shall not be delivered or installed until building is enclosed, wet work completed and HVAC system is operating and maintaining temperature and humidity at occupancy level during remainder of construction period.

B. Comply with CRI 104, Section 6.1 Site Conditions: Temperature and Humidity.
C. Ensure that carpet tile is installed only when the concrete moisture content is below the carpet manufacturer's written recommendations.

3.2 EXTRA MATERIALS

A. Provide additional carpet tiles equal to 1% of each type, color and pattern furnished for USF use as maintenance stock.
B. This stock shall be designated for use by USF only, after completion of the Project and shall not be used for repair or replacement during warranty period.

3.3 DELIVERY, STORAGE, HANDLING

A. Comply with CRI 104 Section 5 Storage and Handling.

3.4 INSTALLATION PROCEDURES

A. Provide all items and accessories as required for a total and complete installation in every respect.
B. Complete preparation and field verification procedures identified in Subparagraph 1.4.C, Preparation/Field Verification.
C. Use trowelable leveling and patching compounds as recommended by carpet tile manufacturer for filling cracks, holes and depressions in substrates.
D. Remove coatings including curing compounds and other substances that are incompatible with adhesives.
E. Install tile carpeting and walk-off tile using releasable installation method. Comply with CRI 104, Section 13, Carpet Modules (Tiles).
    1. Provide adhesive free system that suits subfloor conditions indicated and complies with flammability requirements for installed carpet tile.
    2. As an alternate, if prior approval is obtained from USF, provide water-resistant, mildew-resistant, non-staining, pressure-sensitive adhesive to suit products and subfloor conditions indicated; that complies with flammability requirements for installed carpet tile and recommended by carpet tile manufacturer for releasable installations.
    3. Provide rubber or metal tile carpeting transition divider strip/nosing between carpet tile and walk-off tile when total thickness of each material is not equal. Divider strip nosing and typed selected by A/E.
F. Where tile carpeting does not continue beyond a door to another room, extend carpet tile into door reveals so that carpet tile stops under door when door is in closed position.
G. Remove any adhesives, paint, or other products on the carpet immediately during carpet installation.

3.5 PROTECTION DURING CONSTRUCTION

A. Protect tile carpeting against damage from construction operations and placement of equipment and fixtures during remainder of construction period as recommended by manufacturer and as required by CRI 104, Section 15, Protection of Indoor Installations. Do not use plastic, adhesive sheet.

END OF SECTION 09 68 13

SECTION 09 68 16 SHEET CARPETING

1.1 RESTRICTED AREAS

A. HEAVY TRAFFIC AREAS: Do not plan carpet for corridors which carry heavy traffic.
B. VENDING AREAS: Do not use carpet under vending machines and for a distance of at least 6 feet in front of machines.
C. CAFETERIA SERVING LINES: Omit carpet in or near serving line area.
D. PREVIOUSLY UNCARPETED AREAS: Particularly areas below grade and subject to moist conditions shall not be carpeted without review and approval for carpet by the USF-FM.
E. No carpet on stairs, under water coolers, and at direct entry from exterior.

END OF SECTION 09 68 16

SECTION 09 90 00 PAINTING

1.1. SUBMITTALS (for approval by the USF-FM):

A. SHOP DRAWINGS of seam layout. Avoid seams in heavy traffic paths or areas.

B. NOTARIZED STATEMENT FROM MANUFACTURER: Before carpet materials are ordered, submit 4 copies of the test results from a recognized laboratory and 4 copies of a notarized statement, signed by an officer of the manufacturing firm(s), confirming that the carpet products proposed for use are those which have passed the required tests defined above.

C. AFFIDAVIT BY GENERAL CONTRACTOR: Submit 4 copies attesting that materials actually installed were the same as those certified as meeting specified requirements.

1.2. CLEANING

A. Immediately prior to final inspection, carpeted areas shall be totally cleaned of all soil, including dirt, dust, spots, stains, adhesive, paint, etc.

1.3. SPECIAL FLOORING

A . If design conditions, or budget, dictate thin set method of installation, marble chip or ceramic granule toppings may be installed with chemical matrix or with cement matrix chemically bonded to the substrate, only when such methods and materials are approved by the USF-FM.

1.4. SPECIAL COATINGS

A. ELASTOMERIC COATINGS: If coatings specified can be applied with equipment ordinarily used by painters, these coatings may be specified in Section 09 90 00, Painting.

B. FIRE RESISTANT COATINGS: The following provisions must be included in the specifications:

1. Qualifications of Applicator. Materials shall be applied by applicators franchised and approved by manufacturers of materials approved for use. General Contractor shall furnish the manufacturer's certification that materials delivered to the project meet requirements specified. Certification shall be countersigned by the General Contractor, who shall assume the responsibility of complying with the manufacturer's specifications. Materials and application equipment shall be of type approved by the manufacturer.

1.5. PAINTING

A. COATINGS SCHEDULE: The consultant shall prepare a schedule listing all surfaces in generic terms, all coating or finish operations, the types of finish materials and the number of coats of each material. Preferred finishes for certain locations or surfaces are as follows:

1. INTERIOR WOODWORK: Natural finish - stain, 2 coats sanding sealer, 2 coats semi-gloss varnish. If polyurethane varnish is used, delete sanding sealer. Painted finish - primer and 2 coats semi-gloss alkyd enamel.
2. METAL DOORS AND FRAMES: Shop coat, touch up and 2 coats semi-gloss enamel.
3. NEW GYPSUM WALLBOARD OR INTERIOR PLASTER: Spackle as required, primer and 2 coats semi-gloss alkyd enamel or 2 coats semi-gloss latex.
4. EXISTING PREVIOUSLY PAINTED GYPSUM WALLBOARD OR INTERIOR PLASTER: Primer and 1 coat semi-gloss alkyd enamel or semi-gloss latex. If surface is poor, remove finish to substrate, repair and finish the same as new gypsum wallboard or plaster. Refer to Section 09 00 00, Miscellaneous Requirements, Subparagraph 1.3.A.2, Surface Preparation.
5. INTERIOR CONCRETE OR CONCRETE BLOCK (Unpainted): 1 coat self-sealing heavy filler-type primer and 2 coats semi-gloss alkyd enamel or 2 coats semi- gloss latex. For laboratories requiring chemical resistance, replace the alkyd or latex paint with epoxy two-component finish.
6. EXTERIOR WOOD PLATFORMS OR BENCHES: Use Behr Plus 10 Solid Color Stain or approved equal in accordance with manufacturer's directions.
7. EXTERIOR PORTLAND CEMENT PLASTER (STUCCO): Use integral color, or paint.

1.6. ITEMS TO BE NOTED IN SPECIFICATIONS

A. TOP AND BOTTOM EDGES OF WOOD DOORS: Shall be sanded and sealed after fitting and finished with at least 2 coats of varnish or paint.
B. TOPS AND BOTTOMS OF METAL DOORS: Shall be painted with the same materials and number of coats as used on the door faces.
C. DRY FILM THICKNESS: Shall be specified for all coats of paint on metals.
D. ACCENT COLORS: If it is anticipated 5% or more of the scheduled finishes will be in accent colors, attention should be called to this fact. Estimated percentage of accent colors should be given as an aid to bidders in preparation of bids. A statement should be made to the effect that the information given in no way restricts the consultant in his final selection of colors.
E. COLOR CODING FOR PIPING: Include finish painting of insulated and uninsulated piping in the General Contract documents and include color banding of finished piping in the appropriate contract documents.

1.7. INTERIOR PAINTING

A. Finish coat to be semi-gloss in all corridors and stairwells. Use washable type of finish material on walls for ease of maintenance and cleaning.

1.8. WALLCOVERING & GRAPHICS

A. No vinyl wall covering on the interior face of exterior walls.
B. Materials must conform to ASTM E-84. Research code carefully to determine class of fire and smoke resistance required for the specific application.
C. Vinyl wall covering must satisfactorily pass class A physical requirements for type II wall covering as listed in G.S.A. CCC-W-408A and CFFA Quality Standards for vinyl coated fabric wall covering.

END OF SECTION 09 90 00

DIVISION 10 SPECIALTIES

DIVISION 10 SPECIALTIES
SECTION 10 00 00 SPECIALTIES 2

SECTION 10 00 00 SPECIALTIES

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. Plug anchorage by use of wood, lead or plastic is prohibited.

1.2 VISUAL DISPLAY BOARDS

A. WHITEBOARDS/MARKERBOARDS:
   1. GUARANTEE: Include the following provisions in the specifications:
      GUARANTEE: Furnish a written guarantee to the University signed by an officer of the manufacturer of the whiteboard/markerboard stating that all whiteboards/markerboards which do not retain the original writing quality, the original erasing quality, and the original visual acuity for twenty (20) years after date of acceptance will be replaced and installed without charge to the University.
   2. MATERIALS AND CONSTRUCTION: Whiteboards/markerboards shall be glass or porcelain enameled steel of construction equal to, or better than, the following:
      a. WRITING SURFACE: Shall have a minimum of 2 coats of porcelain enamel on 24 ga cold rolled stretcher-leveled enameling steel.
      b. CORE: Shall be 3/8 inch tempered hardboard or 80 pfc density particleboard.
      c. BACKING shall be aluminum .015 inch thick.
      d. TRIM: Aluminum in manufacturer's standard sections; include marker trough and map rail complete with map hooks, four (4) hooks per section.
   3. MOUNTING: Mount on primed wood grounds. Except for approved special conditions, all whiteboards/marker boards shall be mounted with the marker trough 36 inches above the floor and with a vertical dimension of 48 inches from marker trough to top of board.
   4. ELECTRICALLY OPERATED BOARDS: Provide access panels for servicing motors, drives and controls. Switches shall be key operated. Coordination with Division 26, Electrical is required.

1.3 TOILET PARTITIONS

A. METAL TOILET COMPARTMENTS ARE NOT TO BE USED.
B. HIGH DENSITY POLYETHYLENE (HDPE), SOLD PLASTIC PARTITIONS.
   1. TOILET STALL PARTITIONS AND URINAL SCREENS: Specify solid plastic as Santana, or other manufacturer meeting the requirements, as alternate bid. No particle-board.
   2. TOILET PARTITION DOOR LATCHES: Installer shall furnish extra locking mechanisms (one-half as many as doors installed). Toilet partitions and door-latches shall be metal.
   3. TOILET PARTITION ANCHORS AND FASTENERS: Anchors shall be screw anchors, toggle bolts, hollow wall anchors, or other approved type to suit construction on which compartments are hung: Wood, lead, and plaster plugs are prohibited. Fasteners shall be vandal-proof type screws.
   4. TOILET PARTITION DOOR LATCHES AND PULLS: When it is necessary to provide out-swinging doors, specify slide latches and door pulls.
C. Provide wire pull on interior face of accessible toilet stalls.

1.4. LOUVERS AND VENTS

A. METAL WALL LOUVERS: Louvers and vents for air distribution systems should be specified in Division 23, Heating, Ventilating & Air Conditioning. The HVAC Contractor shall be required to furnish and install all interior louvers and vents. If such items are an integral part of the exterior design of a building and are not connected directly to an air distribution system, specify in Division 23, Section 23 37 13, Diffusers, Registers & Grills.

1.5 IDENTIFYING DEVICES

A. EXTERIOR SIGNS: The University has a standardized modular grid system for all campus signage. The Architect/Engineer (A/E) shall follow the guides published in this manual and any additional directions issued by the USF Facilities Management (USF-FM) in preparing drawings and specifications for signage.
   1. BUILDING NUMBER AND NAMES

a. Building emergency address numbers (example: 13311): 9 inches Gemini formed plastic numbers. Font: Goudy extra bold. Color: black. Installation: stud-mounted in masonry (or white vinyl on glass, if necessary). Location: 8 to 10 feet above grade, whenever possible, thus visible 1). At all main pedestrian entrances and 2). From emergency vehicles as it approaches from all possible emergency routes. See existing campus examples.
b. Building name (example: STUDENT SERVICES): Gemini formed plastic letters.
   i. Font: Goudy bold.
   ii. Color: Pantone 2162 green.
   iii. Size: 24 inches high, if building is 3 stories tall or more; 18 inches high, if building is 2 stories or less.
   iv. Location: uppermost portions of facades, thus visible from all approaches. See existing campus examples.
c. Regional campuses may provide building name and emergency address letters using alternative materials, font style and/or color. All alternative letters shall be submitted to the USF Building Code Official (BCA) for approval.

B. INTERIOR SIGNS
1. GENERAL PROVISIONS
   a. Americans with Disability Act (ADA) compliance: Required for all signage.
   ADA Graphics Requirements: Letters and numerals shall be raised 1/32 inch upper case sans serif type and shall be accompanied with Grade 2 Braille. Raised characters shall be at least 5/8 inch high, but no higher than 2 inches. Pictograms shall be accompanied by the equivalent verbal descriptions placed directly below the pictograms. The border dimensions for the pictogram only shall be 6 inches in height. The characters and background of sign shall be eggshell, matte, or other non-glare finish. Minimum contrast between characters, symbols, and background shall be 70%.
2. RELATED DOCUMENTS
   a. Drawings and general provisions of the Master Contract, including General and Supplementary Conditions, apply to this section.
3. SUMMARY
   a. This Section includes the following types of signs:
      i Panel signs. ii. Pictograms.
   b Related Sections: The following sections contain requirements that relate to this section:
      i. Subparagraph 1.2, Visual Display Boards. Overhead panels, department identification, room numbers, menus, change panels, and pictograms.
4. SUBMITTALS
   a. General: Submit the following in accordance with Conditions of the Contract and Division 1, General Requirements.
   b. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.
   c. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
   a. Provide message list for each sign required, including typical large-scale details of wording and layout of lettering.
   d. Samples: Provide the following samples of each sign component for initial selection of color, pattern, and surface texture as required and for verification of compliance with requirements indicated.
      i. Samples for verification of color, pattern, and texture selected, and compliance with requirements indicated:
      ii. Cast Acrylic Sheet and Plastic Laminate: Provide a sample panel not less than 8-1/2 X 11 inches for each material indicated. Include a panel for each color, texture, and pattern required. On each panel, include a representative sample of the graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.
5. QUALITY ASSURANCE

a. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source, from a single manufacturer.
b. Design Criteria: The drawings indicate size, profiles, and dimensional requirements of signs and are based on the specific type and model indicated. A low profile construction is stipulated. Sign to be manufactured by bonding two (2) thin acrylic streets with radius corners. Signs by all manufacturers will be considered, provided that deviations from dimensions and profiles are minor and do not change the design concept as judged by the A/E. Signs must be constructed in such a way that colored and/or lettered inserts can be replaced easily.

6. PROJECT CONDITIONS
   a. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work are not limited.

2.2. MATERIALS

A. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested in accordance with American Society for Testing and Materials (ASTM) D 790, a minimum allowable continuous service temperature of 176 degrees F (80 degrees C), and of the following general types:
   1. Transparent Sheet: Where sheet material is indicated as “clear”, provide colorless sheet in matte finish, with light transmittance of 92 percent, when tested in accordance with the requirements of ASTM D 1003.
   2. Opaque Sheet: Where sheet material is indicated as “opaque”, provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer’s standards.

B. Regulatory Signs
   1. Tactile Plate: Injection molded ABS plastic. 1/8 inch thick. Texture surface is 15 degrees gloss. Comply with ADA Standards for Accessible Design for raised letters and braille.
      a. Size: Available in 8 inches x 8 inches only.
      b. Corners: 5/16 inch radius.
      c. Depth: 1/8 inch thick.
      d. Background Colors: To be selected Standard from Beige Color range.
      e Letter Color: Thermal transfer foil in Brown.
      f. Typestyle: 5/8 inch Helvetica Medium upper case width.
   2. Signs may be submitted in manufacturer’s standard styles and colors for approval of A/E. Approval must be obtained prior to bidding.
   3. Colored Coating for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are non-fading for the application intended.

2.3. LOW PROFILE SIGNS

A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
   1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.

B. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to conform to the following requirements:
   1. Edge Condition: Rounded.
   2. Corner Condition: Corners rounded to radius indicated.

C. Laminated Sign Panels: Permanently laminate face panels to backing sheets of material and thickness indicated using the manufacturer’s standard process.

D. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.
E. Subsurface Copy: Apply copy to the back face of clear acrylic sheet forming that panel face by either of optional process indicated to produce precisely formed opaque images, free from rough edges.
   a. Reverse silk-screen process to print copy; over-spray the copy with an opaque background color coating, or:
   b. DuPont "Chromalin" heat and pressure-laminates photopolymer film system to form copy and background color.
      i. The manufacturer has the option of selecting either process indicated above.
F. Raised Copy: Machine-cut copy characters from matte-finish opaque acrylic sheet and chemically weld onto the acrylic sheet forming sign panel face. Produce precisely formed characters with square cut edges free from burrs and cut marks.
G. Applied Copy: Die-cut characters from vinyl film with pressure-sensitive adhesive backing. Apply copy to the exposed face of the sign panel.
   a. Panel Material: Matte-finished clear acrylic sheet with opaque color coating subsurface applied.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Locate sign units and accessories where indicated, using methods of the type described and in compliance with the manufacturer's instructions.
   1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
B. Wall Mounted Panel Signs: Attach panel signs to wall surface using the methods indicated below:
   1. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape to hold the sign in pace until the adhesive has fully cured.

3.2. CLEANING AND PROTECTION

A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

3.3 FIRE PROTECTION SPECIALTIES

A. FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES
   1. GENERAL: All portable fire extinguishers and non-valved cabinets shall be furnished and installed by the General Contractor. All portable fire extinguishers and components shall conform to National Fire Protection Association (NFPA) Pamphlet 10, latest edition. Each extinguisher shall be approved by Underwriter's Laboratory (UL) and bear their label.
   2. APPROVALS: The selection and locations of the fire extinguishers are subject to the review and approval of the USF-FM and designated University personnel from the USF Facilities Management-Environmental Health & Safety (FM-EHS). Extinguishers meeting the described requirements, including those manufactured by Amerex or Buckeye will be considered for acceptance.
   3. SELECTION AND QUANTITY: Refer to NFPA Pamphlet 10, Chapters 2, 3, and 4. Chapter 2 is used to determine the classification of potential fires and the rating or relative fire extinguishing effectiveness of various types of extinguishers. Chapter 3 assists in selection of extinguishers which is dependent upon the character of anticipated fires, property construction and occupancy, the vehicle or hazard to be protected, ambient temperature conditions, and other factors. The quantity of extinguisher is determined by Chapter 4.
   4. CAUTION: Penetration of walls by cabinets or other penetrations, unless openings and voids are sealed with fireproof materials, is prohibited. Fire-rated walls must not have the rating reduced by penetrations or reduction of thickness.

5. Provide each fire extinguisher with locked, break-glass fronted fire equipment cabinet with a knocker or other glass breaking means. Attach knocker in a manner which will allow breaking of glass without removing knocker.

B. FIRE EXTINGUISHERS: All fire extinguishers are to be complete, tested, certified, ready for use, and conform to the following:
   1. CARBON DIOXIDE EXTINGUISHERS: Red enameled-steel or aluminum equipped with valve, discharge hose and horn, squeeze-grip lever, and mounting bracket, if not cabinet installed. Minimum rating 5 BC.
   2. MULTI-PURPOSE EXTINGUISHERS: Red enameled-steel, pressurized type equipped with pressure gauge, discharge nozzle, squeeze-grip lever, and mounting bracket, if not cabinet installed. These extinguishers are dry chemical for Class A, B, and C fires. Minimum rating 4A 60 BC.
   3. SPECIAL EXTINGUISHERS:
      a. For computer rooms, expensive laboratory installations, and similar locations, which must be protected from damage, provide appropriate system.
      b. For electrical main distribution boards and mechanical equipment rooms, provide 20 pound, dry chemical fire extinguisher equal to Ansul Chemical Company's hand extinguisher.

3.4 PARTITIONS

A. DEMOUNTABLE PARTITIONS: If outlets, switches, etc. are furnished by the partition manufacturer, specify devices of same quality as those specified in Division 26, Electrical. (Note limitations and prohibitions regarding conduit types and sizes.)

3.5 TOILET AND SHOWER ACCESSORIES

A. TOILET ACCESSORIES
   1. TOILET TISSUE DISPENSERS:
      a. Owner furnished, contactor installed.
      b. Contractor purchased toilet tissue dispensers – provide keyless dispensers.
   2. TOWEL DISPENSERS AND DISPOSALS: Each toilet room shall have a towel dispenser and disposal. Contractor must coordinate location with the University and provide appropriate blocking.
   3. SOAP DISPENSERS: Furnished by the University and installed by the Contractor. Contractor must coordinate location with the University and provide appropriate blocking.
   4. SANITARY NAPKIN DISPENSERS AND DISPOSALS: Each women's toilet room shall have a sanitary napkin dispenser and disposal. Contractor must coordinate type and location with the University.
   5. GARMENT HOOKS: Each toilet stall shall have a garment hook. The hooks shall be mounted on the partition; hooks in stalls for the disabled shall be on the partition, reachable from the water closet and approximately 40 inches above the floor. Hook can incorporate door bumper (and purse hook in stalls for women).
   6. SHELVES: Each public toilet room shall have a stainless steel shelf for books, purses, etc. Each toilet stall in buildings with heavy student traffic shall have a shelf for books, etc. Exception to be made for residence type "private" toilets.
   7. MIRRORS: Each toilet room shall have a stainless steel framed mirror without shelves. If possible, locate mirrors on walls opposite lavatories. Specify long mirrors, for use of disabled persons, with bottom 2 feet above floor and with top located at same height as smaller mirrors. Check and coordinate mirror locations to prevent image reflection through room entrances.

B. SHOWER ACCESSORIES
   1. EMERGENCY SHOWERS AND EYE WASHES, are needed within 100 unobstructed feet or within 10 seconds of a chemical substance deemed hazardous. All emergency showers shall have floor drains accessible in immediate area and required signage.

END OF SECTION 10 00 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 11 EQUIPMENT

DIVISION 11 EQUIPMENT
SECTION 11 00 00 EQUIPMENT 2

SECTION 11 00 00 EQUIPMENT

PART 1 – GENERAL

1.1. GENERAL PROVISIONS

A. EQUIPMENT CATEGORIES. Equipment, as applied in Capital Improvements Projects, falls into one of two categories:
   1. FIXED EQUIPMENT (Contract Equipment) is acquired through one or more of the construction contracts and is funded within the project construction budget.
   2. MOVABLE EQUIPMENT (Non-Contract Equipment) is acquired by the Using Agency utilizing a fund allocation within the total project funds, but independent of the project construction budget. See Section 12, 40 00, Furniture & Accessories.
   3. Typically movable equipment funding allocations are provided for new building construction projects, but not for remodeling/renovation projects.

B. GENERAL CONTRACT ITEMS. Unless otherwise directed by the University, the following equipment shall be classified as fixed equipment and shall be included in the General Contract work:
   1. Library Shelving and Equipment.
   2. Food Service Equipment.
   3, Unit Kitchens and Cabinets.
   4. Laboratory work benches, cabinets, and associated equipment. This includes fume hoods, controlled temperature rooms, and growth chambers.
   5. Fixed Furniture Seating (See Section 12 60 00, Multiple Seating).

C. SEPARATE EQUIPMENT CONTRACT PRE-BID SUBMITTALS. When separate equipment contracts are required by the Program or the University, include the following requirements in the specifications regarding bidder qualification required prior to opening of bids:
   1. Minimum of five (5) years of experience in manufacture of similar or duplicate equipment.
   2. Minimum of five (5) completed installations of equal size that can be inspected prior to award.
   3. Adequate financial resources and personnel to manufacture, deliver, install, and guarantee the equipment.

D. EQUIPMENT CONTRACTOR OR SUPPLIER SUBMITTALS
   1. PRICE BREAKDOWN. A breakdown for each piece of equipment, keyed to contract drawings or shop drawings, must be stipulated to accommodate auditing and inventory needs.
   2. ROUGH-IN DRAWINGS. Must be required in time to enable checking by the Consultant and coordination with all concerned prime contractors.

E. COORDINATION. In specifications, clearly define which contractors have responsibilities relative to equipment receiving, unloading, inventory, and installing (including accessory items such as plumbing, heating, cooling, electric hook-ups, etc.)

F. PENETRATION OF FLOORS AND OF WALLS. By pipes, ducts, or other penetrations unless openings are appropriately fire stopped by fire doors, or fire dampers, and voids around pipes, ducts, conduits, etc. are sealed with fireproof materials is prohibited.

PART 2 – PRODUCTS

2.1 LAUNDRY EQUIPMENT

A. If laundry equipment is required, it will be provided under a separate contract; however, the Consultant shall plan spaces, plumbing, HVAC and electric to accommodate the desired vending equipment. Check the Program and consult the University. Be certain to provide for hook-ups. A/E to provide heat load calculations with regards to additional equipment and plan/revise HVAC system accordingly.

2.2 VENDING EQUIPMENT

A. If vending equipment is required, it will be provided under a separate contract; however, the Consultant shall plan spaces, plumbing, HVAC and electric to accommodate the desired vending equipment. Check the Program and consult the University. Be certain to provide for

hook-ups. A/E to provide heat load calculations with regards to additional equipment and plan/revise HVAC system accordingly.

2.3 LABORATORY EQUIPMENT

A. The Consultant must plan spaces, plumbing, HVAC, and electric to accommodate all laboratory equipment. Be sure to provide for hook-ups and coordination of installation sequences.
   1. FUME HOOD AND EXHAUST SYSTEM: Shall be designed and installed in accordance with American National Standards Institute (ANSI) Z9.5 - 2012. Refer to Appendix A, Environmental Health & Safety Design Guidelines, Section 8.2.
   2. ALL NEW LABORATORY FUME HOODS: Shall use 100% exhaust with an average face velocity of eighty to one-hundred (80-100) feet per minute (with sash fully open for constant air volume hoods with a bypass feature) with no face velocity measurement more than plus or minus twenty percent (20%) of the average. Auxiliary air type hoods are not to be used.
   3. IN LABORATORIES: At least one (1) station in each laboratory shall be provided for the physically disabled. Said station shall have a low workbench with a clear minimum height of 30 inches under the workbench and no apron. Aisles between the tray slides and control railings shall be a minimum of 34 inches.
   4. FITTINGS AND FIXTURES: Utility fittings and fixtures specified for laboratory equipment shall be of quality at least equal to that specified for the Plumbing, HVAC, and electrical contracts. This is critical. Consultant shall certify in writing to the University that 1). The specification quality is equal, and 2). That the installation conforms to specified quality.
      a. AUTOMATIC SHUT-OFF VALVES: Specify that these must have a ten (10) year written warranty.

2.4 MEDICAL EQUIPMENT

A. EYEWASH AND EMERGENCY SHOWERS: Review need and location with University. Refer to Appendix A, Environmental Health & Safety Design Guidelines, Section 8.1.

PART 3 – EXECUTION (Not used)

END OF SECTION 11 00 00

DIVISION 12 FURNISHINGS

DIVISION 12 FURNISHINGS
SECTION 12 05 13 FABRICS 2
SECTION 12 10 00 ARTWORK 3
SECTION 12 20 00 WINDOW TREATMENT 4
SECTION 12 40 00 FURNITURE AND ACCESSORIES 5
SECTION 12 48 00 RUGS AND MATS 6
SECTION 12 60 00 MULTIPLE SEATING 7

SECTION 12 05 13 FABRICS

1.1 DRAPERY AND HANGING FABRICS

A. Fabric draperies or fabric decorative finishes should be avoided. Conform to Florida Building Code (FBC) and National Fire Protection Association (NFPA) requirements when fabrics are used.

1.2. UPHOLSTERY FABRICS AND MATERIALS

A. Select furniture constructions that are less flammable and less smoke producing than constructions known to burn readily and produce toxic smoke.

END OF SECTION 12 05 13

SECTION 12 10 00 ARTWORK

1.1 GRAPHICS

A. DESIGN BY THE CONSULTANT. Directional and identification signs are a part of the General Contract. Directional and identification signage shall be designed by the consultant identified in the contract documents, and as specified in Division 10, Specialties.

B. DESIGN BY OTHER CONSULTANTS AND VENDORS. Other graphics may be designed by the USF Facilities Management (USF-FM) and procured by the University, possibly after completion of the project.

C. PLANNING OF SPACES TO RECEIVE GRAPHICS. If general concepts of future graphics are known during the design phase of the project, the Consultant will be shown sketches of planned installations or applications so that these installations can be given consideration in the total design of the project.

1. SUGGESTIONS BY THE CONSULTANT. On design of graphics will be given due consideration; however, suggested designs must not appear on the contract drawings without approval.
2. PAINTING AND COLOR SCHEDULES: Wall surfaces, to which graphics designed by the University will be applied, must be included in the schedule of surfaces to receive finishes, specified in the Section 09 90 00, Painting. Colors of such finishes may be selected by the University in order to provide suitable backgrounds for planned graphics.

END OF SECTION 12 10 00

SECTION 12 20 00 WINDOW TREATMENT

1.1 BLINDS, SHADES AND DRAPERY

A. Necessary blocking, grounds, tracks, and other devices for installing venetian blinds and/or draperies (see Section 12 05 13, Subparagraph 1.1, Draperies and Hanging Fabrics) shall be included in the contract documents for owner provided blinds, shades, and drapery.

END OF SECTION 12 20 00

SECTION 12 40 00 FURNITURE AND ACCESSORIES

1.1 FURNITURE FOR LOBBIES AND PUBLIC AREAS

A. Furniture is acquired by the University and categorized as fixed equipment and movable equipment. Refer to Division 12, Furnishings.

B. Furniture Layouts: The consultant will provide generic layouts of all equipment to ascertain function and space usage. Submittals are required for schematic and design development phase. Dimension and delineate clear paths of travel.

C. Furniture Specifications (Movable Equipment): The USF Facilities Management (USF-FM) will be responsible for proposing and coordinating the services of professional design consultants for movable equipment planning, design and specifications. Work done here will be coordinated with the Architectural Design Drawings and will take place during the Design Development phase. The Consultant is alerted to electrical, utility or special dimension considerations associated with movable equipment at this stage and to coordinate this information on the construction drawings.

END OF SECTION 12 40 00

SECTION 12 48 00 RUGS AND MATS

1.1. FLOOR MATS

A. ENTRANCE MATS: Provide permanent walk off mats a minimum of ten (10) feet in the direction of travel. Walk off mats are required at ALL exterior doors with the exception of service rooms.

END OF SECTION 12 48 00

SECTION 12 60 00 MULTIPLE SEATING

1.1. STACK CHAIRS AND PORTABLE SEATING:

A. Movable Equipment: For areas of assembly, the consultant shall show generic seating layouts, demonstrating seating volumes, aisle dimensions, and identify all locations of accessible seating, etc., as required for Schematic and Design Development Submittals. The Consultant shall plan for adequate storage space for chair trucks or dollies.

1.2 AUDITORIUM AND LECTURE HALL SEATING

A. Fixed Equipment:
   1. Specification Requirements: Specify complete specifications showing manufacturer, product number and materials from at least two (2) different manufacturers showing equal compatibility of the product for the project.
   2. Tablet Arms: Auditorium and lecture hall seating shall have articulating tablet arms, when appropriate. Tablet arm construction shall be of thermo setting melamine laminate applied to a moisture resistant high density core with a plastic laminate backing. Finish edges with a vinyl "T" molding. Minimum tablet size shall be 96 square inches (8 X 12 inches) or greater. Specify large tablet arm for lecture halls, 10-12% of these shall be left- handed. Left-handed seats shall be located to avoid interference with right-handed tablets.
   3. Seat and back: Chair back and seat shall be two-part (separate) construction. All components including upholstery shall be easily field replaceable. Design shall be for continental-type seating, reinforced polypropylene back upholstered self rise seat.
   4. Armcaps/Armrests: Armcaps and armrests shall be finished wood or molded polyurethane material. Plastic laminate is prohibited. Upholstered armcaps/armrest will be considered only for special circumstances.
   5. Layouts: All seating layouts shall conform to current codes.
   6. Mounting: Specify only beam or riser mounted applications to facilitate maintenance. Newly constructed facilities shall be planned accordingly.
   7. Warranty and Guarantee: Specify that the manufacturers guarantee the product and carry a minimum of two (2) year complete warranty on all componentry. Throughout this two (2) year period, the product will not show signs of excessive wear or deterioration or experience failure of any item, material, construction or finish or the manufacturer shall promptly repair or replace equipment-showing defects of material at no cost to the University.
   8. Fixed auditorium seating should require electronic connection capability if the function of the room requires electronic activities.
   9. Indicate accessible seating areas and companion seating on all review and permit drawings.
   10. Provide space near entrance large enough to accommodate several wheelchairs.

1.3 TABLES

A. Tabletops: construction shall be of a high-pressured laminate with appropriate backing. Finish edges with a vinyl "T" molding.
B. Universal Design, provide at minimum, one adjustable height table at modular study carrels
C. Identify accessible tables with universal accessibility symbol.

END OF SECTION 12 60 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 13 SPECIAL CONSTRUCTION

DIVISION 13 SPECIAL CONSTRUCTION
SECTION 13 34 00 PRE-ENGINEERED STRUCTURES 2
SECTION 13 49 00 RADIATION PROTECTION 3

SECTION 13 34 00 PRE-ENGINEERED STRUCTURES

1.1 ENGINEERING DATA REQUIRED

A. An analysis of framing and structural components is required. Data shall bear the seal and signature of a professional engineer, registered in Florida, attesting that the structures meet requirements of the specifications and comply with requirements of applicable codes. Copies of this data shall be submitted to the USF Facilities Management (USF-FM).

END OF SECTION 13 34 00

SECTION 13 49 00 RADIATION PROTECTION

1.1 OWNER REQUIREMENTS

USF Radiation Safety Officer should be contacted early in the design phase to assist with radiation safety/protection requirements for USF. Radiation machine means any device capable of producing x-rays except those devices with radioactive materials as the only source of radiation. Radiation machines must comply with State of Florida Administrative code 64E-5 and Food and Drug Administration, Code of Federal Regulation (FDA CFR) Title 21.

1.2 RADIATION PROTECTION SURVEY

Room and equipment radiation shielding must be based on current and applicable National Council on Radiation Protection (NCRP) standards/reports after the X-ray equipment has been installed and placed in operating condition, a radiation protection survey shall be performed by a qualified expert recommended by NCRP.

1.3 LISTING REQUIRED

A. The University Research Integrity & Compliance – Radiation Safety Office has the responsibility of registering all equipment that directly produces ionizing radiation with the State of Florida, Department of Health, Bureau of Radiation Control, and Radiation Machine Program (in compliance with the regulations in Florida Statute, Chapter 404 and F.A.C. 64E-5). A listing of all such devices, as well as all radioactive materials specified in the contract documents, shall be submitted by the Consultant to the USF-FM with those documents. Devices include, but are not necessarily limited to:

1. lasers and maser
2. radar
3. microwave generators
4. electron microscopes
5. infrasonic, sonic, and ultrasonic generators
6. X-ray generators and accelerators
7. electron welders
8. diatherapy units
9. infrared and ultra-violet sources

END OF SECTION 13 49 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 14 CONVEYING SYSTEMS

DIVISION 14 CONVEYING EQUIPMENT
SECTION 14 24 00 HYDRAULIC ELEVATORS 2

SECTION 14 24 00 HYDRAULIC ELEVATORS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes hydraulic elevators.
B. Related Sections: The following sections contain requirements that relate to this Section:
   1. Setting of sleeves, inserts, and anchoring devices in concrete is specified in Division 3, Concrete.
   2. Electrical service to each elevator, including fused disconnect switch, is specified in Division 26, Electrical.

1.2 DEFINITIONS

A. Hydraulic elevators are hereby defined to include systems in which cars are hoisted either directly or indirectly by action of a hydraulic plunger and cylinder (jack); with other components of the work including fluid storage tank, pump, piping, valves, car enclosures, hoistway entrances, control systems, signal equipment, guide rails, electrical wiring, roping, buffers, and devices for operating, dispatching, safety, security, leveling, alarm, maintenance, and similar required performances and capabilities.
B. Modernization of an outdated elevator system may include, but is not limited to the following:
   1. Microprocessor Based Control Systems
   2. High Speed Solid - State Door Operators
   3. Americans with Disability Act (ADA) compliant, barrier free access, Security, and Safety Enhancements
   4. Aesthetics Upgrades of Car Enclosures, Entrances, and Operating Devices
   5. Changes to Existing Hoistway

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1, General Requirements.
B. Product Data for each principal component or product of each elevator, including certified test reports on required testing. Indicate capacities, sizes, performance, and operating characteristics, features of control system, finishes, and similar information. Indicate any variations from specified requirements.
C. Shop Drawings including dimensioned drawings showing plans, elevations, sections and large-scale details indicating service at each landing, coordination with building structure and relationships with other construction, and details of car enclosures and hoistway entrances. Include diagrams to indicate elevator service to each level and include excavation requirements for jack. Elevator controls and components shall comply with all requirements of the currently adopted Americans with Disability Act (ADA) code.
D. Signal Operating Fixture Details
E. Electrical Coordination Information
F. Samples of finishes.
G. Prior to substantial completion of the project, the following shall be submitted:
   1 One (1) set of diagnostic tools, including all manuals, troubleshooting and programming guides, codes and sundries necessary to operate the tools to test, adjust and maintain the elevator equipment provided, elevator prints and wiring schematics.
   2. Three (3) sets of complete certified engineering data, including parts lists and parts numbers on all equipment as will be necessary for maintaining the equipment and for ordering replacements. Certified engineering data shall be permanently bound.
   3. One (1) complete set of tested replacement micro-processor chips as required for the elevator controllers, for retention by the Owner.
   4. One (1) original reproducible and three (3) complete and legible sets of blue or black line wiring diagrams and straight line diagrams showing the complete electrical connections, functions and sequence of operation of all apparatus connected with the elevator, including door operator, both in the machine room and in the hoistway, together with photographs or cuts of controller repair parts with numbers listed. Each device on the wiring diagrams and

also on the controller panels shall be properly and permanently identified by name and part number.

5 One (1) original reproducible and three (3) complete sets of As-Built shop drawings, including layouts and signal operating fixture details.

6 One (1) complete parts catalogs listing costs of all major electronic replacement parts and numbers of all equipment installed and the names of the equipment suppliers and reordering procedures and the approval from the factory to sell directly to the Owner's current Service Company, with delivery not to exceed 72 hours.

7 Three (3) sets of neatly bound instructions explaining all operating features including apparatus in the car and lobby control panels, control sequence of operation, adjusting, and troubleshooting procedures.

8 Three (3) sets of lubrication charts indicating lubrication points and type of lubrication recommended for all equipment. One (1) set shall be bound and permanently maintained in the elevator machine room.

9 The Elevator Contractor shall provide three (3) bound sets of printed instructions for use of any tool that may be necessary to perform diagnostic evaluations, systems adjustment, and/or programmable software changes on any unit of the microprocessor based elevator control equipment. The Elevator Contractor shall provide access codes, passwords and other proprietary information that is necessary to interface with the microprocessor control equipment. In addition, the Elevator Contractor shall provide step by step adjusting, programming and troubleshooting procedures as pertain to the microprocessor control equipment, a composite listing of the individual settings chosen for the variable software parameters stored on the software programs of both motion and dispatch controllers.

10 Spill Prevention, Control and Countermeasure (SPPC) Plan: USF-FM maintains a comprehensive SPCC plan adhering to the requirements of the United States Environmental Protection Agency (USEPA) regulations contained in 40 C.F.R. Part 112 – Oil Pollution Prevention. Coordinate with USF Project Manager (USF-PM), FM-Operations (FM-OPS), and FM-Environmental Health & Safety (FM-EHS) regarding applicable information required to amend the SPCC Plan in accordance with 40 C.F.R. Part 112 prior to construction.

1.4 QUALITY ASSURANCE

A. Installer Qualification: Engage the elevator manufacturer or an installer approved by the elevator manufacturer and who has completed elevator installations similar in material, design, and extent to that indicated for Project which have resulted in installations with a record of successful in-service performance.

B. All material, design, clearances, construction, workmanship, operation and tests shall be in accordance with the requirements of the currently adopted issuance of the American National Standards Institute (ANSI) A17.1 Safety Code for Elevators, the National Electrical Code, the Building Officials Code Administrators International (BOCA) Code, the National Fire Protection Association (NFPA) Code, the ADA and all other codes, regulations, laws, and ordinances as may govern. Where conflicts occur in the above codes, the most rigid shall apply.

1.5 WARRANTY

A. Special Project Warranty: Provide special project warranty, signed by Contractor, Installer, and Manufacturer, agreeing to replace, repair, or restore defective materials and workmanship of elevator work during warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.

1. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected, and unsatisfactory conditions.
2. Warranty period is 12 months starting on date of project Substantial Completion.

1.6 PERMITS AND INSPECTIONS

A. The Elevator Contractor shall give all requisite notices, obtain and pay for all permits, and pay all deposits and fees necessary for the installation of all work provided under this specification. In addition, the Elevator Contractor shall obtain and pay for all necessary state and local inspections and conduct such tests as may be required by the regulations of such authorities. These tests shall be made in the presence of the authorized representative of such authorities and in the presence of the Owner. An elevator installation permit shall be displayed on the job site and visible to interested parties.
B. The installation, when complete, shall receive the final approval of all constituted authorities, and the Elevator Contractor shall submit evidence of the inspection results and the Certificate of Operation from the constituted authority, prior to Substantial Completion.

1.7 MAINTENANCE SERVICE

A. Initial Maintenance Service: Provide full maintenance service by skilled, competent employees of the elevator Installer for period of 12 months following Date of Substantial Completion. Include monthly preventive maintenance performed during normal working hours. Include repair or replacement of worn or defective parts or components, and lubricating, cleaning, and adjusting as required for proper elevator operation in conformance with specified requirements. Include 24 hours-per-day, 7 days-per-week emergency callback service. Emergency service shall be provided within 24 hours of service call. Exclude only repair or replacement due to misuse, abuse, accidents, or neglect caused by pers ons other than Installer's personnel.
B. Continuing Maintenance Service: Installer shall provide a continuing maintenance proposal to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date construction contract maintenance requirements are concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.
   1. NOTE: General Elevator Sales and Service is presently providing continuing maintenance service for all existing elevators.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
   1. Acceptable Manufacturers: Otis, Schindler, Kone.

2.2 MATERIALS AND COMPONENTS

A. Description of Universal Non-Proprietary Equipment:
   1 Capacity: (Edit According to Project)
   2 Speed: (Edit According to Project)
   3 Operation: (Edit According to Project)
   4 Car Size: Clear Inside: (Edit According to Project)
   5 Travel: (Edit According to Project)
   6 Power Supply: (Edit According to Project)
   7 Machine Location: (Edit According to Project)
   8 Stops: (Edit According to Project)
   9 Openings: (Edit According to Project)
   10 Hoistway Doors: (Edit According to Project)
   11 Door Operation: (Edit According to Project)
B. General Requirement: Provide manufacturer's standard universal non-proprietary pre-engineered elevator systems that will comply with or fulfill the requirements of the specifications. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system. No proprietary equipment allowed.
C. Hydraulic Machines and Elevator Equipment: Provide manufacturer's standard single-acting under-the car hydraulic plunger-cylinder unit for each elevator, with electric pump-tank-control system equipment in machine room as indicated. If mechanical room is cooled, provide hydraulic oil tank heater.

D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide isolation couplings to prevent sound/vibration transmissions form power unit.
E. Inserts: Furnish required concrete inserts and similar anchorage devices for the installation of guide rails, machinery, and other components of elevator work where installation of devices is indicated as work of another specification section. Provide subject to bidding system.
F. Car Frame and Platform: Manufacturer's standard welded steel units.

2.3 CONTROL SYSTEMS

A. General: Provide manufacturer's standard control system for elevator as required to provide automatic operation of the type indicated and defined in the Code as "Operations".
B. Elevator Control - Passenger: Provide solid-state "Selective Collective Automatic Operation," as defined in American Society of Mechanical Engineers / American National Standards Institute (ASME/ANSI) A17.1.

2.4 SIGNAL EQUIPMENT

A. General: Provide signal equipment for elevator to comply with requirements indicated below and current handicapped code:
   1 Provide illuminated hall-call and car-call buttons that light up when activated and remain lighted until call or other function has been fulfilled; fabricate of acrylic or other permanent translucent plastic.
   2 Except for buttons and illuminated signal elements, fabricate signal equipment with exposed surfaces of stainless steel with manufacturer's standard directional satin finish.
   3 Car Control Stations: Provide car control station in each car with flush-mounted metal faceplates containing call button for each landing served and other buttons, switches, and controls required for specified car operation and control. Mount as shown or scheduled at height complying with ASME/ANSI A117.1. If not otherwise indicated, mount in return panel adjacent to car door. Provide operating device symbols as required by Code. Mark other buttons and switches with manufacturer's standard identification for required use or function.
   4. Elevator control panels shall have the following features:
      a. Buttons: All control buttons shall be at least 3/4 inches in their smallest dimension. They shall be raised or flush.
      b. Tactile, Braille, and Visual Control Indicators: All control buttons shall be designed by Braille and by raised standard alphabet characters for letters, Arabic characters for numerals or standard symbols as required in ASME A17.1-1995. Raised and Braille characters and symbols shall comply with 4.30. The call button for the main entry floor shall be designated by a raised star at the left of the floor designation. All raised designations for control buttons shall be placed immediately to the left of the button to which they apply. Floor buttons shall be provided with visual indicators to show when each call is registered. The visual indicators shall be extinguished when each call is answered.
      c. Height: All floor buttons shall be no higher than 54 inches above the finish floor for side approach and 48 inches for front approach. Emergency controls, including the emergency alarm and emergency stop, shall be grouped at the bottom of the panel and shall have their centerlines no less than 34 inches above the finish floor.
      d. Location: Controls shall be located on a front wall if cars have center opening doors, and on the front wall next to the door if cars have side opening doors.
   5. Car Position Indicator:
      a. For passenger elevator cars, provide either illuminated-signal type or digital-display type, located near top of car or in car control station. Include direction-of-next-travel signal if not provided in car control station.
      b. In addition to visual indicator, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
   6. Hall Push-Button Station:
      a. Provide hall push-button station at each landing for each elevator.

b. Provide unit with flat faceplate designed for flush-mounting on wall with body of unit recessed in wall.
c. Provide 2-button station where passengers can travel either direction; 1-button station where only one direction of travel is available and indicate which direction that is.

7. Hall Lanterns:
a. Provide units with illuminated "up" and "down" signal arrows, but provide single arrow where only one direction is possible. Provide units projecting from faceplate for ease of angular viewing, except provide flush units where a location in hoistway entrance frame is indicated. Match materials, finishes, and mounting method of hall push-button stations.
b. At manufacturer's option, hall lantern signals may be placed either above or beside hoistway entrance or in both jambs of entrance frame for each elevator. Mount at minimum of 6 feet above finished floor.
c. Provide special oversized lantern signals at ground floor.
d. In conjunction with each hall lantern device, provide an audible signal to indicate that a car is arriving in response to a hall call and to indicate direction of car travel. Signal shall sound once for up direction of travel and twice for down direction. Audible signal shall be placed on each car.

B. Hall Position Indicator: Provide illuminated-signal type or digital-display type, located above hoistway entrance at ground floor. Match materials, finishes, and mounting method of hall push-button stations. At manufacturer's option, ground-floor hall lantern signals may be integrated with hall position indicators.
C. Telephone: Provide complete hands-free type telephone in each car, contained in flush-mounted cabinet and complete with identification and instructions for use. Provide an ADA compliant telephone in each elevator.
D. Alarm System: Provide emergency alarm bell properly located within building and audible outside hoistways, equipped to sound automatically in response to emergency stops and in response to "Alarm" button on each car control station.
F. Provide Fireman's Recall System.

2.5 PASSENGER ELEVATOR CAR ENCLOSURES

A. General:
1. Provide manufacturer's pre-engineered car enclosures of the selections indicated. Include ventilation, lighting, ceiling finish, wall finish, access doors, doors, power door operators, sill (threshold), trim, and accessories; floor finish not included in this Section.
2. Provide horizontal sliding doors of manufacturer's standard flush panel type, with operation and number of panels as indicated.
3. Provide manufacturer's standard protective edge trim system for door and wall panels, except as otherwise indicated.

B. Material and Fabrication: Provide selections as indicated for each car enclosure surface; provide manufacturer's standards except as indicated:
1 Aluminum Sills: Cast or extruded aluminum, with grooved surface, 1/4 inch thickness, mill finish.
2 Stainless Steel: American Iron and Steel Institute (AISI) Type 302/304 with satin finish.
3 Fabricate car door frame integrally with front wall of car.
4 Fabricate car with recesses and cutouts for signal equipment.
5 Ceiling: Solid surface ceiling with openings for lighting.
6 Floor finish shall be vinyl or ceramic tile (not part of this Section).

2.6 PERSONAL PROTECTIVE DEVICES

A Handrails: Provide manufacturer's standard stainless steel handrails on side walls and back wall unless otherwise indicated either continuous or segmented units.
B Door Edge Protective Device: Provide electronic multi-beam door detector at 5 inches and 29 inches heights, that when interrupted will cause closing doors to stop and reopen. Provide keyed switch in car operating panel or toggle switch in service cabinet for disconnecting photo-eye protective device. Door reopening devices shall remain effective for at least 20 seconds.

After such an interval, doors may close in accordance with the requirements of ASME A17.1-1990.

2.7 PASSENGER HOISTWAY ENTRANCES

A General: Provide manufacturer's standard, pre-engineered, sliding, door-and-frame hoistway entrances complete with track systems, hardware, safeties, sills, and accessories. Match car enclosure doors for size, number of door panels, and door panel movement. Provide frame-section size and profile to coordinate with hoistway wall construction as indicated.

B Raised and Braille Characters on Hoistway Entrances: All elevator hoistway entrances shall have raised and Braille floor designations provided on both jambs. The centerline of the characters shall be 60 inches above finished floor. Such characters shall be 2 inches high. Permanently applied plates are acceptable if they are permanently fixed to the jambs.

C Materials and Fabrication: Provide selections indicated that comply with manufacturer's standards, but not less than the following:

1 Stainless Steel Frames: Formed stainless steel sheet, AISI Type 302/304 with satin finish.

2 Stainless Steel Door Panels: Flush stainless steel construction, AISI Type 302/304 with satin finish.

3 Aluminum Sills: Extruded aluminum, with grooved surface, 1/4 inch thickness, mill finish.

2.8 PADS

A Provide one (1) set of "move-in" pads for each cab. Pads shall cover all wall surfaces.

PART 3 – EXECUTION

3.1 EXAMINATION

A Prior to commencing elevator installation, examine hoistways, hoistway openings, pits, and machine rooms, as constructed; verify all critical dimensions and examine supporting structure and all other conditions under which elevator work is to be installed. Notify Contractor in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of elevator work. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.2 INSTALLATION OF ELEVATOR SYSTEM

A General: Comply with manufacturer's instructions and recommendations for work required during installation. Hoist beam installed by General Contractor.

B Install plunger-cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place.

C Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with American Welding Society (AWS) standards for workmanship and for qualifications of welding operators.

D Coordination: Coordinate elevator work with work of other trades for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by Contractor to ensure dimensional coordination of the work.

E Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure and thereby to eliminate sources of structure-borne noise from elevator system.

F Install piping without routing underground, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.

G Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.

H Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

I Level Tolerance: 1/2 inch, up or down, regardless of load and direction of travel.

J Set sills flush with finished floor surface at landings. Coordinate with other trades to facilitate and ensure proper grouting of sills.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: Upon nominal completion of each elevator installation, and before permitting use of elevator perform acceptance tests as required and recommended by Code and by governing regulations or agencies.
B. Operating Tests: Load each elevator to its rated capacity and operate continuously for 30 minutes over its full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of pump motor (except submerged pumps) during the 30 minute test period. Record failures of elevator to perform as required.
C. Advise Contractor, Owner, Company Representative and inspection department of governing agencies in advance of dates and times tests are to be performed on elevators. Submit test results/reports to owner.
D. Fill all construction voids.

3.4 PROTECTION

A. Upon start-up or use of elevator work (or portion thereof), provide suitable protective coverings, barriers, devices, signs, or such other methods or procedures to protect elevator work from damage or deterioration.

3.5 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program. Provide video tape of training/operating procedures.
B. Make a final check of each elevator operation with Owner's personnel present and just prior to date of project Substantial Completion. Determine that controls systems and operating devices are functioning properly.

END OF SECTION 14 24 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 21 FIRE SUPPRESSION

DIVISION 21 FIRE SUPPRESSION
SECTION 21 00 00 GENERAL REQUIREMENTS 2
SECTION 21 13 13 WET SPRINKLER SYSTEMS 4

SECTION 21 00 00 GENERAL REQUIREMENTS

PART 1 – GENERAL

1.1 GUIDELINE INTENT

A. This division serves as a design and construction guideline for the Professional Architect/Engineer (A/E) and Contractors performing fire suppression services at the University of South Florida (USF). This guideline is intended to establish the USF standard of quality and is not a specification. The A/E shall develop the permit and construction documents in accordance with the intent of the guideline and as necessary to comply with the given project scope and/or program.

1.2 DESIGN CRITERIA

A. The A/E shall provide Contract Documents prepared in accordance with Division 61G15-32 (Board of Professional Engineers), Florida Administrative Code. Fire Protection construction drawings shall be signed and sealed by a Florida Registered Fire Protection System Design Engineer acting as the Engineer of Record. Copies of signed and sealed construction drawings shall be submitted to this office for review and comment. When approval is achieved, the contractor shall submit the necessary number of copies of signed and sealed drawings to authorities having jurisdiction for review and approval.

B. All work shall meet all of the requirements of the edition in effect at time of permitting of the Florida Fire Prevention Code (FFPC), and applicable National Fire Protection Association (NFPA) codes and standards editions as adopted by the State Fire Marshal's Office in the Florida Fire Prevention Code.

C. All water based systems shall be hydraulically designed. Construction documents shall include hydraulic calculations and a fully developed and complete set of fire suppression system specifications signed and sealed by a Florida Registered Professional Engineer. The design details and installation shall conform to the latest edition of national Fire Protection Association (NFPA) 13, latest edition of the Fire Prevention Code, and all local codes and regulations.

D. During the schematic phase of the project, the A/E shall evaluate the existing site water service conditions and determine if the fire lines and/or site domestic water service designated to serve the fire suppression system is adequate (flow, static and residual pressure) for the building fire suppression system. If the A/E determines the service is not adequate, they shall immediately notify the USF Project Manager (USF-PM) in writing. If the fire pump is deemed necessary, the design shall include the fire pump system design as a basic part of the project.

E. Requirements of the latest revision of the USF Cost Containment Guidelines (CCG), Florida Building Code (FBC), and applicable NFPA 13, NFPA 14, NFPA 20, NFPA 25, NFPA 70 must be met.

F. Appropriate American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), Underwriters Laboratory (UL), American Society of Mechanical Engineers (ASME) and NFPA standards must be met and specified for materials.

G. Fire suppression systems other than Wet Pipe Sprinkler Systems (Dry Pipe Sprinkler Systems, Preaction Sprinkler Systems, Clean Agent Systems, etc.) may be considered for a given program and/or building code requirement. If other systems are being considered for the project, the A/E shall notify the USF-PM in writing and review the concepts and intent with USF-FM prior to finalizing.

1.3 PERMITS AND INSPECTIONS

A. Follow USF Building Code Administrator (BCA) requirements for permitting and scheduling inspections. Coordinate with USF BCA department.

1.4 COORDINATION

A. Visit the site included in the scope of work to ascertain existing conditions. Verify all dimensions and locations before proceeding with work in the area and prior to purchasing equipment.

B. Review and coordinate between all construction documents, all project specifications, and all sections in USF Design and Construction Guidelines (DCG). Notify USF-PM of conflicts or discrepancies prior to proceeding with work.

C. Locate all underground utilities required by the Sunshine Law prior to proceeding with work. Contact USF-PM to obtain latest USF Campus Utilities Map for the area in scope of work prior to proceeding.
D. Coordinate with USF-PM, USF Parking and Transportation Services (PATS), and USF Police Department (UPD) for required lane closures and parking spaces closures minimum 72 hours prior to closures. Contractor is responsible for all closure barriers and signs subject to USF review and approval.

1.5 SUBMITTALS

A. Submit one electronic copy of Fire Suppression Submittals as a single bookmarked pdf. Include a table of contents, bookmark/tab manual based on specification chapters or sections.
B. Submit hydraulic calculations.

PART 2 – PRODUCTS (Not used)

PART 3 -- EXECUTION

3.1 PROJECT CLOSE OUT

A. Submit one electronic copy and one hard copy of Operations Manual as a single bookmarked pdf. Include a table of contents, bookmark/tab manual based on specification chapters or sections.
B. Provide record documents per USF-FM requirements. Coordinate with USF-PM. Record documents shall include updated as-built drawings including clear delineation of main and branch shut-off valve locations and actual installed invert elevations for all applicable services. Submit working CAD drawings (with bound Xref files) on disk or other approved memory storage device, include separate folder or disk including pdf copies of each as-built drawing. Filenames shall include drawing number as reference.

3.2 COLOR CODING OR LABELING AND IDENTIFYING

A. Fire sprinkler devices (valves, accessories, etc.) concealed above ceilings requiring access for service, maintenance or tests shall be labeled on the ceiling tile or ceiling grid, etc. and made clearly visible from below.
B. The following band colors and letter designations shall be used:

Fire Suppression Piping		
Description	Acronym	Color
Fire Pipe	Fire	Red

END OF SECTION 21 00 00

SECTION 21 13 13 WET SPRINKLER SYSTEMS

PART 1 – GENERAL

1.1 DESIGN CRITERIA

A. All systems shall comply with the latest edition of NFPA 13, NFPA 14, NFPA 20, and NFPA 25 where applicable.
B. Hydraulic calculations shall be provided per the latest NFPA code and submitted to BCA.
C. All fire suppression system drawings shall be coordinated with ceilings, air devices, ductwork, lighting, structural members, etc. Sprinkler heads shall be within the center of each ceiling tile where applicable while maintaining spacing requirements.

PART 2 – PRODUCTS

2.1 MATERIALS

A. All pipe shall be ASTM A53, Type S Grade B steel pipe.
B. All threaded pipe shall be minimum Schedule 40. Cut groove pipe shall not be used.
C. Welded and rolled grooved pipe may be used. Schedule 10 piping may be used on pipe sizes 2.5 inches and up. Use of CPVC Fire Sprinkler piping may be considered for use on residential buildings only.
D. Sprinkler pipe hangers shall be Underwriters Laboratory / Factory Mutual (UL/FM) rated and meet NFPA and FBC requirements for pipe support.

PART 3 – EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. Pipes shall follow building lines.
B. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.
C. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.
D. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
E. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8, Openings.
F. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
G. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
H. Painting of fire-suppression systems, equipment, and components is specified in Section 09 90 09, Painting. All exposed riser and branch piping in finished and unfinished rooms shall be painted Red and properly labeled.

END OF SECTION 21 13 13

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 22 PLUMBING

DIVISION 22 PLUMBING
SECTION 20 00 00 GENERAL PLUMBING REQUIRMENTS 1
SECTION 22 05 00 COMMON WORK RESULTS FOR PLUMBING 2
SECTION 22 05 13 COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT 4
SECTION 22 05 19 METERS AND GAGES FOR PLUMBING PIPING 7
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SECTION 22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT 9
SECTION 22 07 00 PLUMBING INSULATION 10
SECTION 22 11 00 PLUMBING PIPING 12
SECTION 22 11 19 PLUMBING SPECIALTIES 13
SECTION 22 30 00 PLUMBING EQUIPMENT 14

SECTION 22 00 00 GENERAL PLUMBING REQUIRMENTS

1.1 GUIDELINE INTENT

A. This division serves as a design and construction guideline for the Professional Architect/Engineer (A/E) and Contractors performing plumbing services at the University of South Florida. This guideline is intended to establish the Universities standard of quality and is not a specification. The A/E shall develop the permit and construction documents in accordance with the intent of the guideline and as necessary to comply with the given project scope and/or program.

B. In some instances, a product is named to represent a minimum acceptable quality standard as a basis for the A/E. The intent is for the A/E to specify/schedule not less than three manufactures/ models based on similar style, appearance & performance characteristics of the named product.

C. This guideline lists minimum material quality standards. Materials not contained here-in shall be selected by A/E based on application and where code allows.

D. Substitution requests shall be in writing to the USF Project Manager (USF-PM). Notification of substitution acceptance will be in writing; utilizing the PMG-01 USF Design & Construction Guideline Change Form, otherwise, the substitute is not accepted.

1.2 DESIGN CRITERIA

A. This Section contains material and equipment for plumbing (domestic water, waste, roof drainage, condensate drainage, gas piping within five feet of the building perimeter), including plumbing fixtures, plumbing specialties, plumbing equipment and disinfection of the interior water distribution system.

B. Professional Engineer shall provide Contract Documents prepared in accordance with 61G15, Florida Administrative Code.

C. Requirements of the latest revision of the USF Cost Containment Guide (CCG), Florida Building Code (FBC), FBC Mechanical Code, FBC Energy Conservation Code, FBC Plumbing Code, and FBC Fuel Gas Code must be met.

D. Appropriate ASTM, ANSI, UL, ASME and NFPA standards must be met and specified for materials.

END OF SECTION 22 00 00

SECTION 22 05 00 COMMON WORK RESULTS FOR PLUMBING

PART 1 -- GENERAL

1.1 PRE-DESIGN REQUIREMENTS (Renovation and Remodel Projects)

A. The A/E (Plumbing Engineer) shall evaluate the existing building drainage system to determine if the system is capable of supporting the additional project load. If existing building drainage system is not capable, a new building drainage system shall be added for the additional project load.
B. As a basic part of evaluating the existing building drainage system capacity, the A/E shall verify existing system drainage slopes; verify existing drain conditions (pipe material, dips, breaks, roughness, etc.) via camera and/or visual inspection of the system. Video-camera inspection of existing drainage systems is recommended.

1.2 PERMITS AND INSPECTIONS

A. Follow USF Building Code Administration (BCA) requirements for permitting and scheduling inspections. Coordinate with USF BCA department.
B. Minor Projects - Contractor is responsible for all permitting and inspecting fees.
C. Major Projects - Coordinate with USF Project Manager for responsible party for permitting fees.
D. Minor Projects with USF approved Construction Manager (CM) - Coordinate with USF Project Manager and assigned Construction Manager for responsible party for permitting fees.

1.3 COORDINATION

A. Visit the site included in the scope of work to ascertain existing conditions. Verify all dimensions and locations before proceeding with work in the area and prior to purchasing equipment.
B. Review and coordinate between all construction documents, all project specifications, and all sections in USF Design and Construction Guidelines (DCG). Notify USF Project Manager of conflicts or discrepancies prior to proceeding with work.
C. Locate all underground utilities required by the Sunshine Law prior to proceeding with work. Contact USF Project Manager to obtain latest USF Campus Utilities Map for the area in scope of work prior to proceeding.
D. Coordinate with USF-PM, USF Parking and Transportation Services (USF-PATS), and USF Police Department (USF-PD) for required lane closures and parking spaces closures minimum 72 hours prior to closures. Contractor is responsible for all closure barriers and signs subject to USF review and approval.

1.4 SUBMITTALS

A. Submit one electronic copy of Plumbing Submittals as a single bookmarked pdf. Include a table of contents, bookmark/tab manual based on specification chapters or sections.

1.5 SITE

A. All existing utilities shall remain in place unless otherwise noted on the contract documents.
B. Contractor shall restore back to original installation primary gear, primary feeders, utilities, irrigation, etc. damaged by the contractor in the area of demolition or construction.
C. Provide an erosion control plan addressing prevention, control, and abatement of water pollution to USF Project Manager for approval prior to proceeding with work.
D. Safety fencing shall be USF green. Orange or black safety fencing shall not be used.
E. Conduit trenches shall be backfilled completely to provide safe crossing by the end of work day or whenever the work zone becomes inactive.
F. Maintain access to side streets, drives, and sidewalks at all times during construction.
G. Existing pedestrian/sidewalk lighting and roadway lighting shall remain operational during all phases of the construction until new lighting is energized.

H. Construction Sites: Provide protective barriers around open plumbing trenches manholes. USF shall have clear vehicle access to these items at all times during construction.
I. Plumbing manholes: Provide 10 feet square barricade around manhole cover. Manhole cover shall be accessible to USF at all times. Remove construction debris such as dirt, sod, ground cover, etc.
J. Temporary services protective barricades shall allow 3 feet clearance on sides and rear (or required by code if greater), and 5 feet clearance in front of equipment.
K. No construction materials or construction tools shall be stored within the protective barricades.
L. No construction vehicles or personal vehicles shall be parked over plumbing manhole covers.
M. Project site design and final site constructed conditions shall include clear vehicle access to all above mentioned equipment for maintenance.
N. Fenced Construction Sites: An access point agreed to by USF Project Manager and USF Facilities Management-Operations (FM-OPS) shall be provided to USF. Chains shall have USF Standard 2000 Padlock and site contractor pad lock daisy chained. Project is responsible to provide the USF Standard 2000 Padlock, coordinate with USF PM.
O. Areas where work is performed shall be kept clean of debris and materials and shall be cleaned at the end of each work day. Contractor is responsible to secure all tools and materials at all times.
P. Remove existing equipment and materials, etc., identified to be removed on plans. Equipment removed should be offered to USF to be kept as spares. If USF elects to not keep equipment as spare, the Contractor shall remove and dispose of properly. Equipment disconnected or abandoned shall be removed by the Contractor and disposed of properly.
Q Provide Tree protection for any tree that may be located within the project construction site or near the lay-down or designated contractor parking area. Parking and Lay-down areas shall be located outside the drip edge of trees. If the project scope impacts within the drip edge of trees in the construction site, the trees shall be properly protected with barriers and/or proper root pruning by qualified arborist. For additional Tree Protection information refer to USF PM.

1.6 WARRANTY

A. Contractor shall provide minimum 1 year warranty for all labor and materials, whether included or not included by equipment manufacturers. The contractor shall replace defective materials during the first year of warranty without additional compensation from USF.
B. Manufacturer warranties greater than 1 year, or where lengthier warranties are required in the project documents, or in USF Design and Construction Guidelines (DCG) shall extend the standard 1 year warranty.
C. Warranty period shall begin on date of substantial completion.

1.7 MISCELLANEOUS

A. USF Furnished Equipment:
   1. Contractor shall be responsible for receipt from USF, storage after receipt, and installation if required.
   2. Verify equipment connection requirements prior to rough-in and ordering materials.
   3. Install equipment in accordance with manufacturer instructions.
   4. Maintain equipment until project is turned over to USF at Substantial Completion.
B. A/E for new construction and renovations or contractor for miscellaneous additions shall demonstrate that the existing services have the required additional capacity and can accommodate the load being added.
C. A/E for new construction and renovations or contractor for miscellaneous additions shall demonstrate that the existing services are at adequate depth to accommodate the minimum slope requirements for tie-in of new to existing services.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 PROJECT CLOSE OUT

A. Submit one electronic copy and one hard copy of Operations Manual as a single bookmarked .pdf. Include a table of contents, bookmark/tab manual based on specification chapters or sections.

B. Provide record documents per USF-FM requirements. Coordinate with USF Project Manager. Record documents shall be submitted in accordance with the CAD & BIM Guidelines & Standards requirements, include updated as-built drawings including clear delineation of main and branch shut-off valve locations and actual installed invert elevations for all applicable plumbing services. Submit working CAD drawings (with bound Xref files) on disk or other approved memory storage device. Include separate folder or disk including pdf copies of each as-built drawing. Filenames shall include drawing number as reference.

3.2 FIELD QUALITY CONTROL

A. Inspect and test water distribution piping. Refer to FBC Plumbing Code for testing requirements.

B. Inspect and test drainage and vent piping.

C. Clean and disinfect water distribution piping.

3.3 COLOR CODING OR LABELING AND IDENTIFYING

A. The following band colors and letter designations shall be used for Plumbing Piping:

Description	Acronym	Color
Domestic Cold Water	DCW	Green
Domestic Hot Water	DHW	Yellow
Domestic Hot Water Return	DHWR	Yellow
Distilled Water	DIST.W	Green
Deionized Water	DEION.W	Green
Soft Water	SOFT W	Green
Sanitary Drain	SAN	Yellow
Storm Drain	ST	Yellow
Compressed Air	A	Yellow
Nitrogen	NIT	Yellow
Oxygen	OXY	Yellow
Natural Gas	GAS	Yellow
Vacuum	VAC	Yellow
Fuel Oil	FUEL	Yellow

END OF SECTION 22 05 00

SECTION 22 05 13 COMMON MOTOR REQUIREMENTS FOR POLUMBING EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, **General Requirements** apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with

the following:
1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

1.4 REFERENCES
A. AFBMA 9 — Load Ratings and Fatigue Life for Ball Bearings.
B. AFBMA 11 — Load Ratings and Fatigue Life for Roller Bearings.
C. ANSI/IEEE 112 — Test Procedure for Polyphase Induction Motors and Generators.
D. ANSI/NEMA MG 1 — Motors and Generators.
E. ANSI/NFPA 70 — National Electrical Code.

1.5 OPERATION AND MAINTENANCE DATA
A. Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

PART 2 PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS
A. Comply with requirements in this Section except when stricter requirements are specified in plumbing equipment schedules or Sections.
B. Comply with NEMA MG 1 unless otherwise indicated.
C. Electrical Service: Refer to Section on Motor Control for required electrical characteristics.
D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency.
E. Electrical Connection: Conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

2.2 MOTOR CHARACTERISTICS
A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS
A. Description: NEMA MG 1, Design B, medium induction motor.
B. Service Factor: 1.15.
C. Multispeed Motors: Variable torque.
   1. For motors with other than 2:1 speed ratio, separate winding for each speed.
D. Multispeed Motors: Separate winding for each speed.
E. Rotor: Random-wound, squirrel cage.
F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
G. Temperature Rise: Match insulation rating.
H. Insulation: Class F.
I. Code Letter Designation:
   1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
   2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.
K. Starting Torque: Between one and one and one-half times full load torque.
L. Starting Current: Six times full load current.

M. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics.
N. Testing Procedure: In accordance with ANSI/IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and compliance with performance data.
O. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
P. Sound Power Levels: To ANSI/NEMA MG 1.
Q. Motors for variable speed (PWM) application shall conform to NEMA Standard MG 1 2016, Part 30 and Part 31.
R. Nominal Power Factor: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
    1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
    2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
    3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
    4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
    1. Permanent-split capacitor.
        a. Starting Torque: Less than 150 percent of full load torque.
        b. Starting Current: Up to seven times full load current.
        c. Breakdown Torque: Approximately 200 percent of full load torque.
        d. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prefabricated sleeve or ball bearings.
        e. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.
    2. Split phase.
        a. Starting Torque: Exceeding one fourth of full load torque.
        b. Starting Current: Up to six times full load current.
        c. Multiple Speed: Through tapped windings.
        d. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.
    3. Capacitor start, inductor run / Capacitor start, capacitor run.
        a. Starting Torque: Three times full load torque.
        b. Starting Current: Less than five times full load current.
        c. Pull-up Torque: Up to 350 percent of full load torque.
        d. Breakdown Torque: Approximately 250 percent of full load torque.
        e. Motors: Capacitor in series with starting winding; capacitor-start/capacitor-run motors shall have two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
        f. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA

Service Factor, prelubricated sleeve ball bearings.
g. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
C. Motors 1/20 HP and Smaller: Shaded-pole type.
D. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.6 EFFICIENCY

A. All motors shall be NEMA Premium Efficient Electric Motors according to the latest Energy Independence and Security Act.

PART 3 EXECUTION

3.1 APPLICATION

A. Motors drawing less than 250 Watts and intended for intermittent service may be germaine to equipment manufacturer and need not conform to these specifications.
B. Motors shall be open drip-proof type, except where specifically noted otherwise. Pump motors located in mechanical rooms shall be totally enclosed fan cooled motors. All motors installed outdoors shall be totally enclosed fan cooled motors.
C. Single phase motors for shaft mounted fans shall be split phase type.

END OF SECTION 22 05 13

SECTION 22 05 19 METERS AND GAGES FOR PLUMBING PIPING

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings shall show location of all gages and meters. Detail of installation shall be shown on drawing. Detail shall include all valves, nipples, unions, thermometers, wells, material of construction, range of gages/meters, etc. All meter locations should be easily serviceable and not in the way of other maintenance needs of other equipment.

1.2 MATERIALS

A. The following meters (where applicable) shall be required on all projects, including garages.
1. Domestic Water
B. PRESSURE shall be read by a differential pressure (DP) gage, calibrated in "feet." (DP gage has two inputs, one high pressure and one low pressure.)
C. PRESSURE GAGES shall be selected so that failure will relieve pressure to the rear of gage.
D. GAGES/METERS shall be selected to operate midway of their scale.

PART 2 – PRODUCTS

2.1 DOMESTIC WATER METERING

A. Neptune MACH 10 Ultrasonic Meter with Neptune Cellular Meter Interface Unit.
B. Neptune Cellular Meter Interface Unit (CMIU) shall be provided for automated meter reading (AMI). USF Utilities shall integrate the meter CMIU to USF account/system.

PART 3 – EXECUTION

3.1 EXECUTION

A. ALL GAGES/METERS shall be installed such that they can be read easily, i.e., grouped together and facing in the same direction.

B. METERS for measuring utility services shall be installed before the first point of use in buildings.
C. Install meters with appropriate distance from change in pipe direction and install with manufacturers recommended upstream and downstream straight length equivalents.

3.2 INTEGRATION

A. Refer to SECTION 23 05 19 METERS AND GAGES FOR HVAC PIPING PART 3 EXECUTION 3.2 INTEGRATION.

END OF SECTION 22 05 19

SECTION 22 05 23 GENERAL-DUTY VALVES

PART 1 – GENEARL

1.1 GENERAL REQUIREMENTS FOR VALVES

A. All applicable products shall be in compliance with the Federal Lead Free mandate effective January 4, 2014.
B. Isolation valves shall be accessible and provided so as to isolate each restroom or restroom group, break room, laboratory, or room with sink, etc. Valves shall be located within accessible ceilings adjacent to room before first branch feed or adjacent hallway/corridor no more than 10 feet from the first branch take-off.
C. Check valves are to be Y-Pattern 200 PSI, WOG, bronze body swing check. 2 inches and smaller shall have integral seat with renewable bronze disc. Sizes larger than 2 inches shall include bronze disc, stainless steel spring, and cast iron body.
D. Balancing Valves: For 2 inches and smaller, use screwed bronze with Pointer and calibrated readout plate and machined orifice. For sizes larger than 2 inches, specify flow meter with machined orifice and two (2) readout connections. Provide a valve with locks located five (5) pipe diameters up-stream of the orifice.
E. All valves are to be rated at working Pressure of 200 PSIG, 250 degrees F minimum WOG, or greater if engineering design demands. Stems are to point vertically or horizontally and must be located for easy service or repair. A valve schedule showing details; number, size, type, material, etc. of all valves should be shown on the Drawings.
F. Valves in Insulated Piping shall include stem extensions to account for installed insulation thickness sufficient to allow full stem movement/rotation.
G. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
H. Shutoff Valve for Laboratories. Each laboratory space containing two or more gas outlets installed on tables, benches, or in hoods in educational, research, commercial, and industrial occupancies shall have a single shutoff valve through which all such gas outlets are supplied. The shutoff valve shall be accessible, located within the laboratory or adjacent to the laboratory's egress door, and identified.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 GENERAL VALVE APPLICATION (Domestic Water)

A. Above Ground Shutoff Service: Bronze body ball valves with stainless steel ball and Teflon seat (up to 4 inches) or butterfly valves (4 inches and larger).
B. Below Ground Shutoff Service: Valves - Provide flanged 2-piece full port cast iron, stainless steel ball and stem, water, oil, gas, full close-off, 200 PSI ball valves. Valves below ground shall be installed in concrete valve box with corrosion resistant hinged access lid properly designed for the traffic condition. Floor of valve box shall not exceed 4 feet deep. If piping to enter valve box is below 4 feet, piping elevation shall transition into and out of valve box with 45 degree fittings. Each valve shall be installed in valve box with orientation and position so handwheel is accessible from surface access opening via to allow for periodic exercising of

valves. Provide brass or stainless steel engraved manhole nametag securely attached to lid. Engrave with minimum ¼" height characters matching name provided by USF PM.

C. Balancing Service: Globe style calibrated balancing valves with memory stop.
D. Provide the following end connections for above ground piping:
   1. For Copper Tubing, NPS 2 and Smaller: Threaded ends.
   2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends unless specified otherwise.
E. Provide the following above ground Valve Actuator Types:
   1. Hand lever: For quarter-turn valves NPS 6 and smaller.

END OF SECTION 22 05 23

SECTION 22 05 29 HANGERS AND SUPPORTS

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Design hangers without disengagement of supported pipe.
B. General Locations: Steel pipe hangers, miscellaneous steel supports, hardware, bolts, washers, nuts, screws, etc., shall be hot dipped galvanized with a minimum of 1.50 oz./ft. on all sides and all field cuts shall be zinc coated.
C. Located in Harsh and/or Corrosive Environments: Pipe hangers, equipment supports, miscellaneous structure components, hardware, bolts, washers, nuts, screws, etc., shall be non-metallic polyester resin, vinyl ester resin, fiberglass, glass reinforced polyurethane or 316 stainless steel.
D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
E. Provide an adequate and complete pipe support system using approved hangers and supports complete with necessary attachments, shields, inserts, bolts, rods, nuts, washers, and other accessories. Shields shall be a minimum of 12 inches long and of sufficient strength to ensure pipe hangers do not cut into or compromise the insulation integrity.
F. Provide adequate and complete pipe support system using hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units. Provide thermal expansion calculations for each system and component subject to stresses.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 22 05 29

SECTION 22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENT

A. Identification of piping and equipment shall be specified by the A/E and in compliance with the University guidelines as set forth below:
B. All Plumbing drawing symbols used shall be in accordance with standards of accepted practice.
C. All equipment and piping including associated electrical devices, shall be labeled and tagged in accordance with the University's guidelines.

1.2 GENERAL

A. Engraved signs and labels shall be permanently attached with Stainless-steel rivets or self-tapping screws unless approved otherwise.
B. Label Content: Include caution and warning information, plus emergency notification instructions.
C. Pipe Labels shall be color-coded according to pipe service, with lettering indicating service, showing flow direction and sized according to application for optimum visibility.
D. Equipment Located Above Ceiling or in Walls (i.e., domestic water isolation valves, etc.): Provide engraved equipment label located on the access door, ceiling or ceiling grid directly adjacent or below the equipment.

1.3 ACCESS PANELS

A. Access panels are required in each situation where items requiring maintenance are located above a concealed ceiling. Size of access panel shall provide the necessary clearances to perform maintenance and removals.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 22 05 53

SECTION 22 07 00 PLUMBING INSULATION

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Design insulation systems for all piping and equipment in accordance with the requirements set forth and no less than the minimum per the latest Energy Code requirements. Insulation thickness/K-Value shall be designed to prevent condensation under all operating conditions especially in a hot humid environment.

1.2 DEFINITIONS

A. Hot Surfaces - normal operating temperatures of 100 degrees F or higher.
B. Cold Surfaces - normal operating temperatures of 75 degrees F or less.
C. Dual Temperature Surfaces - normal operating temperatures that vary from hot to cold.

1.3 APPLICATIONS

A. General: Materials and thicknesses are specified in schedules at the end of this section.
B. Interior, Exposed Piping Systems and Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
   1. Domestic hot water and hot water return.
   2. Sanitary drains for fixtures accessible to the disabled.
   3. Refrigerant suction lines.
   4. Condensate waste piping.
   5. Cold water lines exposed to interior unconditioned environment.
   6. Horizontal roof drains conductors.
C. Exterior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
   1. Domestic cold water, hot water and hot water return.
   2. Refrigerant suction lines.
   3. Condensate waste piping.
   4. Storm/Rain conductors.

PART 2 – PRODUCTS

2.1 PIPE INSULATION SCHEDULES (minimum thicknesses)

Pipe Sizes (NPS)	Materials	Thickness (Inches)	Vapor Barrier Required	Field applied Jacket
INTERIOR DOMESTIC HOT WATER				
1/2 - 2	Round Preformed Glass Fiber	1 1/2	Yes	None
Over 2	Round Preformed Glass Fiber	2	Yes	None
EXTERIOR EXPOSED DOMESTIC WATER (Add UV protection for outside installation)				
All	Round Preformed Flexible Elastomeric	3/4	No	
INTERIOR/EXTERIOR REFRIGERANT SUCTION (Add UV protection for outside installation)				
5/8 - 2-1/8	Round Preformed Flexible Elastomeric	1	No	None
INTERIOR/EXTERIOR CONDENSATE WASTE (Add UV protection for outside installation)				
All	Round Preformed Flexible Elastomeric	3/4	No	None
HORIZONTAL RAIN CONDUCTORS				
All	Round Preformed Glass Fiber	1-1/2	No	None

2.2 GENERAL

A. Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process. Foam plastic insulation is not permitted within buildings or in overhangs or within 5 feet of the building perimeter.

F. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

G. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.

H. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

I. Keep insulation materials dry during application and finishing. Insulation shall not be applied until systems are cleaned and satisfactorily tested. All piping and other work to be insulated shall be clean, dry, and free of building debris, flux and rust prior to installation of insulation.

J. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

K. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

L. Armaflex shall not be split for installation.

M. Insulation and vapor barrier shall be continuous through sleeves, walls penetrations, openings and hangers.
N. Installation shall be in strict accordance with manufacturer's instructions.
O. Flanges, valves, vessels and fittings shall be insulated and finished the same as pipe.
P. Insulation for pumps, heat exchangers, and similar equipment, that may require periodic inspection or maintenance, shall be fabricated in easily removed sections.

PART 3 – EXECUTION (Not Used)

END OF SECTION 22 07 00

SECTION 22 11 00 PLUMBING PIPING

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Design piping systems in accordance with the requirements set forth and no less than the minimum per the latest Florida Plumbing Code requirements.
B. Specialty piping systems shall be specified by A/E for the application consistent with existing base building system materials and intent of these Design and Construction Guidelines.
C. Isometric drawings shall be prepared for all piping systems.
D. Piping riser diagram shall show all valve locations.
E. Slopes for drainage shall be 1/4 inch/foot minimum. A/E shall discuss with USF if this criteria cannot be met and recommend other slopes.
F. All materials shall be new, of quality as specified and when required be clearly labeled and/or stamped.
G. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
H. Shutoff Valve for Laboratories. Refer to Section 22 05 23 General Duty Valves.
I. All floor drains shall have trap primers.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Interior Domestic Water: Building domestic water distribution piping (within five feet of building perimeter) shall be type L copper with no-lead solder joints except on service main piping 4" and larger which shall be type L rigid thick wall piping copper with no-lead solder joints. Mechanical Joint piping systems are not satisfactory for concealed or below grade applications.

Mechanical pressed copper pipe jointing piping similar to Viega Pro Press System or approved equal may be used inside buildings for domestic water piping smaller than 3 inches. Mechanical copper pipe jointing piping systems similar to Victaulic Grooved-joint or approved equal may be used inside buildings for domestic water piping 2 inches thru 3 inches upon written substitution request and approval by the USF Facilities Management.

Approvals will be contingent on base building system materials, cost considerations, installation time and use of space. All of the piping system components in project mechanical joining piping systems shall be of single manufacturer including joints, pipe, grooving tools, couplings, gaskets, fittings, valves and accessories, etc. A direct employee of the jointing system manufacturer shall provide on-site contractor training and installation inspection by the manufacturers authorized representative. The manufacturer's Installation Services representative shall inspect project for properly-installed pipe joints and complete system integrity. Upon completion of each inspection, the manufacturer's Installation Services representative shall provide a report to USF, Contractor and the Engineer to identify any

deficiencies and/or contractor action items. Mechanical joining piping system manufacturers shall provide owner training and provide any/all installation tools needed for maintaining the system. Owner training shall be provided for up to 4 hours of hands on maintenance and repair training for 4 USF Operations personnel as scheduled via USF Project Manager at time of Substantial Completion. Mechanical joining piping system manufacturers shall provide USF with long-term Extended Warranty on each project-accepted for installation.

B. Exterior domestic water pipe service pipe (beyond five feet of the building perimeter) shall be as specified in Division 33 Utilities. This Contractor shall transition piping as necessary at the five feet demarcation point to make proper tie-in to site distribution piping.
C. Pressure relief piping shall be copper type k.
D. Building Drains: Drain, Waste and Vent (DWV) Piping: DWV building drains for non-acid waste discharge of storm water and sanitary, shall be cast iron soil pipe. In ground below slab shall be hub and spigot conforming to ASTM A74, thickness Class (XH). Protection from corrosive soils shall be provided using polyethylene encasement conforming to ANSI A21.5/AWWA C105. Above slab in wall and ceiling spaces, drain pipe shall be hubless cast iron soil pipe conforming to ASTM A888 and CISPI Std. 301. Couplings shall be heavy duty conforming to ASTM 1540. Schedule 40 PVC is allowed under the slab for sanitary and storm lines. PVC storm and/or DWV piping used in buildings shall be approved by the USF FM. Approvals will be contingent on base building system materials, cost considerations, installation time and use of space. Approval of such will be at the discretion of the USF-FM after weighing the merits vs. risks involved.
E. Acid Waste Lines outside the Building: Piping shall be Duriron corrosion resistant piping or equal. Joints in acid-resisting pipe shall be made with caulking lead conforming to ASTM B-29. The need for acid neutralizing sumps will be determined by project requirements and methods allowed by code.
F. Acid Waste Lines within the Building: Piping shall be Schedule 40, flame retardant, polypropylene with mechanical joints similar to Enfield Lab-Line. Schedule 40 PVC piping may be used in specific applications in lieu of polypropylene contingent on cost considerations, compatibility/use of space and upon review and written approval by the USF-PM, and FM-OPS department.
G. Natural Gas Piping installed above ground shall be Schedule 40 seamless black steel or galvanized steel gas piping with malleable screwed fittings. A/E shall select the grade and schedule. Underground Natural Gas Piping shall be corrosion resistant piping as coordinated with the utility service provider.
H. Compressed Air Piping: Compressed air piping above grade shall be Schedule 40, galvanized steel conforming to ASTM A-53. Fittings shall be malleable screwed end.
I. Vacuum Piping: Vacuum piping shall be Schedule 40 black steel with malleable screwed fittings, or Type L, hard drawn copper tubing with no-lead solder joints.
J. Lab grade High Purity Water Piping: High purity water piping, fittings, and valves shall be Schedule 80 polypropylene with butt fusion, socket fusion or electrofusion joints. For higher grade water distribution systems, discuss options with USF prior to specifying materials and joining technology.

PART 3 – EXECUTION (Not Used)

END OF SECTION 22 11 00

SECTION 22 11 19 PLUMBING SPECIALTIES

1.1 GENERAL REQUIREMENTS

A. Water hammer arresters shall be installed in hot water and cold water piping where quick-closing valves are installed and where necessary to reduce the possibility of water hammer. The arresters shall be the hydro-pneumatic type and shall be sized properly to control the water hammer.
B. Provide pressure gages on each side of water meters, water filters, and pressure reducing

valves or regulators.

C. Domestic water pumps shall be manufactured with lead free components.
D. Traps, vents and clean-outs must be provided in accordance with the Standard Plumbing Code and follow the USF Cost Containment Guideline (CCG). Locations shall be specified on drawings. Clean-out plugs in piping shall be set with Teflon sealer or other approved lubricant.
E. Wye Strainers shall be equipped with ball valves for blow-down cleaning equipped with 3/4 inch hose connection.
F. Hose Bibs: All exterior and machinery space hose bibs shall be key operated. Exterior hose bibs shall be bronze finish, interior hose bibs shall be chrome finish. Locate hose bibs at intervals of 100 foot maximum around the building exterior perimeter.

END OF SECTION 22 11 19

SECTION 22 30 00 PLUMBING EQUIPMENT

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. The following gallons per flush or flow in gallons per minute are required maximum flows for project:

1. Water Closets Flushometer (new construction)	1.28 gallons per flush
2. Water Closets Flushometer (remodel)	1.6 gallons per flush (to be determined based on condition and type of existing facility)
3. Urinal Flushomete7 (new construction & remodel)	0.5 gallons per flush
4. Lavatory Faucet	0.5 gallons per minute
5. Showers Heads	1.5 gallons per minute
6. Pantry Sinks	1.5 gallons per minute
7. Mop Sinks	Per ASME A112.18.1, 4.0 gallons per minute

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. WATER CLOSET: Provide water closets similar to American Standard. Afwall FloWise 3351.711 porcelain china, wall hung, ASME A112.19.2M, siphon jet, with elongated rim, exposed top spud, or concealed back-size per flush valve requirements, bolt caps; floor anchored carrier. Disabled Access: Where required. For Residence Halls, consult with University Project Manager for acceptable model and flush valve. If Bariatric Fixtures are required as part of the project, the Architect/Engineer shall submit the proposed fixture cutsheet to the USF Project Manager and Stakeholders for review and approval. Bariatric fixtures shall be provided with suitable 750-pound minimum rated fixture carrier.
B. WATER CLOSET FLUSH VALVES: Provide exposed, long life AA battery powered, Solid Ring Pipe Support, manual override button, sensor operated flush valves similar to Zurn ZTR6200EV-LL (1.28 gpf) & Zurn ZTR6200WS1-LL (1.6 gpf).
C. URINALS: Provide porcelain china, wall hung, washout or siphon jet, integral trap, exposed top spud type, size per flush valve requirements, floor anchored carrier high efficiency urinals similar to Kohler Bardon K-4991-ET or equal with anti-splash back dimensional bowl characteristics. Wall mounted with integral porcelain china trap. (i.e., no metal pipe p-traps will be acceptable). Position a minimum of one (1) urinal in each male toilet room at a height for disabled persons. For Residence Halls, consult with University Project Manager for acceptable model and flush valve. Waterless urinals are unacceptable.
D. URINAL FLUSH VALVES: Provide exposed sensor operated flush valve, quiet, long life AA

battery powered, manual override button, exposed similar to Zurn ZTR6200EV-LL (0.5 gpf).

E. WALL HUNG LAVATORIES: Enameled cast iron flat ledge mounted with arm carriers, with required drillings. For Residence Halls consult with University Project Manager. Lavatories for disabled shall be mounted at height as required by ADA with hot and cold water supply and drain pipes insulated per ADA.

F. COUNTER TOP BASINS: Self-rimming lavatory-size as required with required drillings, front overflow, soap depression, seal of putty, caulking, or concealed vinyl gasket. For Residence Halls consult with University Project Manager. Lavatories for disabled shall be mounted at height as required by ADA with hot and cold water supply and drain pipes insulated per ADA.

G. UNDERCOUNTER LAVATORY: Unglazed rim for under counter mount with rear overflow, size as required with required drillings. For Residence Halls consult with University Project Manager. Lavatories for disabled shall be mounted at height as required by ADA with hot and cold water supply and drain pipes insulated per ADA.

H. PROTECTIVE SHIELDING PIPE COVERS: Provide protective shielding pipe covers similar to Truebro Lav Guard 2. Manufactured insulating wraps for covering plumbing fixture hot- and cold- water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements. Shall be molded/form fitting, tamper- resistant, antimicrobial vinyl, stain resistant, cleanable safety cover, with valve access. Provide undersink protection insulation piping covers where required.

I. METERED LAVATORY FAUCET: Provide Metered Lavatory Faucet ADA compliant, chrome plated brass, long life AA battery powered, sensor activated electronic hand washing faucet for tempered or hot/cold operation similar to Zurn Z6915-XL, 0.5 gpm flow, vandal resistant spray head, low voltage operated solenoid operator and infrared sensor. Provide with TMV on units requiring mixed hot/cold water.

J. SINKS: Single and Multi-compartment self-rimming, counter-mounting, 304 stainless-steel commercial sink in counter with openings as required for accessories and faucet. Sink shall be No. 18 USSG genuine 18-8 solid nickel bearing stainless steel, seamlessly formed. Underside shall be sound deadened. Provide one piece with bowls welded integrally to tops. Horizontal and vertical corners of bowls shall be rounded to 1-3/4 inches radius. Bottom shall be pitched to drain outlet and drilled for trim as required. Faucets shall be selected based on the intended use for the given sink and as approved by the USF Project Manager.

K. MOP SINKS: Provide Floor Mounted Basin similar to Fiat TSB-300. Enameled Cast Iron or Terrazzo nominally 32 inches x 32 inches x 12 inches, chrome plated strainer, stainless steel rim guard, 3 inch cast iron P-trap with adjustable floor flange. Provide Faucet similar to Chicago 897-CP. Provide with 1.5 feet of 5/8 inch diameter plain end reinforced plastic rubber hose with brass coupling at one end, stainless steel hose bracket with spring loaded rubber grip & 24 inches long x 3 inches wide, three tool stainless steel mop hanger with spring loaded rubber grips, 32 inches wide by 24 inches high stainless steel back splash wall mounted above rim at side of service sink with mop hanger.

L. ELECTRIC WATER COOLERS: Provide Single EWC with bottle filling station and Bi-Level EWC with bottle filling station (without filter) similar to Elkay EZH2O.

M. RETROFIT RECESS WALL ELECTRIC WATER COOLERS: Provide Single EWC with bottle filling station (without filter) similar Elkay EZWS-ERPB8-RF.

N. WATER HEATERS: Domestic hot water shall be provided for showers, hand sinks in food preparation areas, etc., where required by code and where required per the building program. The A/E shall evaluate and propose the type water heaters to be selected for use on the given project based on a life cycle analysis (anticipated demand, installation cost including distribution and utility service costs, maintenance costs, energy efficiencies and operating costs over a 20 year period). For Residence Halls consult with the University Project Manager and USF Facilities Management-Operations (FM-OPS).

O. Domestic Water Booster Pumps: During the schematic phase of the project, the A/E shall evaluate the existing site water service conditions and determine if the designated site domestic water service is adequate to serve the domestic water system for the project (flow, static and residual pressure). If the A/E determines the service is not adequate, they shall immediately notify the USF Project Manager in writing. If a domestic water booster pump is deemed necessary, it shall include it as a basic part of the design. The A/E shall evaluate

and propose the manufacturer and model. The domestic Water Booster Pumps shall be manufactured as an assembly, skid mounted and factory tested/certified for the specified service. Pumps/Header to be considered shall be stainless steel, duplex or triplex parallel pump design with Variable Frequency Drive (VFD) as specified by the A/E. Specified VFD shall be one of the University standard VFDs. Refer to Division 23, Heating, Ventilating & Air Conditioning.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation. Provide ball valves as required for isolation of each fixture if stop valves are not specified with fixture.
B. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
C. Install copper tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system. If indirect waste is exposed to view below fixture, paint indirect drain same color as fixture unless directed otherwise by USF Project Manager.
D. Provide chrome plated brass ring pipe support on urinal flush tube securely fastened to wall (wall shall include blocking for exact ring locations as coordinated during rough-in).
E. Use carrier off-floor supports for wall-mounting fixtures.
F. Install fixtures level and plumb. For fixtures indicated for children, install at height required by authority having jurisdiction and as coordinated with the USF Project Manager. Install water supply piping with shut-off valve on supply to each fixture connected to water distribution piping. Use ball valves for isolation. Install valves in locations where they can be easily reached for operation.
G. Plumbing Equipment (water heaters, domestic water booster pumps, etc.) shall be located in designated custodial or mechanical rooms adequately sized to allow for proper installation and maintenance clearances. Equipment rooms shall include doorways and access for ease of maintenance and equipment replacement. Water heaters shall not be installed in attics or above ceilings.
H. Contractor shall adjust all metered lavatory faucets. 0.5 gpm automatic lavatory faucets shall be adjusted to remain open for nominally 15 seconds.
I. Autoclave water connections shall be made from treated water/softened water source and as recommended by the equipment manufacture.

END OF SECTION 22 30 00

DESIGN AND CONSTRUCTION GUIDELINES

DIVISION 23 HEATING, VENTILATING & AIR CONDITIONING (HVAC)

DIVISION 23 HEATING, VENTILATING & AIR CONDIITONING (HVAC)

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SECTION 23 00 00 GUIDELINE INTENT

1.1 GENERAL REQUIREMENTS

A. This division serves as a design and construction guideline for the Professional Architect/Engineer of Record (A/E) and Contractors performing mechanical services at the University of South Florida. This guideline is intended to establish the Universities standard of quality and is not a Specification. The A/E shall develop the permit and Construction Documents in accordance with the intent of the Guidelines and as necessary to comply with the goals of the given project, including the defined scope and/or program.

B. In some instances, a product is named to represent a minimum acceptable quality standard as a basis for the A/E. The intent is for the A/E to specify/schedule not less than three manufactures/ models based on similar style, appearance & performance characteristics of the named product.

C. These Guidelines list minimum material quality standards. Materials not contained herein shall be selected by A/E based on their best professional judgement and the specific application(s) and code requirements or allowances.

D. Deviations from these Guidelines shall be submitted utilizing the USF Design Guideline Deviation process through the USF Project Manager (USF-PM).

E. Substitution requests shall be in writing to the USF Project Manager (USF-PM) and shall be fully documented with complete information describing the originally specified materials, the proposed substitution and any potential cost impact, schedule impact, or life-cycle differential. Notification of substitution acceptance will be in writing utilizing the PMG-01 USF Design & Construction Guideline Change Form, otherwise, the substitute is not accepted.

F. A/E shall provide all ventilation calculations on the Drawings submitted as part of the project permit and Construction Documents. Ventilation airflow calculations and design plans shall be provided by a Florida licensed Professional Engineer as per Building Code Administration (BCA) requirements. All final calculations shall be submitted to the BCA and USF Mechanical Engineer for review and permit. Calculations shall include all engineering assumptions, occupancy classifications, occupancy values, room areas/volumes, rate values, etc. as part of the ventilation calculations scheduled on Drawings.

G. Renovation or Remodeling of existing facilities shall require A/E to evaluate the existing associated HVAC systems and controls to determine if the equipment is in good condition and suitable to be reused in the renovation (i.e.; air-handlers, cooling and heating coils, VAV boxes, control valves, airflow and ventilation quantities and quality of the air). At a minimum, the A/E shall visit the project site to inspect the HVAC system to observe the basic condition of the major HVAC system components and control system. The A/E shall evaluate the Pre-Test and Balance report and accompanying site observations and identify any scope that may need to be included in the renovation as necessary for proper HVAC system operation. All relevant observations and recommendations shall be reported in writing to the Facilities Management Project Manager and FM Mechanical Engineer.

H. This paragraph is intended for Change Of Use projects or minor renovations which may require modifications to the building's existing HVAC system. During the planning and development of the project, contact the USF Mechanical Engineer and BCA to assess potential impacts the project may have on the existing HVAC system. Projects which impose significant impact(s) on existing HVAC systems would require the project to employ engineering consulting services for the HVAC design. A pre-test of the renovation area should include the entire HVAC system, including areas outside of the renovation. The extent of this pre-test shall be determined by the USF Mechanical Engineer and Project Manager to assure completed work has no negative impact to surrounding spaces. The USF Mechanical Engineer will work with the PM to develop this pre-test scope of work. If the pre-test report identifies deficiencies which are needed to expand the HVAC system to meet the project design, these modifications shall be included as part of the project by the design team engineers. The A/E shall advise the PM of the impacts to the project as a result of the necessary modifications. The project final T&B shall be used to validate the design intent was met and pre-test conditions of surrounding spaces are not compromised.

1.2 DESIGN CRITERIA

A. Professional Engineer (aka; Engineer of Record or EOR) shall provide Contract Documents prepared in accordance with 61G15, Florida Administrative Code.

B. Requirements of the latest revision of the USF Cost Containment Guide (CCG), Florida Building Code (FBC), FBC Mechanical Code, FBC Energy Conservation Code, FBC Plumbing Code, and FBC Fuel Gas Code must be met.

C. Appropriate ASTM, ANSI, UL, ASME and NFPA standards must be met and specified for materials.

D. The A/E is responsible for developing, documenting, and promoting technical discussion of proposed systems early in the project design phase. Early submittals are to include narrative technical discussion of system types, materials, and controls, including options, advantages, disadvantages, relative costs, and architect/engineer recommendations. See the USF Professional Services Guide (PSG) for submittal requirements for each phase of design.

E. USF has invested in very energy-efficient central chilled water and hot water systems to serve the campuses. As such, the A/E shall utilize the Central Campus Chilled Water and Hot Water Systems on the specific campus where the project is located as a basis for the project HVAC design. For new standalone buildings on Campus, their heating generation systems shall be included as an integral part of the basic building's design and construction. Acceptable type new buildings heating systems constructed on the Tampa Campus shall be hydronic heating systems produced by the building's high efficiency natural gas condensing boiler system, distributed to air-handlers and terminal units via hot water piping above the ceiling. Alternative direct fired natural gas heating may be considered in specific applications as reviewed and approved by USF Engineers. Hydronic heating systems should be designed with a redundant pump and boiler configuration as a best practice. Other exceptions may be applicable in areas of the campus where the facility is not tied to the TECO primary metered service. Heating systems for new buildings on the Saint Petersburg Campus, Sarasota Manatee Campus and USF Downtown facilities may be generated by electric heating systems or hydronic heating systems described above, whichever is determined to be the most viable and as determined through Life Cycle Cost Analysis (LCCA). Other cooling system types including direct expansion (DX) are not allowed unless a Design Guideline Deviation is submitted and approved by USF Facilities Management (USF-FM). In order to obtain approval, the request shall be accompanied by a Life Cycle Cost Analysis (LCCA) building energy calculations showing the life cycle cost benefit to USF for the requested substitution. Refer to the Article 3 (Technical Applications), USF Professional Services Guide (PSG) for the deviation request and submission requirements. Refer to form PMG-01 for requesting any project specific deviations from USF DAC GUIDELINES.

F. During the early concept/design phase, the A/E shall establish the project chilled water and hot water load for the project and review these loads with USF-FM in order to determine that the central plant capacities are satisfactory to support the additional loads. If additional plant capacity and/or distribution infrastructure are necessary, they should be included as a basic part of the project scope.

G. The design process is intended to be a collaborative, interdisciplinary exercise and where certification is required to meet an energy efficiency goal (e.g. LEED Silver with a specified percentage of energy savings above a baseline), the A/E team shall work collaboratively to develop the approaches to energy efficiency as early in the design process as possible. The USF FM team, including all appropriate stakeholders with specific subject-matter expertise should be fully engaged.

H. The A/E shall ensure that all major decisions regarding system types, materials, and controls are determined and agreed to by Owner/User Group by the end of Design Development phase; and documented in the Design Development submittal. Costs are to be included in the A/E's design development estimate of construction cost.

I. The A/E shall utilize an approved version of either Trane Trace, Carrier HAP or other pre-approved whole building 8760 hour simulation software for design modeling and performing Life Cycle Cost Analysis (LCCA) building energy calculations. The economic feasibility analysis shall include all project cost over a 25-year life cycle payback analysis. Saving

estimates to include maintenance/operations costs as controls integration is required for feedback and monitoring. All project costs, testing, equipment, controls, etc., and maintenance costs shall be included in the economic feasibility analysis calculations. The LCCA shall be used as a basis for making specific equipment selections including Energy Recovery Equipment where applicable on project. The LCCA shall include: installed equipment cost, maintenance and operating cost as a basic part of the feasibility analysis. The A/E shall provide the completed model in electronic file to the owner at the end of the design phase. Refer to the USF Professional Services Guide (PSG) for additional LCCA requirements. Where the criteria for the LCCA is listed in the Agreement between Owner and Architect and criteria differs from above, the Agreement shall prevail.

J. ENGINEERING ASSUMPTIONS AND DESIGN CRITERIA:
   1. INDOOR DESIGN CONDITIONS (by season): Temperature, relative humidity. Cooling: 75 °F / 50 % RH. Heating: 70 °F.
   2. OUTDOOR DESIGN CONDITIONS (by season): Temperature, humidity, wind direction and velocity. Note: Florida may be defined as a humid climate. Refer to Climatic Design Information in the latest publication of ASHRAE Fundamentals Handbook outdoor design conditions for 0.4% category Annual Cooling (DB and MCWB), and 99.6% category Annual Heating (DB). Climatic design conditions should reference ASHRAE data reported from the nearest relevant station to the project site.
   3. COOLING COIL DESIGN selections shall be based on 45 °F coil entering temperatures and 15 °F water temperature rise, producing a nominal leaving air temperature of 52 °F off the coil. Hot water coil design selections shall be based on 140 °F coil entering temperatures and nominally 120°F return temperature, producing a nominal leaving air temperature of minimum 85 - 90 °F off the coil. Design pressures for distribution shall be 200 psi. A/E shall notify USF-FM if the project conditions require any deviations from these values. New heating hot water generators incorporated into new building construction shall be used to incrementally decentralize heating hot on the Tampa Campus. These system designs shall include redundant equipment features including N+1 redundancy distribution pumps and generators, etc. The current standard heating hot water generator accepted for use on Tampa Campus is manufactured by Clever Brooks Clear Fire Condensing Hydronic Boilers or equal utilizing natural gas for fuel.
   4. CONDENSER WATER DESIGN pressures shall be determined by the A/E.
   5. A/E shall model the HVAC system based on anticipated occupancy values for the given occupancy classification and activities performed for each type of space in the building.
   7. A/E shall model the HVAC system based on actual electrical load for lighting and miscellaneous equipment anticipated to be used in occupied spaces.
   8. A/E shall model the HVAC system based out of the ordinary or special thermal and moisture loads anticipated to be used in occupied spaces.
   9. MINIMUM OUTDOOR AIR VOLUME shall be calculated as required by Florida Building Code. Mechanical Ventilation or provide an ASHRAE 62 (latest edition) Alternative with appropriate Addenda.
      a. The Ventilation Rate Procedure (VRP) as described in FBC-Mechanical is a prescriptive procedure in which outdoor intake rates are determined based on space type application, occupancy level and floor area.
      b. The alternate method in ASHRAE 62 is the Indoor Air Quality method in which outdoor intake rates and other system design parameters are based on an analysis of contaminant sources, contaminant concentration targets and perceived acceptability targets. This method is not recommended for most applications on campus.
      c. Class of air assumptions for exhaust and recirculation air streams.
      d. EOR shall include the tabulated ventilation calculations detailed by space type or room as part of the design and Construction Drawings.
      e. Mechanical and Electrical Rooms are allocated as occupiable spaces and shall be provided with ventilation airflow in addition to environmental cooling airflow. Mechanical rooms require cooling airflow for mitigation of condensation formation on cold surfaces.

K. The overall building envelope shall be positively pressurized relative to the outdoor air pressure. The HVAC design goal shall maintain a proper balance of entering and exhausting airstreams in order to maintain an indoor building pressure at or above 0.02 inches of water column.

L. VARIABLE AIR VOLUME SYSTEM designs should include demand-control ventilation (DCV) and shall have sufficient sensor coverage in the air-conditioned zones and large rooms for IAQ to implement this strategy and as required for compliance with the Florida Building Code – Energy Conservation. The control system shall maintain the system ventilation flowrate as necessary to satisfy the proper IAQ. The VAV air-handlers shall include outside air volume dampers and Return control dampers of the quality as referenced in Section 23 09 00 Instrumentation and Control for HVAC.

M. LABORATORY HVAC

1. Building spaces with fume hoods and/or animal holding facilities are prohibited from using recirculated air conditioning air, therefore 100% outside air is required. Clean room "class" per ASHRAE must be determined and documented. It is critical that the detailed design basis and costs be established and documented in early design submittals for Laboratories Laboratory HVAC shall meet the requirements of the BCA-11 Laboratory Construction – Guideline and comply with the accepted USF EH&S Energy Conservation Policy. In general, all labs should include occupancy sensors integral to the general lighting system for the lab. The building HVAC control system should incorporate feedback from each lab to indicate if the space is occupied or unoccupied. During occupied laboratory operation, the building HVAC control system should maintain a minimum of 8 air changes per hour 100% outside airflow throughput. If the lab is unoccupied, the HVAC control system should maintain a minimum of 4 air changes per hour 100% outside airflow throughput. Nominal Air change rates setpoint values should be determined by the A/E and lab user based on the intended lab activities/use for maintaining a safe operation as the highest priority, incorporate the above conservation guideline goals only where guidelines make sense and do not interfere with safe operations.
2. All 100% outside air units shall be equipped with preheat coils.
3. The A/E shall design exhaust systems as necessary to meet or exceed the code requirements for laboratory spaces in accordance with NFPA 45.
4. Air exhausted from chemical fume hoods and other special local exhaust systems shall not be recirculated.
5. Energy conservation devices that could result in recirculation of exhaust air or exhausted contaminants shall not be used unless designed in accordance with ANSI/AIHA Z9.5, “Nonlaboratory Air”, or “General Room Exhaust,” Laboratory Ventilation.
6. Air exhausted from laboratory work areas shall not pass unducted through other areas.
7. Air from laboratory units and laboratory work areas in which chemicals are present shall be continuously discharged through duct systems maintained at a negative pressure relative to the pressure of normally occupied areas of the building.
8 Positive pressure portions of the lab hood exhaust systems (e.g., fans, coils, flexible connections, and ductwork) located within the laboratory building shall be sealed airtight or located in a continuously mechanically ventilated room.
9. Chemical fume hood face velocities and exhaust volumes shall be sufficient to contain contaminants generated within the hood and exhaust them outside of the laboratory building.
10. The hood shall provide containment of the possible hazards and protection for personnel at all times when chemicals are present in the hood.
11. Special local exhaust systems, such as snorkels or “elephant trunks,” shall have sufficient capture velocities to entrain the chemical being released. Each snorkel shall include ultra low leakage industrial quality self-cleaning aluminum or 304 S.S. blast gates located at or near user working height within the room.
12. Canopy hoods shall not be used in lieu of chemical fume hoods.

13. Only Class II, Type B2 biological safety cabinets listed by National Sanitation Foundation as meeting NSF/ANSI 49, Class II (Laminar Flow) Biosafety Cabinetry, shall be permitted to be used in lieu of chemical fume hoods, as determined by a qualified person.
14. Laminar flow cabinets shall not be used in lieu of chemical fume hoods.
15. Air exhausted from chemical fume hoods and special exhaust systems shall be discharged above the roof at a location, height, and velocity sufficient to prevent re-entry of chemicals and to prevent exposures to personnel.
16. Fume Hoods shall be variable position sash type. Two position sash fume hoods are not acceptable. A/E shall review fume hood selections, safeties and control integration features with USF Engineers prior to finalizing design concepts. Chemical Fume Hoods should be designed with energy efficient design optimizing exhaust airflow requirements throughout the operating range from fully closed sash to full open sash (18" height). Hoods should include automatic sash closers intended to close sash when hood is not in use (typically as sensed by hoods occupancy sensor).

N. Janitor Closets
1. Designated use areas including housekeeping, custodial rooms, laundry areas, etc. shall comply with the following requirements:
   a. Provide minimum exhaust rate of 1.0 CFM/SF and stated pressure differential, with no air recirculation. The pressure differential with the surrounding spaces must be at least 0.02 inches of water gauge on average and 0.004 inches of water at a minimum when the doors to the rooms are closed.
   b. Self-closing doors on all spaces outlined above.
   c. Deck-to-deck partitions or hard-lid ceilings. Joints shall be sealed.

O. Roof Mounted HVAC Equipment
1. The interstitial roof deck surface within the equipment curb shall be properly insulated (in addition to the curbs wall insulation), as necessary to prevent condensation within the curb, and/or below the roof deck/ceiling space directly below the unit and curb.

1.3 DRAWING REQUIREMENTS

A. Plans, sections, and isometric drawings shall be prepared for the required HVAC systems.
B. Drawings shall detail mechanical rooms and include section cuts in all directions as necessary to convey clearly all pipe elevations, crossings and the equipment connections/locations. Mechanical room minimum scale shall be 1/4 inch = 1 foot - 0-inch Drawings shall show location of pipes, electrical equipment, drains, hose bib, etc. All equipment service clearances shall be dimensioned. Detail air handlers including adequate number of sections, and coil and filter removal clearances, and access (including size) for coil cleaning, etc. Provision shall be made for shaft removal.
C. Drawings shall include detailed equipment layouts and shall show dimensions: equipment, clearance spaces, inertia bases, housekeeping pads, drains, invert level for all piping, detail of pipe welds, etc.
D. Drawings shall include flow diagrams, system descriptions and a piping and instrumentation diagrams detailing all piping, equipment, instruments, instrument loops, control interlocks Interface for class/material change, annunciation inputs, control relays, manual switches, indicating lights, etc.
E. The flow diagrams shall show all equipment, names, and equipment tag names, all valves, all instruments/controls, pipeline identification, valve identification, all line size transitions, direction of flow, interface for class/material change, annunciation inputs, control relays, manual switches, indicating lights, etc.
F. System description shall include basis of design, operating modes (start-up, normal, shut down, emergency, etc.), description and performance ratings of major equipment, control concepts and control sequence.
G. Flow diagrams shall include all major equipment, capacities or ratings, names and identification number, bypass and recirculation lines, control valves, valves required for routing for all modes, pipe sizes, and connection to other systems.
H. Drawings shall include detailed pipe support drawings. Pipe support drawings shall include all dimensions, materials, fabrication procedures, fastening methods, pipe saddles, etc.

I. Drawings shall include detailed equipment connections and shall show all pipe/sizes dielectric unions or flanges, line-size transitions, vibration isolators, strainers, isolating valves, control valves, and instruments including gage cocks, air vents including isolating valves; drains including isolating valves, etc.
J. Drawings shall include detailed equipment layouts and shall show dimensions for equipment, clearance spaces inertia bases, housekeeping pads, Drawing shall also include location of drains, invert level (bottom or top of pipe) for all piping shown on drawings. Detail of pipe welds shall be shown on drawings.
K. Drawings shall indicate pipe size vs. insulation thickness. Detail of pipe insulation shall include K-Value, method of installation, vapor banner details, insulation shield detail (where required).

END OF SECTION 23 00 00

SECTION 23 05 00 COMMON WORK RESULTS FOR HVAC

PART 1 – GENERAL

1.1 PERMITS AND INSPECTIONS

A. Follow USF Building Code Administration (BCA) requirements for permitting and scheduling inspections. Coordinate with USF BCA department.
B. Minor Projects: Contractor is responsible for all permitting and inspecting fees.
C. Major Projects: Coordinate with USF Project Manager for responsible party for permitting fees.
D. Minor Projects with USF approved Construction Manager (CM): Coordinate with USF Project Manager and assigned Construction Manager for responsible party for permitting fees.
E. Obtain and adhere to the Universities Hot Work Permit for each instance in accordance with the BCA requirements.

1.2 COORDINATION

A. VISIT THE SITE included in the scope of work to ascertain existing conditions. Verify all dimensions and locations before proceeding with work in the area and prior to purchasing equipment.
B. REVIEW AND COORDINATE between all construction documents, all project specifications, and all sections in USF Design and Construction Guidelines (DCG). Notify USF Project Manager of conflicts or discrepancies prior to proceeding with work.
C. LOCATE ALL UNDERGROUND UTILITIES required by the Sunshine Law prior to proceeding with work. Contact USF Project Manager to obtain latest USF Campus Utilities Map for the area in scope of work prior to proceeding.
D. COORDINATE WITH USF PROJECT MANAGER, USF Parking and Transportation Services (USF-PTS), and USF Police Department (USF-PD) for required lane closures and parking spaces closures minimum 2-weeks prior to requested closures, with confirmation and final coordination 72-hours prior to the lane closure. The contractor is responsible for all closure barriers and signs subject to USF review and approval.
E. ISOLATION OF EXISTING UTILITIES: The Project scope work shall always provide extraordinary means to maintain and protect the USF underground utilities and services. This shall include calling 811 utility locates and reviewing the located utilities (via site meetings) with the USF Building Maintenance or Utilities personnel to plan out the details of the dig and work purposes prior to starting. The project shall provide a means to make the necessary utility tie-ins without impacting other USF community facilities and/or utility services. Contract Drawings shall include general notes requiring Contractor to coordinate and schedule all Work impacting existing facilities with the USF PM at a minimum of 2 weeks prior to the anticipated work. Utility isolation valves located in manholes on site or in existing buildings shall only be exercised by USF BUILDING MAINTENANCE OR UTILITIES personnel. In many instances, underground isolation valves have not been able to close-off bubble tight. The Contract Documents shall include a contingency plan to test the valves PRIOR TO cutting into the system as well as provide a means for third party line-stops in case the intended isolation does not support the scope of work. If the valves do not hold adequately to allow Contractor to perform the tie-in,

the USF PM shall be notified immediately, and the Contractor shall plan and implement the line-stop option as coordinated with USF BUILDING MAINTENANCE OR UTILITIES. Contract Documents shall include the cost of isolating the utilities necessary (Third Party Line-stop installation, Line Taps, excavating, etc.) to perform the new tie-in connections. Utility services for new buildings shall include a new manhole with new ball valves for isolation of the new building from the utility service. Valve boxes shall be concrete open bottom with gravel bottom flooring. Provide with traffic rated, full access aluminum hinged lid. Valve boxes shall be sized for the valve dimensions with at least 24 inches clear between supply and return piping and side clearances to allow full unobstructed operation of valve actuators/handles and space for service operator positioning. Refer to SECTION 23 05 23 GENERAL-DUTY VALVES FOR HVAC PIPING AND EQUIPMENT below for additional requirements.

1.3 SUBMITTALS

A. Submit one electronic copy of HVAC Submittals as a single bookmarked pdf. Include a Table of Contents, bookmark/tab manual based on Specification chapters or sections.

1.4 SITE

A. All existing utilities shall remain in place and fully operational, unless otherwise noted on the Contract Documents.
B. Contractor shall restore back to original installation primary gear, primary feeders, utilities, irrigation, etc. damaged by the Contractor in the area of demolition or construction.
C. Provide an erosion control plan addressing prevention, control, and abatement of water pollution to USF Project Manager for approval prior to proceeding with work.
D. Safety fencing shall be USF green. Orange or black safety fencing shall not be used.
E. Visual screening shall be dark green. Blue, Orange or other colored fencing shall not be used. Graphics on visual screening shall be approved by the PM and University Communications and Marketing (UCM) prior to installation. Screening with only company logos shall not be permitted.
F. Conduit trenches shall be backfilled completely and properly compacted to provide safe crossing by the end of workday or whenever the work zone becomes inactive.
G. Maintain access to side streets, drives, and sidewalks at all times during construction.
H. Existing pedestrian/sidewalk lighting and roadway lighting shall remain operational during all phases of the construction until new lighting is energized. Any proposes blocking of sidewalks or pedestrian pathways shall be planned and the USF PM shall be notified a minimum of 2-weeks ahead of planned closure/re-routing and confirmed again 72-hours prior to impact.
I. Construction Sites: Provide protective barriers around open HVAC trenches manholes. USF shall have clear vehicle access to these items at all times during construction.
J. HVAC manholes: Provide 10 feet square barricade around manhole cover. Manhole cover shall be accessible to USF at all times. Remove construction debris such as dirt, sod, ground cover, etc.
K. Temporary services protective barricades shall allow 3 feet clearance on sides and rear (or required by code if greater), and 5 feet clearance in front of equipment.
L. No construction materials or construction tools shall be stored within the protective barricades.
M. No construction vehicles or personal vehicles shall be parked over manhole covers.
N. Project site design and final site constructed conditions shall include clear vehicle access to all above mentioned equipment for maintenance.
O. Fenced Construction Sites: An access point agreed to by USF Project Manager and USF BUILDING MAINTENANCE OR UTILITIES department shall be provided to USF. Chains shall have USF Standard 2000 Padlock and site contractor pad lock daisy chained. Project is responsible to provide the USF Standard 2000 Padlock, coordinate with USF Project Manager.
P. Areas where work is performed shall be kept clean of debris and materials and shall be cleaned at the end of each workday. Contractor is responsible to secure all tools and materials at all times.
Q. Remove existing equipment and materials, etc., identified to be removed on Drawings. Equipment removed should be offered to USF to be kept as spares. If USF elects to not keep equipment as spare, the Contractor shall remove and dispose of properly.

R Provide Tree protection for any tree that may be located within the project construction site or near the lay-down or designated contractor parking area. Parking and Lay-down areas shall be located outside the drip edge of trees. If the project scope impacts within the drip edge of trees in the construction site, the trees shall be properly protected with barriers and/or proper root pruning by qualified arborist. For additional Tree Protection information refer to USF Design and Construction Guidelines Appendix G and Project Management Guide for Tree-Landscape Guidelines (PMG-17).

1.5 WARRANTY

A. Contractor shall provide minimum 1 year warranty for all labor and materials, whether included or not included by equipment manufacturers. Contractor shall replace defective materials during the first year of warranty without additional compensation from USF.
B. Manufacturer warranties greater than 1 year, or where lengthier warranties are required in the project documents, or in USF Design and Construction Guidelines (DCG) shall extend the standard 1-year warranty.
C. Warranty period shall begin on date of Substantial Completion.

1.6 MISCELLANEOUS

A. USF Furnished Equipment:
   1. Contractor shall be responsible for receipt from USF, storage after receipt, and installation if required.
   2. Verify equipment connection requirements prior to rough-in and ordering materials.
   3. Install equipment in accordance with manufacturer instructions.
   4. Maintain equipment until project is turned over to USF at Substantial Completion.
B. A/E for new construction and renovations or contractor for miscellaneous additions shall demonstrate that the existing services have the required additional capacity and can accommodate the load being added.
C. A/E for new construction and renovations or contractor for miscellaneous additions shall demonstrate that the existing services are at adequate depth to accommodate the minimum slope requirements for tie-in of new to existing services.

1.7 PROJECT CLOSE OUT

A. Submit one electronic copy and one hard copy of Operations Manual as a single bookmarked pdf. Include a Table Of Contents, bookmark/tab manual based on specification chapters or sections.
B. Provide Record Documents (as-built) per USF-FM requirements. Coordinate with USF Project Manager. Record documents shall include updated as-built drawings. Submit working CAD drawings (with bound Xref files) on disk or other approved memory storage device include separate folder or disk including pdf copies of each as-built drawing. Filenames shall include drawing number as reference.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 FIELD QUALITY CONTROL

A. EXISTING UTILITIES (CW, HW, Potable Water, Electrical, Communications, etc.): The A/E shall survey the existing site conditions and review current utility plans with USF-FM to evaluate needs for the project and locations below grade to avoid conflicts.
B. DO NOT OPERATE AIR HANDLING UNITS (AHU's) during building construction phases unless filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 are used at each return air grill, as determined by ASHRAE 52 to protect ductwork during construction.
C. SEAL ALL RETURN AIR OPENINGS with plastic and close all return air dampers during construction. Protect fan motors, switches, equipment, fixtures and other items from dirt, rubbish and foreign matter. Do not operate AHU's if the building construction operations such as sanding drywall or any operations that may potentially contaminate the mechanical systems.

Do not operate AHU's if the building is not clean or if dust can enter coils or fan housing and ductwork systems. Do not operate AHU's if the building is not positively pressurized. Do not operate exhaust fans if their operation creates a negative building pressurization.

D. MONITOR AND MAINTAIN ALL FILTERS, filter media and all related items during construction and replace all filtration media during construction to maintain clean filtration and system conditions utilizing media with a minimum value of a MERV 8. Install new, clean filters, filtration media and all related items prior to occupancy with specified filters; minimum MERV 13 filters are required to be installed in all air-handlers at Substantial Completion. Refer to Section 23 41 00, Particulate Air Filtration for additional requirements.

E. The use of sweeping compounds and cleaning products is required during construction clean up on a daily basis and a complete detailed final cleaning will be performed by a qualified subcontractor prior to HVAC final start up and commissioning to ensure a clean environment prior to the occupancy of the building. This will be required at the completion of each phase and start up prior to building turnover and occupancy.

F. SOURCE CONTROL: Use of materials such as adhesives, sealants, and paints shall be low VOC type and comply with LEED IEQ credit 4.1 and 4.2. Please make note that no material will be allowed onsite without prior approval and all material will be inspected and verified during the course of this project.

G. PATHWAY INTERRUPTION: During construction, isolate areas of work to prevent contamination of clean or occupied spaces. Provide temporary barriers that contain the construction area.

H. HOUSEKEEPING: Keep interiors of duct and pipe systems clean and free from dirt, rubbish and foreign matter. Prevent dust, debris and foreign material from entering the piping and ductwork. Remove temporary labels, stickers, etc. from fixtures and equipment. Do not remove permanent nameplates, equipment model numbers, etc. Remove debris, rubbish, left over materials, tools and equipment from work areas and site. Daily clean-up is required and will be strictly enforced. Final acceptance shall not be approved until site is cleaned.

I. SCHEDULING: All construction activities to be coordinated to minimize or eliminate disruptions of operations in occupied portions of the buildings.

3.2 COLOR CODING OR LABELING AND IDENTIFYING

A. The following band colors and letter designations shall be used:

Description	Label Text	Label Color
HVAC PIPING		
Condensate	Condensate	Yellow
Chilled Water Supply (CHWS)	Chilled Water Supply	Green
Chilled Water Return (CHWR)	Chilled Water Return	Green
Condenser Water Supply (CWS)	Condenser Water Supply	Green
Condenser Water Return (CWR)	Condenser Water Return	Green
Hot Water Supply (HWS)	Hot Water Supply	Yellow
Hot Water Return (HWR)	Hot Water Return	Yellow
High Pressure Steam 125psi	High Pressure Steam	Yellow
Medium Pressure Steam 50 psi	Medium Pressure Steam	Yellow
Low Pressure Steam 15psi	Low Pressure Steam	Yellow
BOILER FEED WATER		
Boiler Condensate	Boiler Condensate	Yellow
Boiler Fill Line	Boiler Fill Line	Yellow
Boiler Make-up Water	Boiler Make-up Water	Yellow

SECTION 23 05 13 COMMON MOTOR REQUIREMENTS

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
   1. Motor controllers.
   2. Torque, speed, and horsepower requirements of the load.
   3. Ratings and characteristics of supply circuit and required control sequence.
   4. Ambient and environmental conditions of installation location.

B. Operation and Maintenance Data
   1. Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

C. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.

D. Comply with NEMA MG 1 unless otherwise indicated.

E. Electrical Service: Refer to Section on Motor Control for required electrical characteristics.

F. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency.

PART 2 – PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in plumbing equipment schedules or Sections.

B. Comply with NEMA MG 1 unless otherwise indicated.

C. Electrical Service: Refer to Section on Motor Control for required electrical characteristics.

D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency.

E. Electrical Connection: Conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

F. Provide shaft grounding rings on all motors intended for variable speed operation utilizing variable frequency drives.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Service Factor: 1.15.

C. Multispeed Motors: Variable torque.
   1. For motors with other than 2:1 speed ratio, separate winding for each speed.

D. Multispeed Motors: Separate winding for each speed.

E. Rotor: Random-wound, squirrel cage.

F. Bearings: regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

G. Temperature Rise: Match insulation rating.

H. Insulation: Class F.

I. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.
K. Starting Torque: Between one and one and one-half times full load torque.
L. Starting Current: Six times full load current.
M. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics.
N. Testing Procedure: In accordance with ANSI/IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and compliance with performance data.
O. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
P. Sound Power Levels: To ANSI/NEMA MG 1.
Q. Motors for variable speed (PWM) application shall conform to NEMA Standard MG 1 2016, Part 30 and Part 31.
R. Nominal Power Factor: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
   1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
   2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
   3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
   4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
   1. Permanent-split capacitor.
      a. Starting Torque: Less than 150 percent of full load torque.
      b. Starting Current: Up to seven times full load current.
      c. Breakdown Torque: Approximately 200 percent of full load torque.
      d. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prefabricated sleeve or ball bearings.
      e. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.
   2. Split phase.
      a. Starting Torque: Exceeding one fourth of full load torque.
      b. Starting Current: Up to six times full load current.
      c. Multiple Speed: Through tapped windings.
      d. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.
   3. Capacitor start, inductor run / Capacitor start, capacitor run.
      a. Starting Torque: Three times full load torque.
      b. Starting Current: Less than five times full load current.

c. Pull-up Torque: Up to 350 percent of full load torque.
d. Breakdown Torque: Approximately 250 percent of full load torque.
e. Motors: Capacitor in series with starting winding; capacitor-start/capacitor-run motors shall have two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
f. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve ball bearings.
g. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
C. Motors 1/20 HP and Smaller: Shaded-pole type.
D. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.6 EFFICIENCY

A. All motors shall be NEMA Premium Efficient Electric Motors according to the latest Energy Independence and Security Act.

PART 3 – EXECUTION

3.1 EXECUTION

A. After Test and Balance (TAB), full load amps/voltage shall be tagged on all air handlers and pumps motors and fan motors over 1 hp.

END OF SECTION 23 05 13

SECTION 23 05 19 METERS AND GAGES FOR HVAC PIPING

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings shall show location of all gages and meters. Detail of installation shall be shown on drawing. Detail shall include all valves, nipples, unions, thermometers, wells, material of construction, range of gages/meters, etc. All meter locations should be easily serviceable and not in the way of other maintenance needs of other equipment.

1.2 MATERIALS

A. The following meters (where applicable) shall be required on all projects, including garages.
   1. Chilled and Hot Water
   2. Electric: Refer to Section 26 27 13 for Primary Electrical Metering requirements. Refer to Section 23 05 19 Part 2, Products, for Secondary or sub-meter Electrical Metering requirements.
   3. Domestic Water

B. PRESSURE shall be read by a differential pressure (DP) gage, calibrated in "feet." (DP gage has two inputs, one high pressure and one low pressure.)

C. PRESSURE GAGES shall be selected so that failure will relieve pressure to the rear of gage.

D. GAGES/METERS shall be selected to operate midway of their scale.

PART 2 – PRODUCTS

2.1 CHILLED WATER & HOT WATER METERING

A. Onicon System 10 BTU Meter and Onicon Electromagnetic Flow Meters shall be F-3400 Insertion type unless otherwise noted on the reference USF website.

B. BTU meters shall be installed in mechanical rooms in accessible locations. Coordinate data cabling with USF. Flow meters shall be installed on the pipe that meets the manufacturer's installation requirement.

C. BTU meters shall have BACnet MS/TP communication capability.

2.2 EQUIPMENT FOR ELECTRICITY METERING OF USF PROVIDED PRIMARY

A. A. Refer to Section 262713 Electricity Metering.

2.3 DOMESTIC WATER METERING

A. Neptune MACH 10 Ultrasonic Meter with Neptune Cellular Meter Interface Unit.

B. Neptune Cellular Meter Interface Unit (CMIU) shall be provided for automated meter reading (AMI). USF Utilities shall integrate the meter CMIU to USF account/system.

PART 3 – EXECUTION

3.1 EXECUTION

A. ALL GAGES/METERS shall be installed such that they can be read easily, i.e., grouped together and facing in the same direction.

B. METERS for measuring potable, chilled, and hot water BTU meters and gas shall be installed before the first point of use in buildings.

C. BTU meters and BACnet router/controller panels shall be located in mechanical rooms at normal panel height with appropriate access clearances.

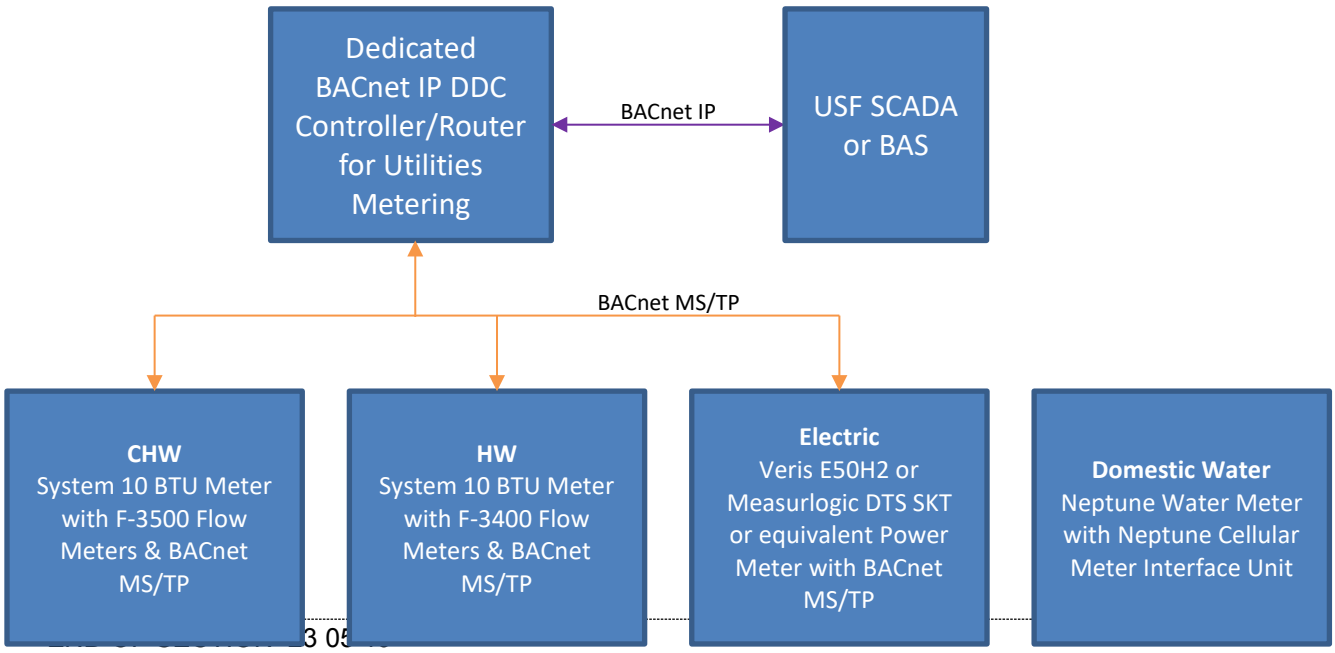
D. Install meters with appropriate distance from change in pipe direction and install with manufacturers recommended upstream and downstream straight length equivalents.

3.2 INTEGRATION

A. Utilities Control System is a dedicated BACnet DDC control system separate from Building HVAC Control System. All meters and DDC controllers utilized to interface with meters for utilities services shall be tied into Utilities Control System. If there is no BACnet DDC control system available, then a BACnet MS/TP to BACnet/IP communication router shall be provided. Router shall be plugged in to the network port provided by USF Information Technology.

B. All meters and DDC controllers utilized to interface with meters for building HVAC shall be tied into existing Building HVAC Control System. If there is no BACnet DDC control system available, then a BACnet MS/TP to BACnet/IP communication router shall be provided. Router shall be plugged in to the network port provided by USF Information Technology.

C. Refer to the diagram below for a typical installation/integration or contact the USF Facilities Management Utilities Department. Any exception shall require pre-approval.



END OF SECTION 23 05 19

SECTION 23 05 23 GENERAL-DUTY VALVES FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
B. All valves are to be rated at working Pressure of 200 psig, 250 °F minimum WOG, or greater if engineering design demands. Stems are to point vertically or horizontally and must be located for easy service or repair. A valve schedule showing details; number, size, type, material, etc. of all valves should be shown on the Drawings.
C. Provide Valve Pressure and Temperature Ratings not less than indicated and as required for system pressures and temperatures.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Check valves are to be Y-Pattern 200 psi, WOG, swing check. For 2 inches and smaller are to be bronze body, integral seat with renewable bronze disc. Sizes larger than 2 inches shall include bronze disc, stainless steel spring, and cast-iron body.
B. Balancing Valves - For 2 inches and smaller, use screwed bronze with Pointer and calibrated readout plate and machined orifice. For sizes larger than 2 inches, specify flow meter with machined orifice and two (2) readout connections. Provide a valve with locks located five (5) pipe diameters up-stream of the orifice.
C. Valves in Insulated Piping shall include stem extensions to account for installed insulation thickness sufficient to allow full stem movement/rotation.
D. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
E. Provide the following above-ground Valve Actuator Types:
   1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
   2. Handwheel: For valves other than quarter-turn types.
   3. Handlever: For quarter-turn valves NPS 6 and smaller [except plug valves].
   4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
F. Valves in Insulated above-ground piping: With 2-inch stem extensions and the following features:
   1. Ball Valves: Full port with extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   2. Butterfly Valves: With extended neck.
G. Provide the following above ground Valve-End Connections:
   1. Flanged: With flanges according to ASME B16.1 for iron valves.
   2. Threaded: With threads according to ASME B1.20.1.
H. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
I. Above ground Application: If valve applications are not indicated, use the following:
   1. Shutoff Service: Full port ball or butterfly valves.
   2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
   3. Throttling Control Valve Service: Belimo Pressure Independent Control Valves. Refer to Section 23 09 00, Instrumentation and Control for HVAC for more information.
   4. Balancing Service: Globe style calibrated balancing valves with memory stop.
J. Above ground End connections:
   1. For Copper Tubing, NPS 2 and Smaller: Threaded ends.
   2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
   3. For Steel Piping, NPS 2 and Smaller: Threaded ends.

4. For Steel Piping, NPS 2-1/2 and Larger: Flanged ends.

K.Below Ground Shutoff Service: Valves - Provide flanged 2-piece full port epoxy coated cast iron body, stainless steel ball and stem, water, oil, gas, full close-off, 200 psi ball valves. Valves below ground shall be installed in open bottom concrete valve box with corrosion resistant hinged (aluminum lids lighter in weight for ease of access are preferred by USF) access lid properly designed aluminum for the traffic condition. Floor of valve box shall not exceed 4-6 feet deep. Line the bottom floor level with minimum 12" layer of rock. If piping to enter valve box is below 6 feet, piping elevation shall transition into and out of valve box with 45-degree fittings. Each isolation ball valve shall be installed in valve box with orientation and position so handwheel has clearances for personnel and operation (nominally 24" clear around each valve/wheel, clear in all directions to wall of manhole vault) and is accessible from surface access opening to allow for periodic exercising of each valve. Provide a stainless steel engraved manhole tag fixed to the lid in plain sight bearing the USF approved manhole name with ½" lettering. Provide a corrosion resistant ladder secured inside wall of manhole to for ease of access to piping and valves, etc. Refer to SECTION 23 05 00 COMMON WORK RESULTS FOR HVAC Part 1 General E. Isolation of Existing Utilities, for additional requirements.

PART 1 – GENERAL

PART 3 – EXECUTION

3.1 EXECUTION

A. Locate valves for easy access and provide separate support where necessary.
B. Install valves in horizontal piping with stem at or above center of pipe.
C. Install valves in position to allow full stem movement.
D. Install chainwheels on operators for ball, butterfly, gate, globe, and plug valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.
E. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
F. Install unions downstream of valves and at equipment or apparatus connections.

END OF SECTION 23 05 23

SECTION 23 05 29 HANGERS AND SUPPORT FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Detail of all hangers/supports/anchors for equipment, piping, ductwork, etc. shall be shown on drawings. Detail shall include size(s) and material of hangers/supports, fastening details, anchoring details etc. Spacing of hangers/supports shall be shown on drawings.
B. Pipe work supports/hangers shall be designed as per the latest edition MSS-58 and MSS-69. (MSS - Manufacturers Standardization Society)
C. Ductwork supports/hangers shall be designed as per the latest edition of SMACNA - HVAC Duct Construction Standard.
D. Design hangers without disengagement of supported pipe.
E. General Locations: Steel pipe hangers, miscellaneous steel supports, hardware, bolts, washers, nuts, screws, etc., shall be hot dipped galvanized with a minimum of 1.50 oz/ft on all sides and all field cuts shall be zinc coated.
F. Located in Harsh and/or Corrosive Environments: Pipe hangers, equipment supports, miscellaneous structure components, hardware, bolts, washers, nuts, screws, etc., shall be non-metallic polyester resin, vinyl ester resin, fiberglass, glass reinforced polyurethane or 316 stainless steel.
G. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
H. Provide an adequate and complete pipe support system using approved hangers and supports complete with necessary attachments, shields, inserts, bolts, rods, nuts, washers, and other accessories. Shields shall be a minimum of 12 inches long and of sufficient strength to ensure pipe hangers do not cut into or compromise the insulation integrity.
I. Provide adequate and complete pipe support system using hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units. Provide thermal expansion calculations for each system and component subject to stresses.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Unless otherwise indicated, factory fabricated hangers, supports, clamps, saddles, shields, and attachments shall comply with MSS requirements for the type or size installation and comply with manufacturer's published product information. Hangers, supports and anchors shall be sized properly to include insulation.
B. Hangers shall be isolated from piping to prevent contact with dissimilar metals.
C. Whenever mechanical equipment rooms are located within or immediately adjacent to the occupied building, vibration dampening hangers and supports shall be specified.

PART 3 – EXECUTION

3.1 EXECUTION

A. HANGERS/SUPPORTS shall be installed true vertical or horizontal.
B. Installation of hangers, supports, anchors, etc., shall be accomplished after required building structural work is completed. Where piping or equipment is to be suspended from concrete construction, approved concrete inserts shall be set in form work to receive hangers. Hangers suspended from metal or other roof deck are not permitted. Explosive driven fasteners and drilled concrete insets are not permissible.
C. Spacing attachments, supports, hangers, etc., are to be installed in accordance with MSS-69. Add additional attachments and supports where required for concentrated loads including changes in direction, fittings, and joints.

D. Piping shall be supported so that no piping weight (live or dead) load is transmitted to pump, equipment, chiller or to other equipment connections. Hangers and supports are to allow controlled movement of piping and to permit freedom of movement between anchors.
E. Vertical piping shall be anchored to building with two-point bearing. Pipe covering and insulation protection shields/saddles shall be used on all insulated piping.

END OF SECTION 23 05 29

SECTION 23 05 48 VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 -- GENERAL

1.1 PERFORMANCE REQUIREMENT

A. Contract drawings shall list each piece of equipment/machinery minimum static deflection.
B. Contract drawings shall list the type of isolator to be used for each piece of equipment/machinery.
C. Design noise level for each space shall be listed in the drawings and/or specifications.
D. Whenever mechanical equipment rooms are located within or immediately adjacent to the occupied building, vibration dampening hangers and supports shall be specified.
E. All motor driven equipment over 2 hp shall be provided with vibration isolation.
F. All equipment/machinery isolators shall be designed at a minimum natural frequency of six (6) times lower than the driving frequency of the equipment/machinery.
G. Structures shall have a minimum natural frequency of three (3) times the driving frequency of the supported equipment/machinery.
H. Inertia base shall be used for all fans operating at 4 inches static pressure. and above or with motors over 40 hp and all base mounted pumps over 15 hp. Engineer shall analyze all rotating equipment and list all which required inertia bases. This list shall be shown on drawings at Advance Schematic phase.
I. Inertial base shall be sized for a minimum of 1.5 times equipment weight but not less than 6 inches high.
J. Vibration isolators e.g., flex connections etc. shall be used at all connection points of all vibration generating equipment.
K. All roof top equipment installation shall be analyzed, and roof curb isolation rails specified if necessary. Except for fans, all roof-top equipment shall be approved, in writing, by the University.
L. A/E shall make recommendation for floating floors where necessary.
M. Internally isolated fans in air handlers are acceptable when approved by A/E.
N. SHOP DRAWINGS: Shop drawings shall include as a minimum: Drawing(s) of equipment detailing operating weight, stiffness of each isolator, mark of each isolator (color coding of each isolator preferred), center of gravity of equipment/machinery, static deflection specified vs static deflection submitted; and static and dynamic load on each isolator.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Springs shall be used for all static deflections greater than 2 inches.
B. Springs shall be used in conjunction with isolating elastomer.
C. Inertial bases fill shall be reinforced 3,000 psi concrete.
D. All isolators outdoors shall be protected. Steel points shall be hot dipped galvanized. Springs and hardware shall be cadmium plated.

PART 3 – EXECUTION

3.1 EXECUTION

A. Install isolators to ensure the integrity of isolators is not compromised, i.e., no short-circuiting exists.
B. For critical areas, the manufacturer shall inspect isolated equipment and submit report including static deflection.

END OF SECTION 23 05 48

SECTION 23 05 53 IDENTIFICATION FOR HVAC PIPING AND EQUIPEMENT

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENT

A. All Mechanical drawing symbols used shall be in accordance with standards of accepted practice.
B. All equipment and piping including associated electrical devices, shall be labeled and tagged in accordance with the University's guidelines.
C. Equipment tags and labels shall be permanently fasten labels on major equipment. Labels shall indicate a list of regular maintenance replacement components (i.e., filters, belts, etc. include quantities and sizes).
D. Label Content: Include caution and warning information, plus emergency notification instructions.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Labels, tags and signage shall be letter color coded according to service, and background color appropriate for the application and size for ease of readability. Comply with ANSIA13.1.
B. Labels shall be made of durable long-lasting materials able to withstand temperatures up to 160 °F.
C. Provide Valve Schedules in mechanical rooms to identify valves: For each piping system, on 8-1/2 by 11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses. Copy of the valve-tag schedule shall be included in operation and maintenance data.
D. Access Panels: Access panels are required in each situation where items requiring maintenance are located above a concealed ceiling. Access panel sizes shall be suitable for application. Access panel locations shall be indicated on contract drawings.

PART 3 – EXECUTION

3.1 EXECUTION

A. Locate tags, signage and equipment labels where accessible and visible.
B. Install identifying devices before installing acoustical ceilings and similar concealment.
C. Engraved signs and labels shall be permanently attached with Stainless-steel rivets or self-tapping screws unless approved otherwise.

END OF SECTION 23 05 53

SECTION 23 05 93 TESTING, ADJUSTING AND BALANCING (TAB) FOR HVAC

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. TAB Agency shall be NEBB or AABC certified. Submit TAB Plan to A/E for approval. Plan shall include locations of all measuring points, instruments to be used, measurements to be made, method for TAB, etc.
B. Where a Commissioning Authority is employed, the TAB Plan shall be submitted to this Authority for approval.
C. The TAB effort shall be as coordinated with the Contractor and performed as scheduled to produce the TAB report which shall be used during the functional performance testing. A copy of the final TAB report should be submitted to the owner and A/E no later than at the time of substantial completion.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

1.2 EXECUTION

A. TAB Agency shall verify all controls and perform calibration of flow measuring stations.
B. TAB results shall be included in the Record Drawings which are included in the Operation and Maintenance Documentation required at Substantial Completion.
C. TAB shall include building pressurization measurements and summation of the ventilation air, exhaust air, etc. to the building pressurization observations.

END OF SECTION 23 05 93

SECTION 23 07 00 HVAC INSULATION

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Design insulation systems for all piping, ductwork and equipment in accordance with the requirements set forth here-in and no less than the minimum per the latest Energy Code requirements. Insulation thickness/K-Value shall be designed to prevent condensation under all operating conditions especially in a hot humid environment.

1.2 DEFINITIONS

A. Hot Surfaces - normal operating temperatures of 100 °F or higher.
B. Cold Surfaces - normal operating temperatures of 75 °F or less.
C. Dual Temperature Surfaces - normal operating temperatures that vary from hot to cold.

1.3 APPLICATIONS

A. General: Materials and thicknesses are specified in schedules at the end of this section.
B. Interior, Exposed Piping Systems and Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
   1. Chilled Water.
   2. Heating Hot Water.
   3. Refrigerant suction lines.
   4. Condensate waste piping. Copper condensate pipe on roof does not require insulation.
C. Exterior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
   1. Chilled Water.
   2. Heating Hot Water.
   3. Refrigerant suction lines.
   4. Condensate waste piping.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Ductwork Insulation (Unless otherwise indicated, insulate the following duct systems)
   1. Interior concealed outside air, top of supply air devices, supply and return air Ductwork – Nominally 2.2 inches thick, 0.75 pcf fiberglass wrap and foil scrim kraft jacket with minimum installed insulation value of R-6.
   2. Mechanical rooms, interior exposed outside air, supply and return air Ductwork – Nominally 1.5 inch thick, 1.5 pcf fiberglass rigid board and foil scrim kraft jacket with minimum installed insulation value of R-6. Similar to CertaPro Commercial Board, CB150. Insulation requirements for exposed ductwork within interior conditioned spaces shall be evaluated and specified by the A/E.
   3. Exterior dual wall outside air, supply and return air Ductwork: Nominally 1.5 inches thick 1.5 pcf fiberglass rigid liner board securely attached and sandwiched within the solid galvanized interior liner and the aluminum exterior jacket with minimum installed insulation value of R-6.
   4. Insulation R-Values/insulation thickness shall be increased to reflect the wider temperature differences to prevent surface condensation and/or heat loss as determined by the A/E.
B. Schedule of HVAC Duct Insulation. Abbreviations used in the following schedules include: Field-Applied Jackets: P - PVC, K - Foil and Paper, A - Aluminum, SS - Stainless Steel. Pipe Sizes: NPS - Nominal Pipe Size.

Materials	Application	Thickness (inches)	Vapor Barrier Required	Field Applied Jacket
Interior Concealed Ductwork				
Duct Wrap	Supply & Return; Outside Air; Plenums, Top of Air Devices	**2.2**	Yes	None
Interior Exposed Rectangular Ductwork in Mechanical Rooms				
Rigid Board	Supply & Return, Outside Air; Plenums	**1.5**	Yes	None
Interior Exposed round Ductwork in Mechanical Rooms				
Duct Wrap	Supply & Return, Outside Air; Plenums	**2.2**	Yes	None

B. Pipe Insulation (Above Ground)
   1. Cellular Glass Pipe Insulation: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells similar to Pittsburgh Corning Corporation; Foamglas. Thermal Conductivity: 0.29 BTU-in/hr. ft2 ºF @ 75 ºF with maximum flame spread index of 25 and a maximum smoke developed index of 50.
   2. Flexible Closed Cell Elastomeric Thermal Preformed Pipe Insulation: Thermal Conductivity: 0.25 BTU-in/hr. ft2 °F @ 75 °F, thick similar to Armaflex with maximum flame spread index of 25 and a maximum smoke developed index of 50.
   3. Glass Fiber Preformed Pipe Insulation with factory applied ASJ similar to Knauf 1000 Pipe Insulation with maximum flame spread index of 25 and a maximum smoke developed index of 50. Thermal Conductivity: 0.23 BTU-in/hr. ft2 °F @ 75 °F.

C. Schedule of HVAC Pipe Insulation. Abbreviations used in the following schedules include: Field-Applied Jackets: P - PVC, K - Foil and Paper, A - Aluminum, SS - Stainless Steel. Pipe Sizes: NPS - Nominal Pipe Size.

Materials	Pipe Size (NPS)	Thickness (inches)	Vapor Barrier Required	Field Applied Jacket
Interior Concealed and Exposed Chilled Water (above 40-degree F)				
Cellular Glass	All	2	Yes	K
Outdoor Aboveground Chilled Water (above 40-degree F)				
Cellular Glass	All	3	Yes	AL
Interior Concealed and Exposed Heating Hot Water (200 degree and below)				
Glass Fiber	1/2 to 1-1/4	1-1/2	Yes	None
	above 1-1/4	2	Yes	None
Outdoor Aboveground Heating Hot water (200 degree and below)				
Cellular Glass	All	2	Yes	AL
Interior Refrigerant Suction Lines (add UV protection for outside installation)				
Cellular Glass	5/8 to 2-1/8	1-1/2	Yes	K
Exterior Refrigerant Suction Lines (add UV protection for outside installation)				
Flexible Elastomeric	5/8 to 2-1/8	1	No	None
Condensate Waste Piping Within Mechanical Rooms or Outdoors (add UV protection for outside installation)				
Flexible Elastomeric	All	3/4	No	None

PART 3 – EXECUTION

3.1 GENERAL

A. Armaflex shall not be split for installation.
B. Insulation shall not be applied until systems are cleaned and satisfactorily tested. All piping and other work to be insulated shall be free of building debris, flux, and foreign material. Duct shall be clean, dry, and free of rust prior to installation of insulation.
C. Insulation and vapor barrier shall be continuous through sleeves, walls penetrations, openings and hangers.

D. Installation shall be in strict accordance with manufacturer's instructions.
E. Flanges, valves, vessels and fittings shall be insulated and finished the same as pipe. Even if the manufacturer's standards for pre-insulated piping allows gaps in the continuity of the insulation, such shall be specified to be made continuous.
F. Continuous unbroken vapor barrier jackets are required on cold surfaces. Special attention is to be given to prevent condensation and subsequent deterioration of piping.
G. Insulation shall be protected at supports and hangers. Shields or saddles adequate to support the weight of pipe without crushing the insulation shall be provided.
H. Foam plastic insulation is not permitted within buildings or in overhangs or within 5 feet of the building perimeter.
I. Insulation for pumps, heat exchangers, and similar equipment, that may require periodic inspection or maintenance, shall be fabricated in easily removed sections.
J. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
K. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
L. Keep insulation materials dry during application and finishing.
M. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
N. Install insulation with least number of joints practical.
O. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
P. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
Q. Any condensate and/or refrigerant piping (or other cold surfaces) routed above interior ceilings or over interior finished spaces shall be insulated with Cellular Glass insulation. This insulation shall include a continuous vapor barrier, etc. (i.e., Flexible Elastomeric foam insulation is not satisfactory). Flexible Elastomeric foam insulation is satisfactory for condensate pipe insulation within mechanical rooms.

END OF SECTION 23 07 00

SECTION 23 08 00 COMMISSIONING OF HVAC

PAT 1 – GENERAL

1.1 PERFORMANCE REQURIEMENTS

A. Functional Performance Testing of the building HVAC and DDC Controls shall be a basic part of the A/E scope of services necessary to verify and validate the proper construction and operation of the systems according to the signed/sealed construction documents and per the Engineer of Records design intent.
B. A/E shall discuss which level of commissioning is desired by USF prior to entering into contract with USF for professional services. The Commissioning Authority should be selected before award of contracts.
C. If USF chooses to hire a third-party Commissioning Authority for Building Commissioning (including Functional Performance Testing of the building HVAC and DDC Controls), the A/E shall support the commissioning effort to the extent necessary for interpretations of the design intent and to uphold their Engineer of Record responsibilities.
D. The A/E and Commissioning Authority shall use the latest edition of ASHRAE Guideline as the basis for Building HVAC and DDC Controls Commissioning.

PART 2 – PRODCUTS (Not Used)

PART 3 – EXECUTION

3.1 EXECUTION

A. Once the level of commissioning is determined, the A/E shall develop the specifications incorporating specific language supporting the commissioning process. The specifications shall include the contractor requirements for coordination, scheduling, submissions, manpower and support of the commissioning effort. The A/E shall coordinate design documents with the Commissioning Authority throughout the design period.
B. The A/E and Contractor shall coordinate submittal documents with the Commissioning Authority throughout the construction period.
C. THE A/E and/or Commissioning Authority shall work with the owner to develop the Operation and Maintenance requirements for installed systems and coordinate these requirements with the Contractor.

3.2 OPERATION AND MAINTENANCE DOCUMENTATION

A. Operation and Maintenance Documentation shall be submitted at substantial completion. Refer to Project Close Out requirements in Section 23 05 00 Common Work Results for HVAC for. A/E shall determine timelines for draft submittal to ensure that A/E and Owner review comments are incorporated in the final documents.
B. A/E shall use the latest edition ASHRAE Guideline as a basis for preparation of specifications for O&M Documentation.
C. Reduced copies 11 inches by 17 inches of Record Drawings shall be included.

END OF SECTION 23 08 00

SECTION 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. Provide a DDC Computerized Energy Management control system, aka Building Automation System (BAS), to facilitate the automated HVAC system operation, scheduling and environmental control.

B The BAS shall interface with the University's SCADA System via USF network. Contractor shall provide appropriate device license package for USF SCADA System, contact USF Facilities Management or IT Operational Technology for more details/requirements. The BAS integration with USF SCADA System shall include dynamic real-time Graphics, and Control, fully setup and operational for remote access, monitoring, trending and scheduling, etc. A/E design documents shall also include integration of other project related Building System Equipment (i.e., Generators and ATS equipment, etc.) into the SCADA system for monitoring. A/E should provide Facilities Management with a vetted list of building system points available to be integrated. Contract documents shall include a basic Network Architecture Diagram identifying the interface and gateway requirements for communicating from each Building System Equipment/BAS to the USF network (i.e., Modbus/TCP, BACnet/IP, etc.), as necessary for the project. For further details contact Facilities Management/IT Operational Technology. SCADA graphics shall include a top-down tiered access approach with the following guidelines.

1. Building Site Plans (Top Tier) showing:
   a. Outside Air Temperature (OAT).
   b. Building power consumption (kW).
   c. Building power source status (utility or emergency generator).
   d. Links to other graphic screens.
   e. Direct link to power single line screen.
2. Floor Plans of Building (Tier Two) showing:
   a. All Floor Plans of Building representing separate HVAC zones, outlined with simplified floor plan layout backgrounds.
   b. Space temperatures. Indicate approximate install location of thermostat.
   c. Major equipment status (i.e., AHU On/Off; fuel tank level, etc.).
   d. Links to Tier Three screens and Tier One screens.
3. Specific Equipment Graphics (Tier Three):
   a. Generator and Fuel Tank.
   b. ATS
   c. Air-handler
   d. DX Split-System Units

C. All new facility to be connected to the owners central control center using the Ethernet network and BACnet protocol. All BACnet devices shall be interconnected on a common BACnet IP subnet. In order to avoid addressing conflicts, a specific range of BACnet Device Instances and Network Numbers shall be assigned for each building.

1. Device Instances
   A unique Device Instance for each BACnet Device shall be assigned within the following format:
   - XXXYYYY, Where:
   - XXX is the building number per the Facilities Planning and Construction Campus Map.
   - YYYY is a unique number for each device within the building. First is the number of the building controller. The second is the MS/TP LAN number. The third and fourth is the controller number and these usually match the MS/TP MAC address numbers. The Environmental Controls Department can assist in coordinating these numbers.
2. Network Numbers
   A unique network number for each BACnet Network utilized (i.e., Ethernet, MS/TP, PTP) shall have a number assigned within the following format:
   - XXXYY, Where:

- XXX is the building number per the Facilities Planning and Construction Campus Map.
- YY is a unique number for each network within the building. The Environmental Controls Department can assist in coordinating these numbers.

3. IP Network Number
   All BACnet devices shall be interconnected on a common BACnet IP subnet. All devices communicating on this network will share the same BACnet IP Network Number. This number shall be 101.

D. Control contractor shall complete all sensing and control installations including electrical and electronic components.

1.2 DRAWINGS

A. The A/E shall provide control drawings on the Construction Documents that show the following:
   1. Sequence of operation.
   2. All sensors location on all equipment.
   3. Type of points (Analog / Digital, Input / Output).
   4. Control Valves.
   5. Control dampers.
   6. Air Monitor sizing.

B. The A/E shall request from the Contractor to submit the following items as a minimum:
   1. Provide copies of all submittal data.
   2. An overall system interconnecting diagram showing all remote panels (PCs, Field Panels, and LAN devices), and power/surge protection locations and Uninterrupted Power Supply (UPS).
   3. Distributed panel locations (site and/or building plan, as appropriate to identify physical locations).
   4. Valve and damper schedules showing size, CV, close-off pressure, configuration, capacity, Manufacturer and location.
   5. Data sheets for all hardware and software control components.
   6. Thermostat/sensor locations.
   7. A description of the methodology used to keep graphics files on various PC terminals updated and consistent with one another. (Remote computer graphics vs. site computer)
   8. A detailed point-to-point diagram of circuitry of all DDC panels. Submit on a per distributed panel basis. Typical are accepted, provided all applicable units are listed and the units are identified.
   9. A list of connected data points, including connected control unit and input or output devices.
   10. A detailed Sequence of Operations.
   11. Detailed documentation on the specific field equipment to be supplied by the Controls Contractor shall be submitted and approved prior to installations; including, but not limited to, actuators, valves, temperature sensors, surge protection, and damper operators.
   12. All schemes and methods proposed to provide lightning protection for the DDC system, entering and leaving each building shall be submitted for review and approval.
   13. The Contractor shall develop project specific verification forms for all control equipment (AHU, FCU, VAV, CPU, Printer, Chiller, etc.) and submit them to the Engineer for approval prior to use. Once they are approved, the Contractor is responsible for completing the columns identified for installed information and inspection.
   14. System verification forms are to be completed by the Contractor and verified by the A/E.
   15. A verification form is to be completed for each individual component or equipment requiring verification.
   16. The Contractor shall submit completed reports immediately after tests are performed.
       a. Record all data gathered on site on approved verification forms.
       b. Provide the Engineers (Engineer-Of-Record and University Engineer) with original of each completed verification form.
       c. Maintain a photocopy on site of data taken during starting and testing period.
       d. Maintain one copy of all final starting, testing, balancing and adjusting reports on site up to the issue of the interim certificate for reference purposes.
   17. All final verification forms are to be submitted in word or excel format.

18. Submit to Engineers for review and approval.
19. Make corrections and re-submit as requested by the Engineers.
20. The Contractor shall submit brief step-by-step description of entire starting procedure to allow the Engineer to repeat starting at any time.
21. The Contractor shall provide the required shop drawing information and verify the correct installations and operation of each item on system verification forms. This will include information such as equipment/component code, location and nameplate data.
22. The systems verification shall not take place before all related components have been verified as correct.
23 Prior to startup and testing of the DDC components or systems, prepare a schedule for the required testing. Review schedule with the Engineers.
24. Provide sufficient notice (minimum seven days) prior to commencing tests.
25. Engineers may witness all, or any portion of testing and startup procedures performed by the Contractor.
26. The Contractor shall be present for all tests.

C. USF shall review submittals prior to the Engineer-Of-Record approval.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Subject to compliance with terms and conditions each manufacturer agreed to provide, the following manufacturers are acceptable:
   1. Tampa Campus
      a. Trane (Native BACNET System)
      b. Alerton (Native BACNET System)
      c. KMC (Native BACNET System)
   2. Regional campuses may specify alternate manufactures or refer to vendors listed below. Alternate vendors for the Tampa campus shall be approved by the USF-FM and USF BUILDING MAINTENANCE OR UTILITIES Environmental Control.
      a. Sarasota Campus
         i. Alerton (Native BACNET System)
         ii. ALC (Native BACNET System)
      b. St. Petersburg Campus
         i. Trane (Native BACNET System)
         ii. Alerton (Native BACNET System)
         iii. KMC (Native BACNET System)

B. COMMUNICATIONS NETWORK, PC
   1. Furnish a totally native BACnet-based system, including appropriate licensing for USF SCADA System. The SCADA system, building controllers, application controllers, and input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135-2008, BACnet. In other words, workstations and controllers, including unitary controllers, shall be native BACnet devices. No gateways shall be used for communication to controllers installed under this section. Gateways may be used for communication to existing systems or to systems installed under other sections.
   2. Each Building shall have a Global Controller with an Ethernet port that supports BACnet over IP protocol and as many MS/TP networks needed to provide for zone-by-zone control of space temperature and humidity as specified.
   3. Building controllers shall include complete energy management capabilities, including scheduling building control strategies with optimum start and logging routines. Building Automation System software and firmware shall be resident in field hardware and shall not be dependent on the operator's terminal. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage.

4. Software and Hardware tools shall be provided for field engineering such as controller replacement, troubleshooting, etc. Software passwords required to program and make future changes with field engineering tools, including graphical programming and applications will be left with the owner.

C. AUXILLIARY CONTROL DEVICES

1. AUTOMATIC CONTROL DAMPERS AND OPERATORS
   a. Automatic control dampers shall be AMCA Certified Ultra-Low leakage Class 1A @ 1" wg static pressure differential airfoil control damper. Damper blades shall be high yield aluminum airfoil construction with stainless steel linkages, corrosion resistant axles, silicone side jamb seals and EPDM blade jamb seals molded synthetic bearings, low pressure drop similar to TAMCO Series 1000SW, or equal. Dampers shall have interlocking blades and frames. Dampers shall be designed and constructed so that the blades, frames, and linkage mechanism shall present a rigid assembly with free and easy action. Bearings shall be long-life maintenance free. Where the damper blades are installed in a vertical position, a thrust type ball bearing shall be provided for the lower bearing. All bearings in ducts or casings to the outside shall have the top and bottom edges on both ends trimmed with replaceable neoprene seal fastened in an approved manner, so as to be practically airtight when closed. Dampers shall be designed for operation in temperatures ranging from -40°F (-40°C) to 212°F (100°C).
   b. The Control Contractor shall furnish all the controlled dampers of the type and sizes indicated on the Drawings for installation by the Sheet Metal subcontractor or the Mechanical contractor.
   c. All two-position control dampers shall be sized for minimum pressure drop, at the specified duct size.
   d. All modulating dampers shall be sized for an effective linear air flow control characteristic within the angle of rotation and maximum pressure drop specified. Information shall be provided to the Sheet metal subcontractor for determining the proper duct reductions or baffles used.
   e. Dampers shall be of the parallel blade design for isolation application and opposed blade design for modulating service.
   f. Approved damper operator manufacturer is: Belimo.
2. AUTOMATIC CONTROL VALVES AND OPERATORS
   a. The A/E shall specify Two-Way Belimo pressure independent control valves for control of all Chilled Water and Heating Hot Water Hydronic Coil systems unless otherwise reviewed and approved by USF-FM. Chiller/Boiler Plant Control valves shall be Belimo industrial actuators for automatic butterfly valve applications.
   b. The Control Contractor shall furnish all the control valves of the type indicated on the drawings for installation by the Mechanical Contractor.
   d. All modulating straight-through water valves shall have equal percentage or linear flow characteristic.
   e. Valves 2 inches and smaller shall have brass or bronze bodies with screwed ends. Valves 2-1/2 inches and larger shall have iron bodies brass or bronze trimming with flanged ends. Valves shall be factory rated to withstand the pressures encountered. Valves shall have stainless steel stems and spring-loaded Teflon packing.
   f. Air handling unit water valves shall be sized for a pressure drop equal to the coil they serve but not to exceed 5 psi. Valves shall have replaceable seats and discs. Provide pressure drop at half flow with submittals.
   g. All automatic control valves shall be fully modulating type unless specified otherwise by the project engineer.
   h. All control valves shall be designed to fail as follows:
   i. Cooling - Fail fully open to coil.
   j. Heating - Fail fully closed to coil.
   k. Each valve operator shall be 0-10 VDC type, with spring return or manual position override and feedback.
   l. Valves actuators shall be mounted vertical only.

m. Valves and Actuators shall be Belimo.

3. CURRENT SWITCHES: Provide a solid-state switch which indicates state change when the current level sensed by the internal current transformer exceeds the adjustable trip point. Internal circuits are to be totally powered by induction from the line being monitored. Provide a zero off-state leakage in the solid-state relay output, while switching both AC and DC circuits. Provide an LED that will show three pieces of information. (Rapid Flashing-switch is tripped, Slow Flashing-current is present but below the trip point and no Flashing-current is either off or below the bottom of the range) and permits setting the trip point adjustment prior to system connection.
4. DIFFERENTIAL PRESSURE TRANSMITTER (DPT): DPT shall be provided as indicated by the sequence for status purposes for either air or water applications. DPT for Building HVAC air pressure applications shall be true analog input signal with LCD display for local reading as manufactured by Dwyer Instruments or equivalent. DPT for filter status monitoring shall be Dwyer model MS-311-LCD. DPT for water applications in Building HVAC shall be as manufactured by Setra, Veris or equivalent. DPT for low differential pressure with high gauge pressure applications (such as chiller evaporator differential pressure) shall be as manufactured by Mercoid, Rosemount or equivalent. Units shall be selected for ranges consistent with the application.
5. ELECTRONIC TEMPERATURE SENSORS:
   a. Temperature sensors shall be thermistors or 100 Ohm platinum RTD. Sensors shall be calibrated to less than or equal to a 1/4 degrees F resolution for the specific application. Substitutions must be approved by the Engineer. All sensors to be field verified as correct.
   b. Provide twisted pair lead wires and shield for input circuit or as otherwise required by the manufacturer.
   c. Use insertion elements in ducts not affected by temperature stratification or smaller than one square meter. Use averaging elements where larger or prone to stratification. Sensor length 2.5 m or 5 m as required.
   d. Insertion elements for liquids shall be one piece machined stainless steel sockets (thermo-wells) with minimum insertion length of 2-1/2 inches (60 mm).
   e. Provide outside air sensors with watertight inlet fittings, shielded from direct rays of the sun. Mount on the North side of the facility.
   f. The temperature sensors shall be field verified by the Installing Contractor. Engineer will spot check verify these calibrations during walk through inspection.
   g. Wall mounted sensor shall be mounted at 5 feet-6 inches above finished floor in an area where they are unobstructed and which free air current is not constricted or blocked, final location shall be approved by the Owner and Engineer prior to installation. Wall sensors in corridors shall have a locking guard. Use digital wall sensors. Control Contractor shall submit floor plan showing location of each device with relative equipment, door swing and relevant casework/furniture, etc. information clearly indicated.
   h. Sensor elements shall be applicable for the medium being sensed, i.e., room elements, well mounted elements, duct mounted elements and outdoor mounted elements. Range shall be from 0 to 150 °F.
   i. Strap on sensors shall not be used unless specifically required.
6. ELECTRONIC STATIC PRESSURE SENSORS
   a. Static pressure sensors shall be differential pressure sensors, with the "high" output sensing the duct pressure and the "low" input sensing atmospheric pressure.
   b. The range for the static pressure sensor shall be matched to the static pressure of the system being sensed, 0 to 0.5-inches, 0 to 2-inches, 0 to 5-inches, or 0 to 10-inches.
   c. Accuracy shall be plus or minus 2 % of the full range being sensed.
7. FIRESTATS: Provide UL-listed fire protection thermostats where indicated in main supply and return air ducts of air handling units which are rated less than 2,000 cfm. Connect thermostats which are capable of stopping fans in event of excessive temperatures in fan control circuits. Provide thermostats with fixed or adjustable settings to operate at not less than 75 °F above normal maximum temperature at their location in the air handling system.

Comply with requirements of NFPA 90A. Provide thermostats with the following operating features: Provide manual reset type thermostat.

8. TEMPERATURE THERMOSTATS (Stand/alone applications, as required): Two position (On/Off) room thermostat with bimetallic sensing element, set point thumb wheel dial, room temperature indicator, surface mounting base, and hard plastic cover plate, UL listed.
9. HUMIDITY SENSOR/TRANSMITTER: Provide relative humidity sensor/transmitter where shown on the control drawings. Sensor and transmitter shall have a sensor accuracy of ±2 % RH @ 25 °C from 20-9 % RH Output Signal, two wire 0-10 VDC linear, proportional to 5-95 % RH Output Signal. The transmitter power shall be compatible with, and powered by, the low voltage power supplied by this Contractor.
10. CARBON DIOXIDE GAS SENSOR/TRANSMITTER: A/E shall not use carbon dioxide sensors except were necessary for LEED and/or for Demand Control Ventilation applications or as deemed necessary by the A/E for a specific control requirement. Provide carbon dioxide gas sensor/transmitter where shown on the control drawings. The diffusion gas chamber in the sensor should incorporate a reflective, gold-plated light pipe or waveguide surrounded by a gas permeable Teflon based hydrophobic diffusion filter that prevents particulate and water contamination of the sensor. The sensor shall provide simultaneous analog outputs in volts and milliamps and shall have a gold bifurcated relay that can be operated as normally open or closed. The sensor shall incorporate elevation correction adjustment and ABCLogic™ (Automatic Background Calibration) software for self-correction of drift to better than ±10ppm per year. The sensor shall have an accuracy of ±75 ppm or 7% of the reading (whichever is greater). All adjustments to the sensor including output scaling, elevation adjustment, relay setpoint, relay dead-band, proportional or exponential output, and single-point calibration shall be made via computer connection to an on-board RJ45 jack. The 8002 product shall also be adjusted using the on-board push buttons and display. For ease of installation, the sensor shall have a detachable base with all field wiring terminals on the base. Calibration Requirements: Provide with software and two (2) gas canisters (or two (2) gas canisters for every 3 units installed, whichever is greater), and interface cabling for RS-232. Ancillary Devices Provide mounting bases and/or aspiration box as required per manufacturer's recommendation. This product shall meet or exceed specifications for the Telaire Ventostat® Model 2001V. The CO2 sensor shall be a single beam absorption infrared (non-disperse) type with 18 months parts and labor, and 5-year calibration guarantee by Telaire International Corp.
11. AIR MONITOR AND CONTROL: Each VAV air handling unit shall have an airflow control station capable of performing constant volume control of outside air without loss of dehumidification at part load. The intent is for the controls to be an integral part of the Building Management and Automatic Temperature Control System.
    a. Each airflow monitor and control station shall be complete with velocity pressure transmitter and air volume flow rate control.
    b. The major control instruments shall be of industrial process control quality and shall be capable of the following minimum performance:
    c. Differential Pressure Transducer: The differential pressure transducer shall be capable of transmitting a linear 0-10 VDC output signal proportional to the differential (velocity) pressure input signals within the following performance and applications criteria.
    d. Calibrated Spans: not greater than 1-1/2 times the maximum design velocity pressure. Calibrated Overall Accuracy: ±1.0 % of span.
    e. Repeatability: ±0.05 % of output.
    f. Operating Range of Sensor: 20 °F to 150 °F
    g. Operating Range of Transmitter: 20 °F to 150 °F
    h. The transmitter output shall be unaffected by direction (or attitude) of mounting or external vibrations and shall be furnished with a factory calibrated span.
    I. Units to comply with minimum manufacturers up and downstream configuration to be coordinated with Division 23 Contractor.

12. AIRFLOW MEASURING STATIONS (DUCT AIRFLOW MEASURING DEVICE):
    a. Each device shall be designed and built to comply with, and provide results in accordance with accepted practice as defined for system testing in the latest revision of ASHRAE Handbook of Fundamentals as well as the latest revision of the Industrial Ventilation Handbook.
    b. Each device shall be designed and built to provide airflow readings across the entire operating airflow range, and capable of operating at 0 - 5000 fpm airflow velocities.
    c. The maximum allowable pressure loss through the unit shall not exceed 0.1-inch wg. Each sensor node shall be calibrated to 16 points of velocity and be capable of measuring the airflow rate within an accuracy of ± 2 % of reading, ±0.25 % repeatability. Each Air Flow Measurement System shall be capable of measuring the airflow rate at an installed location which meets Manufacturer's Suggested Placement Guidelines to within + / - 3 % of Reading at any velocity between 0 to 5,000 feet per minute.
    d. Stations shall be installed in strict accordance with the manufacturer's published requirements. Modulating control dampers shall be installed downstream of air monitoring stations. Placement of air monitor stations in duct shall be coordinated by the installing Contractor with the manufacturer's local representative prior to installation based on the project actual field conditions. These stations serve as the primary signals for the airflow control systems; therefore, it shall be the responsibility of the Contractor to verify location and installation to assure that accurate primary signals are obtained.
    e. The units shall have a self-generated sound rating of less than NC40, and the sound level within the duct shall not be amplified nor shall additional sound be generated.
    f. A/E shall specify similar to Ebtron Advantage III Gold Series Thermal Dispersion Technology or pre-approved substitute. All airflow measuring stations shall comply with the above technical requirements. In the event of noncompliance with the above technical and performance requirements the installing Contractor shall be responsible for providing replacement airflow measurement systems which do meet the requirements.
    g. Airflow measuring stations shall be scheduled on the drawings and shown on floor plan/ductwork drawings. Drawing shall show access doors (required for cleaning) and all necessary upstream and downstream clearances.
    h Each air monitor shall be tested by the project test & balance contractor. Tests shall be conducted at each air-handlers minimum and maximum operating fan capacity. If the installed air flow measurement systems readings and project test & balance measurement values deviate more than allowable project specification, adjustments are to be made in conformance with Manufacturers delineated adjustment procedures.
13. WATER FLOW METER
    a. For Water Flow Meter requirements, refer to Section 23 05 19 Meters and Gages for HVAC Piping.
14. BTU METERING
    a. For BTU Meter requirements, refer to Section 23 05 19 Meters and Gages for HVAC Piping.
15. REFRIGERATION LEAK DETECTORS:
    a. Provide refrigerant leak detectors with up to four (4) remote sensor inputs, controller furnished complete with alarm relays and control relays for Start - Stop control of area makeup and exhaust fans. Sensors will be solid state to include Ammonia and Freon. R-22, R-123 and 134 shall be provided to match selected chiller. Sensors can be located up to 500 feet from the control unit. Control unit to include visual alarms with discreet LEDs for which sensor has caused the alarm. System will have a built-in time delay to prevent false alarms. Provide panel with test buttons for audible and visual alarms.
    b. Acceptable Manufacturers - MSA Instruments.
16. LOW TEMPERATURE LIMIT SENSORS (Coil Freeze Protection): Provide low temperature protection thermostats of manual-reset type, with sensing elements 8 feet or 20 feet in length. Provide thermostat designed to operate in response to coldest 1 foot

length of sensing element, regardless of temperature at other parts of element. Support element properly to cover entire duct width. Provide separate thermostats for each 25 square feet of coil face area or fraction thereof.

17. CONTROL WIRING: Refer to SECTION 260519 PART 2 – PRODUCTS 2.2 CONDUCTORS LESS THAN 120 VOLTS (12 TO 50 VOLTS).

PART 3 -- EXECUTION (Not Used)

END OF SECTION 23 09 00

SECTION 23 11 00 HYDRONIC PIPING

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Design piping systems in accordance with the requirements set forth and no less than the minimum per the latest Florida Mechanical Code requirements.
B. Pipe wall thickness. Wall thickness shall be calculated as per ASME B31.3.
C. A material allowance shall be added to the above calculated wall thickness to account for progressive deterioration due to the effect of corrosion, erosion, wear, and material removed for threading or grooving.
D. Design temperatures shall be 45 °F for chilled water, 160 °F for hot water, and 95 °F for condenser water. Design pressures for distribution shall be 200 psi. Refer to Section 23 00 00 1.2 Design Criteria for additional requirements.
E. Condenser water design pressures shall be determined by the A/E.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Above ground PIPES & PIPE FITTINGS
   1. General: No PVC pipe shall be used.
   2. Steel Pipe: Steel pipe shall be ASTM A53 Grade B, Schedule 40 Steel.
   3. Steel fittings shall be ASTM A234 wp 91 tempered.
   4. Piping 2 inch and smaller may be Type K copper tubing with 95-5 sweated fittings. Mechanical pressed copper pipe jointing piping similar to Viega Pro Press System or approved equal may be used inside buildings for chilled water and heating hot water piping 2 inches and smaller upon written substitution request and approval by the USF-FM. Approvals will be contingent on base building system materials, cost considerations, installation time and use of space. All of the piping system components in project mechanical joining piping systems shall be of single manufacturer including joints, pipe, installation tools, couplings, gaskets, fittings, valves and accessories, etc. A direct employee of the jointing system manufacturer shall provide on-site contractor training and installation inspection by the manufacturers authorized representative. The manufacturer's Installation Services Representative shall inspect the project for properly-installed pipe joints and complete system integrity. Upon completion of each inspection, the manufacturer's Installation Services Representative shall provide a report to USF, Contractor and the Engineer to identify any deficiencies and/or contractor action items. Mechanical joining piping system manufacturers shall provide owner training and provide any/all installation tools needed for maintaining the system. Owner training shall be provided for up to 4 hours of hands-on maintenance and repair training for four USF Operations personnel as scheduled via USF Project Manager prior to Substantial Completion. Mechanical joining piping system manufacturers shall provide USF with long-term Extended Warranty on each project-accepted for installation.
   5. Condensate Drain Piping -Type K or L copper tubing with 95-5 sweated fittings.

B. UNDERGROUND PRE-INSULATED PIPES
   1. Underground pipes shall be factory pre-insulated steel piping.
   2. The carrier pipe shall be steel ASTM A-53, Grade B, seamless (Type S), standard weight for sizes 2 inches and larger, and shall be ASTM A-120/A-53, Grade F (Type F), standard weight for sizes 1 to 1 1/2-inches and smaller. Seamless pipe smaller than 2 inches shall be ASTM A-106, or A53, Grade B. Condensate return piping shall be Schedule 80. When practical, piping shall be provided in 40 feet double-random lengths. All carbon steel pipe shall have ends cut square and beveled for butt welding. Straight sections of factory insulated pipe shall be 6 inches of exposed pipe at each end for field joint fabrication.
   3. Polyurethane foam insulation shall be injected with one shot into the annular space between carrier pipe and jacket with a minimum insulation thickness of 3 inches. Insulation shall be rigid, 90-95 % closed cell polyurethane with a 2.0-to-3.0 pounds per cubic foot density and coefficient of thermal conductivity K-Factor) of 0.14 and shall conform to ASTM

C-591. Maximum operating temperatures shall not exceed 250 °F. Insulation thickness shall be specified by calling out appropriate carrier pipe and jacket size combinations.

4. Jacketing material shall be high density polyethylene (HDPE), conforming to ASTM D-1248. Wall thickness for HDPE jacketing shall vary according to pipe size. Piping wrap shall be heat shrunk at closures. Jacketing for above ground, outdoors installations shall contain ultraviolet inhibitors for protection for sunlight. No FRP jacket allowed.

PART 3 – EXECUTION

3.1 EXECUTION

A. All piping, fittings, specialties, etc. are to be installed in strict accordance with manufacturer's instructions and sound engineering and Code practices. All welded joints shall be field painted to prevent surface rust prior to insulation and/or energizing. Coordinate with inspector to determine sequence of inspections vs. painted welds.

B. Pipe 2 inches and smaller shall be threaded or socket welded.

C. Pipe greater than 2 inches shall be three-pass butt welded. Root pass shall be inspected before other passes are made.

D. Piping installation is to be level. Pipe is to be concealed in chases except in unfinished rooms and when installed above ceiling. No PVC pipe is to be used. Flexible connections are to be installed at all vibrating equipment. Pipe branches from mains must incorporate one change of direction in horizontal plane and one in vertical plane before connecting to equipment. Change of direction are not required if main piping is anchored at branch take-off. Drain valves are to be installed at low points in piping to permit draining of system. Di-electric unions are to be provided between dissimilar metals. Each piece of equipment is to be provided with shut off isolation valves. Air vents are to be installed at all high points, piping drops, and other points where necessary for air removal. A back flow preventer and shut off is to be provided at water service connection.

E. Balancing valves and orifices are to be provided sufficient lengths of straight pipe upstream and downstream of valves, fittings, etc. to reduce turbulence to a minimum.

F. Condensate piping is to be pitched a minimum of 1/8 inch per foot and provided with clean-outs at every 90 bend and at convenient intervals in straight lines. A trap is to be provided at each equipment connection to drain. Water seal must exceed maximum pressure developed by equipment.

G. Buried piping is to be at a minimum of 48 inches for Tampa campus, and 36 inches for Sarasota and St. Petersburg campuses. Joints and fittings are to be carefully excavated and buried so that the piping load is not supported by the joint, etc.

H. Sleeves are to provide at least 1 inch clearance all around pipe and insulation and are to be sealed in exposed areas, through fire walls with fire proofed sealant, and partitions. Insulation must be continuous through sleeves. Where pipes pass through floors top of sleeve is to be set 2 inches above finished floor and flush with underside of floor. Unused sleeves are to be plugged.

I. Hydronic Testing – Piping System are to be purged of all air and hydrostatically tested at 1.5 times the maximum system design pressure, but not less than 100 PSIG for a minimum of 15 minutes. No pressure drop is to be allowed. The A/E and Owner's representative are to witness the tests. Any leaks are to be repaired by replacing defective fitting, joint or piece. Defective section is to be re-tested after repair and witnessed by the Project Architect/Engineer and the Owner's representative. Back-filling, concealing, and insulating is to be done after successful hydrostatic test and after Inspector approval.

J. Adjusting and Cleaning - Clean and flush hydronic piping system.

K. Piping Supports - All piping supported from the ceiling shall have at least one-foot-long saddles of sufficient strength to ensure pipe hangers do not cut into the insulation.

L. Provide P/T Plugs on branch piping at equipment entering and leaving connections. Locations shall allow field measurement of fluid temperatures and pressures across individual equipment for verification and troubleshooting.

SECTION 23 31 13 HVAC DUCTWORK

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. DRAWINGS
   1. Construction Drawings shall identify the portion of each duct system to be constructed for a particular pressure class.
   2. Construction Drawings shall identify and designate the duct pressure class for each system. All ducts shall be constructed in accordance with SMACNA and meet or exceed the specific duct pressure class for each system. All ducts shall be sealed to Seal Class A for duct closure. A/E shall specify the sealant to be used.
   3. Construction Drawings shall indicate all service openings as required by NFPA. Special attention should be given to access coils for cleaning.
   4. Construction Drawings shall indicate all openings for thermometers and controllers.
   5. Construction Drawings shall indicate all dampers, all necessary details, hanger/supports details, and spacing.
   6. Drawings shall be double line.
   7. In renovation work, Construction Drawings shall directly state that abandoned and/or replaced ductwork located in the HVAC scope of the project shall be removed from the building. Ambiguous areas shall be discussed with the USF Project Manager.

B. SHOP DRAWINGS
   1. A/E shall specify shop drawings to be submitted for A/E approval before fabricating ductwork. Two (2) approved copies shall be sent to Owner.
   2. Shop Drawings shall include as a minimum:
      a. Mark of each duct section
      b. Pressure class of the duct section
      c. Gauge of material
      d. Duct reinforcement (if any)
      e. Transverse joint reinforcement
      f. Longitudinal seam
      g. Intermediate reinforcement (if any)
      h. Hanger type, size and spacing. Anchor method and lower hanger detail.

1.2 DESIGN CRITERIA

A. A/E shall select the duct sizing and air distribution methodology and report same to the Owner. Special attention should be given to noise control when selecting sizing method and materials. Consult the Room Data Sheets in the Facilities Program, if available, to determine the NC rating as design criteria for each space. If NC information is not specified in the Facilities Program, consult the ASHRAE HVAC Application Handbook for the type of space being served.
B. Return air system shall be ducted directly back to the air handling unit. Return air plenums shall not be used unless as a last resort, and the engineer has evaluated and proven to the University Mechanical Engineer that return ducting is not possible, as dictated by existing building structural or physical constraints. Comply with the current Florida Building Code building envelope insulation requirements where return plenums are to be used or reused.
C. Internal duct liner SHALL NOT be specified, unless discussed with Owner.
D. Fibrous duct SHALL NOT be specified.
E. Generally, duct material shall be galvanized (G90) steel except as noted. A/E shall analyze each environment and make recommendations on:
   1. the galvanized coating designation or
   2. the selection of alternative duct materials e.g., fiberglass, PVC, Stainless steel etc.
F. Fume Hood exhaust duct shall be welded stainless steel except as recommended otherwise by A/E for the specific fluid handling application or installation circumstances.
G. Kitchen and Dishwasher Hood exhaust duct shall be welded stainless steel.

F. Maximum developed length of flexible duct shall be 6 feet.
G. Specify double wall turning vanes for ducts supply and return.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Sheet metal shall be per ASTM A-653 regular spangled, non-oiled with a minimum zinc coating designation of G90. A/E shall make recommendations.
B. Threaded rod hangers, when used, shall be galvanized with double nuts and lock washers.
C. Take-off fitting with damper: Shall be commercial quality with continuously-welded seams, heavy duty damper & handle with standoff to allow blanket type insulation, conical similar to FlexMaster USA model STOD-B03 with full width damper rod with nylon bushings or equal bellmouth or rectangular to round shoe take-offs.
D. Outside Air and Return Air Control Dampers: Refer to Section 23 09 00 Instrumentation and Control for HVAC paragraph C. Auxilliary Control Devices 1. Automatic Control Dampers and Operators

PART 3 – EXECUTION

3.1 EXECUTION

A. Generally, ducts shall be installed 4 inches below the building structure above.
B. Leakage testing must be specified, per SMACNA criteria. The A/E should specify that the testing is witnessed by the Engineer, TBA agency, and the Owner's Representative.
C. All duct openings shall be protected with visquine during construction. If ducts were not protected, then the Contractor shall vacuum all unprotected ductwork before starting of air handler fans, at no cost to the Owner.
D. Welding shall be as per specification for welding sheet metal (AWS 1990).
E. Ducts shall have access doors every 50 feet, minimum.

END OF SECTION 23 31 13

SECTION 23 34 23 HVAC POWER VENTILATORS

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENT

A. Fans shall be direct drives with speed controllers. If fan duty cannot be achieved, the A/E shall discuss potential options with USF before selection is made.
B. Fan noise levels shall be selected to achieve the NC levels in all occupied spaces (at lower end of the range) as per the latest edition of ASHRAE HVAC Application Handbook.
C. Fan operation shall be verified (thru BAS) by flow switch for belt drives and flow switch/current sensor for direct drive.
D. Do not use axial flow fans unless written permission is granted

PART 2 – PRODUCTS

2.1 MATERIALS

A. Engineer shall analyze the environments (both inside and outside), select materials to ensure long life with minimum maintenance, and discuss the selections before schematic submittals.

PART 3 – EXECUTION

3.1 EXECUTION

A. Provide fixed sheaves after final balance.

END OF SCTION 23 34 23

SECTION 23 37 13 DIFFUSERS, REGISTERS AND GRILLS

PART 1 – GENERAL

1.1 DESIGN CRITERIA

A. A/E shall select and schedule air devices for the specific application on a room-by-room basis to achieve the mixing ventilation and distributed airflow necessary for desired comfort of the space.
   1. Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static pressure drop, and noise ratings.
   2. Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Air devices shall be selected based on best industry practices necessary to achieve quiet operation throughout the operating ranges of the devices. Refer to the specific noise criteria limits for the given application/space. Consult the Room Data Sheets in the Facilities Program, if available, to determine the NC rating as design criteria for each space. If NC information is not specified in the Facilities Program, consult the ASHRAE HVAC Application Handbook for the type of space being served.

C. Submit engineering data in a manner to facilitate convenient review of aspiration ability, including temperature and velocity traverses, throw and drop, noise criteria ratings sizes, free area and quality of construction. Outlets shall be selected for maximum noise criteria level as scheduled on drawings.

D. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 2 – PRODUCTS

2.1 MATERIALS

A. Indoor air devices shall be constructed of Aluminum unless the application dictates otherwise (i.e., highly corrosive environments).

B. Finish shall be powder-coat or baked enamel, white unless otherwise required for the application.

PART 3 – EXECUTION

3.1 EXECUTION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

D. Provide accessible balancing dampers in duct branches and/or devices were necessary to allow for proper balancing. Dampers shall be selected and installed so as not to induce air noise above the noise criteria of the room.

E. Paint ductwork visible behind air outlets and inlets matte black.

F. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

SECTION 23 41 00 PARTICULATE AIR FILTRATION

PART 1 – GENERAL

1.1 DESIGN CRITERIA

A. Drawing shall indicate filter removal/replacement space which shall be dimensioned. Air handler schedule shall include filter size.
B. Filter efficiencies shall be selected based on the areas served. Engineer shall address special filtration needs at advanced schematic.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Provide 2 inches thick pre-filters, with MERV 8 minimum efficiency. Pre-filters shall be Pleated type.
B. Provide 4 inches thick final filters, with MERV 13 minimum efficiency. Final Filters shall be Cartridge type. Roll filters shall not be utilized.

PART 3 – EXECUTION

3.1 EXECUTION

A. During construction filter pressure drop shall be monitored. Filters shall be replaced when pressure drop reads the manufacturers recommended loaded filter pressure drop (approximately 1 inch of water column).
B. New filters shall be installed at substantial completion.
C. Three (3) spare sets of main filters shall be supplied to USF at substantial completion.

END OF SECTION 23 41 00

SECTION 23 73 13 MODULAR INDOOR CENTRAL STATION AIR HANDLING UNITS

PART 1 – GENERAL

1.1 PERFORMANCE REQUIREMENT

A. Engineer shall discuss type of Air Handler (draw through, blow through, etc.) with USF before selection is made. Energy efficiency shall be of paramount concern. Typical design shall be VAV system with no simultaneous heating and cooling.
B. Roof-mounted air-handlers are not allowed unless an exception is requested and approved by USF-FM through the Design Guideline Deviation process.
C. Do not use axial flow fans unless written permission is granted.
D. Access doors shall be provided for service of all components.
E. For special applications, Engineer shall discuss recommendations with USF at Advanced Schematic.
F. Air-handler cooling coils selections shall be based on a nominal leaving air temperature of 52 °F and 15 °F water temperature rise. Hot water coils shall be based on a 50 °F water temperature drop. (Note: This difference shall be measured at the mains. (Engineer shall show calculations for mixed flow to verify the temperature in the pipe mains.) Select main coils with airflow velocities in the range of 420 – 450 fpm velocity and 10-15 feet water pressure drop.
G. Three-way mixing or bypass valves are not acceptable. Use only two-way pressure independent control valves. Refer to Section 23 09 00, Instrumentation And Control For HVAC, 2. Automatic Control Valves and Operators for additional requirements.
H. Each AHU shall have temperature and pressure plugs (P/T) on the supply and return chilled and hot water lines.
I. All 100% outside air units shall be equipped with preheat coils.
J. Provide Energy Recovery Ventilation Systems in accordance with the Florida Building Code – Energy Conservation (latest Edition). Wrap-around Heat Pipes may be used in air-handler applications for code required Energy Recovery Devices where specific code exceptions allow its use. Heat Pipes shall be installed at the air-handler factory. Systems shall include no less than 18 inches of upstream of heat pipe coils, reheat/heating coils and 24 inch clearance upstream of main cooling coil. Clearances between coils for maintenance and instrumentation mounted within a fully accessible section with 18 wide x full height hinged doors. All wraparound heat pipes shall include full controllability (all circuits) and shall be controlled by the BAS sequence of operations and be capable of being fully isolated (turned-off) via heat pipe control valve(s). When heat pipe is isolated by control valve(s), there shall be no residual heat output from the heat pipe coil. If the manufactured heat pipe contributes any residual heat to system supply air temperature, this heat output shall be accounted for in the A/E design (i.e., increasing the system design airflow, cooling coil capacity, etc.) in order to satisfy the cooling space peak sensible load.
K. Energy Recovery Systems may be used on air-handler applications other than where dictated by code if it is suitable for the application and deemed feasible. The Project Engineer shall provide a Life Cycle Cost Analysis (LCCA) for all air-handler projects (new and/or replacements) on all non-code required applications. The LCCA shall be performed by the Project Engineer of Record (Florida Professional Engineer) and submitted to the USF Mechanical Engineer for review. The LCCA shall include a simple payback method based on modeled calculations of annual energy savings and include the net installed first cost for the energy recovery system and the annual maintenance costs. Modeled energy savings may be calculated using an approved hourly load model or an approved BIN load model specific to the project location, weather data and operating schedule. The energy savings model shall adjust for fan

energy costs (additional system static pressure work and airflow), and heat transfer effectiveness of the proposed equipment, etc. The energy calculations shall be performed using the most recent utility costs as determined by USF FM. Systems resulting in favorable payback will be given consideration for inclusion as determined by USF Leadership.

The first cost pricing shall contain control system costs to include instrumentation (i.e., temperature/humidity sensors) located upstream and downstream of the heat exchanger coils for monitoring and trending real time performance data. The system net first cost value shall include the cost to increase unit size/airflow as needed to achieve design capacity and the cost to enlarge mechanical rooms as needed for proper clearances.

Annual maintenance costs may be estimated at $700 per year per system.

If wrap-around energy recovery systems are employed, the energy recovery system shall be fully controllable. If the reheat is designed to be energized during design peak conditions, the air-handler system shall be sized to compensate for any additional airflow required to satisfy the sensible design load conditions.

L. The A/E shall specify factory installed encapsulated UV-C lamps for surface treatment of cooling coils in excess of 6 rows. Lamps shall be designed and installed in accordance with the latest version of the ASHRAE Handbook - HVAC Applications – HVAC System Surface Treatment. UV-C lamps shall be installed at the air-handler factory. Provide UV-C lamps on all units equipped with Heat Pipes.
M. Systems shall include no less than 18 inches of upstream of heat pipe coils, reheat/heating coils and 24-inch clearance upstream of main cooling coil. Clearances between coils for maintenance and instrumentation mounted within a fully accessible section with 18 wide x full height hinged doors.
N. The A/E may specify GPS IBAR for surface treatment of cooling coils in lieu of UV-C Lamps provided the air-handler control system includes VOC and CO_2 sensors installed in the return airstream for monitoring and trending room air quality and the IBAR power supply is mounted outside of the unit for maintenance access and visual feedback to determine operating status. The power to the IBAR shall be interlocked with the air-handler and shut-off anytime the air-handler is off.
O. Fan walls shall be given consideration for use on air-handlers. Review job specific details and options with the USF Project Manager and USF Mechanical Engineer at the Schematic Phase level before finalizing air-handler selections.
P. Acceptable Air Handler manufacturers: Trane, York and Carrier.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Air handling unit shall be insulated double walled with no exposed insulation in the air stream.
B. Unit main drain pan shall be positively sloping IAQ stainless steel drain pans. Provide air-handlers, fan-coil units and blower coil units with 1-1/2" deep auxiliary drain pan below unit with float switch and overflow alarm tied to BAS. Pans shall extend nominally 6" beyond the perimeter dimensions of the unit.
C. The preferred maximum number of hydronic cooling coil row/fins per inch (fpi) is 6/14. If coil duty requires greater row/fpi then unit shall be equipped with UV-C lamps and adequate clearances for cleaning and maintenance. If required to exceed 6 rows, consider split coils provided with access clearance between coils for cleaning.
D. Coils shall have a stainless steel frame.
E. Fans shall be direct drives with speed controllers. If fan duty cannot be achieved, the A/E shall discuss potential options with USF before selection is made.

1. Fan noise levels shall be selected to achieve the NC levels in all occupied spaces (at lower end of the range) as per the latest edition of ASHRAE HVAC Application Handbook.
2. Fan operation shall be verified (thru BAS) by flow switch for belt drives and flow switch/current sensor for direct drive.

F. Provide Variable Frequency Drives (VFD) for all air-handler (variable air volume and constant volume) applications. Other control methods shall be approved, in writing, by USF. Each VFD to be provided with lightning surge protection and manual bypass.

G. The VFD shall be compatible with the Energy Management System. The VFD shall accept 4-20 ma or 0-10 Volt signal to control the frequency on the drive. Furthermore, the VFD shall communicate to the BAS through BACNET protocol. Approved manufacturers are:
1. ABB, Danfoss-Graham, Yaskawa, and Square D.
2. Regional campus facilities may approve alternate manufacturers, after consultation with the University Mechanical Engineer.

PART 3 – EXECUTION

3.1 EXECUTION

A. Air handlers shall be installed to limit noise and vibration. Provide Air-handlers Schedule. Air handlers to be floor-mounted shall be installed on nominal 6" high concrete housekeeping pads. Additionally, provide double deflection neoprene pads between the concrete pad and air handler units for isolation of the dissimilar materials.

B. With unit running, water flow test shall be done to ensure adequate condensate drainage.

C. Condensate drainage shall be gravity-flow wherever possible. Design and installation of condensate pumps shall be by written approval of the USF Mechanical Engineer only.

D. Provide 3" deep secondary drain pan sized to extend 4" beyond the full perimeter of unit, located on floor below unit. This applies to floor mounted units and ceiling hung units and fan coils, etc. A limit water switch shall be installed on the drain pan. Limit switch shall disable unit and send alarm notification via BAS.

E. Provide ball valve and piping on air handler coil air vents.

F. Air cleaning and filtration efficiencies for each air handling system. These shall be clearly shown on design drawings. Refer to Section 23 41 00 Particulate Air Filtration for additional requirements.

END OF SECTION 23 73 13

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 26 ELECTRICAL

DIVISION 26 ELECTRICAL

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SECTION 26 00 00 GENERAL ELECTRICAL REQUIREMENTS

1.1 SUMMARY

This Section includes general electrical requirements for all projects.

1.2 PERMITS AND INSPECTIONS

A. Follow USF Building Code Administrator (USF-BCA) requirements for permitting and scheduling inspections. Coordinate with USF-BCA department.
B. Minor Projects: Contractor is responsible for all permitting and inspecting fees.
C. Major Projects: Coordinate with USF Project Manager (USF-PM) for responsible party for permitting fees.
D. Minor Projects with USF approved Contractor/Construction Manager (CM): Coordinate with USF-PM and assigned CM for responsible party for permitting fees.

1.3 COORDINATION

A. Visit the site included in the scope of work to ascertain existing conditions. Verify all dimensions and locations before proceeding with work in the area and prior to purchasing equipment.
B. Review and coordinate between all construction documents, all project specifications, and all sections in USF Design and Construction Guidelines (USF-DCG). Notify USF-PM of conflicts or discrepancies prior to proceeding with work.
C. Locate all underground utilities required by the Sunshine 811 law prior to proceeding with work. Contact USF-PM to obtain the latest USF Campus Utilities and GIS Map for the area in scope of work prior to proceeding.
D. Coordinate with USF-PM, USF Parking and Transportation Services (USF-PATS), and USF Police Department (USF-UP) for required lane closures and parking spaces closures minimum 72 hours prior to closures. The contractor is responsible for all closure barriers and signs subject to USF review and approval.

1.4 SITE

A. All existing utilities shall remain in place unless otherwise noted in the contract documents.
B. Contractor shall restore back to original installation transformers, primary gear, primary feeders, utilities, irrigation, etc. damaged by the contractor in the demolition or construction area.
C. Provide an erosion control plan addressing prevention, control, and abatement of water pollution to USF-PM for approval prior to proceeding with work.
D. Safety fencing shall be green or neon green. No exceptions.
E. Conduit trenches shall be backfilled completely to provide safe crossing by the end of workday or whenever the work zone becomes inactive.
F. Maintain access to side streets, drives, and sidewalks always during construction.
G. Existing pedestrian/sidewalk lighting and roadway lighting shall remain operational during all phases of the construction until new lighting is energized.
H. Construction Sites: Provide protective barriers around primary switchgear (Vacuum switches, Trayer gear, and PMH switchgear), transformers, electrical and communications manholes, and temporary services. USF shall always have clear vehicle access to these items during construction.
    1. Vacuum switches, Trayer gear, and PMH switchgear protective barricades shall allow 5 feet clearance on the sides, and 10 feet clearance on sides with doors. The area in front of the sides with doors shall be clear of construction materials or equipment from 15 feet from the equipment.
    2. Transformers protective barricades shall allow 5 feet clearance on the sides and rear and 10 feet clearance in front. The area in front shall be clear of construction materials or equipment for 15 feet.
    3. Electrical and communications manholes: Provide 15 feet square barricade around manhole cover. Manhole cover shall be always accessible to USF. Remove construction debris such as dirt, sod, ground cover, etc.
    4. Temporary services protective barricades shall allow 3 feet clearance on sides and rear (or required by code if greater), and 5 feet clearance in front of equipment.

5. No construction materials or construction tools shall be stored within the protective barricades.
6. No construction vehicles or personal vehicles shall be parked over electrical or communications manhole covers.
7. Project site design and final site constructed conditions shall include clear vehicle access to all above mentioned equipment for maintenance.

I. New Construction: Clear working clearances.
1. Vacuum switches, Trayer gear, and PMH switchgear: 5 feet clearance on the sides, and 15 feet clearance on sides with doors.
2. Transformers: 5 feet clearance on the sides and rear and 15 feet clearance in front with doors.
3. Electrical and communications manholes: 15 feet square clearance around manhole cover. Remove construction debris such as dirt, sod, ground cover, etc.
4. Project site design and final site constructed conditions shall include clear vehicle access to all above mentioned equipment for maintenance.

J. USF Primary: Contractor shall develop site construction plan indicating all existing primary equipment including Vacuum switches, PMH switchgear, transformers, and underground primary after the first Sunshine 811 locate and maintain copies on site during construction. All underground work, digging, and trenching shall be coordinated with USF Design & Construction (USF-DAC) and USF-PM prior to proceeding. The contractor shall not rely on multiple locates from USF Utilities after the site is disturbed by the site contractor or any sub-contractors.

K. Fenced Construction Sites: An access point agreed to by USF-PM and USF Utilities shall be provided to USF. Chains shall have USF Standard 2000 Padlock and site contractor pad lock daisy chained. Project is responsible to provide the USF Standard 2000 Padlock, coordinate with USF-PM and USF Utilities.

L. Areas where work is performed shall be kept clean of debris and materials and shall be cleaned at the end of each workday. The contractor is responsible to secure all tools and materials.

M. Adhere to USF Tagout Policy when servicing or working on electrical systems.

N. Abandoned Equipment and Raceways:
1. Remove cables.
2. Remove all abandoned equipment, raceways, manholes, pull boxes, and duct banks. Where removal is not feasible and approved by USF-PM, USF–BCA, USF DAC and USF Utilities, cut abandoned raceway at horizontal level (before turning up) and cap (do not use tape – use existing conduit type cap).
3. Paint abandoned raceways cap red.
4. Document locations on record documents.

1.5 WARRANTY

A. The contractor shall provide minimum one (1) year warranty for all labor and materials, whether included or not included by equipment manufacturers. The contractor shall replace defective materials during the first year of the warranty without additional compensation from USF.

B. Manufacturer warranties greater than one (1) year, or where lengthier warranties are required in the project documents, or in USF-DCG shall extend the standard one (1) year warranty.

C. The warranty period shall begin on the date of substantial completion.

1.6 MISCELLANEOUS

A. Main Electrical Rooms: Direct access from the exterior shall be provided.

B. USF Furnished Equipment:
1. The contractor shall be responsible for receipt from USF, storage after receipt, and installation if required.
2. Verify equipment connection requirements prior to rough-in and ordering materials.
3. Install equipment in accordance with manufacturer instructions.
4. Maintain equipment until project is turned over to USF at Substantial Completion.

C. Fault-Current Study: All projects shall include a fault current study. Indicate the available fault current and ampacity interrupting capacity for all switchboards, distribution boards, panelboards, transfer switches, enclosed circuit breakers, motor control centers, VFDs, and

disconnect switches. Provide labels in accordance with National Electrical Code (NEC) 110.22 and 110.24.

D. Coordination Study: Perform a coordination study for all overcurrent protection devices.

E. Arc-Flash Hazard Analysis: Perform an arc-flash study on all new construction and major renovations that include electrical equipment additions. Provide arc-flash labels in accordance with NEC 110.16 on all electrical equipment, such as switchboards, distribution boards, panelboards, transfer switches, enclosed circuit breakers, motor control centers, VFDs, disconnect switches, and meter sockets.

F. Branch Circuits: No more than six (6) current carrying conductors (3 circuits) shall be installed in any one raceway. Six (6) current carrying conductors shall consist of three (3) circuit conductors and three (3) neutral conductors. Provide dedicated neutrals for multi-wire branch circuits for compliance with NEC 210.4.

G. Design team for new construction and renovations or contractor for miscellaneous additions shall demonstrate via load summary or per NEC 220.87 Determining Existing Loads that the service including pad mounted transformer, switchboard, panelboard, or equipment can accommodate the load being added.

H. The project is responsible for all costs associated with the design and construction including purchasing materials and equipment to provide temporary construction site electric service and permanent electric service to the facility. The equipment and materials may include 13.2 kV primary equipment including raceways, conductors, Trayer switchgear and pad mounted transformer. The Construction Manager, Contractor, and/or Design Team shall coordinate with University Electrical Engineer (USF-EE) for requirements prior to Programming Phase for the Project.

I. Utility company services entering campus shall be underground distribution system coordinated and approved by USF Campus Planning and USF-EE during project programming. Overhead services or cables on campus are prohibited.

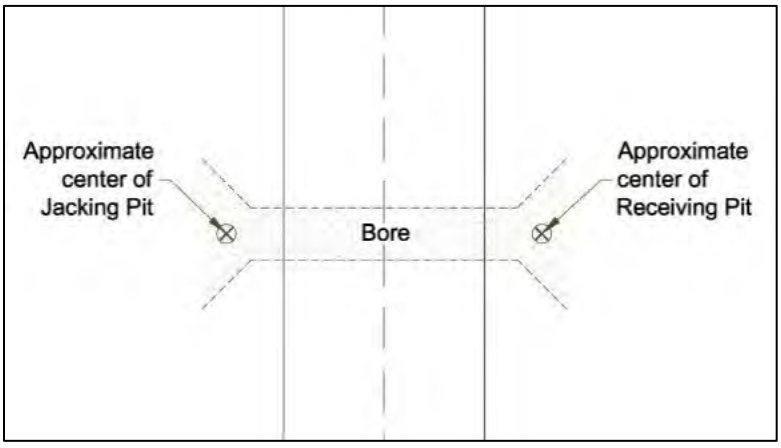
1.7 PROJECT CLOSE OUT

A. Closeout documents shall include laminated full size electrical site plan and electrical riser diagrams in the main electrical room. Provide on a chain hook system adjacent to the main electrical room entrance.

B. Provide record documents per USF requirements. Coordinate with USF-PM.

C. Record documents shall include the following:

1. Directional boring logs.
2. Indicate directional boring “jacking and receiving pits” on a scaled site plan. Provide minimum of two (2) documented measures from two (2) separate existing physical features, such as from curbs, sidewalks, center of roadways, or structures, to the center of the “jacking or receiving pit”.



Jacking Pit and Receiving Pit Figure

SECTION 26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Building wires and cables rated 600 volt and less.
   2. Connectors, splices, and terminations rated 600 volt and less.

1.2 ACTION SUBMITTALS

A. Product data for low voltage electrical power conductors and cables.
B. Manufacturer's specification sheets inclusive of materials ratings and listings for intended applications and installation instructions.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in National Fire Protection Association (NFPA) 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
B. Comply with the most recently adopted NFPA 70.

PART 2 – PRODUCTS

2.1 CONDUCTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Alan Wire.
   2. Anaconda
   3. American Insulated Wire Corp.
   4. CMC Wire and Cable.
   5. Encore Wire Corporation.
   6. General Cable Co.
   7. Okonite Company.
   8. Southwire Company.
   9. LS Cable & System USA.
B. Conductors shall be Copper: Comply with National Electrical Manufacturers Association (NEMA) WC 70. Aluminum conductors are not approved.
C. Conductor Insulation: Type THHN/THWN. Color coding shall be employed throughout entire length of conductor for all conductor sizes. Phase taping is not allowed.
D. Use of MC Cable is limited to the following applications and shall be installed per the following requirements.
   1. Approved in the following applications:
      a. Final 6' connection from a junction box to light fixtures installed in accessible suspended ceiling.
      b. Inside residential or dormitories rooms.
      c. Concealed inside non-bearing partitions. Home run to source panel shall be EMT or Rigid Conduits.
   2. Installation shall adhere to the following requirements:
      a. Install parallel and perpendicular in a good workmanlike manner and properly supported.
      b. Cable insulation colors shall adhere to Section 26 05 53, Identification for Electrical Systems.
      c. Provide protection from physical damage. Any damaged MC Cable shall be replaced by the installing contractor.
      d. Workmanship and quality control shall include labeling and proper support for trouble shooting.
      e. Penetrations through fire-resistive assemblies shall be installed per UL listings. Design Professionals or installing contractor if project does not have a Design Professional shall specify and provide supporting submittal for USF-BCA review and approval allowable UL Listing for all fire rated penetrations.

2.2 CONDUCTORS LESS THAN 120 VOLTS (12 TO 50 VOLTS)

A. Manufacturers: Compliance with the manufacturer's installation requirements for the system.

B. Conductors shall be copper, UL listed for the use in the space in which they are installed, and in compliance with the applicable sections of NEC and NFPA Class 1, Class 2 or Class 3 requirements.
C. All conductors shall have protective insulation or outer jacket and shall be plenum rated where required by code.
D. Where the conductors comingle in enclosures with 120 volts or higher, the conductors and protective outer jacket shall be rated at or higher than the highest voltage located within the enclosure.
E. All conductors shall be supported with J-hooks or similar support apparatus, spaced no further than 5 feet apart. Support apparatus shall comply with Section 26 05 29 Hangers and Supports for Electrical Systems. The conductors shall not sag over 12 inches between supports or lay on top of ceiling finishes. The conductors support apparatus shall not be part of or attached to luminaires support hangers or apparatus.
F. Access from ceiling area to wall mounted outlets: Provide 1/2-inch conduit from outlet, concealed in the wall space, up to minimum 6" above ceiling line, and turn 90 degrees out from wall, and terminate with a plastic bushing.
G. Workmanship and quality control shall include labeling and proper support for trouble shooting. Conductors shall be properly identified/tagged with matching wire markers on both ends. Refer to Section 26 05 53 Identification for Electrical Systems.

2.3 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Hubbell Power Systems, Inc.
   2. O-Z/Gedney; EGS Electrical Group LLC.
   3. Polaris Electrical Connectors.
   4. Ideal Wire Connectors.
   5. ILSCO
   6. Tyco Electronics
   7. Raychem
B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
C. Connectors and splices in exterior in-ground handholes shall be Raychem GHFC H Frame weatherproof closures Underwriters Laboratory (UL) listed for the application. Ideal weatherproof connectors are acceptable for terminating single conductors, or for conductor sizes less than #6 AWG. Use Raychem GHFC H Frame closures for two or more conductors larger than #8 AWG.
D. Provide lugs for terminating service entrance conductors to USF primary transformers. Lugs shall be multiple lug kit, dual rated, mechanical lugs, double screw on each conductor. Conductor range shall between 750 KCMIL and 1/0 AWG. Provide two (2) spare lugs for each phase and neutral. Mounting hardware shall be stainless steel. Provide lock washer and flat washer at nut and flat washer at bolt head. Coordinate requirements with and submit lugs submittals to USF-PM and USF Utilities. Service entrance conductors for new services shall be no smaller than 1/0 AWG.

PART 3 – EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. Minimum conductor size No. 12 AWG.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-THWN, single conductors in raceway.
B. Feeders: Type THHN-THWN, single conductors in raceway.
C. Branch Circuits: Type THHN-THWN, single conductors in raceway.
D. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS

A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
B. Use pulling means such as fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
C. Identify and color-code conductors and cables according to Section 26 05 53, Identification for Electrical Systems.
D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
E. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors. Service entrance and panel feeders shall not be spliced.
F. Wiring at Outlets: Install conductors including low voltage cable less than 120 volts at each outlet, with at least 6 inches of slack.
G. Wiring in in-ground handholes: Loop all phase conductors, neutral conductors, and equipment grounds 360 degrees in handhole before terminating or before pulling to the next handhole.
H. Wiring in light poles handholes: Provide at least 18 inches of slack at handhole.

END OF SECTION 26 05 19

SECTION 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.2 ACTION SUBMITTALS

A. Product data for ground bus bars, electrodes, mechanical and compression connectors, and exothermic connectors.

1.3 INFORMATIONAL SUBMITTALS

A. Field measured ground impedance in Ohms for each grounding system.
B. Measuring instrument and test method.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70.
B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 – PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire insulated for 600 volt unless otherwise required by applicable code or authorities having jurisdiction.
B. Equipment Ground Conductors: Insulated with green colored insulation.
C. Isolated Ground Conductors: Insulated with green colored insulation with yellow stripe.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
B. Bolted Connectors for Pipes: Copper or copper alloy, U clamp type, sized for the pipe and conductor, with at least two bolts.
C. Bolted connectors below grade or in ground handholes.
    1. Pipe Connectors: U clamp type, sized for pipe and conductor. Clamp shall be copper or brass and UL listed for direct burial.
    2. Ground connection for light pole (other than sports light pole) ground to driven ground rod: Acorn type, copper or brass, sized for the conductor and ground rod, and UL listed for direct burial.
D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions. Exothermic CADWELD shall be used for building grounding system connection to driven ground rods, connection to lightning protection driven ground rods, and connection to sports lighting driven ground rods.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad, sectional length; 3/4 inch diameter by 10 feet long each. Provide additional lengths in 10 feet sections to achieve specified minimum resistance to ground, measured in Ohms, at building services grounding systems.

2.4 GROUND BARS:

A. Provide as follows:
    1. Main electrical room ground bus bars: Newton Instrument Company insulated ground bar, copper, manufacturer pre-drilled holes. Minimum size shall be 1/4 inch X 4 inches X 20 inches. Bond to building grounding system with minimum 1/0 copper ground, or sized per code, for a continuous copper grounding system.
    2. Electrical room ground bus bars (non-main electrical room): Newton Instrument Company insulated ground bar, minimum size 1/4 inch X 4 inches X 10 inches, copper, manufacturer pre-drilled holes. All ground bus bars shall be bonded to main electrical ground bus bar with minimum 1/0 copper ground, or sized per code, for a continuous copper grounding system. Utilizing building steel or footing is not acceptable.

3. Telecommunications, IDF, Data, computer, and similar rooms: Newton Instrument Company insulated ground bar, 1/4 inch X 4 inches X 20 inches, copper, manufacturer pre-drilled holes. Bond ground bus bar to main electrical ground bus bar or nearest electrical room ground bus bar with minimum 6 AWG copper.

PART 3 – EXECUTION

3.1 APPLICATIONS

A. Conductors: Provide solid conductor for 4 AWG and smaller, and stranded conductors for 3 AWG and larger.
B. Underground Grounding Conductors: Provide copper conductor, size per code but not smaller than 1/0 AWG, bury at least 24 inches below grade.
C. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Provide insulated equipment grounding conductors in all raceways, except for service entrance feeders.
B. Air-Duct Equipment Circuits: Provide insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 volt and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Provide a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
D. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
    1. For telephone, alarm, voice and data, and other communication equipment, provide 6 AWG minimum insulated grounding conductor in raceway from ground bus bar to each service location, terminal cabinet, wiring closet, cable tray, and central equipment location.
    2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
E. Aluminum Poles Supporting Outdoor Lighting Fixtures: Provide ground lug with stainless steel screw in pole handhole, adjacent to handhole cover. Bond pole to 3/4 inch diameter by 10 feet long driven grounding rod located inside in-ground handhole within 3 feet of pole with 8 AWG solid bare copper wire.
F. Transformers: Bond XO to ground bus bar in electrical equipment room. Transformer XO bond grounding system shall be in accordance with NEC Handbook Exhibit 250.15. Bond to grounding electrode conductor to electrical room ground bus bar. Provide equipment ground conductor from the primary source equipment ground bus bar to ground lug in transformer and from XO ground lug to secondary panel equipment ground bus bar. Transformer ground lug shall be multiple lug kit to accommodate the number of connections. Double wire on lug is not acceptable.
G. All feeder metallic conduits and flexible metal conduits connections to panel cabinets, equipment cabinets, transformer enclosures, etc. shall be provided with grounding bushings.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, following major building/structure lines, unless otherwise indicated or required by code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
B. Ground Rods: Drive rods until tops are 6 inches above bottom of inspection well or in-ground handhole gravel base. Connection to ground rod shall be above gravel base.
    1. Interconnect building driven ground rods with grounding electrode conductor below grade, inside inspection wells.
    2. For building's service grounding electrode system, install at least three rods spaced at least 10 feet apart in a Triad grounding configuration. For temporary services or standalone services such as for lighting, wells, etc., install at least two rods spaced at least 10 feet apart.
C. Inspection Wells: Provide inspection wells for all building grounding system driven rods and lightning protection driven grounding rods.

1. Non-vehicular traffic areas: Harger GAW910 with HDPE cover.
2. In concrete or subject to vehicular traffic including maintenance vehicles: Harger traffic rated, GAW121212HD with heavy duty top
3. Color shall be gray or green and labeled "Ground".
4. Bolts shall be stainless steel.
5. Provide gravel base, Stone 57 or similar. Crushed concrete or pea gravel is not acceptable. Provide additional gravel inside inspection well to allow proper drainage.
6. Ground rod connection shall be above gravel base for easy inspection.

D. Service Grounding Systems Bonding to Piping:
1. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main ground bus bar to main metal water service entrance to building.
2. Water Meter Piping: Provide braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond gas piping system downstream from equipment shutoff valve.

E. Bond equipment grounding conductors to associated fans, blowers, electric heaters, and air cleaners' equipment housings.

F. Concrete encased electrode in building footer shall be a bare conductor, same size as the building systems grounding conductor, routed minimum 20 feet and tie wired to the reinforcing bars.

3.4 LABELING

A. Comply with requirements in Section 26 05 53, Identification for Electrical Systems for instruction signs. The label or its text shall be green.

B. Install labels at all ground bus bars indicating each ground conductor origin.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each service enclosure grounding terminal, and at driven ground rods inspection wells.
4. Test shall be fall-of-potential method using megohmmeter.

B. Report measured ground resistances that exceed 5 ohms.

C. Excessive Ground Resistance: If resistance to ground exceeds 5 ohms, provide additional driven grounding rods until the measured ground resistance does not exceed 5 ohms.

END OF SECTION 26 05 26

SECTION 26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes hangers and supports for electrical equipment and systems.

1.2 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Steel slotted support systems.
   2. Raceway and cable support systems.
   3. Mounting and support clamps.
   4. Mounting and support through bolts and toggle bolts.
   5. Mounting and support all thread hanger rods.
B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
   1. Trapeze hangers. Include Product Data for components.
   2. Aluminum/Steel slotted channel systems. Include Product Data for components.
   3. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
B. Comply with NFPA 70.

PART 2 – PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Allied Tube & Conduit.
      b. GS Metals Corp.
      c. Wesanco, Inc.
      d. Kindorf.
      e. Cooper B-Line, Inc. (Cooper Industries)
      f. ERICO International Corporation.
      g. Thomas & Betts Corporation.
      h. Unistrut (Tyco International, Ltd.)
   2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
      Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-.
   4. Channel Dimensions: Selected for applicable load criteria.
   5. Exterior mounted channel: stainless steel or aluminum.
B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported. Exterior and wet locations shall be stainless steel or aluminum with stainless steel hardware.
D. Structural Steel for Fabricated Supports and Restraints: (American Society for Testing and Materials) ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         i. Hilti Inc.
         ii. ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         iii. MKT Fastening, LLC.
         iv. Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
   2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         i. Cooper B-Line, Inc.; a division of Cooper Industries.
         ii. Empire Tool and Manufacturing Co., Inc.
         iii. Hilti Inc.
         iv. ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         v. MKT Fastening, LLC.
   3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
   4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
   5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
   6. Toggle Bolts: All-steel springhead type.
   7. Hanger Rods: Threaded steel.
   8. Mounting apparatus for exterior applications shall be stainless steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
B. Materials: Comply with requirements in Section 05 50 00, Metal Fabrications for steel shapes and plates.

PART 3 -- EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports with two-bolt conduit clamps.
E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2 inches and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits.

Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Existing Concrete: Expansion anchor fasteners.
   5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
   6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
   7. To Light Steel: Sheet metal screws.
   8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
F. Supporting raceways via other raceways is not approved.
G. Supporting raceways via cable trays and wireways or cable tray and wireway supports is not approved.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 05 50 00, Metal Fabrications for site-fabricated metal supports.
B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
B. Touchup: Comply with requirements in Section 09 90 00, Painting for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.5 EXTERIOR SUPPORT FOR ELECTRIC PANELS, CABINETS & EQUIPMENT

A. Support post shall be concrete sized for the intended installation. Minimum size for mounting panels, disconnect switches, etc. shall be 6 inches x 6 inches x 10 feet (4 feet embedded).
B. Unistrut channel shall be stainless steel or aluminum.
C. Mounting hardware shall be stainless steel.

END OF SECTION 26 05 29

SECTION 26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal conduits, tubing, and fittings.
   2. Nonmetal conduits, tubing, and fittings.
   3. Metal wireways and auxiliary gutters.
   4. Nonmetal wireways and auxiliary gutters.
   5. Surface raceways.
   6. Boxes, enclosures, and cabinets.
   7. Handholes and boxes for exterior underground cabling.

1.2 ACTION SUBMITTALS

A. Product Data: For raceways, fittings, outlet boxes, junction and pull boxes, floor boxes, hinged-cover enclosures, and cabinets.
B. LEED Submittals:
   1. Product Data for LEED Credit: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 – PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. RMC (Rigid Metallic Conduit)
   1. GRC (Galvanized Rigid Conduit): Comply with American National Standards Institute (ANSI) C80.1 and UL 6.
   2. RAC (Rigid Aluminum Conduit): Comply with ANSI C80.5 and UL 6A.
C. IMC (Intermediate Metal Conduit): Comply with ANSI C80.6 and UL 1242.
D. EMT (Electrical Metallic Conduit): Comply with ANSI C80.3 and UL 797.
E. FMC (Flexible Metal Conduit): Comply with UL 1; zinc-coated steel or aluminum.
F. LFMC (Liquidtight Flexible Metal Conduit): Flexible steel conduit with PVC jacket and complying with UL 360.
G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B, compatible with raceway and tubing materials.
H. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
I. Fittings for EMT:
   1. Material: Steel or die cast.
   2. Type: Setscrew or compression.
   3. Fittings shall be die cast compression type in damp locations.
J. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
K. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
L. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. ENT (Electrical Nonmetallic Conduit): Comply with NEMA TC 13 and UL 1653. Use requires USF-PM and USF-BCA pre-approval.

C. RNC (Rigid Nonmetallic Conduit): Type EPC-40-PVC (PVC), complying with NEMA TC 2 and UL 651 unless otherwise indicated.
D. Fittings for ENT: Comply with NEMA TC 3; match to conduit or tubing type and material.
E. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, Type 3R, Type 4, or Type 12 dictated by the application unless otherwise indicated, and sized according to NFPA 70.
   1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5.
C. Surface Nonmetallic Raceways: Two or three-piece construction, complying with UL 5A, and manufactured of rigid PVC. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.
D. Tele-Power Poles:
   1. Material: Galvanized steel with ivory baked-enamel finish or Aluminum with clear anodized finish as specified and subject to USF-PM approval.
   2. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
E. Metal Floor Boxes:
   1. Material: Cast metal.
   2. Type: Fully adjustable.
   3. Shape: Rectangular.
   4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
F. Nonmetallic Floor Boxes (where use is approved by USF-PM): Nonadjustable, rectangular.
   1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb. shall be listed and marked for the maximum allowable weight.
H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
K. Gangable boxes are prohibited.
L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, Type 3R, Type 4, or Type 12 required by the application with continuous-hinge cover. Interior hinged cover

enclosures shall have flush latch. Exterior hinged cover enclosures shall be pad lockable with USF Standard 2000 pad lock.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures are not acceptable.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
4. Hinged Cover Enclosures located in chiller plants, tower yards, boiler plants, lift stations, and irrigation wells shall be stainless steel.

M. Cabinets:

1. NEMA 250, Type 1, Type 3R, or Type 12 required by the application galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge. Exterior hinged door shall be pad lockable with USF Standard 2000 pad lock.
3. Interior hinged door shall be key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets are not acceptable.
7. Enclosures and cabinets located in or exterior of chiller plants, tower yards, boiler plants, lift stations, and potable water and irrigation wells shall be stainless steel.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover (traffic rated): Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two. USF Standard is Quazite: PG1118HA00 ANSI Tier 15 cover with open bottom PG1118BA12 ANSI Tier 22 open bottom (minimum size, or size per code if larger handhole is required).

1. Standard: Comply with SCTE 77.
2. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by stainless steel bolt devices and having structural load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC".
6. Color: Gray.
7. Installation: Provide in concrete areas or where traffic rating required. Per manufacturer instructions with gravel base equivalent to Stone 57. Re-cycled concrete, crushed concrete or pea gravel is not acceptable. Open bottom base shall sit on top of minimum 6 inches gravel base. Provide additional gravel inside (4 to 6 inches) bottom base to allow proper drainage. Conduits stubbed inside handhole shall extend minimum 6 inches above gravel.

C. Plastic HDPE Handholes and Boxes: High-density polyethylene; thermoplastic. USF Standard is Carson: L Series 1419-12, T-Cover (1419-4B Bolt Down), Open Body (1419-12) (minimum size, or size per code if larger handhole is required).

1. Standard: Comply with ATSM D-635 or UL-94.
2. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
3. T-Cover: Weatherproof, secured by stainless steel bolt and having structural load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC".
6. Color: Gray.
7. Installation: Provide in landscape or grass areas not requiring traffic rating. Per manufacturer instructions with gravel base equivalent to Stone 57. Re-cycled, crushed concrete or pea gravel is not acceptable. Open bottom base shall sit on top of minimum 6 inches gravel base. Provide additional gravel inside (4 to 6 inches) bottom base to allow

proper drainage. Conduits stubbed inside handhole shall extend minimum 6 inches above gravel.

PART 3 – EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
   1. Exposed Conduit subject to physical damage or roof applications: GRC.
   2. Concealed Conduit, Aboveground: GRC, IMC, RAC, EMT, or Type EPC-40-PVC for the approved application. Coordinate with USF-PM.
   3. Underground Conduit: Type EPC-40-PVC. Minimum size shall be 3/4 inch.
   4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC or LFMC approved for the application and subject to USF-PM and FM-BCA approval.
   5.
   6. Underground Raceways Warning Tapes: 6 inches wide by 0.004 inch thick polyethylene film with aluminum coil detectable tape with appropriate label:
      a. Tape color red with label "Caution – Electrical Line Below"
      b. Tape color yellow with label "Caution – Communications Line Below"

B. Indoors: Apply raceway products as specified below unless otherwise indicated.
   1. Exposed, Not Subject to Physical Damage: EMT.
   2. Exposed and Subject to Physical Damage: GRC or IMC. Raceway locations include the following:
      a. Loading docks.
      b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
      c. Mechanical rooms.
      d. Main and panels feeder raceways in main electrical rooms.
      e. Fire pump rooms.
   3. Lift station, tower yards, and boilers areas shall be GRC.
   4. Exposed in chiller plants shall be GRC.
   5. Concealed in Ceilings and Interior Walls and Partitions: EMT.
   6. Connection to Vibrating Equipment, including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment: FMC, except use LFMC in damp or wet locations.
   7. Wet Locations not subject to physical damage: GRC or RAC.
   8. Wet Locations subject to physical damage: GRC.
   9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in kitchens areas, chiller areas, boiler areas, lift stations areas, wells areas.

C. Minimum Raceway Size: 1/2 inch trade size. Minimum EPC-40 size is 3/4 inch.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
   2. EMT: Use setscrew or compression fittings. Fittings in damp locations shall be die cast compression type. Comply with NEMA FB 2.10.
   3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in direct contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 degrees F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Comply with requirements in Section 26 05 29, Hangers and Supports for Electrical Systems for hangers and supports.
D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
E. Install no more than the equivalent of three 90-degree bends in any conduit. Support within 12 inches of changes in direction.
F. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated.
G. Install conduits (concealed or exposed) parallel or perpendicular to building lines or major structural elements.
H. Support conduit within 12 inches of enclosures to which attached.
I. Raceways Embedded in Slabs (requires pre-approval from USF-PM):
    1. Run conduits parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10 feet intervals.
    2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
    3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
    4. Do not embed threadless fittings in concrete unless specifically approved by USF-PM for each specific location.
    5. Transition from PVC to GRC before rising above floor.
J. Stub-ups to Above Recessed Ceilings:
    1. Use EMT, IMC, or RMC for raceways.
    2. Use a conduit bushing or insulated fitting to terminate stub-ups.
K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits 3/4 inch to 1-1/4 inches trade size and insulated throat metal bushings on 1-1/2 inches trade size and larger conduits terminated with locknuts.
N. Install bell ends on all PVC conduits entering medium voltage (campus primary) transformers, gear, switch vaults, pull boxes, or manholes.
O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 24 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use. Label all spare conduits with origin.
P. Surface Raceways:
    1. Install surface raceway with a minimum 2-inch radius control at bend points.
    2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.
R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
    1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    2. Where an underground service raceway enters a building or structure.
    3. Where otherwise required by NFPA 70.
S. Expansion-Joint Fittings:
    1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 degrees F and that has straight-run length that exceeds 25 feet.
    2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
        a. Outdoor Locations Not Exposed to Direct Sunlight: 125 degrees F temperature change.

b. Outdoor Locations Exposed to Direct Sunlight: 155 degrees F temperature change.
c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 degrees F temperature change.
d. Attics: 135 degrees F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

U. Mount boxes at heights indicated on drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

V. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

W. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel and to maintain wall fire rating.

X. Locate boxes so that cover or plate will not span different building finishes.

Y. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

Z. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
1. Set metal floor boxes level and flush with finished floor surface.
2. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
3. Junction boxes, pull boxes, or other boxes (electrical and control) located in chiller plants, boiler plants, lift stations, and irrigation wells shall be stainless steel.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
1. Excavate trench bottom to provide firm and uniform support for conduit.
2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamped backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
3. Provide GRC conduit elbows at turn up to equipment and at building entrances through floor. Provide GRC or heavy-duty fiberglass at 90 degrees elbows below grade or turn up inside exteriors utility transformers. Coat GRC below grade or slab with bitumastic.
4. Underground Warning Tape: Provide underground metallic warning tape 24 inches above raceway, or 12 inches below grade if conduit is buried 24 inches below grade. Color Red for electric raceways.
5. Electrical raceways shall have minimum of 24 inches cover (burial depth). Electrical feeders' raceways (service entrance and panel feeders) shall have minimum 36 inches cover (burial depth). Electrical raceways installed under concrete slabs shall have minimum 12 inches cover from slab bottom with electrical warning tap 6 inches above raceway. Electrical service entrance raceways installed under concrete slabs shall have minimum 24 inches cover from slab bottom with electric warning tap 6 inches above raceway.

6. Electrical feeders' service entrance raceways shall have a 4" minimum concrete warning cap entire width extending 6" minimum beyond conduit duct on each side. The cap shall be formed and top 24" minimum below grade. Provide red metallic electric warning tape entire length, 3 along width of concrete cap.
7. Provide directional boring under all existing roadways and sidewalks.
8. Raceways for site lighting, including pedestrian, roadway, and parking lot, shall be routed 12 to 18 inches within roadway curb or sidewalk and sweep to the in-ground handhole to allow future trees.
9. Coordinate with USF-EE for 13.2 kV duct bank requirements prior to design.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
B. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
C. In-ground handholes and boxes in finish grade:
   1. In landscaped areas: Set top 1 inch above finish ground cover.
   2. In sodded areas: Set top 2 inches above grade before sod is laid. Once sod is laid, the top shall be no more than 1 inch above the sod.
   3. Handholes shall be set to follow slope of grade.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies meeting required UL fire ratings.

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies meeting required UL fire ratings.
B. Refer to Section 07 84 00 Penetration Firestopping for more information.

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.
   3. Provide bitumastic coating prior to installation to all RMC installed in grade.

3.8 RENOVATIONS AND DEMOLITION

A. Remove abandoned outlets and raceways, including conductors, back to last device to remain in service or back to source panel. Where removed back to source panel, label circuit breaker(s) not re-used as spare and provide an updated typewritten panel directory.

END OF SECTION 26 05 33

SECTION 26 05 36 CABLE TRAYS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Ladder cable trays.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: For each type of cable tray.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS FOR CABLE TRAYS

A. Cable Trays and Accessories: Identified as defined in NFPA 70 and marked for intended location, application, and grounding.

2.2 LADDER CABLE TRAYS

A. Description:
   1. Configuration: Two I-beam side rails with transverse rungs welded to side rails.
   2. Rung Spacing: 12 inches on center.
   3. Radius-Fitting Rung Spacing: 9 inches at center of tray's width.
   4. Minimum Cable-Bearing Surface for Rungs: 7/8 inch width with radius edges.
   5. No portion of the rungs shall protrude below the bottom plane of side rails.
   6. Structural Performance of Each Rung: Capable of supporting a maximum cable load, with a safety factor of 1.5, plus a 200 lb concentrated load, when tested according to NEMA VE 1.
   7. Minimum Usable Load Depth: 2 inches.
   8. Straight Section Lengths: 10 feet except where shorter lengths are required to facilitate tray assembly.
   9. Width: 12 inches minimum and 24 inches minimum for major trunk lines. Coordinate with USF-PM and USF Information Technology (USF-IT) for cable tray layout and major trunk lines requirements.
   10. Fitting Minimum Radius: 12 inches.
   11. Class Designation: Comply with NEMA VE 1, Splicing Assemblies: Bolted type using serrated flange locknuts.
   12. Hardware and Fasteners: ASTM F 593 and ASTM F 594 stainless steel, Type 316.
   13. Splice Plate Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.
   14. Provide solid bottom cable tray when installed in exposed areas outside equipment rooms. Coordinate with USF-PM for locations that require solid bottom cable tray.

2.3 MATERIALS AND FINISHES

A. Steel:
   1. Straight Section and Fitting Side Rails and Rungs: Steel complies with the minimum mechanical properties of ASTM A 1011/A 1011M.
   2. Steel Tray Splice Plates: ASTM A 1011/A 1011M.
   3. Fasteners: Steel complies with the minimum mechanical properties of ASTM A 510/A 510M, Grade 1008.
   4. Finish: Mill galvanized before fabrication.
      a. Hardware: Galvanized, ASTM B 633.
   5. Finish: Electrogalvanized before fabrication.
   6. Finish: Hot dip galvanized after fabrication.
      a. Hardware: Stainless steel, Type 316, ASTM F 593 and ASTM F 594.
   7. Finish: Powder-coat enamel paint.
      a. Hardware: Stainless steel, Type 316, ASTM F 593 and ASTM F 594.

8. Finish: Factory-standard primer, ready for field painting, with chromium-zinc-plated hardware according to ASTM F 1136.
9. Finish: Black oxide finish for support accessories and miscellaneous hardware according to ASTM D 769.

B. Aluminum:
1. Materials: Alloy 6063-T6 according to ANSI H35.1/H 35.1M for extruded components, and Alloy 5052-H32 according to ANSI H35.1/H 35.1M for fabricated parts.
2. Hardware: Stainless steel, Type 316, ASTM F 593 and ASTM F 594.
3. Hardware for Aluminum Cable Tray Used Outdoors: Stainless steel, Type 316, ASTM F 593 and ASTM F 594.

2.4 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.
B. Barrier Strips: Same materials and finishes as for cable tray.
C. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.5 WARNING SIGNS

A. Lettering: 1-1/2 inches high, black letters on yellow background with legend "Warning! Not To Be Used as Walkway, Ladder, or Support for Ladders or Personnel".

2.6 SOURCE QUALITY CONTROL

A. Testing: Test and inspect cable trays according to NEMA VE 1.

PART 3 – EXECUTION

3.1 CABLE TRAY INSTALLATION

A. Install cable trays according to NEMA VE 2.
B. Install cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, covers, and bonding.
C. Fasten cable tray supports to building structure.
D. Design fasteners and supports to carry cable tray, the cables, and a concentrated load of 200 lb. Comply with requirements in Section 26 05 29, Hangers and Supports for Electrical Systems.
E. Install center-hung supports for single-rail trays designed for 60% versus 40% eccentric loading condition, with a safety factor of 3.
F. Make connections to equipment with flanged fittings fastened to cable trays and to equipment. Support cable trays independent of fittings. Do not carry weight of cable trays on equipment enclosure.
G. Install expansion connectors where cable trays cross building expansion joints and in cable tray runs that exceed dimensions recommended in NEMA VE 2. Space connectors and set gaps according to applicable standard.
H. Seal penetrations through fire and smoke barriers. Comply with requirements in Division 07 Section 07 84 00, Penetration Firestopping.
I. Install capped metal sleeves for future cables through firestop-sealed cable tray penetrations of fire and smoke barriers.
J. Install warning signs in visible locations on or near cable trays after cable tray installation.

3.2 CABLE TRAY GROUNDING

A. Ground cable trays according to NFPA 70 unless additional grounding is specified. Comply with requirements in Section 26 05 26, Grounding and Bonding for Electrical Systems.

3.3 CABLE INSTALLATION

A. Install cables only when each cable tray run has been completed and inspected.
B. Fasten cables on horizontal runs with cable clamps or cable ties according to NEMA VE 2. Tighten clamps only enough to secure the cable, without indenting the cable jacket.

C. Fasten cables on vertical runs to cable trays every 18 inches.
D. Fasten and support cables that pass from one cable tray to another or drop from cable trays to equipment enclosures. Fasten cables to the cable tray at the point of exit and support cables independent of the enclosure. The cable length between cable trays or between cable tray and enclosure shall be no more than 72 inches.
E. Tie MI cables down every 36 inches where required to provide a 2-hour fire rating and every 72 inches elsewhere.
F. Renovation Construction: Remove inactive or dead cables from cable trays. Coordinate with USF-PM and USF-IT prior to removing any cables.

3.4 CONNECTIONS

A. Connect raceways to cable trays according to requirements in NEMA VE 2.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements.
   2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.
   3. Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.
   4. Remove dust deposits, industrial process materials, trash of any description, and any blockage of tray ventilation.
   5. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and re-torque in suspect areas.
   6. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
   7. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 ohm.

3.6 PROTECTION

A. Protect installed cable trays and cables.

END OF SECTION 26 05 36

SECTION 26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Identification for raceways.
   2. Identification for conductors.
   3. Underground-line warning tape.
   4. Warning labels and signs.
   5. Instruction signs.
   6. Equipment identification labels.
   7. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.
B. Provide sample of each label for approval prior to ordering materials upon USF-PM request.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.
B. Comply with NFPA 70.
C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
D. Comply with ANSI Z535.4 for safety signs and labels.
E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 -- PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding for conductors shall be consistent throughout entire length. Phase tape color coding is not acceptable. Applies to feeders' conductors and branch circuit conductors. Color coding shall be:

Voltage	Phase A	Phase B	Phase C	Neutral
277/480	Brown	Orange	Yellow	Gray
120/208	Black	Red	Blue	White
120/240	Black	Red	*****	White
120/240 (*)	Black	Orange	Blue	White

(*) Orange shall indicate high leg on three phase 240 Volt delta system.

2.2 FLOOR MARKING TAPE

A. 2 inches wide, 5 mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Provide warning tape to identify and locate underground electrical (color Red) and communications (color Orange) utility lines.
   1. Printing on tape shall be permanent and shall not be damaged by burial operations.
   2. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
B. Color and Printing:
   1. Comply with ANSI Z535.1 through ANSI Z535.5.
C. Refer to Section 26 05 33, Subparagraph 3.1 A 6 Raceways & Boxes for Electrical System for additional requirements.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
C. Baked-Enamel Warning Signs:
   1. Preprinted aluminum signs punched or drilled for fasteners, with colors, legend, and size required for application.
   2. 1/4 inch grommets in corners for mounting.
   3. Nominal size, 7 by 10 inches.
D. Metal-Backed, Butyrate Warning Signs:
   1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396 inch galvanized-steel backing; and with colors, legend, and size required for application.
   2. 1/4 inch grommets in corners for mounting.
   3. Nominal size, 10 by 14 inches.

2.5 INSTRUCTION SIGNS

A. Engraved laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 square inches and 1/8 inch thick for larger sizes.
   1. Engraved legend with white letters on black face.
   2. Punched or drilled for mechanical fasteners.
   3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.
C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Interiors - Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed and pop rivet to enclosure, with white letters on a dark-gray background. Minimum letter height shall be 1/2 inch.
B. Outdoors - Stenciled Legend: In nonfading, waterproof. Adhesive backed and pop rivet to enclosure, seal penetrations with silicone. Minimum letter height shall be 1/2 inch.
C. Identifications:
   1. 277/480 Volt – White background with black letters.
   2. 120/208 (120/240) Volt – Black background with white letters.
   3. 277/480 Volt Emergency Systems – Red background with white letters.
   4. 120/208 (120/240) Volt Emergency Systems – Red background with black letters.
   5. Letters shall be 1/2 inch high.
   6. Each panel shall be labeled with the panel designation, voltage and phase, and source feeding the panel including circuit numbers. Label location on enclosure above the door.
   7. Each transformer shall be labeled with the transformer designation and primary source including circuit numbers and secondary fed equipment designation. Coordinate with USF-PM for labels descriptions.
   8. Each safety switch, enclosed circuit breaker enclosure, etc. shall be labeled with the equipment designation, voltage and phase, and source feeding the equipment including circuit numbers.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Select paint system applicable for surface material and location (exterior or interior).
B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Do not apply labels on panelboard door; locate on cabinet above the door.

B. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
C. Underground-Line Warning Tape: Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.
D. Label outlet boxes/junction boxes indicating circuits contained therein and source panel, neatly with black permanent marker.
E. Provide labels on outlets cover plates indicating source panel and circuit number. Labels shall be machine type onto permanent tape.
F. Label outlets boxes, inside (not cover plates), indicating circuit contained therein and source panel, neatly with black permanent marker.
G. Paint fire alarm systems outlet boxes/junction boxes red. Spot paint fire alarm conduit red every 10 feet to within 12 inches of box or enclosure.
H. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
    1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
    2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
    3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
J. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
K. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
L. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 1/2 inch high letters for emergency instructions at equipment used for power transfer.
M. Each branch circuit conductor shall be labeled with the panel circuit designated 1 inch from termination to the circuit breaker with self-adhesive vinyl labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
N. Installing contractor info, logos, or marking info on equipment is prohibited.

END OF SECTION 26 05 53

SECTION 26 09 23 LIGHTING CONTROL DEVICES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Time switches.
   2. Photoelectric switches.
   3. Indoor vacancy/occupancy sensors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Wiring Diagrams for each type of product or systems.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.
B. As-build documents showing locations of all devices including sensors, power packs, relays, switches, etc.

1.5 USF BUILDING CODE ADMINISTRATOR DIRECTIVES

A. BCA Directive 14.
   1. AHSRAE 90.1-2010 Automatic Receptacle Control – Not required.
   2. FBC Energy Code Lights Manual On Control – Not required. Provide automatic occupancy on.

PART 2 -- PRODUCTS

2.1 TIME SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Cooper Industries, Inc.
   2. Intermatic, Inc.
   3. Leviton Mfg. Company Inc.
   4. NSi Industries LLC; TORK Products.
   5. Watt Stopper
B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Contact Configuration: SPST, DPST, DPDT as required for the desired control scheme.
   3. Contact Rating: 20-A ballast load, 120/240-V ac or 277 V ac.
   4. Programs: Two on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
   5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
   6. Astronomic Time: All channels.
   7. Automatic daylight savings time changeover.
   8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.
C. Electromechanical-Dial Time Switches are not approved.
D. Time switches shall not be used for interior lighting control unless approved by USF-DAC and USF Maintenance and Utilities. Provide an USF Design and Construction Guideline Change Form (PMG-1) for review and approval prior to design.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. All exterior lighting control shall be via photoelectric. Provide TORK 2007 A for all outdoor photoelectric switches.
B. Description: Solid state, with SPST dry contacts rated for 1800 VA, to operate connected load, complying with ANSI C136.10 and EEI NEMA.
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Mounting: Twist lock complying with NEMA C136.10, with base.

2.3 INDOOR CEILING VACANCY/OCCUPANCY SENSORS (120 and 277 VOLT)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Acuity Brands
   2. Bryant Electric; a Hubbell company.
   3. Cooper Industries, Inc.
   4. Hubbell Building Automation, Inc.
   5. Leviton Mfg. Company Inc.
   6. Lithonia Lighting; Acuity Lighting Group, Inc.
   7. Lutron Electronics Co., Inc.
   8. Watt Stopper.
B. General Requirements for Sensors: Ceiling-mounted, dual technology type indoor vacancy/occupancy sensors.
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 3 to 30 minutes. Set range at 30 minutes unless directed otherwise by the USF-PM.
   3. Provide manual switch (dimmer controls for LED luminaires) to allow manual means to turn load off. Provide dual switching (dimmer controls for LED luminaires) in classrooms and computer labs, and research labs. Coordinate control scheme with USF-PM prior to design. Classroom row of luminaires at digital or smart board shall be controlled via separate dimmer.
   4. Provide 3-way switching for classrooms to control lights at the entrances and at the professor podium.
   5. Power Pack: Dry contacts rated for 20-A ballast load at 120 and 277-V ac, for 13-tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70. Use when multiple sensors are required. Equal to DT-300 Series Dual Technology Ceiling Sensors. Locate power packs above manual switches location at the entrance to the space.
   6. Line Voltage Sensors Preferred: Use line voltage sensor equal to Watt Stopper DT-355 Dual Technology Line Voltage Ceiling Sensor when only one sensor is required.
   7. Automatic Light-Level Sensor Option: Adjustable from 10 to 300 FC; turn lights off when selected lighting level is present.
   8. LEDs to indicate occupancy detection.
   9. Provide five-year warranty.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS (SMALL OFFICES AND SIMILAR SPACES) (120 and 277 VOLT)

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Acuity Brands
   2. Bryant Electric; a Hubbell company.
   3. Cooper Industries, Inc.
   4. Hubbell Building Automation, Inc.
   5. Leviton Mfg. Company Inc.
   6. Lithonia Lighting; Acuity Lighting Group, Inc.
   7. Lutron Electronics Co., Inc.
   8. NSi Industries LLC; TORK Products.
   9. Watt Stopper.

B. General Requirements for Sensors: Automatic-wall-switch vacancy/occupancy sensor, suitable for mounting in a single gang switchbox.
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 degrees F.
   3. Switch Rating: Not less than 800-VA fluorescent at 120 V and 1200-VA fluorescent at 277 V. Dimming type for spaces with LED luminaires.
   4. Standard Range: 180 degrees field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 square feet.
   5. Sensing Technology: Dual technology - PIR and ultrasonic.
   6. Switch Type: Provide with choice of Auto-On or Manual-On.
   7. Provide means for manual-Off override via pushbutton.
   8. Voltage: Dual voltage, 120 and 277 V; dual-technology type.
   9. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 FC. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
   10. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes. Set at 30 minutes unless directed otherwise by the USF-PM.
   11. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.5 OCCUPANCY SENSORS (LOW VOLTAGE) (12 to 24 VOLT)

A. Manufacturers: Refer to sections 2.3 and 2.4.
B. Use of low voltage sensors and LED dimmer controls are an acceptable alternative.
C. General Requirements:
   1. Sensors shall comply with the requirements in sections 2.3 and 2.4 except for low voltage rating and wiring between the power pack, sensors, and wall switches and/or dimmers.
   2. Sensors shall interconnect with other sensors and power/relay packs with manufacturer recommended conductors. Refer to conductor requirements in Section 26 05 19 Low-Voltage Electrical Power Conductors & Cable.
   3. Sensors shall operate on 12 to 24 VAC or VDC.
   4. Power packs shall accept and switch 120 or 277 VAC, plenum rated, and compatible with the sensors and wall switches and/or dimmers.
   5. Power packs shall securely mount to junction box location through a threaded ½-inch chase nipple. Plastic clips into junction box shall not be accepted.
   6. Wireless controls for occupancy sensors and LED dimmer controls are prohibited.

2.6 LIGHTING CONTACTORS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Allen-Bradley/Rockwell Automation.
   2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
   3. Eaton Corporation.
   4. General Electric Company; GE Consumer & Industrial - Electrical Distribution; Total Lighting Control.
   5. Square D; a brand of Schneider Electric.
B. Description: Electrically operated and mechanically/electrically held (as required for the control type), complying with NEMA ICS 2 and UL 508.
   1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
   2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
   3. Enclosure: Comply with NEMA 250.

2.7 CONDUCTORS AND CABLES

A. Power Wiring and Low Voltage Control Wiring. Comply with requirements in Section 26 05 19 Low-Voltage Electrical Power Conductors & Cable.

PART 3 -- EXECUTION

3.1 APPLICATION AND INSTALLATION

A. Spaces control schemes:
   1. Dusk to Dawn via photoelectric switch: Exterior
   2. Vacancy/occupancy sensor on/off with manual override switches: Offices, Open Offices, Work Rooms, Classrooms, Conference Rooms, Labs, Breakrooms, Corridors, Stairways (unless path of egress), Restrooms, Storage Rooms, and similar spaces.
   3. Vacancy/occupancy sensor on/off with manual override switches: Single Story Lobbies and Atriums.
   4. Building Automated System (time control) and vacancy sensor on/off: Multiple Level Lobbies and Atriums.
   5. Manual on/off: Elevator, Mechanical and Electrical Rooms.
   6. Lighting control systems are permissible in large Auditorium spaces or meeting spaces where AV is integral with lighting control. Automatic control vacancy off shall be incorporated into the system. The lighting control system shall be provided with BACnet module for FM-OPS remote control via the BAS. Dedicate closet space shall be provided for lighting control systems control units and control computer and terminal. This may be housed in the same room as the AV control system. Provide USF Design and Construction Guideline Change Form (PMG-1) with minimum of two optional systems for USF-PM, USF Design & Construction and USF Maintenance review and approval prior to design.
   7. Daylight Controls Area and Spaces:
      a. Daylight controls are not desired.
      b. If daylight controls are required, provide USF Design and Construction Guideline Change Form (PMG-1) with minimum of two optional systems for USF-PM, USF Design & Construction and USF Maintenance review and approval prior to design.

B. Install and aim sensors in locations to achieve 100 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

C. Identify components and power and control wiring according to Section 26 05 53, Identification for Electrical Systems.

D. Interior spaces lighting control shall be via line voltage occupancy sensors with means to manually override the load side off. Power packs with multiple occupancy sensors shall be used in large spaces or corridors requiring more than one sensor for adequate coverage. Small spaces control shall be via wall type occupancy sensor. Relay control panels are prohibited. Low voltage sensors are acceptable option per Section 2.5.

E. Provide training for all lighting control devices to USF Maintenance.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 26 09 23

SECTION 26 22 00 LOW-VOLTAGE TRANSFORMERS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:
   1. Distribution transformers.
   2. Buck-boost transformers.

1.2 ACTION SUBMITTALS

A. Product Data: For each product indicated.
B. Shop Drawings: Indicate dimensions and weights.
   1. Wiring Diagrams: Power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
B. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. ACME Electric Corporation; Power Distribution Products Division.
   2. Challenger Electrical Equipment Corp.; a division of Eaton Corp.
   3. Eaton Electrical Inc.; Cutler-Hammer Products.
   4. General Electric Company.
   5. Magnetek Power Electronics Group.
   6. Siemens Energy & Automation, Inc.
   7. Sola/Hevi-Duty.
   8. Square D; Schneider Electric.

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and tested, air-cooled units for 60-Hz service.
B. Cores: Grain-oriented, non-aging silicon steel.
C. Coils: Continuous windings without splices except for taps.
   1. Internal Coil Connections: Brazed or pressure type.
   2. Coil Material: Interior locations: Copper or Aluminum / Exterior locations Copper.
   3. Coil Material: Exterior locations: Copper

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NEMA ST 20, and list and label as complying with UL 1561.
B. Cores: One leg per phase.
C. Indoor enclosure: Ventilated, NEMA 250, Type 2.
   1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
D. Outdoor enclosure: Ventilated with weather shield, Type 3R.
   1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
E. Taps for Transformers Smaller than 3 kVA: One 5 percent tap above normal full capacity.

F. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above, and one 5 percent tap below normal full capacity.
G. Taps for Transformers 25 kVA and larger: Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.
H. Insulation Class: 220 degrees C, UL-component-recognized insulation system with a maximum of 150 degrees C rise above 40 degrees C ambient temperature.
I. Energy Efficiency for Transformers Rated 15 kVA and Larger:
   1. Complying with NEMA TP 1, Class 1 efficiency levels.
   2. Tested according to NEMA TP 2.
J. K-Factor Rating where specified: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for non-sinusoidal load current-handling capability to the degree defined by designated K-factor.
   1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.
   2. Indicate value of K-factor on transformer nameplate.
   3. Coil Material: Copper
K. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.

2.4 BUCK-BOOST TRANSFORMERS

A. Description: Self-cooled, two-winding dry type, rated for continuous duty and with wiring terminals suitable for connection as autotransformer. Transformers shall comply with NEMA ST 1 and shall be listed and labeled as complying with UL 506 or UL 1561.
B. Enclosure: Ventilated, NEMA 250, Type 2.
   1. Finish Color: Gray.

2.5 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated plastic. Nameplates are specified in Section 26 05 53, Identification for Electrical Systems.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Wall mounted transformers: Mount level and plumb with wall brackets fabricated by transformer manufacturer.
   1. Brace wall-mounting transformers in accordance with structural engineer direction.
B. Floor mounted transformers - Construct 4 inches housing keeping concrete base and anchor floor-mounting transformers according to manufacturer's written instructions.
C. Dry-type transformers installed indoors and rated 112.5 KVA or less shall have a separation of at least 12 inches from combustible material, inclusive of drywall, unless separated from the combustible material by a fire resistant, heat-insulated barrier.
D. Provide a non-fused disconnect switch at primary side of transformers located remote (not in site of) from their primary overcurrent protection device.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.
B. Tests and Inspections:
   1. Test secondary phase, neutral, and ground to ensure the transformer is connected properly (no floating neutral).

3.3 ADJUSTING

A. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.
B. Connect buck-boost transformers to provide nameplate voltage of equipment being served, plus or minus 5 percent, at secondary terminals.
C. Output Settings Report: Prepare written report recording output voltages and tap settings.

END OF SECTION 26 22 00

SECTION 26 24 13 SWITCHBOARDS

PART 1 -- GENERAL

1.1 SUMMARY

A, Section Includes:
1. Service and distribution switchboards rated 600 V and less.
2. Disconnecting and overcurrent protective devices.
3. Instrumentation.
4. Control power.
5. Accessory components and features.
6. Identification.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: For each switchboard and related equipment.
1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards.
3. Include schematic and wiring diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with NEMA PB 2.
C. Comply with NFPA 70.
D. Comply with UL 891.

1.6 WARRANTY

A. Manufacturer shall provide standard one year warranty against defects in materials and workmanship for products specified in this section. Warranty period shall begin on date of substantial completion. Project contractor shall replace defective materials during the one-year warranty without additional compensation from USF.

PART 2 -- PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.
B. Enclosure: Steel, NEMA 250, Type 1.
1. Enclosure Finish: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.
2. Enclosure: Flat roof; bolt-on rear covers for each section, with provisions for padlocking.
C. Provide metering compartment in accordance with USF Utilities metering requirements for service entrance switchboards. If separate vertical section is required for metering, match and

align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.

D. Service entrance rated main circuit breakers shall be 100% rated.
E. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.
F. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.
G. Pull Box on Top of Switchboard (if required by the project):
   1. Provide adequate ventilation to maintain temperature in pull box within same limits as switchboard.
   2. Provide removable covers shall form top, front, and sides. Top covers at rear shall be easily removable for drilling and cutting.
   3. Bottom shall be insulating, fire-resistive material with separate holes for cable drops into switchboard.
   4. Cable supports shall be arranged to facilitate cabling and adequate to support cables indicated, including those for future installation.
H. Phase and Neutral Buses and Connections: Three phase, four wire unless otherwise indicated. Tin-plated, high-strength, electrical-grade aluminum alloy with tin-plated aluminum circuit-breaker line connections.
   1. Ground Bus: 1/4 inch x 2 inches minimum size, hard-drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors.
   2. Main Phase Buses and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
   3. Neutral Buses: 100 percent of the ampacity of phase buses, equipped with pressure connectors for outgoing circuit neutral cables.
I. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2.2 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating to meet available fault currents.
   1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
   3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
      a. Instantaneous trip.
      b. Long- and short-time pickup levels.
      c. Long- and short-time time adjustments.
      d. Ground-fault pickup level, time delay, and i2 t response.
      e. Current-Limiting Circuit Breakers: Frame sizes 40 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
   4. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
      a. Standard frame sizes, trip ratings, and number of poles.
      b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
      c. Ground-Fault Protection when required by NEC: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
      d. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
      e. Communication Capability: Universal-mounted communication module with functions and features compatible with power monitoring and control system.
      f. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
      g. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

B. Insulated-Case Circuit Breaker (ICCB): 100 percent rated, sealed, insulated-case power circuit breaker with interrupting capacity rating to meet available fault current.
   1. Fixed circuit-breaker mounting.
   2. Two-step, stored-energy closing.
   3. Full-function, microprocessor-based trip units with interchangeable rating plug, trip indicators, and the following field-adjustable settings:
      a. Instantaneous trip.
      b. Long- and short-time time adjustments.
      c. Ground-fault pickup level, time delay, and I2t response.
   4. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
   5. Remote trip indication and control.
   6. Communication Capability: Integral communication module with functions and features compatible with power monitoring and control system.

C. Disconnecting and overcurrent protection devices shall have a UL Label, factory applied, indicating the device is listed for the service voltage.

2.3 INSTRUMENTATION

A. Instrument Transformers: IEEE C57.13, NEMA EI 21.1, and the following:
   1. Current Transformers: IEEE C57.13; 5 A, 60 Hz, secondary and secondary shorting device. Burden and accuracy shall be consistent with connected metering and relay devices.
   2. Control-Power Transformers: Dry type, mounted in separate compartments for units larger than 3 kVA.
   3. Current Transformers for Neutral and Ground-Fault Current Sensing: Connect secondary wiring to ground overcurrent relays, via shorting terminals, to provide selective tripping of main and tie circuit breaker. Coordinate with feeder circuit-breaker, ground-fault protection.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:
   1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:
      a. Phase Currents, Each Phase: Plus or minus 1 percent.
      b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
      c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
      d. Megawatts: Plus or minus 2 percent.
      e. Megavars: Plus or minus 2 percent.
      f. Power Factor: Plus or minus 2 percent.
      g. Frequency: Plus or minus 0.5 percent.
      h. Accumulated Energy, kilowatt Hours: Plus or minus 2 percent; accumulated values unaffected by power outages up to 72 hours.
      i. Kilowatt Demand: Plus or minus 2 percent; demand interval programmable from 5 to 60 minutes.
   2. Mounting: Display and control unit flush or semi flush mounted in instrument compartment door.

2.4 CONTROL POWER

A. Control Circuits: 120-V ac, supplied through secondary disconnecting devices from control-power transformer.

B. Control-Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.

C. Control Wiring: Factory installed, with bundling, lacing, and protection included. Provide flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.

2.6 ACCESSORY COMPONENTS AND FEATURES

A. Portable Test Set: For testing functions of solid-state trip devices without removing from switchboard. Include relay and meter test plugs suitable for testing switchboard meters and switchboard class relays.

2.7 IDENTIFICATION

A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store and install switchboards and accessories according to NECA 400.
B. Equipment Mounting: Install switchboards on concrete housekeeping pad base, 4 inches nominal thickness.
   1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18 inches centers around the full perimeter of concrete base.
   2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to switchboards.
C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.
D. Install filler plates in unused spaces of panel-mounted sections.
E. Install overcurrent protective devices, transient voltage suppression devices, and instrumentation.
   1. Set field-adjustable switches and circuit-breaker trip ranges.
F. Comply with NECA 1.
G. Comply with requirements for terminating feeder bus specified in Section 26 25 00, Enclosed Bus Assemblies. Drawings indicate general arrangement of bus, fittings, and specialties.
H. Comply with requirements for terminating cable trays specified in Section 26 05 36, Cable Trays for Electrical Systems. Drawings indicate general arrangement of cable trays, fittings, and specialties.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 26 05 53, Identification for Electrical Systems.
B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Section 26 05 53, Identification for Electrical Systems. Label each switchboard compartment with a factory applied nameplate indicating switchboard manufacturer's name, drawing number, manufacturer location, section number, amperage, voltage, phase, number of wires, short-circuit rating, ampacity interrupting capacity rating, and Arc Flash Warning label in accordance with NEC. Nameplate and factory applied nameplate voltage shall be listed as the service voltage.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:
   1. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.
B. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
C. Switchboard will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 24 13

SECTION 26 24 16 PANELBOARDS

PART 1 -- GENERAL

1.1 SUMMARY
A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: For each panelboard and related equipment.
   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details.
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
   5. Include evidence of NRTL listing for series rating of installed devices.
   6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
   7. Include wiring diagrams for power, signal, and control wiring.
   8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.
C. Drawings submissions – provide panel schedules including load summary on the design documents. Panel schedules inserted into the specifications or book format are not acceptable.

1.3 INFORMATIONAL SUBMITTALS
A. Field quality-control reports.
B. Panelboard schedules for installation in panelboards.

1.4 CLOSEOUT SUBMITTALS
A. Operation and maintenance data.

1.5 QUALITY ASSURANCE
A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
A. Comply with NEMA PB 1.
B. Comply with NFPA 70.

1.6 WARRANTY
A. Manufacturer shall provide standard one year warranty against defects in materials and workmanship for products specified in this section. Warranty period shall begin on date of substantial completion. Project contractor shall replace defective materials during the one-year warranty without additional compensation from USF.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS
A. Panelboards.
   1. Enclosures: Rated for environmental conditions at installed location.
      a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
      b. Outdoor Locations: NEMA 250, Type 3R.
      c. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
      d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
   2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
   3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

4. Directory Card: Provide typewritten directory indicating areas, rooms, and loads being served by each circuit position inside panelboard door, mounted in transparent card holder. Update with new typewritten directory card for all renovations. Handwritten modifications are not acceptable.

B. Phase, Neutral, and Ground Buses: Cooper or Tin-plated aluminum.
C. Conductor Connectors: Suitable for use with conductor material and sizes.
   1. Material: Tin-plated aluminum.
   2. Main and Neutral Lugs: Mechanical type.
   3. Ground Lugs and Bus Configured Terminators: Mechanical type.
   4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
   5. Sub feed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
D. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.
E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
F. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices and listed and labeled for series-connected short-circuit rating by an NRTL.
G. Exterior Located Panelboards: Provide door handles that are lockable with USF standard New Standard padlock. Coordinate with USF-PM and USF Maintenance and Utilities.

2.2 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.
B. Panelboards: NEMA PB 1, power and feeder distribution type.
C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
D. Mains shall be circuit breaker construction.
E. Branch Overcurrent Protective Devices: Circuit-Breakers shall be bolt-on type.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.
B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type. Load center construction is prohibited.
C. Mains shall be circuit breaker construction.
D. Branch Overcurrent Protective Devices: Bolt-on type.
E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.
B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
   a. Instantaneous trip.
   b. Long- and short-time pickup levels.
   c. Long- and short-time time adjustments.
   d. Ground-fault pickup level, time delay, and i2 t response.
4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
   a. Standard frame sizes, trip ratings, and number of poles.
   b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
   c. Ground-Fault Protection (where required by code): Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
   d. Communication Capability (if required by the project): Universal-mounted communication module with functions and features compatible with power monitoring and control system specified in Section 26 27 13, Electricity Metering.
   e. Handle Padlocking Device: Fixed attachment for locking circuit-breaker handle in on or off position.
   f. Handle Clamp: Loose attachment for holding circuit-breaker handle in on position.

C. Disconnecting and overcurrent protection devices shall have a UL Label, factory applied, indicating the device is listed for the service voltage.
D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
   1. Fuses and Spare-Fuse Cabinet: Comply with requirements specified in Section 26 28 13, Fuses.

2.5 ACCESSORY COMPONENTS AND FEATURES

A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store and install panelboards and accessories according to NECA 40.
B. Mount top of trim 90 inches above finished floor unless otherwise indicated.
C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
D. Install overcurrent protective devices and controllers not already factory installed.
   1. Set field-adjustable, circuit-breaker trip ranges.
E. Install filler plates in unused spaces.
F. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
G. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
H. Comply with NECA 1.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 05 53, Identification for Electrical Systems.
B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53, Identification for Electrical Systems.
D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 26 05 53, Identification for Electrical Systems.
E. Panelboard Nameplates: Label each panelboard with a factory applied nameplate indicating manufacturer's name, drawing number, manufacturer location, section number, amperage, voltage, phase, number of wires, short-circuit rating, ampacity interrupting capacity rating, and Arc Flash Warning label in accordance with NEC. Factory applied nameplate voltage shall be listed as the service voltage.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.
B. Acceptance Testing Preparation:
   1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.
C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
D. Panelboards will be considered defective if they do not pass tests and inspections.
E. Prepare test and inspection reports including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 24 16

SECTION 26 25 00 ENCLOSED BUS ASSEMBLIES

PART 1 – GENERAL

1.1 OWNER APPROVAL

A. Enclosed bus assemblies shall not be used unless pre-approved by USF Design & Construction and USF Maintenance.

1.2 SUMMARY

A. This Section includes the following:
   1. Feeder-bus assemblies.
   2. Plug-in bus assemblies.
   3. Bus plug-in devices.

1.3 ACTION SUBMITTALS

A. Shop Drawings: For each type of bus assembly and plug-in device.
   1. Show fabrication and installation details for enclosed bus assemblies.
   2. Show fittings, materials, fabrication, and installation methods for listed fire-stop barriers and weather barriers.
   3. Wiring Diagrams: Power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
B. Comply with NEMA BU 1, "Busways."
C. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Derate enclosed bus assemblies for continuous operation at indicated ampere ratings for ambient temperature not exceeding 140 degrees F.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Calvert Company (The).
   2. Eaton Electrical Inc.; Cutler-Hammer Products.
   3. General Electric Company; Electrical Distribution & Control Division.
   4. Siemens Energy & Automation, Inc.
   5. Square D; Schneider Electric.

2.2 ENCLOSED BUS ASSEMBLIES

A. Feeder-Bus Assemblies: NEMA BU 1, low-impedance bus assemblies in nonventilated housing; single-bolt joints; ratings as indicated.
   1. Provide 100 percent neutral capacity.
   2. Temperature Rise: 55 degrees C above 40 degrees C ambient maximum for continuous rated current.
   3. Bus Materials: Current-carrying copper or aluminum, fully insulated with Class 130C insulation except at joints; plated surface at joints.
   4. Ground:
      a. 50 percent capacity integral with housing.
      b. 50 percent capacity internal bus bars of material matching bus material.
      c. 50 percent capacity isolated, internal bus bar of material matching bus material.

5. Enclosure: Steel or aluminum with manufacturer's standard finish. Aluminum weatherproof with manufacturer's standard finish, sealed seams, drains, and removable closures where installed in damp or exterior locations.
6. Fittings and Accessories: Manufacturer's standard.
7. Mounting: Arranged flat, edgewise, or vertically without derating.

B. Plug-in Bus Assemblies: NEMA BU 1, low-impedance bus assemblies in nonventilated housing; single-bolt joints; ratings as indicated.
1. Provide 100 percent neutral capacity.
2. Temperature Rise: 55 degrees C above 40 degrees C ambient maximum for continuous rated current.
3. Bus Materials: Current-carrying copper or aluminum, fully insulated with Class 130C insulation except at stabs and joints; plated surface at stabs and joints.
4. Ground:
   a. 50 percent capacity integral with housing.
   b. 50 percent capacity internal bus bar of material matching bus material.
   c. 50 percent capacity isolated, internal bus bar of material matching bus material.
5. Enclosure: Steel or aluminum, with manufacturer's standard finish, plug-in openings 24 inches on center, and hinged covers over unused openings.
6. Fittings and Accessories: Manufacturer's standard.
7. Mounting: Arranged flat, edgewise, or vertically without derating.

2.3 PLUG-IN DEVICES

A. Molded-Case Circuit Breakers: NEMA AB 1; hook stick-operated handle, lockable with two padlocks, and interlocked with cover in closed position.
B. Accessories: Hook stick operator, adjustable to maximum extension of 14 feet.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Support bus assemblies independent of supports for other elements such as equipment enclosures at connections to panelboards and switchboards, pipes, conduits, ceilings, and ducts.
1. Design each fastener and support to carry 200 lb. or four (4) times the weight of bus assembly, whichever is greater.
2. Support bus assembly to prevent twisting from eccentric loading.
3. Support bus assembly with not less than 3/8-inch rods. Install side bracing to prevent swaying or movement of bus assembly. Modify supports after completion to eliminate strains and stresses on bus bars and housings.
4. Fasten supports securely to building structure according to Section 26 05 29, Hangers and Supports for Electrical Systems.

B. Install expansion fittings at locations where bus assemblies cross building expansion joints. Install at other locations so distance between expansion fittings does not exceed manufacturer's recommended distance between fittings.
C. Construct rated fire-stop assemblies where bus assemblies penetrate fire-rated elements such as walls, floors, and ceilings.
D. Install weather seal fittings and flanges where bus assemblies penetrate exterior elements such as walls or roofs. Seal around openings to make weathertight.
E. Coordinate floor penetrations with Structural Drawings.
F. Install a concrete curb at least 4 inches high around bus-assembly floor penetrations.
G. Coordinate bus-assembly terminations to equipment enclosures to ensure proper phasing, connection, and closure.
H. Tighten bus-assembly joints with torque wrench or similar tool recommended by bus-assembly manufacturer. Tighten joints again after bus assemblies have been energized for 30 days.
I. Install bus-assembly, plug-in units. Support connecting conduit independent of plug-in unit.
J. Set field-adjustable, circuit-breaker trip ranges and overload relay trip settings as indicated.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Infrared Scanning: 2 months after Substantial Completion, contractor shall perform an infrared scan of bus assembly including joints and plug-in units.
      a. Use an infrared-scanning device designed to measure temperature or detects significant deviations from normal values. Provide documentation of device calibration.
      b. Perform two (2) follow-up infrared scans of bus assembly, one at 4 months and the other at 11 months after Substantial Completion.
      c. Prepare a certified report identifying bus assembly checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.

END OF SECTION 26 25 00

SECTION 26 27 13 ELECTRICITY METERING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes equipment for electricity metering by Tampa Electric Company (TEC) and electricity metering by USF Utilities.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: Dimensioned plans and sections or elevation layouts and wiring diagrams.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 -- PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY (Not USF Owned)

A. Coordinate with USF-EE for areas that are fed from TEC prior to project design.
B. Provide meter bases and connections in accordance with TEC standards. Obtain standards from TEC customer service website, subject to USF Design & Construction and USF-EE review, inspection, and approval.
C. Services 400 Amps and less (loads 320 amps and less) shall be metered via a self-contained meter in accordance with TEC standards. Meter locations shall be coordinated with USF Design & Construction prior to design and construction.
D. Services larger than 400 Amps (loads larger than 320 amps) shall be metered via Current-Transformer Cabinets in accordance with TEC standards. Current transformer cabinets and meter locations shall be coordinated with USF Design & Construction prior to design and construction. Current transformers in pad mounted transformer secondary are not approved without special permission.
E. Meter cabinets and bases shall be provided by the contractor and shall be TEC approved. Meter sockets shall be provided by TEC. The installation shall be inspected by USF-BCA and obtain a USF-BCA Authorization to Connect Utility letter prior to TEC energizing the service.
F. TEC meters cabinet shall be labeled with service address prior to inspection. Provide label complying with requirements for identification specified in Section 26 05 53, Identification for Electrical Systems. Coordinate address with USF-BCA.
G. Coordinate with USF Utilities to set up an account with TEC.

2.2 EQUIPMENT FOR ELECTRICITY METERING OF USF PROVIDED PRIMARY.

A. Coordinate with USF-EE for areas that are fed from the USF provided primary prior to project design.
B. Projects requiring self-contained meters or CT meters. Provide USF Utilities approved, across the line or CT meter for appropriate application. CT meters shall be provided with split core CT's and three (3) inline fuses. Meters shall be submitted to USF Design & Construction and USF-EE for review and approval prior to design and construction. Obtain meter number to apply to the generic label from USF Utilities. Meters and CT cabinets shall be mounted on the building they are serving; location shall be coordinated and approved by USF Design & Construction prior to design and construction. Meter options to include the following:
    1. Across the line socket mounted meters, self-contained Class 320 – Form 16S, Measurlogic DTS SKT or pre-approved equivalent.
    2. CT socket mounted meters shall be transformer rated Class 20 – Form 9S, Measurlogic DTS SKT or pre-approved equivalent.
    3. Enclosure: NEMA 250, Type 1 or Type 3R (suitable for application), with hasp for padlocking with USF Standard 2000 padlock.
    4. Meters shall have BACnet MS/TP communication capability. Data available for monitoring via BACnet communication shall include following:
        a. Display: LCD with characters not less than 0.25 inches high.

b. Monitoring: A, V, VA, kW, kvar, kWh, kvarh, kVAh, PF, Hz.
c. Demand metering: W, var, A, VA

5. Identification: Comply with requirements in Section 26 05 53, Identification for Electrical Systems.
6. Current-Transformer Cabinet: Listed or recommended by metering equipment manufacturer for use with sensors indicated.
7. Current-Transformer Cabinet: Provide isolating means via circuit breaker or non-fused disconnect switch between CTs and monitoring module and between monitoring module and meter.
8. Across the line meters shall have a main circuit breaker on the line side to isolate the meter from the supply for maintenance.

C. Projects with main switchboards or main distribution board shall be provided with integral meter Veris E50H2A or preapproved equivalent. Refer to Section 230900 for requirements. Features shall include the following.
1. Provide isolating means via circuit breaker accessible near display meter allowing replacing the display meter without de-energizing the switchboard service.
2. Meters shall have BACnet MS/TP communication capability.

D. Provide meter integration for all installations.
1. Facilities provided with a Utilities Control System, Building Control System or Building Automated System (BAS), refer to section 230519 for integration into building system.
2. Facilities not provided with a Utilities Control System, Building Control System or Building Automated System (BAS).
a. Provide a BACnet MS/TP to BACnet/IP communication router in the nearest IDF room.
b. Provide 120 Volt connection to the router.
c. Provide a network port/data jack for the router to plug into. Coordinate with USF Design and Construction, USF Utilities, and USF Information Technology for requirements.
d. Provide RS 45 twisted shield pair #18 wire in ½" conduit to router.
3. Exterior located meters.
a. Provide a BACnet MS/TP to BACnet/IP communication router in the nearest building IDF room. Coordinate with USF Design & Construction and USF Information Technology for nearest IDF room. Indicate building letters and IDF room number on the design documents and record documents.
b. Provide 120 Volt connection to the router.
c. Provide a network port/data jack for the router to plug into. Coordinate with USF Design & Construction, USF Utilities, and USF Information Technology for requirements.
d. Provide RS 45 twisted shield pair #18 wire in ¾" conduit to router.

2.3 USF SUB-METERING AND SEGREGATION OF LOADS

A. Coordinate with USF-PM for sub-metering of auxiliary spaces, subleased spaces, and loads. Follow requirements in section 2.2 for sub-metering.
B. Coordinate with USF-PM for sub-metering requirements for LEED criteria or for code required segregation of loads. The design team shall provide the proposed design team approach during the programming phase prior to schematic design submission for USF-PM and USF Design & Construction and USF Utilities review and approval.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Comply with equipment installation requirements.
B. Comply with requirements for identification specified in Section 26 05 43, Identification for Electrical Systems.
C. New services shall be inspected and approved by USF-BCA inspector, USF-EE, and USF Utilities prior to energizing the service.
D. Obtain a USF-BCA Authorization to Connect Utility letter prior to energizing the service.

END OF SECTION 26 27 13

SECTION 26 27 26 WIRING DEVICES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Receptacles, receptacles with integral GFCI, and associated device plates.
   2. Weather-resistant receptacles.
   3. Snap switches and wall-box dimmers.
   4. Solid-state fan speed controls.
   5. Wall-switch and exterior occupancy sensors.
   6. Communications outlets.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Receptacles for USF furnished equipment - match plug configurations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: List of legends and description of materials and process used for marking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
   1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
   2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
   3. Leviton Mfg. Company Inc. (Leviton).
   4. Pass & Seymour/Legrand (Pass & Seymour).
B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with NFPA 70.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596, specification grade.

2.4 GFCI RECEPTACLES

A. General Description:
   1. Straight blade, non-feed-through type.
   2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
   3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
B. Duplex GFCI Convenience Receptacles, 125 V, 20 A, specification grade.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
B. Switches, 120/277 V, 20 A, specification grade.
C. Pilot-Light Switches, 20 A, specification grade.
   1. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."
D. Key-Operated Switches, 120/277 V, 20 A, specification grade.
   1. Description: Single pole, with factory-supplied key in lieu of switch handle.

2.6 DECORATOR-STYLE DEVICES

A. Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498, specification grade.
B. GFCI, Non-Feed-Through Type, Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A, specification grade.
C. Toggle Switches, Square Face, 120/277 V, 15 A: Comply with NEMA WD 1, UL 20, and FS W-S-896, specification grade.
D. Lighted Toggle Switches, Square Face, 120 V, 15 A: Comply with NEMA WD 1 and UL 20, specification grade.
   1. Description: With neon-lighted handle, illuminated when switch is "off."

2.7 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
B. Control: Continuously adjustable slider toggle switch; with single-pole or three-way switching. Comply with UL 1472.
C. LED Dimmer Switches: Compatible with dimmer LED drivers, capable of consistent dimming with low end not greater than 10 percent of full brightness. In new construction, utilize LED dimmable fixtures with compatible LED dimmer.

2.8 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.
   1. Plate-Securing Screws: Metal with head color to match plate finish.
   2. Material for Finished Spaces: Smooth, high-impact thermoplastic, 0.035-inch thick, satin-finished.
   3. Material for Unfinished Spaces: Galvanized steel.
   4. Material for Damp Locations: Cast aluminum while in use cover listed and labeled for use in wet and damp locations.
   5. Material for kitchens or food processing areas – stainless steel.
   6. Chiller plants and Lift Stations – stainless steel.
B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum while in use cover.

2.9 FINISHES

A. Device Color:
   1. Wiring Devices Connected to Normal Power System: Color shall be coordinated with USF-PM. In renovated areas, the color shall match building standard and be approved by USF-PM prior to ordering.
   2. Wiring Devices Connected to Emergency Power System: Red.
   3. TVSS Devices: Blue.
B. Wall Plate Color: For plastic covers, match device color.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:
1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
   a. Cut back and pigtail or replace all damaged conductors.
   b. Straighten conductors that remain and remove corrosion and foreign matter.
   c. Pigtailing existing conductors is permitted, provided the outlet box is large enough, meets NEC.

D. Device Installation:
1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15 or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
10. Do not install GFI type devices where readily inaccessible such as behind water fountain housings or where food prep equipment blocks access. In these instances, provide a GFI type circuit breaker protecting a standard device.

E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:
1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

I. Adjust locations of service poles to suit arrangement of partitions and furnishings.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
1. Test Instruments: Use instruments that comply with UL 1436.

2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:
   1. Line Voltage: Acceptable range is 115 to 126 V.
   2. Percent Voltage Drop under 15-A Load: A value of 5 percent or higher is unacceptable.
   3. Ground Impedance: Values of up to 2 ohms are acceptable.
   4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
   5. Using the test plug, verify that the device and its outlet box are securely mounted.
   6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 26 27 26

SECTION 26 28 13 FUSES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, fusible panelboards, switchboards, enclosed controllers, and motor-control centers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with NEMA FU 1 for cartridge fuses.
C. Comply with NFPA 70.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
   1. Cooper Bussmann, Inc.
   2. Ferraz Shawmut, Inc.
   3. Edison Fuse, Inc.
   4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 -- EXECUTION

3.1 FUSE APPLICATIONS

A. Service Entrance: Class L, time delay.
B. Feeders: Class L, fast acting.
C. Motor Branch Circuits: Class RK5, time delay.
D. Other Branch Circuits: Class RK5, time delay.
E. Control Circuits: Class CC, time delay.
F. All pedestrian post top light fixtures, parking lot light fixtures, and roadway light fixtures shall be individually fused. Provide Bussmann FNQ 10 Amp, time delay fuse, in Little Fuse LEB AB series (rated for #10 AWG line side and #10 AWG load side) single-pole breakaway in-line fuse holder. Locate the fuse holder in the pole's handhole. No exceptions.

3.2 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 26 05 53, Identification for Electrical Systems and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 26 28 13

SECTION 26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 -- GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fusible switches.
   2. Non fusible switches.
   3. Shunt trip switches.
   4. Molded-case circuit breakers.
   5. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.
B. NO: Normally open.
C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
   1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with NFPA 70.

PART 2 -- PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.
B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A thru 400 A: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
C. Type HD, Heavy Duty, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept one padlock, and interlocked with cover in closed position.
D. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
   3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
   4. Lugs: Suitable for number, size, and conductor material.
   5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A thru 400 A: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept one padlock, and interlocked with cover in closed position.

D. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
   3. Lugs: Suitable for number, size, and conductor material.

2.3 SHUNT TRIP SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cooper Bussmann, Inc.
   2. Ferraz Shawmut, Inc.
   3. Littelfuse, Inc.

B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.

C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Accessories:
   1. Oiltight key switch for key-to-test function.
   2. Oiltight ON pilot light.
   3. Isolated neutral lug.
   4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
   5. Form C alarm contacts that change state when switch is tripped.
   6. Three-pole, double-throw, fire-safety, and alarm relay; with appropriate coil voltage.
   7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
   1. Instantaneous trip.
   2. Long- and short-time pickup levels.
   3. Long- and short-time time adjustments.
   4. Ground-fault pickup level, time delay, and i2 t response.

E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
F. Features and Accessories:
   1. Standard frame sizes, trip ratings, and number of poles.
   2. Lugs: Suitable for number, size, trip ratings, and conductor material.
   3. Ground-Fault Protection: Comply with UL 1053; integrally mounted type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
   4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
   5. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
   6. Alarm Switch: One NC contact that operates only when circuit breaker has tripped.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
   1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
   2. Outdoor Locations: NEMA 250, Type 3R.
   3. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
   4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
   5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
C. Install fuses in fusible devices.
D. Comply with NECA 1.
E. Exterior located switches and circuit breaker enclosures shall be pad lockable with USF Standard 2000 pad lock.
F. Circuit breaker construction is preferred over fusible type fusible type construction.

3.2 IDENTIFICATION

A. Comply with requirements in Section 26 05 23, Identification for Electrical Systems.
   1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
   2. Label each enclosure with engraved metal or laminated-plastic nameplate.
   3. Indicate manufacturer's name, amperage, voltage, phase, number of wires, short-circuit rating, ampacity interrupting capacity rating, and Arc Flash Warning label in accordance with NEC.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.
B. Acceptance Testing Preparation:
   1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.
C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests

and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 28 16

SECTION 26 32 13 ENGINE GENERATORS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes packaged engine-generator sets for emergency and standby power supply with the following features:
   1. Natural gas or diesel engine. The fuel source shall be coordinated with USF Design & Construction and USF Utilities prior to design and construction.
   2. Unit-mounted cooling system.
   3. Unit-mounted control and monitoring.
   4. Outdoor enclosure.

B. See Section 26 36 00, Transfer Switches for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of packaged engine generator and accessory indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1.3 INFORMATIONAL SUBMITTALS

A. Source quality-control test reports.

B. Field quality-control test reports.

C. Warranty: Special warranty specified in this Section.

D. Provide PDF of load generator sizing program showing step loads input and sizing results.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for the project/facility.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 200 miles of USF, a service center capable of providing training, parts, and emergency maintenance repairs.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with ASME B15.1.

E. Comply with NFPA 37.

F. Comply with NFPA 70.

G. Comply with NFPA 99.

H. Comply with NFPA 110 requirements for applicable Level 1 or 2 emergency power supply system.

I. Comply with UL 2200.

J. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

K. Noise Emission: Comply with applicable state and local government requirements for maximum noise level due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation. Utilize critical grade exhaust silencer and sound attenuated enclosure so not to exceed 72 dBA 20 feet from generator.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
   1. Ambient Temperature: 5 to 40 degrees C.
   2. Relative Humidity: 0 to 95 percent.

3. Altitude: Sea level to 100 feet.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Caterpillar; Engine Div.
   2. Magnetek, Inc.
   3. Onan/Cummins Power Generation (Industrial Business Group)
   4. Kohler Co.; Generator Division.
   5. Spectrum Detroit Diesel.

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.
B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.
C. Batteries: Gel cell type manufactured by Odyssey or USF Utilities approved equal.
D. Generator-Set Performance:
   1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
   2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
   3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
   4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
   5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
   6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
   7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
   8. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.3 ENGINE

A. Fuel:
   1. Natural gas or diesel. The fuel source shall be coordinated with USF Design & Construction and USF Utilities prior to design and construction. Generators serving critical programming facilities such as research, mission critical IT, and surgical clinics shall have diesel fuel source.
B. Rated Engine Speed: 1800 rpm.
C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm.
D. Lubrication System: The following items are mounted on engine or skid:
   1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
   2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature.

Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Engine Fuel System:
1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
2. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
3. Natural Gas System:
a. Carburetor.
b. Secondary Gas Regulators: One for each fuel type.
c. Fuel-Shutoff Solenoid Valves: One for each fuel source.
d. Flexible Fuel Connectors: One for each fuel source.

F. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.

G. Governor: Adjustable isochronous, with speed sensing.

H. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.
1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

I. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
1. Sound level measured at 20 feet from exhaust discharge after installation is complete shall be 72 dBA or less.

J. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

K. Starting System:
1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Paragraph 1.6, Project Conditions above.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: As required by NFPA 110 for system level specified.
4. Battery: Adequate capacity within ambient temperature range specified in Paragraph 1.6 Project Conditions above to provide specified cranking cycle at least twice without recharging.
5. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
a. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type. Unit shall comply with UL 1236.

2.4 FUEL OIL STORAGE

A. Comply with NFPA 30 and Chapter 62-762, F.A.C.

B. Below grade, underground tanks are prohibited.

C. Base-Mounted Fuel Oil Tank: Factory installed and piped, complying with UL 142 fuel oil tank. Features include the following:
1. Tank level indicator at fill point.
2. Capacity: Coordinate with USF Design & Construction and USF Utilities for required fuel supply hours of continuous operation at 100 percent rated power output.
3. Vandal-resistant fill cap. Coordinate fill cap type with USF-PM and USF Utilities.
4. Containment Provisions: Comply with requirements of authorities having jurisdiction and minimum provisions of Chapter 62-762, F.A.C.
5. Release Detection Requirements: Comply with the minimum requirements of Chapter 62-762, F.A.C. Coordinate with USF Design & Construction, USF Utilities, and USF Environmental Health & Safety for review and approval of proposed release detection

methods.

6. Overfill Protection Devices: Comply with the minimum requirements of Chapter 62-762. F.A.C. Coordinate with USF Design & Construction, USF Utilities, and USF Environmental Health and Safety for review and approval of proposed release detection methods.
7. Provide structural supports and neoprene pads or similar means to lift skid base mounted tanks above concrete pad to prevent moisture accumulation around and in contact with tank. Include methods and details in generator shop drawings for USF Design & Construction and USF Utilities review and approval.
8. Tank Installation/Upgrade Application and Registration: Installation contractor shall complete all applicable tank installation/upgrade applications and FDEP registration requirements (per Chapter 62-762, F.A.C.) and shall obtain approval from all appropriate regulatory departments having jurisdiction prior to installation and addition of fuel to the tank.
9. Spill Prevention, Control and Countermeasure (SPPC) Plan – USF Environmental Health and Safety maintains a comprehensive spill prevention, control, and countermeasure (SPCC) plan adhering to the requirements of the United States Environmental Protection Agency (USEPA) regulations contained in 40 C.F.R. Part 112 – Oil Pollution Prevention. Coordinate with USF Design & Construction and USF Environmental Health and Safety regarding applicable information required to amend the SPCC Plan in accordance with 40 C.F.R. Part 112 prior to construction.
10. Other above ground storage tanks that are not skid base mounted require approval from USF Design & Construction, USF Utilities, and USF Environmental Health and Safety prior to design.
11. Ensure that inspection points are easily accessible.

2.5 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms.

B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms.

C. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.

D. Indicating and Protective Devices and Controls: As required by NFPA 110 for applicable Level 1 or 2 system, and the following:
   1. AC voltmeter.
   2. AC ammeter.
   3. AC frequency meter.
   4. DC voltmeter (alternator battery charging).
   5. Engine-coolant temperature gage.
   6. Engine lubricating-oil pressure gage.
   7. Running-time meter.
   8. Ammeter-voltmeter, phase-selector switch(es).
   9. Generator-voltage adjusting rheostat.
   10. Fuel tank derangement alarm.
   11. Fuel tank high-level shutdown of fuel supply alarm.
   12. Fuel level indicator.
   13. Generator overload.

E. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

F. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel. Provide an alarm function at the remote annunciator panel for the below.
   1. Over crank shutdown.
   2. Control switch not in auto position.
   3. Battery low-voltage alarm.
   4. Coolant low-temperature alarm.
   5. Battery-charger malfunction alarm.

G. Remote Alarm Annunciator: Comply with NFPA 99. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated. Include remote visual and audible alarms in F.

2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.
   1. Tripping Characteristic: Designed specifically for generator protection.
   2. Trip Rating: Matched to generator rating.
   3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices. Generator EPO button shall simultaneously shut off the generator engine ad and shunt trip the generator circuit breaker(s).
   4. Mounting: Adjacent to or integrated with control and monitoring panel.

B. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.
B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
C. Electrical Insulation: Class H or Class F.
D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
F. Enclosure: Drip proof.
G. Instrument Transformers: Mounted within generator enclosure.
H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
   1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.
I. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
K. Sub transient Reactance: 12 percent, maximum.

2.8 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description: Vandal-resistant, weatherproof sound attenuated aluminum housing, wind resistant up to 145 mph unless directed otherwise by USF-PM, verify prior to design. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
B. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.
   1. Louvers: Fixed-engine, cooling-air inlet, and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
   2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed

to reduce enclosure heat loss in cold weather when unit is not operating.

C. Interior Lights with Switch (if required for larger enclosures): Factory-wired, vaporproof-type fixtures within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
   1. AC lighting system and connection point for operation when remote source is available.
   2. DC lighting system for operation when remote source and generator are both unavailable.
   3. Provide LED fixtures, 4000K-4100K.

D. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection. Do not wire lights or battery charger downstream from GFCI outlet.

2.9 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components, and equipped with identical or equivalent accessories.
   1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.
   2. Report factory test results within 10 days of completion of test.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.

B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

C. Install packaged engine generator with elastomeric isolator pads or restrained spring isolators having a minimum deflection of 1 inch on 4 inches high concrete base. Secure sets to anchor bolts installed in concrete bases.

D. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are specified in Section 23 11 00, Hydronic Piping.
   1. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints.

E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

F. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.

G. Connect engine exhaust pipe to engine with flexible connector.

H. Connect fuel piping to engines with a gate valve and union and flexible connector.

I. Ground equipment according to Section 26 05 26, Grounding and Bonding for Electrical Systems.

J. Connect wiring according to Section 26 22 00, Low-Voltage Electrical Power Conductors and Cables.

K. Identify system components according to Section 26 05 53, Identification for Electrical Systems.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
   2. Provide fuel for testing and fill tank upon completion of test prior to turning project over to USF.

B. Tests and Inspections:
   1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to

those specified here including, but not limited to, single-step full-load pickup test.

4. At the completion of the NFPA 110 Acceptance Tests, perform a continuous full load bank test for four hours.
5. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
   a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
   b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
   c. Verify acceptance of charge for each element of the battery after discharge.
   d. Verify that measurements are within manufacturer's specifications.
6. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
7. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
8. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg (120kPa). Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
9. Exhaust Emissions Test: Comply with applicable government test criteria.
10. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50% and 100% step-load increases and decreases and verify that performance is as specified.
11. Harmonic-Content Tests: Measure harmonic content of output voltage under 25% and at 100% of rated linear load. Verify that harmonic content is within specified limits.
12. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at locations 20 feet from generator enclosure, and compare measured levels with required values.

C. Coordinate tests with tests for transfer switches and run them concurrently.
D. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
E. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
F. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
G. Remove and replace malfunctioning units and retest and reinspect as specified above.
H. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
I. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.
J. At conclusion of testing, service the generator set including replacing air, oil and fuel filters, changing lubrication oil, checking batteries, adjusting fan belts for manufacturer required tightness, and refilling cooling system.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train USF Utilities maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 26 32 13

SECTION 26 36 00 TRANSFER SWITCHES

PART 1 -- GENERAL

1.1 SUMMARY
A. This Section includes automatic transfer switches rated 600 V and less.

1.2 ACTION SUBMITTALS
A. Product Data: Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

1.3 INFORMATIONAL SUBMITTALS
A. Field quality-control test reports.

1.4 CLOSEOUT SUBMITTALS
A. Operation and maintenance data.

1.5 QUALITY ASSURANCE
A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
B. Comply with NEMA ICS 1.
C. Comply with NFPA 70.
D. Comply with NFPA 99.
E. Comply with NFPA 110.
F. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.6 WARRANTY
A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Transfer Switches:
      a. Caterpillar; Engine Div.
      b. Emerson; ASCO Power Technologies, LP.
      c. Generac Power Systems, Inc.
      d. GE Zenith Controls.
      e. Kohler Power Systems; Generator Division.
      f. Onan/Cummins Power Generation; Industrial Business Group.
      g. Russelectric, Inc.
      h. Spectrum Detroit Diesel.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS
A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer.
B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in project/facility under the fault conditions indicated, based on testing according to UL 1008.
   1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.

C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 degrees C to plus 70 degrees C.
D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
E. Electrical Operation: Accomplish by a non-fused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
   1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
   2. Switch Action: Double throw; mechanically held in both directions.
   3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
G. Three-pole switches are preferred. Neutral Switching, four-pole switches shall be approved by USF Design & Construction and USF Utilities prior to design. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles. Provide four-pole switches on services where NEC requires GFCI. Provide grounding and bonding in accordance with NEC, NFPA, and manufacturer instructions.
H. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
I. Enclosures: General-purpose NEMA 250, applicable Type 1, 3R, or 12 complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.
B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
C. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.
D. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.
E. Automatic Transfer-Switch Features:
   1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
   2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from 0 to 6 seconds, and factory set for one second.
   3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
   4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
   5. Test Switch: Simulate normal-source failure.
   6. Switch-Position Pilot Lights: Indicate source to which load is connected.
   7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
      a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
      b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
   8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
   9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal

source. Pilot light indicates override status.

10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.
12. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
13. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    b. Push-button programming control with digital display of settings.
    c. Integral battery operation of time switch when normal control power is not available.

F. All automatic transfer switches shall report status to the building automation system (BAS) via BACnet protocol, or to the nearest IDF/Data room when a BAS system is not available. The design professional (EOR) shall coordinate the requirements with USF-PM, USF-Utilities, and USF-IT prior to the design submission and include all requirements on the documents. Each project site, selected manufacturer options are different and there is constantly improving technology that requires confirming and specifying all requirements to complete the monitoring requirements prior to the design for any renovation, replacement, or new project.

1. Required monitoring points for reporting status.
    a. Normal Power Available
    b. Transfer Switch Position
    c. Generator Run Status (running or not running).
    d. Generator Fault Status
2. Provide Alerton VLC-444 BACnet field controller or USF Utilities and USF-IT approved switch, in general purpose enclosure adjacent to each automatic transfer switch required to complete the monitoring and reporting requirements. Provide connection between automatic transfer switch and field controller for the monitoring points as directed by the automatic transfer switch manufacturer and USF-IT. Verify type of BACnet field controller for each installation with USF Utilities and USF-IT prior to the design.
3. Provide connection to nearest active BAS controller with #18 shielded twisted pair cable or Catorgey 6 cable as directed by the manufacturer, USF-Utilities, and USF-IT-in 3/4-inch conduit.
4. BAS and/or generator monitoring system shall be on standby generator power.
5. Provide all specifications on the design documents to include all programming requirements to meet the manufacturer and USF-IT requirements to complete the monitoring and reporting to the BAS and/or USF-IT switch.
6. The documents shall identify the building designation and room number for the BAS connection or the IDF/Data room number.

2.4 DOCKING STATION for MOBILE GENERATOR CONNECTION

A. Provide a docking station between the generator and automatic transfer switch manufactured by Trystar or equivalent.
B. The Docking Station location shall be approved by USF Design & Construction and USF Utilities prior to design.
C. Provide an aluminum or stainless-steel enclosure for an exterior located docking station.
D. Provide GFI receptacle and connections for a generator battery charger and block heater.
E. Provide automatic start via each ATS switch (confirm the number of ATS switches). The design may require a distribution board on the load side of the docking station for multiple ATS switches configuration.
F. Provide capability for a load bank connection.

2.5 SOURCE QUALITY CONTROL

A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Floor-Mounting Switch: Anchor to floor by bolting.
   1. Concrete Bases: 4 inches high, reinforced, with chamfered edges. Extend base no more than 4 inches in all directions beyond the maximum dimensions of switch, unless otherwise indicated.
B. Identify components according to Section 26 05 53, Identification for Electrical Systems.
C. Set field-adjustable intervals and delays, relays, and engine exerciser clock. Coordinate with USF-PM and USF Utilities.

3.2 CONNECTIONS

A. Ground equipment according to Section 26 05 26, Grounding and Bonding for Electrical Systems.
B. Connect wiring according to Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
   2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
   3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
      a. Check for electrical continuity of circuits and for short circuits.
      b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
      c. Verify that manual transfer warnings are properly placed.
      d. Perform manual transfer operation.
   5. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
      a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
      b. Simulate loss of phase-to-ground voltage for each phase of normal source.
      c. Verify time-delay settings.
      d. Verify pickup and dropout voltages by data readout or inspection of control settings.
      e. Perform contact-resistance test across main contacts and correct values exceeding 500 microohms and values for 1 pole deviating by more than 50 percent from other poles.
      f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
   6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
      a. Verify grounding connections and locations and ratings of sensors.
B. Coordinate tests with tests of generator and run them concurrently.
C. Report results of tests and inspections in writing. Record adjustable relay settings and

measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

D. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train USF Utilities personnel to adjust, operate, and maintain transfer switches and related equipment.

B. Coordinate transfer switch training with generator set training.

END OF SECTION 26 36 00

SECTION 26 41 13 LIGHTNING PROTECTION FOR STRUCTURES

PART 1 -- GENERAL

1.1 SUMMARY

A. Section includes lightning protection for structures, structure elements, and building site components. All structures shall have lightning protection.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: For air terminals and mounting accessories.
   1. Layout of the lightning protection system, along with details of the components to be used in the installation.
   2. Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Certified by UL as a Master Installer/Designer, trained and approved for installation of units required for this Project.
B. System Certificate:
   1. UL Master Label.
   2. UL Master Label Recertification for renovations and expansions. If existing structure does not have a UL Master Label, provide “Letter of Compliance”.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 780, "Definitions" Article.

PART 2 -- PRODUCTS

2.1 LIGHTNING PROTECTION SYSTEM COMPONENTS

A. Comply with UL 96A and NFPA 780.
B. Roof-Mounted Air Terminals: NFPA 780, appropriate Class I or Class II, aluminum unless otherwise indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. East Coast Lightning Equipment Inc.
      b. ERICO International Corporation.
      c. Harger.
      d. Heary Bros. Lightning Protection Co. Inc.
      e. Independent Protection Co.
      f. Preferred Lightning Protection.
      g. National Lightning Protection.
      h. Robbins Lightning, Inc.
      i. Thompson Lightning Protection, Inc.
   2. Air Terminals More than 24 Inches Long: With brace attached to the terminal at not less than half the height of the terminal.
   3. Single-Membrane, Roof-Mounted Air Terminals: Designed specifically for single-membrane roof system materials. Comply with requirements in the roofing sections of the Division 07, Thermal and Moisture Protection.
C. System Conductors and Down Conductors: Aluminum and copper-clad aluminum, sized per classification required in NFPA and for Master UL Label.
D. Counterpoise System Ground: Copper, provide when required by NFPA and for Master UL Label. Maintain system if existing.
E. Ground Rods: Copper-clad; 3/4 inch in diameter by 10 feet long.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Provide lightning protection components and systems according to UL 96A and NFPA 780 on all new facilities, renovated facilities, and where roof replacements require removing or modifying existing lightning protection systems.
B. Conceal the following conductors:
   1. System conductors.
   2. Down conductors.
      a. Do not use steel structure for down conductors.
      b. Down conductors shall be installed in PVC Schedule 40 conduit concealed in the wall.
   3. Interior conductors.
   4. Conductors within normal view of exterior locations at grade.
C. Cable Connections: Use crimped or bolted connections for all conductor splices and connections between conductors and other components. Use exothermic-welded connections in underground portions of the system.
D. Air Terminals on Single-Ply Membrane Roofing: Comply with roofing membrane and adhesive manufacturer's written instructions.
E. Bond extremities of vertical metal bodies exceeding 60 feet in length to lightning protection components.
F. Ground Loop (Counterpoise System Ground): Install ground-level, potential equalization conductor and extend around the perimeter of structure.
   1. Bury ground ring not less than 24 inches from building foundation.
   2. Bond ground terminals to the ground loop.
   3. Bond grounded building systems to the ground loop conductor within 12 feet of grade level.
G. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at 60 feet intervals.
H. Ground conductors located outside of building shall have 24 inches minimum burial depth.
I. Provide inspection wells for all building grounding system rods and lightning protection driven grounding rods.
J. Provide dual conductor paths to all roof mounted equipment including metal drains.
K. Provide lightning conductor connection to all air terminals. Do not solely use the equipment for the path between the air terminal and conductor.

3.2 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.
B. Use conductors with protective coatings where conditions cause deterioration or corrosion of conductors.

3.3 FIELD QUALITY CONTROL

A. UL Inspection: Meet requirements to obtain a UL Master Label for system. Provide UL Master Label in accordance with UL 96A with project closeout documents.
B. Test resistance to ground at each lightning protection driven ground round, using fall-of-potential method using megohmmeter. If the measured resistance to ground is greater than 25 ohms, provide additional driven grounds per 2.1 E until the measured resistance is less than 25 ohms.

END OF SECTION 26 41 13

SECTION 26 43 13 SURGE PROTECTION DEVICES

PART 1 -- GENERAL

1.1 SUMMARY

A. Section includes field-mounted SPD for low-voltage (120 to 600 V) power distribution and control equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include unit dimensions, rated capacities, operating weights, electrical characteristics, furnished specialties, and accessories.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.
B. Warranty information.
C. Drawings: Provide shop drawings indicating mounting provisions, installation instructions, and wiring diagrams.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.
B. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45.
C. Comply with UL 1449.
D. Comply with NFPA 70.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 SERVICE ENTRANCE SUPPRESSORS – Type 1

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Current Technology Inc.
   2. LEA International.
   4. Leviton Mfg. Company Inc.
   5. PQ Protection.
   6. Siemens.
B. Surge Protection Devices:
   1. LED indicator lights for power and protection status.
   2. Comply with UL 1449.
   3. Fabrication using bolted compression lugs for internal wiring.
   4. Integral service disconnect switch when connected to line side of main service switch.
   5. Redundant suppression circuits.
   6. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
C. Peak Single-Impulse Surge Current Rating: 150 kA per mode / 300 kA per phase.
D. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V or 208Y/120 V, 3-phase, 4-wire circuits shall be as follows:
   1. Line to Neutral: 1200 V for 480Y/277 V / 800 V for 208Y/120 V.
   2. Line to Ground: 1200 V for 480Y/277 V / 800 V for 208Y/120 V.
   3. Neutral to Ground: 1000 V for 480Y/277 V / 700 V for 208Y/120 V.
E. Protection modes and UL 1449 VPR for 240/120 V, single-phase, 3-wire circuits shall be as

follows:
1. Line to Neutral: 800 V.
2. Line to Ground: 800 V.
3. Neutral to Ground: 700 V.

F. Protection modes and UL 1449 VPR for 240/120-V, 3-phase, 4-wire circuits with high leg shall be as follows:
1. Line to Neutral: 1200V for 480Y/277 V / 800V for 208Y/120 V.
2. Line to Ground: 1200V for 480Y/277 V / 800V for 208Y/120 V.
3. Neutral to Ground: 1000V for 480Y/277 V / 700V for 208Y/120 V.

G. Protection modes and UL 1449 VPR for 240 V or 480 V, 3-phase, 3-wire, delta circuits shall be as follows:
1. Line to Line: 1800 V for 480 V / 1800 V for 240 V.
2. Line to Ground: 1800 V for 480 V / 1200 V for 240 V.

H. Units integral with the switchboard are not allowed.

2.2 PANELBOARD SUPPRESSORS – Type 2.

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Current Technology Inc.
2. LEA International.
3. Leviton Mfg. Company Inc.
4. PQ Protection.
5. Siemens.

B. Surge Protection Devices:
1. LED indicator lights for power and protection status.
2. Fabrication using bolted compression lugs for internal wiring.
3. Redundant suppression circuits.
4. Arrangement with wire connections to phase buses, neutral bus, and ground bus via panel mounted 30 Amp, 3 Pole, circuit breaker.

C. Peak Single-Impulse Surge Current Rating: 150 kA per mode / 300 kA per phase.

D. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V or 208Y/120 V, 3-phase, 4-wire circuits shall be as follows:
1. Line to Neutral: 1200 V for 480Y/277 V / 800 V for 208Y/120 V.
2. Line to Ground: 1200 V for 480Y/277 V / 800 V for 208Y/120 V.
3. Neutral to Ground: 1000 V for 480Y/277 V / 700 V for 208Y/120 V.

E. Protection modes and UL 1449 VPR for 240/120-V, single-phase, 3-wire circuits shall be as follows:
1. Line to Neutral: 800 V.
2. Line to Ground: 800 V.
3. Neutral to Ground: 700 V.

F. Protection modes and UL 1449 VPR for 240/120-V, 3-phase, 4-wire circuits with high leg shall be as follows:
1. Line to Neutral: 800 V.
2. Line to Ground: 800 V.
3. Neutral to Ground: 700 V.

G. Protection modes and UL 1449 VPR for 240 V or 480 V, 3-phase, 3-wire, data circuits shall be as follows:
1. Line to Line: 2000 V for 480 V / 1000 V for 240 V.
2. Line to Ground: 1500 V for 480 V / 800 V for 240 V.

H. Units integral to panelboards are not allowed.

2.3 ENCLOSURES

A. Indoor Enclosures: NEMA 250 Type 1.
B. Outdoor Enclosures: NEMA 250 Type 3R or Type 4.
C. Stainless steel where required such as chiller plants and lift stations areas.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Provide Type 1 SPD devices at all service entrances on load side of main switch, with ground lead bonded to service entrance ground.
B. Provide Type 2 SPD devices for panelboards and auxiliary panels with conductors between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground. Locations shall include all exterior panels, lab panels, panels serving exterior lighting and equipment loads, and process equipment panels. Coordinate with USF-PM for other panels requiring Type 2 connection prior to design.
    1. Provide multiple pole, 30-A circuit breaker as a dedicated disconnecting means for Type 2 SPD unless otherwise indicated.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.
    1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
B. Tests and Inspections:
    1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.
    2. After installing SPD devices but before electrical circuitry has been energized, test for compliance with requirements.
    3. Complete startup checks according to manufacturer's written instructions.
C. SPD device will be considered defective if it does not pass tests and inspections.
D. Prepare test and inspection reports.

3.3 STARTUP SERVICE

A. Do not energize or connect service entrance equipment or panelboards to their sources until SPD devices are installed and connected.
B. Do not perform insulation resistance tests of the distribution wiring equipment with the SPD installed. Disconnect before conducting insulation resistance tests and reconnect immediately after the testing is over.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train USF Maintenance and Utilities personnel to maintain SPD devices.

END OF SECTION 26 43 13

SECTION 26 51 00 INTERIOR LIGHTING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior lighting fixtures.
   2. Emergency lighting units.
   3. Exit signs.
   4. Lighting fixture supports.

B. Related Sections:
   1. Section 26 09 23, Lighting Control Devices for automatic control of lighting, including time switches, photoelectric relays, and occupancy sensors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, and finishes.

B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories. Product Certificates: For each type of dimmer-controlled fixtures from manufacturer.

C. Provide a fixture sample if directed by USF-PM.

D. Submit photometric calculations superimposed onto the floor plan if directed by USF-EE, USF-PM, or USF-BCA. The photometric levels are to be legible when plotted to scale.

E. Submit emergency egress photometric calculations superimposed onto the floor plan and/or site plan if directed by USF-EE, USF-PM, or USF-BCA.

F. Lighting fixture schedule indicating the fixture manufacturer, catalog number, input watts, CRI and Kelvin temperature color identification, and description shall be included on the electrical plan documents.

G. Light levels shall meet IESNA recommendations unless directed otherwise by USF-EE, USF-PM, or USF-BCA.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

1.5 WARRANTY

A. LED Fixtures, Light Emitting Diodes (LEDs), and Drivers: Manufacturer shall provide five-year warranty against defects in materials and workmanship for all products. Project contractor shall replace defective fixtures and components during the first year of warranty without additional compensation from USF.

B. Warranty period shall begin on date of substantial completion.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers and products are subject to USF-Facilities review and approval.
   1. Provide electronic (PDF format) cutsheets of proposed fixtures with reflected ceiling plan at design development.
   2. Provide electronic (PDF format) cutsheets of specified fixtures at 100% Construction Documents.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. All fixtures shall be LED type.

C. Incandescent, MR16, and quartz lamp fixtures are prohibited.
D. Fluorescent and induction lamp fixtures are prohibited.
E. HID lamp fixtures are prohibited.
F. LED: UL listed per document UL 8750.
G. Metal Parts: Free of burrs and sharp corners and edges.
H. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
I. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit maintenance without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during maintenance and when secured in operating position.
J. USF campus standard LED fixtures (coordinate with USF-PM for the fixture appropriate for the project):
    1. 2'x4', equal to Lithonia 2ALL4 series architectural LED troffer.
    2. 2'x2', equal to Lithonia 2ALL2 series architectural LED troffer.
    3. Specification grade LED down lights for the application.
    4. Provide standard 1% (0-10 volt) dimming.
    5. Deviations require USF-FM approval via USF Design and Construction Guideline Change Form. Coordinate with USF-PM.
K. Diffusers and Globes:
    1. Use of lay-in acrylic lens luminaires requires approval from USF-FM and Maintenance prior to design.
    2. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
        a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
        b. UV stabilized.
        c. Glass: Annealed crystal glass unless otherwise indicated.
        d. Polycarbonate lens are not permitted.
L. Air-handling fluorescent fixtures shall not be used.

2.3 EMERGENCY POWER UNIT

A. Internal Type, locations without life safety generator: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body. Comply with UL924.
    1. Emergency Connection: Operate as night light where not required to be switched.
    2. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
        a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
        b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
    3. Battery: Sealed, maintenance-free, nickel-cadmium type.
    4. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
    5. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
    6. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
    7. Protection: Class P thermal cutout.
B. Wall or ceiling mount dual head emergency lights with battery back-up are not approved. Provide self-contained, modular, battery inverter unit in LED fixtures in accordance with 2.5 A.

2.4 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
B. Internally Lighted Signs:
    1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
    2. Self-Powered Exit Signs (Battery Type), locations without a life safety generator: Integral

automatic charger in a self-contained power pack.
a. Battery: Sealed, maintenance-free, nickel-cadmium type.
b. Charger: Fully automatic, solid-state type with sealed transfer relay.
c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.5 LAMPS (EXISTING FLUORESCENT LAMP REPLACEMENT)

A. USF campus standard T8 rapid-start lamps, rated 28 W maximum, nominal length of 48 inches 2800 initial lumens (minimum), CRI 85 (minimum), color temperature 3500K, and average rated life of 36,000 hours.
1. Campus standard lamp is Sylvania Product Number 22178, F028/835/XP/SS/ECO with matching ballast: 1 lamp – QHE1x32 T8/UNV ISN-SC, 2 lamp – QHE 2x32 T8/UNV ISN-SC, and 3 lamp – QHE 3x32 T8/UNV ISN-SC. Or equivalent Phillips lamps and ballasts.
2. College of Medicine buildings (CMS, CPH, MDA, MDC, MDH, MDL, MDN, and MDT) Kelvin temperature shall be 4100K.

2.6 LED LAMP RETROFIT (MAINTENANCE REPLACEMENT OF EXISTING FLUORESCENT LAMPS ONLY)

A. LED retrofit replacement for USF campus standard T8 rapid-start lamps, rated 28 W maximum, nominal length of 48 inches 2800 initial lumens (minimum), CRI 85 (minimum), color temperature 3500K, and average rated life of 36,000 hours. Replace with Keystone KT-LED12T8-48G-835-E 3500K. Replace lamp ballast with new Keystone KTLD-4LT8-UV-12C-VDIM/G2 US class 2 LED dimmable driver.
1. Adjust model numbers as required to accommodate single lamp, 2 lamp, 3 lamp, or 4 lamp replacements, and for 2'x2' type luminaires replacements.
2. College of Medicine buildings (CMS, CPH, MDA, MDC, MDF, MDH, MDL, MDN, and MDT) Kelvin temperature shall be 4100K.
3. SUN Corral Area (Volleyball) Kelvin temperature shall be 4000-4100K.

2.7 KELVIN TEMPERATURE AND CRI STANDARDS

A. USF campus standard:
1. Color Index: CRI 80-85 (provide CR 95 minimum in galleries or other spaces requiring higher CRI – coordinate with USF-PM prior to design).
2. Campus standard Kelvin temperature shall be 3500K.
3. College of Health buildings (CMS, CPH, MDA, MDC, MDF, MDH, MDL, MDN, MDT, and SWC) Kelvin temperature shall be 4100K.
4. SUN Corral Area (Volleyball) Kelvin temperature shall be 4000-4100K.
5. Interior portions of parking structures (BDG, CBG, CHG, and LDG) Kelvin temperature shall be 5000K. Exterior mounted luminaries shall be 4100K in accordance with Section 26 56 00 Exterior Lighting.

2.8 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Section 26 05 29, Hangers and Supports for Electrical Systems for channel- and angle-iron supports and nonmetallic channel and angle supports.
B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 ga.
E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 ga.
F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

Part 3 -- EXECUTION

3.1 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
B. Provide final aiming and focusing of luminaires under direction of USF-PM. All exterior lights final aiming and focusing shall be performed during non-daylight hours at the discretion of USF-PM.
C. Comply with NFPA 70 for minimum fixture supports.
D. Suspended Lighting Fixture Support:
   1. Pendants and Rods: Where longer than 48 inches brace to limit swinging.
   2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
   3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
E. Adjust amiable lighting fixtures to provide required light intensities.
F. Connect wiring according to Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables.
G. All fixtures' LEDs boards and drivers shall be readily accessible from underneath the fixture, through the lens, door, open aperture, etc.
I. Provide emergency lights in all restrooms.
J. Facilities with life safety generator (Level 1): connect emergency egress lighting to the life safety generator.

3.2 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 26 51 00

SECTION 26 56 00 EXTERIOR LIGHTING

PART 1 -- GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior luminaires with LED illumination source and drivers.
   2. Poles and accessories.

1.2 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in the Florida Building Code. Poles and fixtures assemblies shall meet 145 mph.

1.3 ACTION SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.
B. Provide a fixture sample if directed by USF-PM.
C. Submit photometric calculations superimposed onto the site plan or floor plan for all exterior lighting. The photometric levels shall be legible when plotted to scale. Provide separate photometric calculations for emergency egress lighting. Provide photometric calculations for all approved luminaires in section 2.1. Final design layout and quantities shall be based on the manufacturer requiring the greatest number of luminaires to meet USF guidelines. Coordinate with USF-PM to schedule a pre-design meeting with the USF-EE to review design approach prior to proceeding.
D. Design Light levels (Provide for USF Design & Construction review and approval in the 50% Construction Document Phase or earlier submission):
   1. Pedestrian Walkways/Sidewalks: 1.0 to 1.5 foot-candle average, 4:1 average to minimum ratio. 0.3 foot-candle minimum allowable level.
   2. Parking Areas: 1.0 to 2.0 foot-candle average, 4:1 average to minimum ratio. 0.5 foot-candle minimum allowable level.
   3. Roadways: 1.0 to 1.5 foot-candle average, 4:1 average to minimum ratio. 0.3 minimum allowable level.
   4. Emergency Egress lighting required 50 feet from building at all emergency egress exits: 1.0 foot-candle average, no point less than 0.1 foot-candle, comply with NFPA 101 7.9.2. Coordinate with USF Building Code Administrator.
   5. Pedestrian Crosswalks: Provide roadway standard pole assembly at each entrance point from the sidewalk (e.g., both sidewalk to crosswalk entrances)
   6. Design light levels shall be maintained levels: between .08 and 0.9 maintenance factor.
   7. Maximum Driver Current 800mA.
E. Lighting fixture schedule indicating the fixture manufacturer, catalog number, voltage, input watts, CRI and Kelvin color identification, mounting, and description shall be included on the electrical plan documents in a “Fixture Schedule”.
F. Light levels for exterior stairs shall comply with NFPA and USF-BCA requirements. Provide separate photometric calculations for exterior stairs to USF Design & Construction and USF-BCA.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with IEEE C2, "National Electrical Safety Code”.
C. Comply with NFPA 70.

1.5 WARRANTY

A. LED fixtures, lighting emitting diodes, and drivers: Manufacturer shall provide five-year warranty against defects in materials and workmanship for all products. Project contractor shall replace defective fixtures and components during the first year of warranty without additional compensation from USF.

B. C. Warranty period shall begin on date of substantial completion.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers and products are subject to Design and Construction review and approval.
   1. Provide electronic (PDF format) cutsheets of proposed fixtures at design development.
   2. Provide electronic (PDF format) cutsheets of specified fixtures at 100% Construction Documents.
B. USF campus standard LED roadway fixture (verify project specific voltage).
   1. Cooper Lighting: NAV SA3B 740 U (or 8) T3 AP 10K, or
   2. Lumec: RFL 145W64LED4K G2 R3M UNV (or HVU) DMG PH9 SP2 GY3
   3. Proposed substitutions require preapproval from USF Electrical Engineer.
C. USF campus standard Parking Lot LED fixture (verify project specific voltage).
   1. Parking Lot Perimeter:
      a. Cooper Lighting: NAV SA3B 740 U (or 8) T3 AP 10K, or
      b. Lumec: RFL 145W64LED4K G2 R3M UNV (or HVU) DMG PH9 SP2 GY3
      c. Proposed substitutions require preapproval from USF Electrical Engineer.
   2. Parking Lot Interior (verify project specific voltage):
      a. Cooper Lighting: NAV SA3B 740 U (or 8) SWQ AP 10K, or
      b. Lumec: RFL 145W64LED4K G2 5 UNV (OR HVU) DMG PH9 SP2 GY3
      c. Proposed substitutions require preapproval from USF Electrical Engineer.
D. USF campus standard post top pedestrian LED fixture (verify project specific voltage).
   1. Cooper Lighting: MPW A5 D U (or 8) SYM GREY 10K, or
   2. AEL: 245L 20LED70 4K MVOLT R5 GL NR SD SS
   3. Substitutions are not permitted.
E. Roadway and parking lot fixture color shall be grey.
F. Pedestrian/sidewalk fixture color shall be grey.
G. Coordinate with USF-PM for building mounted fixture color. All building mounted and canopy luminaires shall be LED.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
B. All exterior light fixtures including building mounted and canopy luminaires shall be full cutoff type, dark sky friendly, to reduce light pollution. USF standard pedestrian light fixture specified in 2.1 is exempt from the full cutoff requirement.
C. Metal Parts: Free of burrs and sharp corners and edges.
D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
E. Housings: Rigidly formed, weather- and light-tight aluminum enclosures that will not warp, sag, or deform in use.
F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during servicing and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
G. Exposed Hardware Material: Stainless steel.
H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
I. Light Shields: Aluminum baffles, or shields factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
J. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
K. Provide factory mounted in-line surge projection in all exterior roadway fixtures, parking lot fixtures, and pedestrian/sidewalk fixtures. Provide additional surge protector in each pole handhole: DITEK DTK-DL Series Surge Protection Device.
L. All exterior fixtures shall be aluminum. Factory-applied finish for aluminum luminaires shall comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for

recommendations for applying and designating finishes.
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.

M. Factory-Applied Labels: Comply with UL 1598. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles.

N. Exterior pedestrian, roadway, and parking lot lighting shall be fed from 60 ampere, 3 phase source via 60 amperes, 3 pole circuit breaker. Branch wiring shall be 4 # 6, 1 # 6 equipment ground in 1-1/2 inches conduit. Luminaires shall be 277 Volt. A 3-phase branch circuit shall be utilized, alternating between Phase A, B, and C for a balanced load. Extend all three Phases to end of conduit run unless directed otherwise by USF-PM and USF Utilities.

2.3 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with Florida Building Code.
1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.

B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
1. Materials: Shall not cause galvanic action at contact points.

D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 inches x 5 inches, with cover secured by stainless-steel captive screws. Provide ground lug with stainless steel screw inside of pole, adjacent to the handhole opening. Center line of handhole shall be 24 inches above finish grade for all poles. Handhole cover shall be flush to pole.

2.5 ALUMINUM POLES

A. Poles: Seamless, extruded structural tube complying with ASTM B 429/B 429M, Alloy 6063-T6 with access handhole in pole wall.
1. Shape: Round, tapered.
2. Direct Burial.

B. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

C. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, and then bolted together with stainless-steel bolts.

D. Pole Finish – Brush satin natural aluminum finish.

E. Poles Delivered to Site:
1. Unwrap protective covering immediately and store so not to damage finish.
2. Schedule inspection with USF-PM to ensure protective wrapping has been removed and the pole finish is acceptable to USF.

F. USF standard poles: Substitution requires pre-approval from USF-Facilities prior to design.
1. Roadway and Parking Lot Poles located in grass or landscape areas (direct burial type): Fixture mounting heights, 32 feet-6 inches above finish grade. Valmont 290845806TEE (verify for 9' burial depth) A/1TA0832BSBF-HH 24 inches nominal 39 feet pole embedded 9 feet, or preapproved equal. Fixture Truss Arm shall be 8 feet arm.
2. Parking Lot Poles (concrete base mounted): Fixture mounting heights, 32 feet-6 inches above finish grade. Valmont 270245805T4/1TA0832B45SBF nominal 27 feet-2 inches mounted on concrete base (nominal 2 feet-6 inches above ground and minimum 8 feet embedded), or preapproved equal. Fixture Truss Arm shall be 8 feet. Concrete pole base required for locations in asphalt or concrete areas without grass islands. Pole base shall be stained DOT yellow. Pole base detail shall be pre-approved by USF-FM at schematic design phase. Concrete base with pole assembly submittal including wind load calculations meeting USF campus wind load criteria shall be signed and sealed by a Florida Registered Structural Engineer.
3. Post Top Pedestrian Lights Pole: Fixture mounting heights, top of pole 9 feet-8 inches to 10 feet-0 inches above finish grade. Valmont Structures 0908 30404TE TENON SBF, or

preapproved equal.

4. Burial (embedded) depths shall be as required by manufacturer to meet wind load requirement. Provide protective coating (Bitumastic) from pole bottom to line indicated for the embedded depth. The pole shall not be embedded no lower than the protective coating. If pole is embedded beyond this line, the contractor shall replace pole at no additional compensation from USF.

PART 3 -- EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Provide final aiming and focusing of luminaires that require field adjustment or aiming under the direction of USF-PM. Aiming and focusing luminaires shall be performed during non-daylight hours.

C. Provide adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

3.2 POLE INSTALLATION (Site Lighting - Pedestrian Light Poles, Roadway Light Poles, Parking Lot Light Poles, etc.)

A. Alignment: Align poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Coordinate all pole locations with USF-PM prior to installation. All pole locations shall be staked for USF review and approval prior to excavating. Failure to verify proposed pole locations prior to excavating, the contractor shall bear all costs to relocate raceways, handholes, and poles as directed by USF. Maintain the following minimum horizontal distances from surface and underground features:
   1. Fire Hydrants: 7 feet-6 inches.
   2. Water, Gas, Electric, Communication, and Sewer Lines: 5 feet.
   3. Trees: Coordinate tree spacing with poles, locate pole at midpoint between trees.
   4. All roadway and parking lot light poles shall be located 4 feet from edge of parking or roadway curb to face of pole.
   5. All sidewalk light poles shall be located 3 feet from edge of sidewalk to face of pole.

C. Embedded Poles with Tamped Earth Backfill: Set poles to depth below finished grade indicated by the manufacturer to meet the wind load requirements.
   1. Dig holes large enough to permit use of tampers in the full depth of hole.
   2. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.
   3. Contractor shall re-tamp grade around pole 30 days after installation. Provide required fill and sod.
   4. Provide concrete collar at all roadways light poles. Obtain USF standard concrete collar detail from USF Electrical Engineer prior to design.

D. Raise and set poles using web fabric slings (not chain or cable).

E. Provide an in-ground handhole within 3 feet of each light pole for branch wiring connection to light pole. Minimum distance from pole shall be 1 feet-6 inches, but no closer that will affect the wind load rating for the pole assembly installation; consult with pole manufacturer performing the wind load structural analysis. In-ground handhole shall be located behind the pole, opposite of the sidewalk or roadway. The pole handhole shall face the in-ground handhole. “Electrical” label on in-ground handhole cover shall face the sidewalk or roadway. These may not be shown on plan view, but they are implied by the pole location.

F. Branch wiring connection to light pole (between in-ground handhole and pole handhole) shall be 2 #10, 1 #10 equipment ground, and 1 #8 bare ground (bond between driven ground rod and pole ground lug) in 1-inch non-metallic flexible conduit.

G. Provide a DITEK DTK-DL Series Surge Protection Device in each pole handhole. DL120 or DL240/480 matching luminaires voltage. An acceptable substitution is HESC/RLS Highway Lighting equivalent. Any other substitutions require USF Design & Construction and USF Utilities pre-approval prior to design.

H. Connection to luminaires shall be #10 and #10 equipment ground. Provide slack at luminaire to allow removal from pole or mounting arm without disconnecting conductors and ground.

I. Electrical connections in in-ground handholes shall be Raychem GHFC H Frame weatherproof

closures UL listed for the application. Use weatherproof Blue Ideal wire nuts for end of single conductors.

J. Provide luminaires fuses in pole handhole in accordance with Section 26 28 13, Fuses.

K. Project USF PM shall provide a paying workorder to USF Utilities to provide identification tag on each light pole.

3.3 GROUND MOUNTED LUMINAIRES

A. All landscape up lighting, building floodlighting, sign lighting, and flag up lighting shall be LED type floodlight mounted on concrete base. USF campus standard is RAB HBLED26NVG (verify project specific voltage). Use narrow beam for flag up lighting RAB HNLED26NG (verify project specific voltage). USF standard color shall be Verde Green (verify with USF-PM prior to ordering).

B. Install on concrete base with top of concrete 6 inches above finish grade. Cast conduit or support into base, and finish by troweling and rubbing smooth.

C. Concrete base diameter shall provide protection for the luminaire from lawn equipment, but in no case be smaller than 18 inches diameter, or less than 6 inches from furthest end of luminaire. Concrete base shall support Arlington Industries, Inc. GARD-N-POST GP26G 77094 Green for mounting floodlight.

3.4 GROUNDING

A. Ground metal poles and support structures according to Section 26 05 26, Grounding & Bonding for Electrical System.

1. Install grounding electrode for each pole in pole handhole.
2. Provide #8 bare copper ground from grounding electrode to ground lug in pole. Bond the equipment grounds and pole ground to the driven grounding electrode via Acorn type connector. Ground pole to driven grounding electrode with #8 bare copper, looped through the Acorn connector at the electrode and connect to #6 and #10 equipment grounds in the in-ground handhole.

3.5 USF EMERGENRCY PHONES BLUE LIGHTS

A. The emergency safety light and phone towers (Blue Lights) shall be "Talk-a-phone" Model ETP-MTE. Pole tower shall be painted USF standard Pantone Green color PMS 342 with reflective white lettering. Coordinate with USF-PM, USF-IT, and FM-OPS for most current specification.

1. Talk-A-Phone ETP-MTE
2. Talk-A-Phone ETP-500E: Hands Free Help Phone.
3. Talk-A-Phone Blue Light shall be LED top light ETP-EL and LED faceplate light.

B. Provide concrete base per manufacturer installation instructions.

C. Power via dedicated 120 Volt branch circuit from the nearest building. Provide a lock-on handle on the branch circuit breaker. 120 Volt branch circuit shall be via standby generator backed up panel if available.

D. Provide 3/4-inch conduit with CAT 6E wire from the nearest building IDF room. Coordinate with USF-IT.

E. Coordinate Blue Lights locations with USF-PM, USF-IT, and USF-PD prior to conduit rough-in.

F. Project USF-PM shall identify and provide funding source chart field for a monthly billing entity through USF-IT Communications for the phone service and/or purchase of the Blue Light assembly prior to design or construction.

3.6 EXTERIOR POLE MOUNTED LIGHTING CONTROL

A. Provide 24 inches x 24 inches x 8 inches deep NEMA 3R Hoffman enclosure. Locate on exterior of building as directed by USF-PM and FM-OPS.

B. Provide backboard in Hoffman enclosure for mounting equipment. Backboard shall be manufactured with fire resistant materials.

C. Provide 60 ampere, 3 pole circuit breaker for local means to disconnect power. Locate circuit breaker on the left side of the enclosure. The line side conduit shall enter the enclosure on the left side.

D. Provide 60 ampere, 3 pole lighting contactor. Locate contactor on top right side of the enclosure. The load side conduit shall exit the enclosure on the right side.

E. Provide on/off/auto selector switch for lighting contactor override control. Selector switch shall

be located inside the enclosure, lower left-hand corner. Selector switch shall not be integral to the lighting contactor and shall not be able to be controlled by the public while the enclosure is closed. Label the selector switch control positions: ON / OFF / AUTO.

F. Provide lightning arrestor, leads connected to load side of lighting contactor. The lightning arrestor shall be located at the lower right bottom of enclosure.
G. Provide Tork 2007A photocell on Hoffman enclosure for lighting control. Face photocell away from light sources. Locate photocell at the right top of enclosure.
H. Provide the same exterior lighting control apparatus listed in Subparagraph 3.6 A thru G above for the emergency egress pole mounted lighting. Emergency egress lighting branch circuit breaker can be sized to the load, but no smaller than 30 amperes. All items on the load side of the contactor shall meet USF site lighting standards, such as 3 phase branch circuit, minimum conductor size #6 AWG, and minimum conduit size 1-1/2 inches. The emergency lighting branch circuit, circuit breaker, and contactor can be located in the same Hoffman enclosure as the normal exterior lighting branch circuit apparatus provided there is a separation barrier and there is NEC code required space in the Hoffman enclosure. Contractor shall provide layout for USF approval prior to ordering, include in project submittals.

3.7 USF COORDINATION

A. Coordinate with USF-PM and USF Utilities prior to working on any existing branch circuit.
B. All roadway, parking lot, walkway, and area lighting circuits shall remain operational during modifications or relocations.
C. Removed concrete poles, fiberglass poles, concrete base poles and concrete bases that are not re-used shall be removed from the campus for disposal by the contractor. USF Utilities approval is required before re-using any removed pole.
D. Removed fixtures arms shall be removed from the campus for disposal by the contractor. Removed fixtures shall be delivered to USF Utilities approved storage area if requested by USF Utilities. Coordinate with USF-PM and USF Utilities prior to construction.

END OF SECTION 26 56 00

University of South Florida

July 1

2023

Division 27
Data/Communications Guidelines

Category 6A
Specification

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GENERAL

1.1 SCOPE OF WORK

A. THIS DOCUMENT SPECIFIES **UNIVERSITY OF SOUTH FLORIDA** REQUIREMENTS FOR PRODUCT DESIGN, PERFORMANCE, QUALITY ASSURANCE, AND CONTRACTOR RESPONSIBILITIES FOR EXECUTION OF WORK TO INSTALL A COMPLETE CATEGORY 6A STRUCTURED CABLING SYSTEM. EXECUTION OF WORK INCLUDES DELIVERY AND STORAGE OF MATERIALS, PREPARATION, INSTALLATION, FIELD-TESTING, AND PROJECT COMPLETION TASKS. SYSTEM CERTIFICATION AND WARRANTY SUBMITTAL REQUIREMENTS FOR COMPLETED WORK AND FUTURE MOVES, ADDS AND CHANGES (MAC'S) ARE ALSO SPECIFIED IN THIS DOCUMENT. COMPLIANCE TO APPLICABLE CODES, STANDARDS AND REGULATIONS IS REQUIRED FOR ALL CONSTRUCTION WORK PERFORMED.

1.2 SUMMARY

A. SECTION INCLUDES PRODUCTS AND EXECUTION REQUIREMENTS PERTAINING TO DIVISION 27 SYSTEMS. COPPER AND FIBER BACKBONE AND HORIZONTAL CABLING ALONG WITH SUPPORT SYSTEMS ARE COVERED UNDER THIS DOCUMENT.

B. PRODUCT SPECIFICATIONS, GENERAL DESIGN CONSIDERATIONS, AND INSTALLATION GUIDELINES ARE PROVIDED IN THIS DOCUMENT. QUANTITIES FOR ALL CABLING PRODUCTS SHALL BE PROVIDED AS REQUIRED TO COMPLETE CABLING TO ALL WORK STATIONS AS SHOWN ON FLOOR PLANS.

C. THE APPROVED CONTRACTOR SHALL FURNISH THE REQUIRED MATERIALS AND LABOR TO COMPLETE THE CATEGORY 6A CABLING INFRASTRUCTURE SPECIFIED IN THE CONTRACT DOCUMENTS.

D. CONSTRUCTION WORK SHALL COMPLY WITH CONTRACT DRAWINGS, SPECIFICATIONS, PROJECT COMPLETION SCHEDULES, AND APPLICABLE CODES AND STANDARDS.

E. WORK SHALL INCLUDE ALL DETAILED EXECUTION REQUIREMENTS, SUCH AS PREPARATION, INSTALLATION, SYSTEM CERTIFICATION, AND PROJECT CLOSEOUT ACTIVITIES ACCORDING TO THE CONTRACT.

F. THE SAME MANUFACTURER'S PRODUCT SHALL BE UTILIZED THROUGHOUT THE ENTIRE PROJECT FOR ALL COPPER AND FIBER OPTIC CABLING AND CONNECTIVITY.

G. SUBSTITUTIONS: NO SUBSTITUTED PRODUCTS SHALL BE INSTALLED EXCEPT WITH WRITTEN APPROVAL BY OWNER.

1.3 DATA AND VOICE COMMUNICATIONS CONTRACT WORK

A. GENERAL:

a) FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT AND SERVICES FOR THE INSTALLATION IN ACCORDANCE WITH GENERAL PROVISIONS OF THE SPECIFICATIONS AND THE CONTRACT DRAWINGS.

b) COMPLETELY COORDINATE WITH WORK OF ALL OTHER TRADES.

c) PROVIDE ALL SUPPLEMENTARY OR MISCELLANEOUS ITEMS, APPURTENANCES AND DEVICES INCIDENTAL TO OR NECESSARY FOR A SOUND, SECURE AND COMPLETE INSTALLATION, WHETHER OR NOT SPECIFICALLY INDICATED IN THE CONTRACT DOCUMENTS.

d) PROVIDE ALL FLOOR PENETRATIONS, FLOOR SLEEVES, CONDUIT RACEWAYS, WALL PENETRATIONS, ETC. NOT SHOWN ON THE ELECTRICAL PLANS BUT NEEDED FOR THE ROUTING OF CABLING PROVIDED HEREIN.

e) PROVIDE FIRESTOPPING.

f) PROVIDE LABOR FOR PATCH CORD INSTALLATION AT HORIZONTAL PATCH PANEL IN THE TR AND TC.

g) PROVIDE LABOR FOR TESTING HORIZONTAL AND BACKBONE CABLING.

h) PROVIDE LABOR FOR WIRELESS LAN ACCESS POINT, ANTENNAS AND POWER INJECTOR INSTALLATION AND SYSTEM TESTING.

i) PROVIDE TELECOMMUNICATIONS GROUNDING AND BONDING.

B. PROVIDE COMPLETE INSTALLATION FOR STRUCTURED TELECOMMUNICATIONS CABLING SYSTEM INCLUDING BUT NOT LIMITED TO:

a) CATEGORY 6A UTP HORIZONTAL CABLES.

b) MULTIMODE & SINGLEMODE OPTICAL FIBER BACKBONE CABLES.

c) WORK AREA TELECOMMUNICATION OUTLETS.

d) WALL MOUNTED OUTLETS.

e) EQUIPMENT MOUNTING RACKS AND RACK ENCLOSURES.

f) CATEGORY 6A MODULAR PATCH PANELS.

g) OPTICAL FIBER PATCH PANELS.

h) OPTICAL FIBER CONNECTORS.

i) DATA CATEGORY 6A PATCH CORDS

j) OPTICAL FIBER PATCH CORDS.

k) WIRE MANAGEMENT PANELS.

l) FIELD TESTING.

m) CONDUIT FLOOR SLEEVES, CONDUIT AND SUPPORTS REQUIRED FOR INSTALLATION OF ALL CABLING.

n) FIRESTOPPING.

1.4 SUBMITTALS

A. SUBMITTALS SHALL BE COMPLETE AND AT ONE TIME. PARTIAL SUBMITTALS WILL NOT BE CONSIDERED.

B. MATERIAL LISTS, SCHEDULE OF VALUES, LISTS OF SUBCONTRACTORS, AND PROOF OF CONTRACTOR QUALIFICATIONS SHALL BE PROVIDED TO ENGINEER UPON REQUEST AND SHALL FOLLOW THE GUIDELINES AS STATED IN THE GENERAL REQUIREMENTS (DIVISION 1 OF THE SPECIFICATION).

C. SHOW DRAWINGS SHALL BE SUBMITTED. ALL COMMUNICATION SYSTEM SHOP DRAWINGS SHALL INCLUDE:

a) MANUFACTURER'S DATA (SPECIFICATIONS, "CUT SHEETS").

b) WIRING DIAGRAMS FOR ALL INSTALLED CABLING.

c) EQUIPMENT RACK/CABINET LAYOUTS.

d) PROPOSED LABELING SCHEMES AND LABELING METHOD.

e) LIST OF CABLING DISTANCES (TYPICAL AND MAXIMUM) FOR ALL STRUCTURED CABLING

f) SUBMIT COPIES OF CERTIFICATIONS FOR ALL TECHNICIANS AND THE PROJECT MANAGER WHO WILL SUPPORT THIS PROJECT. THE CERTIFICATIONS SHALL INCLUDE:

a) STRUCTURED CABLING AND TERMINATION EQUIPMENT INSTALLATION CERTIFICATIONS FOR COPPER AND OPTICAL FIBER CONNECTIVITY AND CABLING.

b) APPROVED MANUFACTURER CLASSES SATISFACTORILY COMPLETED.

g) CONTRACTOR SHALL SUBMIT A TEST PLAN THAT DEFINES THE TESTS REQUIRED TO ENSURE THAT THE SYSTEM MEETS TECHNICAL, OPERATIONAL, AND PERFORMANCE SPECIFICATIONS 20 WORK DAYS PRIOR TO PROPOSED TEST DATE.

h) CONTRACTOR WILL SUBMIT PRIOR TO TESTING, ALL CERTIFICATES OF CALIBRATION(S) FOR TEST EQUIPMENT BEING USED ON THE PROJECT

i) WORK SHALL NOT PROCEED WITHOUT THE OWNER'S APPROVAL OF THE SUBMITTED ITEMS.

D. DRAWINGS & INSPECTION OF SITE:

a) FLOOR PLAN DRAWINGS ARE TO SCALE AND TYPICALLY ARE NOT DIMENSIONED. THE CONTRACTOR SHALL NOT USE SCALE DRAWINGS FOR EQUIPMENT PLACEMENT AND CLEARANCES. DIMENSIONS GIVEN ON DRAWINGS SHALL ALWAYS TAKE PRECEDENCE OVER SCALED DRAWINGS.

b) ANY EXISTING WIRES, UTILITIES, OR EQUIPMENT SHOWN ON THE DRAWINGS ARE SHOWN FOR GENERAL INFORMATION AND TO THE BEST KNOWLEDGE OF THE ENGINEER. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING WIRES, UTILITIES, OR EQUIPMENT.

c) THE CONTRACTOR SHALL FIELD VERIFY DISTANCES AND EQUIPMENT PLACEMENTS COORDINATING LOCATIONS WITH OTHER TRADES, CONSTRUCTION MANAGERS, AND GENERAL CONTRACTOR PRIOR TO INSTALLATION.

d) THE CONTRACTOR SHALL REVIEW ALL SITE CONDITIONS PRIOR TO SUBMITTING A BID ON THIS PROJECT. ANY OBVIOUS DISCREPANCIES BETWEEN THE SITE CONDITIONS AND BIDDING DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AT THE TIME OF BIDDING SO CLARIFICATION CAN BE MADE BY ADDENDUM.

e) CHANGE ORDER REQUESTS FOR ADDITIONAL COSTS RELATED TO THE CONTRACTORS MISUNDERSTANDING RELATED TO THE AMOUNT OF WORK INVOLVED AND LACK OF KNOWLEDGE RELATED TO THE SITE CONDITIONS WILL NOT BE ALLOWED.

E. TEST REPORTS:

a) SUBMIT COPIES OF COMPLETE REPORTS OF ALL TESTING PERFORMED TO THE GENERAL CONTRACTOR, WITH COPIES TO THE GC AND ENGINEER UPON COMPLETION OF JOB.

1.5 APPROVED CONTRACTOR

A. THE CONTRACTOR SHALL HAVE EXPERIENCE IN THE INSTALLATION AND TESTING OF SIMILAR SYSTEMS AS SPECIFIED HEREIN AND SHALL PROVIDE REFERENCES UPON REQUEST (INCLUDING THE PROJECT NAME, ADDRESS, DATE OF IMPLEMENTATION, CLIENT NAME, TITLE, TELEPHONE NUMBER, AND PROJECT DESCRIPTION.

B. ALL MEMBERS OF THE INSTALLATION TEAM MUST BE CERTIFIED BY THE MANUFACTURER AS HAVING COMPLETED THE NECESSARY TRAINING TO COMPLETE THEIR PART OF THE INSTALLATION. ALL PERSONNEL SHALL BE ADEQUATELY TRAINED IN THE USED OF SUCH TOOLS AND EQUIPMENT AS REQUIRED.

C. THE CONTRACTOR BIDDING ON COMMUNICATION SYSTEMS SPECIFIED HEREIN SHALL BE CERTIFIED BY THE CONNECTIVITY MANUFACTURER TO INSTALL, SERVICE, AND WARRANTY THE SPECIFIED PRODUCT PRIOR TO THE TIME OF BID AND THROUGHOUT THE DURATION OF THE INSTALLATION. MANUFACTURER CERTIFICATIONS SHALL NOT BE PROJECT SPECIFIC AND SHOULD BE VALID FOR ANY AND ALL PROJECTS COMPLETED BY CONTRACTOR.

D. THE CONTRACTOR MUST BE CERTIFIED TO INSTALL A FIRE-STOP SYSTEM.

E. THE CONTRACTOR SHALL OWN AND MAINTAIN TOOLS, INSTALLATION EQUIPMENT, AND TEST EQUIPMENT NECESSARY FOR SUCCESSFUL INSTALLATION AND TESTING OF OPTICAL AND CATEGORY 5E, 6 & 6A PREMISE DISTRIBUTION SYSTEMS.

F. THE OWNER RESERVES THE RIGHT TO REQUIRE THE CONTRACTOR TO REMOVE FROM THE PROJECT ANY SUCH EMPLOYEE THE OWNER DEEMS TO BE INCOMPETENT, CARELESS OR INSUBORDINATE.

G. THE CONTRACTOR SHALL HAVE HIS PLACE OF BUSINESS, OFFICIAL OFFICE NOT A RESIDENTIAL DWELLING, LOCATED NO MORE THAN 140 MILES FROM THE JOB SITE.

H. THE CONTRACTOR MUST MAINTAIN A STATE CONTRACTOR'S LICENSE AS REQUIRED BY THE STATE.

I. THE CONTRACTOR SHALL PROVIDE COPIES OF CERTIFICATES FOR PROOF OF MANUFACTURER'S TRAINING, MANUFACTURER'S CERTIFIED INSTALLER, AUTHORIZED DISTRIBUTOR IN THE SHOP DRAWING SUBMITTAL AND AT THE REQUEST OF THE ENGINEER TO VERIFY COMPLIANCE WITH SPECIFICATION PRIOR TO RECOMMENDATIONS FOR AWARDING BID.

J. THE APPROVED CONTRACTOR SHALL ASSUME THE FOLLOWING RESPONSIBILITIES:

a) EXECUTE CONSTRUCTION IN ACCORDANCE WITH CONTRACT DRAWINGS AND SPECIFICATIONS.

b) ADHERE TO PROJECT SCHEDULES AND JOB SITE RULES.

c) ADHERE TO THE QUALITY, REGULATORY, LOGISTICS, AND DOCUMENTATION REQUIREMENTS.

d) FURNISH THE CABLING SYSTEM CERTIFICATION AND WARRANTY PROVISIONS OUTLINED IN PART 1.

e) ADHERE TO THE PRODUCT REQUIREMENTS OUTLINED IN PART 2.

f) ADHERE TO THE EXECUTION GUIDELINES OUTLINED IN PART 3.

K. **CONTRACTOR SHALL ALSO BE INCLUDED IN THE APPROVED CONTRACTORS LIST THROUGH USF PURCHASING / INFORMATION TECHNOLOGY CURRENT ITN CONTRACT.**

1.6 APPROVED PRODUCT MANUFACTURERS

A. THE MANUFACTURER OF THE CONNECTIVITY PRODUCTS SPECIFIED IN THIS DOCUMENT, AS REQUIRED FOR CONSTRUCTION OF THE CABLING INFRASTRUCTURE PER CONTRACT DOCUMENTS SHALL BE:

a) HUBBELL PREMISE WIRING CATEGORY 6A

B. THE MANUFACTURER OF THE CABLING PRODUCTS SPECIFIED IN THIS DOCUMENT, AS REQUIRED FOR CONSTRUCTION OF THE COPPER CABLE INFRASTRUCTURE PER CONTRACT DOCUMENTS SHALL BE:

a) GENERAL CABLE CORPORATION CATEGORY 6A

b) PAIGE DATA COMM GAMECHANGER (FOR EXTENDED LENGTH DESIGNS)

C. THE MANUFACTURER OF THE FIBER OPTIC CABLING PRODUCTS SPECIFIED IN THIS DOCUMENT, AS REQUIRED FOR CONSTRUCTION OF THE FIBER OPTIC CABLE PER CONTRACT DOCUMENTS SHALL BE:

a) OCC

b) GENERAL CABLE CORPORATION

D. PRODUCT SUBSTITUTIONS ARE PERMITTED UNDER THE CONDITIONS STATED BELOW. (1.7 A)

1.7 PRODUCT SUBSTITUTIONS

A. PRODUCT SUBSTITUTIONS FROM OTHER MANUFACTURERS ARE PROHIBITED AND SHALL REQUIRE THE APPROVAL OF USF REPRESENTATIVE 20 DAYS PRIOR TO BID OPENING.

1.8 QUALITY ASSURANCE

A. INSTALLED CATEGORY 6A BALANCED UTP AND FIBER CABLING SYSTEMS, PATHWAYS AND DISTRIBUTION FACILITIES SHALL ADHERE TO MANUFACTURER'S INSTRUCTIONS, CONTRACT DRAWINGS AND SPECIFICATIONS, AND APPLICABLE CODES, STANDARDS AND REGULATIONS.

B. INSTALLED CATEGORY 6A BALANCED UTP CABLING SYSTEMS AND FIELD TEST RESULTS SHALL STRICTLY ADHERE TO REQUIREMENTS OF ANSI/TIA-568-C.0, ANSI/TIA-568-C.1 AND ANSI/TIA/EIA-568-C.2.

C. INSTALLED OPTICAL FIBER CABLING SYSTEMS AND FIELD TEST RESULTS SHALL STRICTLY ADHERE TO REQUIREMENTS OF ANSI/TIA-568-C.0 AND ANSI/TIA/EIA-568-C.3.

D. WHERE APPLICABLE, ALL EQUIPMENT, COMPONENTS, ACCESSORIES AND HARDWARE SHALL BE UL LISTED FOR THE INTENDED PURPOSE OF THE INSTALLATION.

E. INSTALLED PRODUCTS SHALL BE MANUFACTURED BY AN ISO 9001 CERTIFIED FACILITY.

F. INSTALLED PRODUCTS SHALL BE FREE FROM DEFECTS IN MATERIAL OR WORKMANSHIP FROM THE MANUFACTURER, AND SHALL BE OF THE QUALITY INDICATED.

G. ALL METHODS OF CONSTRUCTION THAT ARE NOT SPECIFIED IN THE CONTRACT DOCUMENTS SHALL BE SUBJECT TO CONTROL AND APPROVAL BY THE OWNER OR OWNER'S REPRESENTATIVE.

H. INSTALLED PRODUCTS SHALL BE LOT-TRACEABLE BY DATE CODE.

I. ALL CRITICAL INTERNAL MANUFACTURING OPERATIONS FOR INSTALLED PRODUCTS SHALL HAVE DOCUMENTED IN-PROCESS INSPECTION AND TESTING ACCORDING TO ISO9001.

1.9 DRAWINGS

A. APPROVED OR PRELIMINARY CONTRACT DRAWINGS FURNISHED AT THE TIME OF BID SOLICITATION SHALL SERVE AS THE BASIS FOR PRODUCT SELECTION, CREATION OF BILLS OF MATERIAL, AND DETERMINATION OF LABOR CONTENT.

B. CHANGES, ADDITIONS, OR DELETIONS TO CONTRACT DRAWINGS PRIOR TO AWARDING OF THE CONTRACT, SHALL REQUIRE AND AMENDMENT TO THE ORIGINAL BID.

C. PRIOR TO SUBMITTING THE BID, IN REVIEWING THE CONTRACT DRAWINGS, THE APPROVED CONTRACTOR SHALL:

a) REQUEST THE ATTENTION OF THE ENGINEER, OWNER, OR DESIGN AGENCY TO CLARIFY ANY MATERIALS, APPARATUS OR WORK BELIEVED TO BE INCORRECT, INADEQUATE, OMITTED, OR IN VIOLATION OF APPLICABLE CODES, STANDARDS OR REGULATIONS.

b) NOTE ANY CONTINGENCIES RELATED TO UNKNOWN ASPECTS OF ANY DRAWINGS OR SPECIFICATIONS.

D. CONTRACT DRAWINGS, PRIOR TO EXECUTION OF THE PROJECT, SHALL BE FORMALLY APPROVED AND RELEASED BY THE ENGINEER OR DESIGN AGENCY, AND SHALL BE APPROVED BY THE OWNER OR OWNER'S REPRESENTATIVE.

E. EXECUTION OF WORK SHALL BE ACCORDING TO APPROVED DRAWINGS, IN ADDITION TO APPLICABLE SPECIFICATIONS AND CONTRACTUAL OBLIGATIONS.

1.10 APPLICABLE STANDARDS, CODES, AND REGULATIONS

A. INSTALLATION STANDARDS: CABLE INSTALLATION SHALL COMPLY WITH THE FOLLOWING:

a) AMERICAN NATIONAL STANDARDS INSTITUTE, (ANSI)

a) ANSI/TIA-568-C.0, "GENERIC TELECOMMUNICATIONS CABLING FOR CUSTOMER PREMISES", PUBLISHED 2009

b) ANSI/TIA-568-C.1, "COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING STANDARD", PUBLISHED 2009

c) ANSI/TIA-568-C.2, "BALANCED TWISTED-PAIR TELECOMMUNICATION CABLING AND COMPONENTS STANDARD", PUBLISHED 2009

d) ANSI/TIA-568-C.3, "OPTICAL FIBER CABLING COMPONENTS STANDARD", PUBLISHED 2008.

e) ANSITIA/EIA-569-B, COMMERCIAL BUILDING STANDARDS FOR TELECOMMUNICATIONS PATHWAYS AND SPACES, 2003.

f) ANSITIA/EIA-569-B.2, COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING STANDARD. BALANCED TWISTED PAIR CABLING COMPONENTS.

g) ANSI/TIA/EIA-606-A, ADMINISTRATION STANDARD FOR COMMERCIAL TELECOMMUNICATIONS INFRASTRUCTURE, 2002.

h) ANSI/TIA-607-B, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS, 2011.

i) ANSI/TIA/EIA-942, TELECOMMUNICATIONS INFRASTRUCTURE FOR DATA CENTERS, 2004.

j) ANSI/TIA-1179, HEALTHCARE FACILITY TELECOMMUNICATIONS INFRASTRUCTURE STANDARD

k) ANSI/ICEA S-83-596, FIBER OPTIC PREMISES DISTRIBUTION CABLE, 2001.

l) ANSI/TIA/EIA-598, COLOR CODING OF OPTICAL FIBER CABLES, 2001

m) ANSI/ICEA S-87-640, FIBER OPTIC OUTSIDE PLANT DISTRIBUTION CABLE, 1999.

n) ANSI/TIA/EIA-492AAC, DETAIL SPECIFICATION FOR 850NM LASER-OPTIMIZED 50UM CORE DIAMETER/125 UM CLADDING DIAMETER CLASS 1A GRADED INDEX MULTIMODE OPTICAL FIBERS, 2003.

o) ANSI/TIA/EIA-492CAA, DETAIL SPECIFICATION FOR CLASS IVA DISPERSION-UNSHIFTED SINGLEMODE OPTICAL FIBERS, 2002.

p) ANSI/TIA/EIA-758: CUSTOMER-OWNED OUTSIDE PLANT TELECOMMUNICATIONS CABLING STANDARD, 2004.

q) ANSI/TIA/EIA-526-7, OPTICAL POWER LOSS MEASUREMENTS OF INSTALLED SINGLEMODE FIBER PLANT: OFSTP-7, 2002.

r) ANSI/TIA/EIA-526-14-A, OPTICAL POWER LOSS MEASUREMENTS OF INSTALLED MULTIMODE FIBER PLANT: OFSTP-14A, 2003.

s) ANSI/TIA/EIA-TSB-125, GUIDELINES FOR MAINTAINING OPTICAL FIBER POLARITY THROUGH REVERSE-PAIR POSITIONING, 2001.

t) ANSI/TIA/EIA-TSB-140, ADDITIONAL GUIDELINES FOR FIELD TESTING LENGTH, LOSS, AND POLARITY OF OPTICAL FIBER CABLING SYSTEMS, 2004.

u) ANSI/EIA-310-D, CABINETS, RACKS, PANELS, AND ASSOCIATED EQUIPMENT, 1992.

v) ANSI/TIA/EIA-604 (SERIES), FOCIS FIBER OPTIC CONNECTOR INTERMATEABILITY STANDARD, 2000-2003.

b) NATIONAL FIRE PROTECTION ASSOCIATION, INC., NFPA 70

c) NATIONAL ELECTRIC CODE (NEC), 2005.

a) NEC ARTICLE 250: GROUNDING

b) NEC ARTICLE 386: SURFACE METAL RACEWAYS

c) NEC ARTICLE 388: SURFACE NON-METALLIC RACEWAYS

d) NEC ARTICLE 800: COMMUNICATIONS CIRCUITS

e) NEC ARTICLE 770: OPTICAL FIBER CABLES AND RACEWAY

d) UNDERWRITER'S LABORATORY, INC. (UL)

a) UL-5A: STANDARD FOR NON-METALLIC RACEWAYS AND FITTINGS

b) UL-5: STANDARD FOR SURFACE METAL RACEWAYS AND FITTINGS

c) UL-5C: STANDARD FOR SURFACE RACEWAYS AND FITTINGS FOR USE WITH DATA, SIGNAL, AND CONTROL CIRCUITS

d) UL-50: STANDARD FOR ENCLOSURES FOR ELECTRICAL EQUIPMENT

e) UL-94-V0: TESTS FOR FLAMMABILITY OF PLASTIC MATERIALS

f) UL-498: ATTACHMENT PLUGS AND RECEPTACLES

g) UL-1479: FIRE TESTS OF THROUGH-PENETRATION FIRESTOPS (IN ACCORDANCE WITH ASTM E814).

h) UL-1863: STANDARD FOR SAFETY OF COMMUNICATIONS CIRCUIT ACCESSORIES

e) NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)

a) ANSI/NEMA WD-6-2002: WIRING DEVICES – DIMENSIONAL REQUIREMENTS

b) NEMA 250-2003: ENCLOSURES FOR ELECTRICAL EQUIPMENT

f) FEDERAL COMMUNICATIONS COMMISSION (FCC) TITLE 47, CODE OF FEDERAL REGULATIONS, PART 68: CONNECTION OF TERMINAL EQUIPMENT TO THE TELEPHONE NETWORK, 1998.

g) U.S. PUBLIC LAW 336. 101ST CONGRESS, ADA: AMERICANS WITH DISABILITIES ACT OF 1992.

h) IEEE 802.3AF, DATA TERMINAL EQUIPMENT (DTE) POWER OVER MEDIA DEPENDENT INTERFACE (MDI), 2003.

i) IEEE 802.3AT (CURRENT DRAFT), DATA TERMINAL EQUIPMENT (DTE) ENHANCED POWER OVER MEDIA DEPENDENT INTERFACE (MDI).

j) IEEE 802.3AE, SPECIFICATION FOR 10 GBIT/S ETHERNET OPERATION OVER OPTICAL FIBER.

k) TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL, 12TH EDITION, BUILDING INDUSTRY CONSULTING SERVICES INTERNATIONAL (BICSI).

l) WIRELESS DESIGN REFERENCE MANUAL, 3RD EDITION, BUILDING INDUSTRY CONSULTING SERVICES INTERNATIONAL (BICSI).

m) ANSI/BICSI 001-2009, INFORMATION TRANSPORT SYSTEMS DESIGN STANDARD FOR K-12 EDUCATIONAL INSTITUTIONS, BUILDING INDUSTRY CONSULTING SERVICES INTERNATIONAL (BICSI).

n) BICSI 002-2010, DATA CENTER DESIGN AND IMPLEMENTATION BEST PRACTICES, BUILDING INDUSTRY CONSULTING SERVICES INTERNATIONAL (BICSI).

o) ANSI/NECA/BICSI 568-2006, STANDARD FOR INSTALLING COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING.

p) INFORMATION TRANSPORT SYSTEMS BUILDING INDUSTRY CONSULTING SERVICES INTERNATIONAL (BICSI), INSTALLATION METHODS MANUAL, 5TH EDITION.

q) NETWORK DESIGN REFERENCE MANUAL, 7TH EDITION, BUILDING INDUSTRY CONSULTING SERVICES INTERNATIONAL (BICSI).

B. THIS DOCUMENT IS NOT A SUBSTITUTE FOR ANY CODE, STANDARD OR REGULATION. THE APPROVED CONTRACTOR MUST BE AWARE OF LOCAL CODES THAT MAY IMPACT THE BID SUBMITTAL OR EXECUTION OF THE PROJECT. THE CURRENT REVISION OF ANY APPLICABLE CODE, STANDARD, OR REGULATION SHALL TAKE PRECEDENCE AT THE POINT OF PROJECT EXECUTION, UNLESS OTHERWISE RECOGNIZED BY LOCAL AUTHORITIES. APPLICABLE STANDARDS OR CODES THAT AFFECT CONSTRUCTION, WHICH ARE LISTED AS NORMATIVE REFERENCES WITHIN ANY GOVERNING DOCUMENT, ARE ALSO THE RESPONSIBILITY OF THE APPROVED CONTRACTOR FOR COMPLIANCE.

1.11 MATERIALS:

A. ALL MATERIALS SHALL BE UL OR ETL LISTED AND VERIFIED AND SHALL BE MARKED AS SUCH.

B. PRODUCTS SHALL BE REGULARLY CATALOGUED ITEMS OF THE MANUFACTURER AND SHALL BE SUPPLIED AS A COMPLETE UNIT IN ACCORDANCE WITH THE MANUFACTURER'S STANDARD SPECIFICATIONS WITH ANY OPTIONAL ITEMS REQUIRED FOR PROPER INSTALLATION UNLESS OTHERWISE NOTED.

C. ALL MATERIALS USED ON THIS PROJECT SHALL BE NEW. USED AND REFURBISHED EQUIPMENT IS NOT PERMITTED UNLESS APPROVED BY UNIVERSITY OF SOUTH FLORIDA. PROVIDE EQUIPMENT TO SITE IN ORIGINAL PACKAGING WHENEVER PRACTICAL.

D. MATERIAL SHALL BE DELIVERED TO THE SITE IN THE ORIGINAL PACKING.

1.12 DELIVERY, STORAGE AND HANDLING LOGISTICS

A. MATERIALS DELIVERED TO THE CONSTRUCTION SITE SHALL BE STORED IN A DRY, SECURE AREA, PREFERABLY INDOORS. STORAGE TEMPERATURE OF MATERIALS SHALL ADHERE TO MANUFACTURER'S RECOMMENDATIONS. MOVEMENT OF PACKAGED MATERIALS SHALL BE IN A MANNER TO AVOID DAMAGE OF CONTENTS. ON-SITE STORAGE, EITHER INDOORS OR TRAILER, SHALL HAVE PERMISSION BY THE OWNER, AND SHALL NOT INTERFERE WITH OTHER CONSTRUCTION ACTIVITY.

B. INSTALLATION OF CATEGORY 6A CABLE SHALL BE WITHIN THE RECOMMENDED TEMPERATURE RANGE SPECIFIED BY THE MANUFACTURER. CABLE INSTALLATION TEMPERATURE ABOVE 50F IS RECOMMENDED.

C. THE CONTRACTOR IS RESPONSIBLE FOR SCHEDULING ALL DELIVERIES AND PROVIDING PROPER RECEIPT, HANDLING, AND STORAGE OF ALL MATERIALS. PROTECT ALL EQUIPMENT FROM PHYSICAL DAMAGES (DENTS, SCRATCHES, DUST, WATER, PAINT, CHEMICALS, AND TEMPERATURE EXTREMES) AND VANDALISM, OR THEFT. THE CONTRACTOR SHALL REPLACE ANY DAMAGED OR STOLEN EQUIPMENT. THE CONTRACTOR IS RESPONSIBLE FOR ALL EQUIPMENT UNTIL FINAL PROJECT ACCEPTANCE BY OWNER.

D. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING THE WORKSITE EVERY BUSINESS DAY AND REMOVE DEBRIT FROM THE FACILITY.

1.13 WARRANTY

A. UNIVERSITY OF SOUTH FLORIDA REQUIRES A LINK WARRANTY FOR THE PROJECT.

B. UNIVERSITY OF SOUTH FLORIDA REQUIRES A CHANNEL WARRANTY ON ANY POE LINKS

C. THE LENGTH OF THE EXTENDED WARRANTY SHALL BE A MINIMUM OF TWENTY-FIVE (25) YEARS.

D. WARRANTY COVERING ALL COMPONENTS, EQUIPMENT AND WORKMANSHIP SHALL BE SUBMITTED IN WRITING WITH SYSTEM DOCUMENTATION.

E. THE WARRANTY PERIOD SHALL BEGIN ON THE SYSTEM'S FIRST USE BY THE OWNER.

F. SHOULD THE CABLING SYSTEM FAIL TO PERFORM ITS EXPECTED OPERATION WITHIN THIS WARRANTY PERIOD DUE TO INFERIOR OR FAULTY MATERIAL AND/OR WORKMANSHIP, THE CONTRACTOR SHALL PROMPTLY MAKE ALL REQUIRED CORRECTIONS WITHOUT COST TO THE OWNER

G. UPON COMPLETION OF THE PROJECT THE TELECOMMUNICATION CONTRACTOR SHALL FORWARD THE SIGNED WARRANTY REGISTRATION FORM AND WARRANTY CERTIFICATE TO THE OWNER.

PART 2 PRODUCTS

2.1 WORK AREA CONNECTORS

A. CATEGORY 6A JACKS

a) JACKS SHALL BE STANDARD 8-POSITION, RJ-45 STYLE, UN-KEYED, FCC COMPLIANT.

b) JACKS SHALL BE DESIGNED FOR 4-PAIR, 100 OHM BALANCED UNSHIELDED TWISTED PAIR (UTP) CABLE.

c) EACH JACK SHALL BE SINGLE UNIT CONSTRUCTION, WITH SNAP – FIT TO INDUSTRY STANDARD KEYSTONE OPENING (.760” X .580”).

d) JACK HOUSINGS SHALL BE HIGH IMPACT UL 94 V-0 RATED THERMOPLASTIC.

e) JACKS SHALL HAVE A TEMPERATURE RATING OF -10 °C (14°F) TO 70°C (158 °F).

f) JACK HOUSINGS SHALL FULLY ENCASE AND PROTECT PRINTED CIRCUIT BOARDS AND IDC FIELDS.

g) MODULAR JACK CONTACTS SHALL ACCEPT A MINIMUM OF 25 MATING CYCLES WITHOUT DEGRADATION OF ELECTRICAL OR MECHANICAL PERFORMANCE.

h) JACK CONTACTS SHALL MAINTAIN A MINIMUM DEFLECTION FORCE OF 100 GRAMS WHILE MATED WITH AN FCC-STANDARD RJ-45 PLUG.

i) JACK CONTACTS SHALL BE FORMED FLAT FOR INCREASED SURFACE CONTACT WITH MATED PLUGS.

j) JACK CONTACTS SHALL BE CONSTRUCTED OF BERYLLIUM COPPER FOR MAXIMUM SPRING FORCE AND DURABILITY. CONTACT PLATING SHALL BE A MINIMUM OF 50 MICRO-INCHES OF HARD GOLD IN THE CONTACT AREA OVER 50 MICRO-INCH OF NICKEL.

k) JACK TERMINATION METHOD SHALL FOLLOW THE INDUSTRY STANDARD..

l) JACKS SHALL HAVE THE CATEGORY 6A DESIGNATION, VISIBLE FROM THE FRONT WHEN INSTALLED.

m) JACKS SHALL TERMINATE 26-22 AWG SOLID OR STRANDED CONDUCTORS.

n) JACKS SHALL NOT REQUIRE SPECIAL CORDS, SPECIALTY TOOLS OR SPECIAL INSTALLATION REQUIREMENTS.

o) STUFFER CAP SHALL HAVE 4 RETENTION SNAPS TO ASSURE CONDUCTOR STRAIN RELIEF.

p) JACKS SHALL NOT ACCEPT FCC COMPLIANT 6 POSITION PLUGS.

q) JACKS SHALL ACCEPT OPTIONAL HINGED DUST COVERS.

r) JACKS SHALL BE COMPATIBLE WITH ANSI/TIA/EIA-606-A COLOR CODE LABELING.

s) JACKS SHALL ACCEPT SNAP-ON ICONS FOR SPECIFIC IDENTIFICATION.

t) JACKS SHALL BE AVAILABLE IN VARIOUS COLORS TO MEET SPECIFIC CUSTOMER APPLICATIONS.

u) JACKS SHALL HAVE ATTACHED WIRING INSTRUCTION LABELS TO PERMIT EITHER T568A OR T568B WIRING CONFIGURATIONS.

v) CATEGORY 6A JACKS SHALL BE BACKWARD COMPATIBLE WITH EXISTING CATEGORY 3, 5, AND 5E CATEGORY 6 CABLING SYSTEMS FOR FIT, FORM, AND FUNCTION.

w) JACKS SHALL BE MANUFACTURED IN THE USA.

x) ALL TRANSMISSION PERFORMANCE PARAMETERS SHALL BE INDEPENDENTLY VERIFIED BY A UL OR ETL THIRD PARTY TESTING ORGANIZATION.

y) THE MANUFACTURER SHALL PROVIDE CATEGORY 6A COMPONENT COMPLIANCE CERTIFICATES FROM THIRD PARTY TESTING ORGANIZATION UPON REQUEST.

z) JACKS SHALL BE UL LISTED 1863.

aa) JACKS SHALL BE UL LISTED CSA CERTIFIED.

bb) JACKS SHALL EXCEED IEEE 802.3AF DTE POWER SPECIFICATION TO 4 TIMES THE RATED CURRENT LIMITS WITH NO DEGRADATION OF PERFORMANCE OR MATERIALS.

cc) JACKS SHALL BE TESTED TO IEEE 802.3AF, 802.3AT AND 802.3BT

dd) JACKS SHALL BE THIRD PARTY VERIFIED, ERROR FREE 10 GIGABIT ETHERNET PERFORMANCE TO IEEE 802.3AN.

ee) CATEGORY 6A JACKS SHALL MEET OR EXCEED THE 4-CONNECTOR CHANNEL PERFORMANCE REQUIREMENTS OF CATEGORY 6A, PER THE ANSI/TIA/EIA-568-C.2 STANDARD.

ff) CATEGORY 6A MODULAR JACKS, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) **Hubbell (HUB-HJU6A**) **= COLOR**

Green = GN = data

Yellow = Y = wireless access points

Purple = P = security cameras

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

B. FIBER OPTIC - LC DUPLEX FLUSH MOUNT KEYSTONE ADAPTER

a) KEYSTONE ADAPTERS ARE FACTORY LOADED WITH LC MM SIMPLEX ADAPTERS

b) KEYSTONE ADAPTERS ARE USED WHEN FIBER CONNECTORS ARE NEEDED AT THE WORK AREA.

c) FLUSH MOUNTED

d) INSERTION LOSS: <0.5DB

e) HIGH RETENSION PHOSPHOR BRONZE ALIGNMENT SLEEVE

f) MEETS TIA/EIA-568-C.3 SPECIFICATION

g) ADAPTER SNAP-IN FORCE: 15+/- 5 LB

h) WHITE ADAPTER BEZEL

i) FIBER OPTIC ADAPTER, SC SIMPLEX, FLUSH MOUNT, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

a) HUBBELL (SFFLCW)

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa Technology Department

C. FIBER OPTIC - SC SIMPLEX FLUSH MOUNT KEYSTONE ADAPTER

a) KEYSTONE ADAPTERS ARE FACTORY LOADED WITH SC MM SIMPLEX ADAPTERS

b) KEYSTONE ADAPTERS ARE USED WHEN FIBER CONNECTORS ARE NEEDED AT THE WORK AREA.

c) FLUSH MOUNTED

d) INSERTION LOSS: <0.5DB

e) HIGH RETENSION PHOSPHOR BRONZE ALIGNMENT SLEEVE

f) MEETS TIA/EIA-568-C.3 SPECIFICATION

g) ADAPTER SNAP-IN FORCE: 15+/- 5 LB

h) WHITE ADAPTER BEZEL

i) FIBER OPTIC ADAPTER, SC SIMPLEX, FLUSH MOUNT, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

a) HUBBELL (SFFSCW)

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

2.2 FACE PLATES

A. REAR LOADING WITHOUT DESIGNATION WINDOW

a) FACEPLATES SHALL BE CONSTRUCTED OF HIGH IMPACT, UL94 V-0 RATED THERMOPLASTIC.

b) FACEPLATES SHALL BE COMPATIBLE WITH STANDARD NEMA OPENINGS AND BOXES.

c) FACEPLATES SHALL BE 2.75" W X 4.5" H (69.8 MM X 114.3 MM) FOR SINGLE GANG AND 4.5” X 4.5” (114.3 X 114.3 MM) FOR DOUBLE GANG.

d) PORT SIZE IN EACH FACEPLATE SHALL FIT THE CATEGORY 6A MODULAR JACK OR SNAP-FIT FIBER OPTIC, AUDIO, AND VIDEO MODULES FOR MULTIMEDIA APPLICATIONS.

e) FACEPLATES SHALL PROVIDE FOR ANSI/TIA/EIA-606-A COMPLIANT WORKSTATION OUTLET LABELING.

f) #6-32 PAN HEAD PHILLIPS/SLOTTED MOUNTING SCREWS SHALL BE INCLUDED WITH EACH FACEPLATE.

g) FACEPLATES SHALL BE UL LISTED AND CSA CERTIFIED.

h) WORK AREA FACEPLATES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

a) HUBBELL (NSP1*WUSF SERIES) * = NUMBER OF PORTS

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Information Technology Department

2.3 CABLE

A. CATEGORY 6A UTP

a) CABLE CONSTRUCTION SHALL BE FOUR TWISTED PAIRS OF 23 AWG INSULATED SOLID CONDUCTORS, WITH A RIPCORD, SURROUNDED BY A TIGHT OUTER JACKET.

b) RIPCORD SHALL BE DIRECTLY UNDERNEATH THE OUTER JACKET.

c) CABLE SHALL BE MARKED WITH MANUFACTURER AND PERTINENT INFORMATION. UL, ETL, OR CSA AGENCY CERTIFICATION OR VERIFICATION

MARKINGS SHALL BE MARKED ON THE CABLE JACKET ACCORDING TO THE CERTIFYING AGENCY'S REQUIREMENTS.

d) COLOR CODING OF THE PAIRS SHALL BE AS FOLLOWS:

a) PAIR 1: WHITE/BLUE; BLUE

b) PAIR 2: WHITE/ORANGE; ORANGE

c) PAIR 3: WHITE/GREEN; GREEN

d) PAIR 4: WHITE/BROWN; BROWN

e) PLENUM OR RISER RATED JACKETS

f) CABLE SHALL BE SUPPLIED IN 1000 FT SPOOLS.

g) CABLE SHALL EXCEED CATEGORY 6A TRANSMISSION REQUIREMENTS SPECIFIED IN ANSI/TIA/EIA-568-C.2.

h) CABLE SHALL BE UL AND C(UL) LISTED.

i) CATEGORY 6A UTP HORIZONTAL DISTRIBUTION CABLE, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

a) **GENERAL –RISER –(7143822 SPOOL) YELLOW**

GENERAL – RISER – (7143802 PULL-PAC) YELLOW

b) **GENERAL –PLENUM –(7141871 SPOOL) YELLOW**

GENERAL – PLENUM – (7141822 SPOOL PAC) YELLOW

GENERAL – PLENUM – (7141802 PULL-PAC) YELLOW

BLACK CABLING APPROVED WHERE APPLICABLE SHALL BE:

c) **GENERAL – PLENUM – (7141828 SPOOL) BLACK**

GENERAL – PLENUM – (7141807 PULL – PAC) BLACK

GENERAL – RISER – (7143828 SPOOL) BLACK

GENERAL – RISER – (7143807 PULL-PAC) BLACK

B. BACKBONE DISTRIBUTION CABLE – FIBER OPTIC

a) MULTIMODE AND SINGLEMODE FIBER BACKBONE DISTRIBUTION CABLE SHALL BE AVAILABLE IN MULTI-STRAND CONSTRUCTIONS WITH ARMORED JACKET FOR INTRABUILDING APPLICATIONS. MULTIMODE FIBER BACKBONE DISTRIBUTION CABLE FOR 10/40/100 GBIT/S APPLICATIONS SHALL BE CONSTRUCTED WITH 50/125 MICRON LASER-OPTIMIZED OPTICAL FIBER, OM3 OR OM4.

b) LASER-OPTIMIZED 50/125 MICRON FIBER SHALL BE CLASS 1A FIBER IN COMPLIANCE WITH ANSI/TIA/EIA-492AAC.

c) OFNR OR OFNP WILL BE DETERMINED AT EACH SITE.

d) THE CONTRACTOR WILL BE RESPONSIBLE TO ASSURE THAT THE PROPER TYPE OF JACKETING IS BEING USED. FAILURE TO MEET THE LOCAL CODE WILL BE CAUSE FOR REPLACEMENT OF CABLE AT NO EXPENSE TO <CUSTOMER>.

e) FIBER SHALL BE FUSION SPLICED WITH FACTORY TERMINATED CONNECTIONS AT EACH TERMINATION POINT

f) SINGLEMODE FIBER SHALL BE DISPERSION UN-SHIFTED FIBER IN COMPLIANCE WITH ANSI/TIA/EIA-492CAA.

g) INTRABUILDING FIBER DISTRIBUTION CABLE DESIGN SHALL BE ACCORDING TO ANSI/ICEA S-83-596.

h) MULTIMODE AND SINGLEMODE BACKBONE FIBER DISTRIBUTION CABLE, WHEN INSTALLED, SHALL EXCEED THE PERFORMANCE REQUIREMENTS OF ANSI/TIA/EIA-568-C.3.

i) MULTIMODE AND SINGLEMODE BACKBONE FIBER DISTRIBUTION CABLE, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

   a) OCC MANUFACTURER OR GENERAL MANUFACTURER

   b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa Technology Department

C. BACKBONE DISTRIBUTION CABLE – OPTICAL FIBER, INDOOR/OUTDOOR

a) MULTIMODE AND SINGLEMODE FIBER BACKBONE CABLE SHALL BE AVAILABLE IN MULTI-STRAND CONSTRUCTIONS. CABLE DESIGN SHALL BE SUITABLE FOR THE ENVIRONMENTAL AND MECHANICAL CONDITIONS OF THE INSTALLATION.

b) RISER(OFNR) AND PLENUM (OFNP) FIBER OPTIC CABLES

c) THESE CABLES CAN BE INSTALLED IN CONDUITS OR INNER-DUCTS. INTRABUILDING FIBER SHALL BE ARMORED

d) THE TIGHT BUFFER FEATURE OF THESE INDOOR/OUTDOOR CABLES ELIMINATES THE NEED FOR BREAKOUT KITS AND OR OTHER SPECIAL TERMINATION EQUIPMENT.

e) THE OUTER JACKET IS COMPRISED OF A RUGGED UL LISTED SUNLIGHT RESISTANT POLYMER THAT ALLOWS FOR THE CABLE TO BE EXPOSED TO DIRECT SUNLIGHT WITHOUT THE CONCERN OF MATERIAL DEGRADATION AND GREATLY REDUCES MOISTURE MIGRATION.

f) FIBER SHALL BE FUSION SPLICED WITH FACTORY TERMINATED CONNECTIONS AT EACH TERMINATION POINT

g) 900 ÌM TIGHT BUFFERED FIBERS - ALL DIELECTRIC

h) MULTIMODE INDOOR/OUTDOOR DISTRIBUTION CABLE FOR 10 GBIT/S APPLICATIONS SHALL BE CONSTRUCTED WITH 50/125 MICRON LASER-OPTIMIZED OPTICAL FIBER. LASER-OPTIMIZED 50/125 MICRON FIBER SHALL BE CLASS 1A FIBER IN COMPLIANCE WITH ANSI/TIA/EIA-492AAC.

i) MULTIMODE AND SINGLEMODE BACKBONE OSP FIBER DISTRIBUTION CABLE, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

   a) OCC MANUFACTURER OR GENERAL MANUFACTURER

   b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

D. BACKBONE DISTRIBUTION CABLE – OPTICAL FIBER, LOOSE-TUBE

a) MULTIMODE AND SINGLEMODE FIBER BACKBONE OSP CABLE SHALL BE AVAILABLE IN MULTI-STRAND CONSTRUCTIONS FOR OUTSIDE PLANT (OSP) APPLICATIONS. CABLE DESIGN SHALL BE SUITABLE FOR THE ENVIRONMENTAL AND MECHANICAL CONDITIONS OF THE INSTALLATION.

b) LOOSE TUBE OSP CABLE WILL BE USED IN AREAS WHERE EXCESSIVE MOISTURE POTENTIAL EXISTS. APPLICATIONS REQUIRING GOOD OZONE, MOISTURE, WEATHER RESISTANCE

c) BUILDING INTERCONNECTIONS AND DATA TRUNK

d) DUCTS BETWEEN BUILDINGS AND AERIAL LASHING

e) DIELECTRIC CENTRAL STRENGTH MEMBER

f) DRY OR WATERBLOCK GEL BLOCKING FOR MOISTURE PROTECTION

g) POLYETHYLENE JACKET FOR WEATHER AND UV PROTECTION

h) INSTALLER MUST FOLLOW TERMINATION INSTRUCTIONS FROM THE MANUFACTURER

i) BREAKOUT KITS WILL BE REQUIRED FOR TERMINATION

j) FIBER SHALL BE FUSION SPLICED WITH FACTORY TERMINATED CONNECTIONS AT EACH BUILDING TERMINATION POINT

k) MULTIMODE AND SINGLEMODE BACKBONE OSP FIBER DISTRIBUTION CABLE, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) OCC MANUFACTURER OR GENERAL MANUFACTURER

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

2.4 CONNECTORS – FIBER OPTIC

A. CONNECTOR, SC

a) PRE-POLISHED SC CONNECTORS SHALL REQUIRE NO FIELD POLISHING AND REQUIRE NO ADHESIVES FOR TERMINATION.

b) PRE-POLISHED FIBER CONNECTOR BASIC DESIGN SHALL BE A FACTORY PRE-POLISHED SC-STYLE OPTICAL FIBER CONNECTOR PIGTAIL

c) PIGTAILS SHALL BE FUSION SPLICED IN THE FIELD AT <0.5 DB LOSS.

d) CONNECTOR MATERIALS SHALL BE DESIGNED TO COMPLY WITH:

a) ANSI/TIA/EIA-568-C.3.

b) TELCORDIA GR-326

c) IEC61754-20 A

d) TIA-604-10

e) CONNECTOR DESIGN AND TERMINATION TECHNIQUE SHALL BE INDEPENDENT OF CABLE TYPE OR MANUFACTURER, AND SHALL BE COMPATIBLE FOR EITHER 900 MICRON BUFFER OR 250 MICRON BUFFER DISTRIBUTION CABLES.

f) PRE-POLISHED SC FIBER CONNECTORS, WHEN PROPERLY INSTALLED ONTO QUALIFIED CABLE, SHALL MEET THE 10 GB/S ETHERNET PERFORMANCE REQUIREMENTS OF IEEE802.3.

g) SC FIBER CONNECTORS, PROPERLY INSTALLED ONTO QUALIFIED CABLE, SHALL EXCEED THE MECHANICAL AND ENVIRONMENTAL PERFORMANCE REQUIREMENTS OF ANSI/TIA/EIA-568-C.3.

h) SC OPTICAL FIBER OPTIC CONNECTORS, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

a) OCC MANUFACTURER OR GENERAL MANUFACTURER

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

B. CONNECTOR, LC

a) PRE-POLISHED LC CONNECTORS SHALL REQUIRE NO FIELD POLISHING AND REQUIRE NO ADHESIVES FOR TERMINATION.

b) PRE-POLISHED FIBER CONNECTOR BASIC DESIGN SHALL BE A FACTORY PRE-POLISHED LC-STYLE OPTICAL FIBER CONNECTOR PIGTAIL

c) PIGTAILS SHALL BE FUSION SPLICED IN THE FIELD AT <0.5 DB LOSS.

d) CONNECTOR MATERIALS SHALL BE DESIGNED TO COMPLY WITH:

a) ANSI/TIA/EIA-568-C.3.

b) TELCORDIA GR-326

c) IEC61754-20 A

d) TIA-604-10

e) CONNECTOR DESIGN AND TERMINATION TECHNIQUE SHALL BE INDEPENDENT OF CABLE TYPE OR MANUFACTURER, AND SHALL BE COMPATIBLE FOR EITHER 900 MICRON BUFFER OR 250 MICRON BUFFER DISTRIBUTION CABLES.

f) PRE-POLISHED LC FIBER CONNECTORS, WHEN PROPERLY INSTALLED ONTO QUALIFIED CABLE, SHALL MEET THE 10 GB/S ETHERNET PERFORMANCE REQUIREMENTS OF IEEE802.3.

g) LC FIBER CONNECTORS, PROPERLY INSTALLED ONTO QUALIFIED CABLE, SHALL EXCEED THE MECHANICAL AND ENVIRONMENTAL PERFORMANCE REQUIREMENTS OF ANSI/TIA/EIA-568-C.3.

h) LC OPTICAL FIBER OPTIC CONNECTORS, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

a) OCC MANUFACTURER

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

2.5 PATCH CORDS

A. CATEGORY 6A

a) CATEGORY 6A PATCH CORDS SHALL BE STRANDED UTP CABLE CONSTRUCTION USING A SMOKE-COLORED POLYCARBONATE 8-POSITION RJ-45 PLUG WITH A LOW-PROFILE OVER-MOLDED STRAIN RELIEF BOOT ON EACH END.

b) PLUG SHALL HAVE VERTICALLY STAGGERED, TRIFURCATED COPPER ALLOY CONTACTS, EACH HAVING 50 MICRO-INCHES OF GOLD PLATING OVER NICKEL UNDER-PLATE.

c) PATCH CORDS SHALL BE CONSTRUCTED WITH CATEGORY 6A PATCH CABLE, WITH 24 AWG 7/32 TINNED COPPER STRANDED CONDUCTORS, EACH INSULATED WITH POLYETHYLENE, WITH A TIGHT OVERALL JACKET.

d) PLUG DIMENSIONS AND FUNCTION SHALL COMPLY WITH FCC CFR-47, PART 68.5.

e) PLUG SHALL BE A 2-PIECE DESIGN, WITH AN OUTER BODY, PRE-LOADED WITH 8 TRIFURCATED CONTACTS, AND A DIELECTRIC WIRE PRE-ALIGNMENT ELEMENT TO AID IN PLUG TERMINATION DURING MANUFACTURING.

f) DIELECTRIC WIRE PRE-ALIGNMENT ELEMENT SHALL POSITION INDIVIDUAL CONDUCTORS IN A MANNER TO OPTIMIZE NEAR-END CROSS-TALK (NEXT) PERFORMANCE. PRE-ALIGNMENT ELEMENT SHALL ALSO CONTROL VARIABILITY OF NEXT PERFORMANCE IN THE MANUFACTURING PROCESS.

g) PATCH CORD STRAIN RELIEF BOOTS SHALL HAVE AN INTEGRAL SNAG-LESS FEATURE TO PROTECT PLUG RELEASE TAB DURING CABLE ROUTING. STRAIN RELIEF BOOT SHALL BE OVER-MOLDED PVC. STRAIN RELIEF BOOT SHALL BE A LOW PROFILE, TIGHT-FIT DESIGN TO MAXIMIZE CLEARANCE WITH ADJACENT PATCH CORD CONNECTIONS. STRAIN RELIEF BOOT DESIGN AND MATERIAL PROPERTIES SHALL AID IN SUPPRESSION OF ALIEN CROSS-TALK (ANEXT) WITH ADJACENT PATCH CORD CONNECTIONS.

h) JACKET MATERIAL SHALL BE FLAME-RETARDANT PVC.

i) PATCH CORDS SHALL BE MANUFACTURED USING A T568B WIRING FORMAT, AND SHALL FUNCTION SUITABLY FOR EITHER T568A OR T568B WIRING SCHEMES.

j) STANDARD PATCH CORD LENGTHS SHALL RANGE FROM 3 FT TO 20 FT.

k) CUSTOM MAKE-TO-ORDER PATCH CORDS SHALL BE AVAILABLE IN LENGTHS, RANGING FROM 25 FT TO 75 FT AND WITH A DELIVERY LEAD-TIME QUOTATION.

l) CATEGORY 6A PATCH CORDS SHALL BE BACKWARD COMPATIBLE WITH EXISTING CATEGORY 3, 5, 5E, AND 6 CABLING SYSTEMS FOR FIT, FORM, AND FUNCTION.

m) ALL TRANSMISSION PARAMETERS SHALL BE INDEPENDENTLY VERIFIED BY A UL OR ETL THIRD PARTY TESTING ORGANIZATION. TRANSMISSION TESTING SHALL BE TO 625 MHZ. THE TIA/EIA-568-C.2 SPECIFICATION LIMIT IS 500 MHZ. THE MANUFACTURER SHALL PROVIDE COMPLIANCE CERTIFICATES FROM THIRD PARTY TESTING ORGANIZATION UPON REQUEST.

n) PATCH CORD PLUG AND CONTACTS SHALL WITHSTAND 2,000 MATING CYCLES WITH STANDARD CATEGORY 6A FCC-COMPLIANT JACKS OR PANELS.

o) CATEGORY 6A PATCH CORDS SHALL EXCEED TRANSMISSION REQUIREMENTS SPECIFIED IN ANSI/TIA/EIA-568-C.2.

p) PATCH CORDS SHALL BE UL LISTED 1863 AND CSA CERTIFIED.

q) PATCH CORDS SHALL EXCEED IEEE 802.3 DTE POWER SPECIFICATION TO 4 TIMES THE RATED CURRENT LIMITS WITH NO DEGRADATION OF PERFORMANCE OR MATERIALS.

r) CATEGORY 6A PATCH CORDS SHALL MEET OR EXCEED 4-CONNECTOR CHANNEL PERFORMANCE REQUIREMENTS OF ANSI/TIA/EIA-568-C.2 STANDARD.

s) CATEGORY 6A PATCH CORDS AS SPECIFIED IN THE CONTRACT DOCUMENTS SHALL BE

   a) HUBBELL (NEXTSPEED ASCENT HC6A**YY SERIES)**= COLOR YY= LENGTH

   b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

B. FIBER OPTIC

a) OPTICAL FIBER PATCH CORDS AND CROSS-CONNECT CORDS SHALL BE STANDARD SC, LC, AND SC-TO-LC HYBRID CONSTRUCTIONS. PATCH CORDS FOR 10 GBIT/S APPLICATIONS SHALL BE CONSTRUCTED WITH LASER OPTIMIZED 50/125 MICRON OPTICAL FIBER.

b) INSTALLED MULTIMODE FIBER PATCH CORDS, WHEN INSTALLED, SHALL EXCEED THE PERFORMANCE REQUIREMENTS OF ANSI/TIA/EIA-568-C.3.

c) OPTICAL FIBER PATCH CORDS SHALL BE CONSTRUCTED WITH ARAMID-REINFORCED PVC LOOSE-JACKET DUPLEX OR SIMPLEX CABLE, WITH OPTICAL FIBER(S) HAVING A 900-MICRON PVC BUFFER COATING DIAMETER.

d) CONNECTOR TERMINATIONS ON EACH END OF THE FIBER PATCH CORD SHALL BE HEAT-CURED EPOXY TYPE WITH A MACHINE POLISH, INSPECTED 100% FOR POLISH QUALITY AND MATED-PAIR INSERTION LOSS

e) THE ARAMID (KEVLAR) STRENGTH MEMBER SHALL BE MECHANICALLY SECURED AT EACH CONNECTOR TO PROVIDE TENSILE STRAIN RELIEF OF THE OPTICAL FIBER.

f) FACTORY MOUNTED CONNECTORS ON EACH END OF THE PATCH CORDS SHALL COMPLY WITH THE APPLICABLE ANSI/TIA/EIA-604 INTERMATEABILITY STANDARD.

g) DUPLEX FIBER PATCH CORDS SHALL HAVE REVERSE-PAIR POLARITY ACCORDING TO ANSI/TIA/EIA-568-C.3 AND TIA/EIA-TSB-125.

h) FIBER A-B POLARITY SHALL BE CLEARLY MARKED ON EACH END OF DUPLEX PATCH CORDS.

i) MULTIMODE PATCH CORDS SHALL HAVE A MAXIMUM MATED-PAIR INSERTION LOSS OF 0.60 DB PER END, WITH A MINIMUM RETURN LOSS OF –20 DB.

j) MULTIMODE AND SINGLEMODE FIBER PATCH CORDS SHALL EXCEED THE GIGABIT ETHERNET PERFORMANCE REQUIREMENTS OF IEEE 802.3Z STANDARD.

k) OPTICAL FIBER PATCH CORDS, AS SPECIFIED IN THE CONTRACT DOCUMENTS SHALL BE

a) OCC MANUFACTURER

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

2.6 PATCH PANELS – CATEGORY 6A MODULAR PATCH PANEL

A. KEYSTONE 48 PORT 1RU PATCH PANEL

B. PANEL FRAMES SHALL BE BLACK POWDER COATED 14 GAGE STEEL WITH ROLLED EDGES TOP AND BOTTOM FOR PROPER STIFFNESS.

C. PANELS SHALL ACCOMMODATE 48 PORTS FOR EACH RACK MOUNT UNIT (1 RMU = 1.75 IN.).

D. PANELS SHALL BE DESIGNED FOR 4-PAIR, 100 OHM BALANCED UNSHIELDED TWISTED PAIR (UTP) CABLE.

E. CATEGORY 6A PANELS SHALL BE BACKWARD COMPATIBLE WITH EXISTING CATEGORY 3, 5, 5E, AND CATEGORY 6A CABLING SYSTEMS FOR FIT, FORM, AND FUNCTION.

F. PANELS SHALL ACCEPT A CLIP-ON REAR CABLE MANAGEMENT SUPPORT BAR TO PROVIDE CABLE STRAIN RELIEF.

G. PANELS SHALL BE MANUFACTURED IN THE USA.

H. PANELS SHALL BE UL LISTED 1863 AND CSA CERTIFIED.

I. CATEGORY 6A PATCH PANELS, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) HUBBELL (UDX481EU)

b) ACCEPTABLE MANUFACTURERS: BASIS OF DESIGN OR EQUIVALENT AS APPROVED BY UNIVERSITY OF SOUTH FLORIDA – INFORMATION TECHNOLOGY DEPARTMENT

2.7 RACKS – FREE STANDING

A. EACH BASIC RACK DELIVERED SHALL CONSIST OF: EQUIMENT RACK, ISOLATION PADS, VERTICAL & HORIZONTAL CABLE ORGANIZERS, MOUNTING HARDWARE, A SINGLE SIDED SOLID SHELF- RACK MOUNTED, 18” WIDE BLACK LADDER RACK & MOUNTS TO SECURE TO RACK, A HORIZONTAL ELECTRICAL 20 AMP OUTLET STRIP(MINIMUM 6 RECEPTACALS) WITH MOUNTING BRACKETS.

B. RACK MATERIAL SHALL BE STRUCTURAL ALUMINUM WITH A DURABLE BLACK POLYURETHANE POWDER COAT FINISH.

C. INSTALLED RACKS SHALL HAVE A STATIC LOAD CAPACITY OF 500 LBS.

D. RACKS SHALL BE AVAILABLE IN EITHER 19-INCH OR 23-INCH STANDARD RACK CONFIGURATIONS.

E. TAPPED HOLES IN THE VERTICAL RAILS FOR MOUNTING OF PANELS SHALL BE #12-24 THREAD SIZE. COATING SHALL NOT INTERFERE WITH THREAD FIT. CAGE NUT DESIGNS ARE NOT ACCEPTABLE.

F. STANDARD RACK HEIGHTS OF 7 FT (84 IN), AND HAVE A CAPACITY OF 45 RMU.

G. RACK BASE ANGLES SHALL BE PRE-DRILLED FOR FLOOR MOUNTING, AND FOR ASSEMBLY TO VERTICAL RAILS.

H. EACH RACK SHALL BE PROVIDED WITH, RACKS SHALL ACCOMMODATE EXPANSION OF CABLE CAPACITY AND ADDED VOLUME FOR CATEGORY 6A CABLING.

I. FREE STANDING RACKS AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) OCC (CMR45) 2 – POST RACK

APC (AR204A) 4 – POST RACK

b) ACCEPTABLE MANUFACTURERS: BASIS OF DESIGN OR EQUIVALENT AS APPROVED BY UNIVERSITY OF SOUTH FLORIDA – INFORMATION TECHNOLOGY DEPARTMENT

2.8 CABLE MANAGEMENT – VERTICAL

A. FINISH SHALL BE A BLACK POWDER COAT.

B. VERTICAL MANAGEMENT SHALL HAVE A MEANS TO ATTACH TO THE EQUIPMENT RACK.

C. CABLE PASS-THROUGH HOLES OF 4-INCH DIAMETER SHALL BE LOCATED AT REGULAR INTERVALS FOR FRONT-TO-REAR CABLE ROUTING. PASS-THROUGH HOLES SHALL ACCEPT CLIP-ON SPOOLS FOR BEND RADIUS CONTROL OF FIBER CABLING.

D. CABLE ROUTING GATES SHALL BE FABRICATED FROM 14 GAGE CRS.

E. GATES SHALL HAVE ROLLED EDGES TO CONTROL CABLE BEND RADIUS.

F. COVERS MAY BE SPECIFIED AS AN OPTION TO CONCEAL CABLES IN THE VERTICAL ORGANIZER.

G. HINGED FRONT COVER SHALL BE FABRICATED FROM 20 GAGE CRS.

H. COVERS SHALL CLIP ONTO INSTALLED GATES WITHOUT FASTENERS.

I. VERTICAL CABLE MANAGEMENT AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) PANDUIT (PRV12-PAN) WITH DOORS ON BOTH SIDES (PRD12-PAN)

b) ACCEPTABLE MANUFACTURERS: BASIS OF DESIGN OR EQUIVALENT AS APPROVED BY UNIVERSITY OF SOUTH FLORIDA – INFORMATIONA DN TECHNOLOGY DEPARTMENT

2.9 CABLE MANAGEMENT – HORIZONTAL

A. HORIZONTAL MANAGEMENT WILL BE CONSTRUCTED OF 16 GA COLD-ROLLED STEEL (CRS)

B. FINISH SHALL BE A DURABLE, BLACK POWDER COAT.

C. HORIZONTAL MANAGAEMENT SHALL NOT HAVE HINGED COVER.

D. SIZE: 1 & 2RU

E. FRONT RING DEPTH: 4 & 7”

F. ALL STEEL CONSTRUCTION - RUGGED, NON-FLAMMABLE, NO FASTENERS TO WEAR OR BREAK, NO FINGERS TO FUSS WITH.

G. MODULAR COMPONENTS EASILY CONFIGURED IN FIELD TO ADAPT TO DEMANDING APPLICATIONS.

H. GENEROUS SPACE BETWEEN RINGS ALLEVIATES CONGESTION.

I. PASS-THRU HOLES WITH ROLLED EDGES.

J. HORIZONTAL CABLE MANAGEMENT AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) ORTRONICS (OR-60400131) 1 RU WIRE MANAGER

b) ACCEPTABLE MANUFACTURERS: BASIS OF DESIGN OR EQUIVALENT AS APPROVED BY UNIVERSITY OF SOUTH FLORIDA – INFORMATION TECHNOLOGY DEPARTMENT

2.10 CABINETS, ENCLOSURE & ACCESSORIES

A. CONSOLIDATION POINT ENCLOSURES

a) CONSOLIDATION POINT (CP) ENCLOSURES SHALL BE CONSTRUCTED OF 16 GA. COLD- ROLLED STEEL, WITH ZINC GALVANIZED FINISH.

b) CP ENCLOSURES SHALL HAVE A REMOVABLE FRONT COVER, CONSTRUCTED OF 20 GA. COLD ROLLED STEEL, WITH ELECTROSTATIC POWDER COAT FINISH IN EITHER BLACK OR ELECTRIC IVORY COLORS.

c) CP ENCLOSURES SHALL BE SUPPLIED COMPLETE WITH DETAILED INSTRUCTIONS, WALL-MOUNTING SCREWS, PANEL-MOUNTING FASTENERS, FIBER STORAGE SPOOLS AND FIBER FSP ADAPTER MOUNTING BRACKET.

d) CP ENCLOSURES SHALL HAVE OPTIONAL ACCESSORIES AVAILABLE, INCLUDING A TRIM RING, LOUVERED DOOR, AND LOCK KIT.

e) CP ENCLOSURES SHALL HAVE FEATURES TO PERMIT MOUNTING BETWEEN STUDS ON 16-INCH CENTERS FLUSH TO WALL, OR DIRECT WALL SURFACE MOUNTING.

f) STUD-LOCATING TABS SHALL BE LOCATED ON EACH SIDE OF THE CP ENCLOSURE TO FACILITATE POSITIONING ONTO WALL STUDS.

g) CABLE ENTRY KNOCKOUTS SHALL BE LOCATED ON THE TOP, BOTTOM, AND SIDES OF THE CP ENCLOSURE. A KNOCKOUT SHALL ALSO BE FURNISHED FOR MOUNTING A LOCK.

h) CP ENCLOSURES SHALL HAVE TWO VERTICAL MOUNTING RAILS, PRE-TAPPED WITH #10-24 HOLES. TAPPED MOUNTING HOLES ALONG THE RAILS SHALL BE LOCATED ON 9.1-INCH CENTERS AND 10.2-INCH CENTERS.

i) MOUNTING FEATURES SHALL BE LOCATED WITHIN THE ENCLOSURE TO ACCEPT A REMOVABLE FIBER FSP PANEL-MOUNTING BRACKET, WITH CAPACITY TO ACCEPT (2) FSP OR JACK-PACK PANELS FOR MULTI-MEDIA APPLICATIONS.

j) CAPACITY OF THE CP ENCLOSURE SHALL BE 5 RACK-MOUNT UNITS (RMU), EACH ACCEPTING EITHER A 100-PAIR BLOCK OR 89-D BRACKET FOR 12-PORT PANELS.

k) VERTICAL MOUNTING RAILS SHALL ACCEPT 110-STYLE/100-PAIR PUNCH-DOWN BLOCKS AND 89-D BRACKETS IN ANY RMU LOCATION.

l) ZONE CEILING BOXES SHALL BE UL LISTED, AND PLENUM RATED FOR USE IN CEILING SPACE APPLICATIONS.

m) CONSOLIDATION POINT ENCLOSURES USED IN HORIZONTAL CABLE RUNS, USING WALL-MOUNT, IN-FLOOR, OR CEILING-MOUNT INSTALLATION SHALL BE DESIGNED AND UL LISTED SPECIFICALLY FOR THE INTENDED PURPOSE.

n) CONSOLIDATION POINT ENCLOSURES, AS SPECIFIED IN THE CONTRACT DOCUMENTS SHALL BE:

a) HUBBELL (CPEI)

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

B. CABINETS – FULL SIZE NETWORK AND SERVER

a) NETWORK AND SERVER CABINETS SHALL BE FREE STANDING, FULL-SIZE ENCLOSED CABINETS, WITH A FORMED, WELDED AND POWDER COATED CONSTRUCTION.

b) NETWORK AND SERVER CABINETS SHALL BE SUITABLE FOR EQUIPMENT ROOMS, TELECOMMUNICATIONS ROOMS, ENTRANCE FACILITIES AND DATA CENTERS. HEAVY-DUTY, WELDED FOUR-POST FRAME

c) CHOICE OF 19” OR 23” EIA SQUARE HOLE OR #12-24 TAPPED RAILS

d) VENTILATION OPTIONS FOR DOORS, SIDE PANELS, TOP, AND BASE, INCLUDING PERFORATION, VENTS, AND FANS

e) AVAILABLE IN A VARIETY OF SIZED FOR ANY APPLICATION AND EQUIPMENT STANDARD

f) NETWORK AND SERVER CABINETS, AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

a) HUBBELL CABINETS

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

C. CABINETS – WALL MOUNT

a) BASIC DESIGN SHALL BE A THREE PIECE MODULAR SWIVEL-TYPE, 14 GAGE STEEL, REINFORCED WELDED ENCLOSURE WITH A REMOVABLE FRONT DOOR, AND REMOVABLE REAR SECTION.

b) SHALL BE CONSTRUCTED OF 14 GAGE COLD ROLLED STEEL (CRS)

c) FINISH SHALL BE BLACK OR OFFICE WHITE DURABLE POWDER COAT ON ALL SURFACES.

d) INSTALLED CABINETS SHALL HAVE A STATIC LOAD CAPACITY OF 400 LBS IN THE OPEN OR CLOSED POSITION. FULL LOAD CAPACITY SHALL NOT CAUSE INTERFERENCE WITH OPENING OR CLOSURE OF CENTER SECTION.

e) CABINETS SHALL BE EQUIPPED WITH PANEL-MOUNTING RAILS COMPLIANT TO ANSI/EIA-310-D. RAIL LOCATION SHALL BE ADJUSTABLE, WITH NOTCHES TO FACILITATE POSITIONING.

f) STANDARD CABINET HEIGHTS OF 24", 36", AND 48" SHALL BE AVAILABLE, EACH IN DEPTHS OF 20", 26", AND 36".

g) REAR SECTION SHALL BE REMOVABLE TO FACILITATE WALL INSTALLATION, AND HAVE A 16" HOLE PATTERN SUITABLE FOR MOUNTING TO PLYWOOD BACKBOARDS, STEEL OR WOOD STUDDED WALLS, CINDER BLOCK OR CONCRETE WALLS.

h) REAR SECTION TOP SURFACE SHALL HAVE ECCENTRIC KNOCKOUTS FOR CONDUIT ENTRY. ECCENTRIC KNOCKOUTS SHALL ACCOMMODATE CONDUIT SIZES INCLUDING ¾", 1.0", 2.5", AND 3.0".

i) CABINET SHALL HAVE DEDICATED BONDING POINTS FOR PROPER GROUNDING ACCORDING TO ANSI-J-STD-607A.

j) CENTER SECTION SHALL HAVE SLOTS FOR VENTILATION, AND SHALL ACCEPT DUST FILTERS FOR COOLING FAN APPLICATIONS. A GASKET KIT SHALL BE AVAILABLE SEPARATELY TO ENHANCE PROTECTION FROM DUST ENTRY.

k) CABINET SHALL HAVE PROVISIONS FOR MOUNTING TO AN ACCESSORY MOBILE BASE FOR USE AS A FLOOR-STANDING UNIT. MOBILE BASE SHALL BE AVAILABLE SEPARATELY.

l) CABINETS SHALL BE UL LISTED.

m) WALL-MOUNTED CABINETS SHALL BE FORMED/WELDED AND POWDER COATED CONSTRUCTION, SIZED APPROPRIATELY FOR THE CABLE INSTALLATION, AND SHALL ACCEPT 19-INCH PATCH PANELS.

n) WALL-MOUNTED CABINETS MAY SERVE AS A SMALL TELECOMMUNICATIONS ROOM, HORIZONTAL OR INTERMEDIATE CROSS CONNECT FACILITY, OR CONSOLIDATION POINT.

o) WALL-MOUNT CABINETS AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) HUBBELL (QUADCAB)

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

D. FRAMES – WALL MOUNT - HINGED

a) SUPPORTS HEAVY OR DEEP EQUIPMENT IN LOCATIONS WITH LIMITED FLOOR SPACE

b) QUICK RELEASE LATCHES – RAKE FRAME HINGES BOTH LEFT AND RIGHT

c) CABLE TIE SLOTS ALONG BOTH SIDES AND INSIDE TOP AND BOTTOM FOR SECURING CABLES

d) FRAME WILL BE CONSTRUCTED OF 16 GA

e) ALL SURFACES WILL BE FINISHED WITH A DURABLE BLACK POWDER COAT.

f) 70 LBS LOAD CAPACITY

g) MOUNTING HOLES WILL BE 16” ON CENTER FOR EASY ATTACHEMENT TO ANY STANDARD WALL STUDS.

h) EIA-310-D UNIVERSAL SPACING TAPPED #12-24 FRONT AND BACK

i) WALL-MOUNT HINGED FRAMES AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) HUBBELL (HPWWMR**)

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

E. BRACKETS – WALL MOUNT – HINGED

a) BOTTOM OR SIDE HINGES ALLOWS ACCESS TO THE REAR OF COMPONENTS MOUNTED ON THE WALL

b) WALL BRACKETS WILL BE CONSTRUCTED OF 16 GA STEEL

c) ALL SURFACES WILL BE FINISHED WITH A DURABLE BLACK POWDER COAT.

d) WILL BE AVAILABLE IN 1RU TO 6RU

e) MOUNTING HOLES WILL BE 16” ON CENTER FOR EASY ATTACHEMENT TO ANY STANDARD WALL STUDS.

f) EIA-310-D UNIVERSAL SPACING TAPPED #12-24 FRONT AND BACK

g) HEIGHT WILL BE FROM 24” (12RU) TO 48” (26RU)

h) WALL-MOUNT HINGED BRACKETS, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) HUBBELL (HPWWB*U*)

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

F. ENCLOSURES – WALL MOUNT

a) REMOTE EQUIPMENT BOX BASIC DESIGN SHALL BE A ONE-PIECE, 16-GAGE STEEL, REINFORCED WELDED ENCLOSURE WITH A PRE-CONFIGURED LEFT-HINGED DOOR.

b) BASIC UNIT DELIVERED SHALL INCLUDE: (1) WALL MOUNT ENCLOSURE BODY WITH VENTED DOOR ASSEMBLED, WITH (2) SETS OF UNIVERSAL #12-24 TAPPED MOUNTING RAILS FOR COMMUNICATIONS EQUIPMENT, (2) SETS OF HUB MOUNTING BRACKETS, (2) NSQ LOCKS, AND (1) SET OF PANEL MOUNTING BRACKETS.

c) BODY AND DOOR MATERIAL SHALL BE 16-GAGE COLD ROLLED STEEL (CRS).

d) BASIC DIMENSIONS SHALL BE STANDARD HEIGHTS OF 24.5”, 32.5” OR 42.5” BY 24.2” WIDTH, IN 7” OR 10” DEPTH VERSIONS.

e) FINISH SHALL BE LIGHT GRAY OR BLACK DURABLE POLYURETHANE POWDER COAT ON ALL SURFACES.

f) INSTALLED CABINETS SHALL HAVE A STATIC LOAD CAPACITY OF 100 LBS.

g) INSTALLED MOUNTING RAILS SHALL ACCEPT 19” RACK-MOUNT PANELS AND EQUIPMENT WITH ANSI/EIA-310-D MOUNTING PATTERN.

h) CABINET SHALL ACCEPT A MAXIMUM HUB DEPTH OF 14.5” FOR 32” HEIGHT UNITS, AND 22” FOR 42” HEIGHT UNITS.

i) INSTALLED CABINET SHALL HAVE SUFFICIENT STORAGE CAPACITY FOR THE MAXIMUM NUMBER OF FEEDER AND DISTRIBUTION CABLES.

j) BODY SHALL HAVE A PATTERN OF KEY-SHAPED HOLES ON 16” CENTERS FOR STUD-MOUNTING. MOUNTING IS SUITABLE FOR ¾” PLYWOOD BACKBOARDS, STEEL OR WOOD STUDDED WALLS, CINDER BLOCK, OR CONCRETE WALLS.

k) THE WEIGHT OF THE CABINET SHALL NOT EXCEED 50LB (22.7KG).

l) BODY INNER BACK WALL SHALL HAVE CLIP FEATURES TO ACCEPT OPTIONAL MOUNTING BRACKETS FOR EQUIPMENT, SUCH AS PANELS, 110 BLOCKS, HUBS, SWITCHES, ROUTERS, UPS UNITS, POWER SUPPLIES, AUDIO/VIDEO, COAX SPLITTERS, FIBER BRACKETS, AND OTHER SUITABLE NETWORKING DEVICES.

m) BODY SHALL HAVE ECCENTRIC KNOCKOUTS IN THE TOP, BOTTOM, AND SIDES FOR CONDUIT ENTRY. ECCENTRIC KNOCKOUTS SHALL ACCOMMODATE CONDUIT SIZES INCLUDING ¾", 1.0", 2.5", AND 3.0".

n) CABINET SHALL HAVE DEDICATED GROUNDING AND BONDING LOCATIONS ACCORDING TO ANSI J-STD-607-A.

o) DOOR SHALL BE LOCKABLE.

p) VENTILATION: DOOR VENTILATION PATTERN SHALL MEET THE REQUIREMENTS OF UL1950 FOR FIRE CONTAINMENT AND INGRESS OF FOREIGN PARTICLES.

q) REMOTE EQUIPMENT CABINETS SHALL BE UL LISTED.

r) INSTALLED CABINETS SHALL PERFORM TO NEMA 2 RATING.

s) TAMPER RESISTANCE, VENTILATION, AND HEAT DISSIPATION PERFORMANCE SHALL MEET DESIGN REQUIREMENTS.

t) WALL-MOUNTED ENCLOSURES MAY SERVE AS A SMALL TELECOMMUNICATIONS ROOM, HORIZONTAL OR INTERMEDIATE CROSS CONNECT FACILITY, OR CONSOLIDATION POINT.

u) WALL-MOUNT ENCLOSURES AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

   a) HUBBELL (REBOX ENCLOSURES)

   b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

G. ENCLOSURES – FIBER RACK MOUNT

a) RACK-MOUNTED, POWDER COATED FORMED COLD ROLLED STEEL ENCLOSURE.

b) SWING-OUT OR PULL-OUT INNER TRAY SHALL PROVIDE ACCESS TO INNER CABLES AND CONNECTIONS, AND MAINTAIN PROPER CABLE BEND RADIUS THROUGHOUT THE RANGE OF MOTION.

c) FIBER RACK-MOUNT ENCLOSURES SHALL BE A 19-INCH FORMED/WELDED AND POWDER COATED MODULAR DESIGN, SIZED ACCORDING TO THE CABLE INSTALLATION.

d) FIBER RACK-MOUNT ENC LOSURES MAY SERVE AS A MAIN, HORIZONTAL, OR INTERMEDIATE CROSS CONNECT FACILITY.

e) PANEL MOUNTING BRACKETS SHALL BE CONFIGURABLE TO EITHER 19” OR 23” RACKS PER ANSI/EIA-310-D.

f) ENCLOSURE CHASSIS SHALL HAVE TWO MOUNTING BRACKET LOCATIONS FOR EITHER FLUSH MOUNT OR CENTER MOUNT ON THE RACK.

g) INNER TRAY MOUNTING POSTS FOR MODULAR FPR3SP PANELS SHALL ALSO ACCEPT MULTI-MEDIA FSP PANELS FOR INTEGRATION OF TWISTED PAIR (UTP) COAXIAL, OR OTHER CABLE MEDIA.

h) INNER TRAY SHALL HAVE A THREADED MOUNTING BOSS TO ACCEPT A MOUNTING STUD FOR SPLICE TRAYS. SPLICE TRAY CAPACITY SHALL BE (2) 10” SPLICE TRAYS, EACH WITH 24-SPLICE CAPACITIES (48 SPLICES TOTAL). SPLICE TRAY MOUNTING BOSS SHALL ALSO ACCEPT A STUD FOR MOUNTING 1-RMU BLOWN FIBER ADAPTER BRACKETS.

i) INNER TRAY MOUNTING POSTS FOR MODULAR PANELS SHALL ALSO ACCEPT 12-FIBER MTP-STYLE CASSETTES FOR “PLUG & PLAY” INSTALLATIONS.

j) INNER TRAY SHALL HAVE REAR CABLE TIE-DOWN FEATURES TO ACCEPT VARIOUS DIAMETER BACKBONE CABLES ENTERING THE ENCLOSURE.

k) ENCLOSURES SHALL BE CONSTRUCTED OF 16 GAGE COLD ROLLED STEEL (CRS)

l) FIBER RACK-MOUNT ENCLOSURES AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

   a) OCC (RTC SERIES)

   b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

H. ENCLOSURES – FIBER WALL MOUNT

a) BASIC FIBER ENCLOSURE DESIGN SHALL BE A FORMED COLD ROLLED STEEL ENCLOSURE WITH A SINGLE HINGED COVER.

b) ENCLOSURE MATERIAL SHALL BE 16-GAGE COLD ROLLED STEEL (CRS).

c) FINISH SHALL BE DURABLE BLACK ELECTROSTATIC POWDER COAT ON ALL SURFACES.

d) ENCLOSURES SHALL BE AVAILABLE IN 24 PORT AND 48 PORT CAPACITIES.

e) ENCLOSURES SHALL BE SUPPLIED COMPLETE WITH MANUFACTURER'S INSTRUCTIONS AND HARDWARE. SCREWS FOR WALL MOUNTING ARE NOT INCLUDED.

f) ENCLOSURE REAR SIDE SHALL HAVE PRE-PUNCHED, KEY-SHAPED HOLES TO PERMIT FASTENING TO SUITABLE STRUCTURES AND WALL SURFACES.

g) ENCLOSURE TOP AND BOTTOM SHALL HAVE A KNOCKOUT, EACH VERTICALLY ALIGNED, TO PERMIT CONDUIT AND CABLE ENTRY, AND VERTICAL STACKING OF MULTIPLE UNITS.

h) COVER SHALL BE LOCKABLE WITH A KEYED LOCK AVAILABLE SEPARATELY.

i) ENCLOSURES SHALL BE SUPPLIED WITH CABLE ROUTING CLIPS.

j) FIBER WALL-MOUNT ENCLOSURES SHALL BE A FORMED/WELDED AND POWDER COATED DESIGN, SIZED ACCORDING TO THE CABLE INSTALLATION. FIBER WALL-MOUNT ENCLOSURES MAY SERVE AS A HORIZONTAL CROSS CONNECT, CONSOLIDATION POINT, OR MUTOA ENCLOSURE.

k) FIBER WALL-MOUNT ENCLOSURES AND ACCESSORIES, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE

   a) NOT PREFERRED AND SPECIFIED BY CUSTOMER DURING DESIGN

l) ADAPTER PANELS – OPTICAL FIBER

m) OPTICAL FIBER ADAPTER PANELS SHALL BE A MODULAR DESIGN POWDER COATED STAMPED METAL CONSTRUCTION.

n) AVAILABLE IN SC, ST, LC, AND MT-RJ ADAPTER CONFIGURATIONS

o) HIGH OR LOW-DENSITY VERSIONS.

p) ADAPTER PANELS SHALL HAVE QUICK-RELEASE SNAP FASTENERS TO FIT DIRECTLY INTO FIBER ENCLOSURES.

q) FIBER PATCH PANELS, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

   a) HUBELL (FSP SERIES PANELS)

b) Acceptable Manufacturers: Basis of Design or equivalent as approved by University of South Florida – Informationa dn Technology Department

2.11 FIRE STOP MATERIAL

A. CABLES PASSING THROUGH FIRE-RATED FLOORS OR WALLS SHALL PASS THROUGH FIRE-RATED WIRING DEVICES WHICH CONTAIN AN INTUMESCENT INSERT MATERIAL THAT ADJUSTS AUTOMATICALLY TO CABLE ADDITIONS OR SUBTRACTIONS.

B. THE DEVICE (PER CODE REQUIREMENTS) SHALL INCLUDE BOTH INTERNAL AND EXTERNAL FIRESTOPPING.

C. CABLES PENETRATING THROUGH FIRE-RATED FLOORS OR WALLS SHALL UTILIZE FIRE-RATED PATHWAY DEVICES CAPABLE OF PROVIDING AN F RATING EQUAL TO THE RATING OF THE BARRIER IN WHICH THE DEVICE IS INSTALLED.

D. THE DEVICE SHALL BE TESTED FOR SMOKE LEAKAGE (L RATING) AND SHALL NOT REQUIRE THE USE OF ANY OPTIONAL SEALING MATERIALS TO ACHIEVE THE PUBLISHED RATING.

E. THE DEVICE SHALL UTILIZE A FIRE AND SMOKE SEALING SYSTEM THAT AUTOMATICALLY ADJUSTS TO THE ADDITION OR REMOVAL OF CABLES.

F. WIRING DEVICES SHALL BE CAPABLE OF ALLOWING A 0 TO 100-PERCENT VISUAL FILL OF CABLES.

G. WIRE DEVICES SHALL BE OF A SUFFICIENT SIZE TO ACCOMMODATE THE QUANTITY AND SIZE OF ELECTRICAL WIRES AND DATA CABLES REQUIRED AND SHALL BE SUITABLE FOR USE WITH NEW OR EXISTING CABLE INSTALLATIONS.

H. THE INSTALLED DEVICE (IN NORMAL USE) SHALL REQUIRE NO MAINTENANCE AND SHALL ACCOMMODATE FUTURE CABLE CHANGES WITHOUT MECHANICAL ADJUSTMENT AND/OR REMOVAL OR REPLACEMENT OF PROTECTIVE MATERIALS.

I. WIRE DEVICES TO BE PROVIDED WITH STEEL WALL PLATES ALLOWING FOR SINGLE OR MULTIPLE DEVICES TO BE GANGED TOGETHER.

J. THE DEVICE SHALL BE MODULAR AND SHALL PROVIDE MECHANICAL INSTALLATION OPTIONS FOR COMMON WALL AND FLOOR CONSTRUCTIONS AS WELL AS COMMON CONSTRUCTION CONDITIONS INCLUDING OVER-SIZED OR DAMAGED OPENINGS OR EXISTING SLEEVES.

K. ACCEPTABLE MANUFACTURERS:

a) SPECIFIED TECHNOLOGIES INC. (EZ-PATH) OR APPROVED EQUAL

2.12 INNER-DUCT

A. FIBER OPTIC CABLE SHALL BE INSTALLED WITH INNERDUCT FOR PROTECTION OF FIBER CABLES IN A SHARED PATHWAY

B. THE INNER DUCT WILL BE RATED FOR THE ENVIRONMENT THAT IT IS BEING INSTALLED IN. PLENUM AND RISER RATED

C. THREE INNER DUCTS WILL BE RUN BETWEEN CLOSETS. ONE FOR CURRENT INSTALLATION, TWO SPARE FOR FUTURE APPLICATIONS.

D. SIZE: 1”

E. FLEXIBLE & LIGHTWEIGHT FOR EASE OF HANDLING

F. PRE-THREADED WITH PULL LINE

G. INNER DUCT, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) PREMIER CONDUIT

2.13 PROTECTION UNITS – COPPER CABLE

A. UL LISTED PROTECTION FOR DATA COMMUNICATION CIRCUITS. THE 4 PAIR BLOCK PROTECTS NETWORKS FROM TRANSIENTS THAT CAN HARM SENSITIVE ELECTRONIC EQUIPMENT.

B. ULTRA LOW CAPACITANCE SOLID STATE TECHNOLOGY ALLOWS FOR CAT 6 PERFORMANCE WHILE PROVIDING QUICK REACTION TO HAZARDOUS ELECTRICAL SURGES WITHOUT NETWORK DEGRADATION.

C. DESIGNED TO PROTECT DATA NETWORKS OPERATING BELOW 65 VOLTS.

D. THESE PROTECTORS PROVIDE OPTIMUM TRANSMISSION PERFORMANCE FOR PROTOCOLS OPERATING AT TRANSMISSION SPEEDS UP TO 250 MHZ.

E. UL LISTED

F. 65V MODEL IS IDEAL FOR POWER OVER ETHERNET (POE) CIRCUIT PROTECTION

G. 110 TERMINATION

H. COVER INCLUDED

I. FACTORY LOADED WITH 65V SOLID STATE MODULES

J. INNER DUCT, AS SPECIFIED IN THE CONTRACT DOCUMENTS, SHALL BE:

a) PORTA SYSTEMS (606)

PART 3 EXECUTION

3.1 PREPARATION –

A. CABLE PATHWAYS AND FIRESTOPS

a) CABLE PATHWAYS, INCLUDING CONDUIT, CABLE TRAY, LADDER RACK, RACEWAY, SLOTS, SLEEVES, ETC. SHALL BE LOCATED AND MOUNTED ACCORDING TO CONTRACT DRAWINGS AND MANUFACTURER'S INSTRUCTIONS. PATHWAYS SHALL NOT BE INSTALLED IN WET AREAS.

b) NOTE: USF IS REQUIRING THE USE OF 1" CONDUIT TO STUB IN THE WORKSTATION.

c) CABLE PATHWAY FILL RATIO, BEND RADIUS, RUN LENGTH, NUMBER OF BENDS, AND PROXIMITY TO EMI SOURCES SHALL BE IN ACCORDANCE WITH ANSI/TIA/EIA-569-B. MAXIMUM CABLE COUNT OF THE INITIAL INSTALLATION SHALL NOT EXCEED 40% FILL RATIO IN ANY PATHWAY.

d) IN ACCORDANCE WITH NEC 2005, POWER WIRING AND COMMUNICATIONS CABLING SHALL NOT SHARE THE SAME PATHWAY OR OUTLET.

e) CABLE PATHWAYS SHALL BE SECURED TO A STRUCTURAL MEMBER OF THE BUILDING, OR PERMANENT WALL STUDS. WALL SURFACES FOR RACEWAY MOUNTING SHOULD BE FINISHED COMPLETE.

f) CEILING DATA AND DEVICE LOCATION PATHWAYS AND BOXES SHALL BE SECURED TO STRUCTURAL MEMBER OF THE BUILDING.

g) METALLIC PATHWAYS SHALL BE ELECTRICALLY CONTINUOUS, FREE OF SHARP EDGES, AND PROPERLY BONDED TO AN APPROVED GROUND. EMI SOURCES SUCH AS BALLASTS, MOTORS, AND BUS CONDUCTORS SHALL BE AVOIDED BY USING PROPER SEPARATION DISTANCES.

h) PATHWAYS THAT PENETRATE FIRE-RATED BARRIERS SHALL BE FIRE STOPPED WITH REUSABLE INTUMESCENT PUTTY ACCORDING TO LOCAL CODES AND RECOGNIZED PRACTICES. FIRE STOP MATERIALS OR DEVICES SHALL BE QUALIFIED TO UL-1479, IN ACCORDANCE WITH ASTM E814. FIRE STOP METHOD SHALL HAVE P.E. APPROVAL.

i) CORE DRILLING OF HOLES FOR FIRE-RATED POKE-THROUGH OUTLET DEVICES SHALL HAVE APPROVAL BY A STRUCTURAL ENGINEER OR P.E. ON THE CONTRACT DRAWINGS PRIOR TO START OF WORK.

j) PATHWAYS FOR VERTICAL CABLE RUNS, SUCH AS SLOTS AND SLEEVES, SHALL BE INSTALLED IN THE PROPER LOCATION IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.

B. TELECOMMUNICATIONS ROOMS AND EQUIPMENT ROOMS

a) TELECOMMUNICATIONS ROOM (TR) LAYOUT, LOCATION AND DESIGN SHALL BE IN ACCORDANCE WITH THE GUIDELINES OF ANSI/TIA/EIA-569-B. TR'S ON EACH FLOOR OF THE BUILDING SHOULD BE CENTRALLY LOCATED AND VERTICALLY ALIGNED TO SIMPLIFY BACKBONE CABLE AND PATHWAY ROUTING. TR'S SHALL NOT BE INSTALLED IN WET AREAS, OR NEAR EMI SOURCES OR CAUSTIC CHEMICALS. PLUMBING INFRASTRUCTURE SHALL NOT ENTER TR. ALL TR LOCATIONS SHALL BE COORDINATED WITH USF REPRESENTATIVE

b) LAYOUT OF RACK, CABINET OR ENCLOSURE LOCATIONS SHALL BE ACCORDING TO CONTRACT DRAWINGS.

c) RACKS AND CABINETS SHALL BE SECURED TO THE FLOOR USING PROPER ANCHORS AND FASTENERS.

d) ALL WALLS SHOULD BE COVERED WITH ¾", A-C GRADE PLYWOOD PAINTED GRAY FIRE RETARDANT PAINT. THIS PLYWOOD SHALL BE FIRE-RATED TO MEET APPLICABLE CODES AND SECURELY FASTENED TO THE WALL STUDS. THE PLYWOOD WILL BE INSTALLED TO GIVE UP TO 8 FT OF WORKSPACE ON THE WALL AND SHALL BE MIN 6 INCHES OFF THE FINISHED FLOOR. THE WALL SHOULD BE LIGHT IN COLOR WORKSPACE TO ENHANCE ROOM LIGHTING, UNLESS ALTERED BY USF REPRESENTATIVE.

e) OPEN CEILINGS ARE PREFERRED IN TR ROOMS. INTERIOR WALLS SHOULD BE FINISHED FROM FLOOR TO STRUCTURAL DECK ABOVE.

f) MOUNT AND ASSEMBLE RACKS, CABINETS, BRACKETS AND ENCLOSURES PER MANUFACTURER'S INSTRUCTIONS. MOUNT PATCH PANELS AND CABLE MANAGEMENT ACCESSORIES IN THE SPECIFIED LOCATIONS.

g) ADJOINING PATHWAYS (LADDER RACK, CABLE TRAY, ETC.) SHALL BE PROPERLY SECURED AND POSITIONED TO ALLOW ADEQUATE BEND RADIUS OF CABLES ENTERING THE RACK OR CABINET.

h) RACKS AND LADDER TRAY WITHIN TR SHALL BE GROUNDED AND BONDED IN ACCORDANCE WITH ANSI/TIA-942

C. WALL OUTLETS AND RECESSED WALL BOXES

a) WALL OUTLET AND CABLE DROP PATHWAY LOCATION SHALL BE ACCORDING TO CONTRACT DRAWINGS. GUIDELINES FROM ANSI/TIA/EIA-569-B SHOULD BE FOLLOWED FOR LOCATION WITH ELECTRICAL OUTLETS AND OUTLET HEIGHT ABOVE FINISHED FLOOR, TYPICALLY 18" AFF.

b) OUTLET BOXES SHALL BE FASTENED SECURELY TO A WALL STUD OR STRUCTURAL ELEMENT, IN A MANNER TO PERMIT FLUSH MOUNTING OF THE FACEPLATE WITH THE FINISHED WALL.

c) MULTI-CONNECT BOXES SHALL BE INSTALLED IN A MANNER TO COMPLY WITH SEPARATION RULES FOR POWER AND COMMUNICATIONS WIRING IN CLOSE PROXIMITY.

d) REFER TO SPECIFIC MANUFACTURER'S RECOMMENDATIONS FOR WALL OUTLET SELECTION, CABLE DEPLOYMENT, AND TERMINATION OF JACKS INTO FACEPLATES. NOTE: DUE TO THE LARGER SIZE OF FUTURE CABLES, USF IS REQUIRING THE INSTALLATION OF A 2-GANG BOX WITH A SINGLE GANG MUD RING TO ALLOW FOR PROPER CABLE BEND RADIUS WHEN THE FACEPLATE IS INSTALLED.

3.2 INSTALLATION

A. CABLE SUPPORT

a) THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL SUPPORTS FOR CABLES SPECIFIED IN THIS SECTION.

b) CABLE SUPPORTS SHALL BE SPACED RANDOMLY, BUT NO FURTHER THAN 5'-0" APART AND MAINTAINING ALIGNMENT.

c) IN EACH TELECOMMUNICATIONS ROOM THE INNER-DUCTS ENTERING THE SPACE WILL BE COMBINED, IN A SIZE APPROPRIATE METALIC BOX THAT IS MOUNTED ON THE WALL. THE COMBINED INNERDUCTS WILL THEN BE ROUTED TO THE RACK AND THE FIBER BAY.

d) PROVIDE ALL ADDITIONAL CABLE MANAGEMENT PRODUCTS, SLEEVES OR CONDUIT RACEWAYS AS REQUIRED TO PROTECT EXPOSED CABLING AND COMPLETE THE INSTALLATION OF CABLES IN A NEAT MANNER.

e) A HORIZONTAL CONDUIT DISTRIBUTION SYSTEM CONSISTS OF CONDUITS RADIATING FROM THE TELECOMMUNICATIONS ROOM TO THE WORKSTATION OUTLETS IN THE FLOOR, WALLS, CEILINGS, AND COLUMNS OF A BUILDING. WHEN USING A CONDUIT DISTRIBUTION SYSTEM UTILIZE THE MOST DIRECT ROUTE FOLLOWING THE BUILDING STRUCTURE.

f) THE SIZE AND NUMBER OF CONDUITS OR SLEEVES USED FOR BACKBONE PATHWAYS DEPENDS ON THE USABLE FLOOR SPACE SERVED BY THE BACKBONE SYSTEM. AT LEAST THREE 4 TRADE SIZE SLEEVES ARE RECOMMENDED.

g) CONDUIT IS ONLY REQUIRED IF BUILDING CODES OR ENVIRONMENTAL CONDITIONS NECESSITATE IT. RIGID OR EMT METAL CONDUITS ARE DEEMED

SUITABLE FOR BUILDING INSTALLATION. ADEQUATE PLANNING SHOULD ALLOW FOR A MINIMUM OF ONE 1 INCH CONDUITS TO EACH WORKSTATION.

h) CONDUIT FILL RATIOS SHALL NOT EXCEED 40%; CONTACT YOUR CABLE MANUFACTURER TO GET RECOMMENDATION ON FILL RATES.

i) NO CONDUIT RUN SHOULD BE DESIGNED WITH MORE THAN TWO (2), 90 DEGREE BENDS BETWEEN PULL POINTS OR PULL BOXES. IF A RUN REQUIRES MORE THAN TWO 90 DEGREE BENDS, INSTALL A PULL BOX.

a) EXCEPTIONS:

i. THE TOTAL RUN IS NOT LONGER THAN 33 FT.

ii. THE CONDUIT SIZE IS INCREASED TO THE NEXT TRADE SIZE.

iii. ONE OF THE BENDS IS LOCATED WITHIN 12 IN OF THE CABLE FEED END. (THIS EXCEPTION ONLY APPLIES TO PLACING OPERATIONS WHERE CABLE IS PUSHED AROUND THE FIRST BEND.)

j) ALL CONDUITS WILL BE EQUIPPED WITH A CONTIGUOUS LENGTH OF PLASTIC OR NYLON PULL STRING WITH A MINIMUM RATING OF 200 LBS. (90 KG)

k) A CONDUIT RUN SHOULD NOT BE DESIGNED WITH CONTINUOUS CLOSED SECTIONS LONGER THAN 100 FT WITHOUT PULL POINTS OR PULL BOXES INSTALLED.

l) ALL CONDUITS SHOULD TERMINATE ABOVE THE INSTALLED CABLE TRAYS AND ALLOW FOR PROPER CABLE RACKING. CABLE WATERFALLS SHOULD BE CONSIDERED IN AREAS THAT HAVE EXCESSIVE DISTANCE BETWEEN THE CONDUIT AND LADDER RACK.

m) TRAYS AND CONDUITS LOCATED WITHIN THE CEILING SHALL PROTRUDE INTO THE ROOM A DISTANCE OF 1 TO 2 IN WITHOUT A BEND AND ABOVE 8 FT HIGH. CLEAR, UNOBSTRUCTED ACCESS TO THE LADDER RACK AND CONDUITS SHALL BE PROVIDED WITHIN TELECOMMUNICATIONS ROOMS.

n) CONDUITS ENTERING THROUGH THE FLOOR SHALL TERMINATE AT LEAST TWO (2) INCHES ABOVE THE FINISHED FLOOR

o) LOCATE SLOT/SLEEVE SYSTEMS IN PLACES WHERE MAINTENANCE OF CABLING IS PRACTICAL.

p) IF POSSIBLE, LOCATE SLEEVES, SLOTS, AND/OR CONDUITS ON THE LEFT SIDE OF THE ROOM; THIS PLACEMENT ENHANCES THE USE OF WALL SPACE FROM LEFT TO RIGHT.

q) WHEN POSSIBLE, ENTRANCE CONDUIT AND DISTRIBUTION CONDUIT/CABLE TRAY SHOULD ENTER AND EXIT ON THE SAME WALL; IF THIS IS NOT POSSIBLE, LADDER RACK INSIDE THE ROOM SHOULD BE PROVIDED FOR DISTRIBUTION FROM WALL TO WALL.

r) ALL FLOOR PENETRATIONS SHALL BE CORE DRILLED WITH A MAXIMUM 1/4 INCH SIZE GREATER THAN THE EXTERIOR DIMENSION OF THE RISER CONDUIT

s) CONDUITS ENTERING THROUGH A WALL SHALL BE REAMED AND BUSHED, AND TERMINATED AS CLOSE TO CABLE TRAY OR LADDER RACK

t) TERMINATING ABOVE A SUSPENDED CEILING MUST TERMINATE NOT LESS 3 INCHES ABOVE FINISHED CEILING AND FINISHED WITH BUSHING OPENING.

u) ALL CONDUIT WILL BE LABELED FOR EASY IDENTIFICATION

v) ALL FLOOR PENETRATIONS SHALL BE AT COLUMNS, EXTERIOR WALLS OR IN EQUIPMENT ROOMS.

w) CABLES SHALL BE SUPPORTED AT HEIGHT OF BOTTOM FLANGE OF STRUCTURAL BEAMS USING A RIGID SUPPORT METHOD (I.E. THREADED ROD, BEAM CLAMPS, ETC.)

x) DO NOT SUPPORT CABLES FROM DUCTWORK, SPRINKLER PIPING, WATER PIPING, WASTE PIPING, CONDUIT, CEILING WIRE, OR OTHER SYSTEM SUPPORTS.

y) THE CONDUITS OR SLEEVE WILL BE INSTALLED PER TIA/EIA-569-B AND SEAL ALL PENETRATION WITH APPROVED FIRE STOP PRODUCT.

z) PROVIDE INDEPENDENT SUPPORT SYSTEM FOR EACH LOW VOLTAGE CABLING SYSTEM.

B. CABLE:

a) CATEGORY 6A CABLE WILL BE RUN FOR DATA. CATEGORY 5 GELLED FILLED CABLE WILL BE RUN IN THE BACKBONE FOR ALL COMMUNICATIONS APPLICATIONS. CERTAIN ENVIRONMENTS MAY REQUIRE THE USE OF DIFFERENT CABLES AND/OR CABLE JACKETS.

b) ALL TERMINATIONS WILL UTILIZE T568B TERMINATION. INSTALLATIONS OUT OF COMPLIANCE WITH THIS WIRING REQUIREMENT SHALL BE CORRECTED AT NO COST TO USF.

c) MAXIMUM CABLE LENGTHS TO BE 295 FEET (90 M) INCLUDING SERVICE LOOP. PROVIDE ALL NECESSARY INSTALLATION MATERIALS, TOOLS AND EQUIPMENT TO PERFORM INSULATION DISPLACEMENT TYPE TERMINATIONS AT ALL COMMUNICATIONS OUTLETS, PATCH PANELS.

d) ALL COMMUNICATIONS CABLING THAT HAS BECOME ABANDONED AS PART OF NEW RENOVATION PROJECTS, PREVIOUS RENOVATION PROJECTS, OR TEMPORARY COMMUNICATION CABLES USED DURING THE CONSTRUCTION PROCESS SHALL BE COMPLETELY REMOVED.

e) REFER TO DETAILED MANUFACTURER'S GUIDELINES FOR DEPLOYMENT OF CATEGORY 6A CABLE. CERTAIN RESTRICTIONS APPLY, AND SPECIFIC TECHNIQUES ARE RECOMMENDED.

f) ALL CABLING SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS' WRITTEN BEND RADIUS AND PULLING TENSIONS. GENERAL INDUSTRY GUIDELINES RECOMMEND THE FOLLOWING BEND RADIUS AND PULLING TENSIONS:

   a) TENSILE LOADING ON A SINGLE 4-PAIR COPPER UTP CABLE SHALL NOT EXCEED 25 LBF.

   b) BEND RADIUS OF A SINGLE 4-PAIR COPPER UTP CABLE SHALL NOT EXCEED 4 TIMES THE DIAMETER OF THE CABLE.

   c) BEND RADIUS OF MULTI-PAIR COPPER UTP AND OPTICAL FIBER CABLE SHALL NOT EXCEED 10 TIMES THE DIAMETER OF THE CABLE.

g) ALL CONDUITS AND CONDUIT SLEEVES SHALL HAVE BUSHINGS OR GROMMETS SHALL BE INSTALLED PRIOR TO THE INSTALLATION OF COMMUNICATIONS CABLES TO AVOID DAMAGE AND ABRASIONS TO CABLE SHEATHING AND INSULATION. IF BUSHINGS HAVE ARE INSTALLED BY THE ELECTRICAL CONTRACTOR, THE COMMUNICATIONS CABLING CONTRACT SHALL FURNISH AND INSTALL BUSHINGS PRIOR TO PULLING COMMUNICATIONS CABLING.

h) HORIZONTAL CABLE LENGTH FOR 4-PAIR COPPER UTP CAT6A CABLES SHALL NOT EXCEED 295 FEET. PRIOR TO BIDDING AND INSTALLATION, THE CONTACTOR SHALL REVIEW THE DRAWINGS AND VERIFY NO CABLE RUN EXCEEDS 295 FEET AND NOTIFY THE COMMUNICATIONS DESIGNER OF CABLE RUNS THAT MAY EXCEED 295 FEET.

i) SPLICES ARE NOT PERMITTED IN ANY VOICE OR DATA CABLING..

j) AVOID PLACING COPPER CABLES NEAR SOURCES OF EXTREME HEAT (I.E. BOILERS, RADIATORS, HEAT COILS).

k) MAINTAIN CABLE TWISTS FOR ALL UTP CABLES. FOR TERMINATIONS CABLE SHEATHING SHALL BE STRIPPING BACK NO MORE THAN ½" BACK FROM TERMINATION POINT FOR ALL CATEGORY 6A CABLES.

l) ALL CABLES SHALL BE SUPPORTED BY CABLE TRAY, CABLE RUNWAY, OR J-HOOKS. WHEN LARGE QUANTITIES OF CABLES LEAVE TRAYS OR RUNWAYS, CABLES SHALL BE SUPPORTED BY DROP-OUTS OR CABLE SUPPORT HARDWARE MANUFACTURED SPECIFICALLY FOR THE PURPOSE OF SUPPORTING CABLES. J-HOOKS SHALL BE INSTALLED A MINIMUM OF EVERY 5 FEET AND CABLING SHALL MAINTAIN MINIMAL DEFLECTION AND STRAIN (LESS THAN 12" DEFLECTION). CABLES SHALL NOT BE SUPPORTED FROM CEILING GRID WIRES. CABLES SHALL NOT RUN ABOVE IRON JOISTS.

m) ALL CABLES SHALL BE SEPARATED INTO LIKE GROUPS.

n) ANY CABLING INSTALLED IN EQUIPMENT ROOMS SHALL BE NEATLY PLACED IN CABLE TRAYS, CABLE RUNWAYS, OR HORIZONTAL AND VERTICAL RACK/CABINET CABLE MANAGERS

o) VELCRO CABLE TIES MAY BE USED TO SECURE PERMANENTLY INSTALLED HORIZONTAL AND BACKBONE CABLING; ANY VELCRO INSTALLED IN PLENUM CEILING SPACES SHALL BE RATED FOR USE IN PLENUM SPACES. VELCRO SHOULD BE TIGHTED TO THE POINT OF CHANGING THE CABLE GEOMETRY. TIE WRAPS, OR ZIP TIES SHALL NEVER BE USED.

p) VELCRO STRAPS SHALL BE UTILIZED IN THE TR AND INSIDE TC ENCLOSURES FOR ALL CABLE BUNDLING. TIE WRAPS SHALL BE PROHIBITED IN THE TELECOMMUNICATION ROOMS.

q) SEPARATION: MAINTAIN THE FOLLOWING DISTANCES BETWEEN CABLES, OTHER SYSTEM CABLES AND OTHER BUILDING SYSTEMS:

   a) ONE (1) FOOT FROM FLUORESCENT LIGHTS.

   b) ONE (1) FOOT FROM POWER CABLE IN PARALLEL

   c) ONE (1) FOOT FROM ELECTRICAL CONDUITS, OTHER SYSTEMS CABLES OR OTHER ELECTRICAL EQUIPMENT.

   d) FOUR (4) FEET FROM MOTORS AND TRANSFORMERS

   e) THREE (3) FEET FROM HOT WATER PIPING OR OTHER MECHANICAL EQUIPMENT.

   f) TEN (10) FEET FROM BUS CONDUCTORS OR HIGH-CURRENT BRANCH CIRCUITS

g) ALL LOW VOLTAGE CABLES SHALL BE RUN PARALLEL OR AT RIGHT ANGLES TO BUILDING STRUCTURAL FRAMEWORK. DO NOT RUN CABLES DIAGONALLY ACROSS CEILING SPACE WITHOUT WRITTEN AUTHORIZATION BY THE ARCHITECT'S ELECTRICAL ENGINEER OR USF REPRESENTATIVE.

h) COMMUNICATIONS CABLING THAT MUST CROSS POWER CABLES OR CONDUIT SHALL CROSS AT A 90-DEGREE ANGLE, AND SHALL NOT MAKE PHYSICAL CONTACT.

r) FIRE SEAL AROUND ALL CABLES RUNNING THROUGH RATED FLOORS AND WALLS. FIRESTOP ALL CABLES AND PATHWAYS THAT PENETRATE FIRE-RATED BARRIERS USING APPROVED METHODS AND ACCORDING TO LOCAL CODES UTILIZING INTUMESCENT PUTTY.

s) LEAVE SPARE PULL STRING WITH EVERY OUTLET INSTALLED.

t) DO NOT INSTALL CABLE IN WET AREAS, OR IN PROXIMITY TO HOT WATER PIPES OR BOILERS.

u) CABLE ENDS FOR TERMINATION SHALL BE CLEAN AND FREE FROM CRUSH MARKS, CUTS, OR KINKS LEFT FROM PULLING OPERATIONS. INSTALLED CABLE JACKETS SHALL HAVE NO ABRASIONS WITH EXPOSED CONDUCTOR INSULATION OR BARE COPPER "SHINERS". THE INSTALLER IS RESPONSIBLE TO REPLACE DAMAGED CABLES.

v) BACKBONE CABLES SHALL BE INSTALLED AND BUNDLED SEPARATELY FROM HORIZONTAL DISTRIBUTION CABLES. BACKBONE AND HORIZONTAL CABLE BUNDLES SHALL BE LOOSE AND RANDOM.

w) BACKBONE CABLES SPANNING MORE THAN THREE FLOORS SHALL BE SUPPORTED AT THE TOP OF THE CABLE RUN WITH A WIRE MESH GRIP AND ON ALTERNATING FLOORS, UNLESS OTHERWISE SPECIFIED BY LOCAL CODES OR MANUFACTURER'S GUIDELINES.

x) VERTICAL RUNS OF BACKBONE CABLES ENTERING EACH TR SHALL BE SECURELY FASTENED ALONG A PROPERLY PREPARED WALL IN THE TR ON EACH FLOOR. USE OF CABLE LADDER IS RECOMMENDED.

C. COMMUNICATIONS INFRASTRUCTURE

a) MAXIMUM CABLE LENGTHS TO BE 295 FEET (90 M) INCLUDING SERVICE LOOP. PROVIDE ALL NECESSARY INSTALLATION MATERIALS, TOOLS AND EQUIPMENT

b) SUPPORT AND SECURE CABLES AT PATCH PANELS USING REAR CABLE MANAGEMENT BRACKET, SPOOLS OR MANAGEMENT DEVISE.

c) INSTALL CATEGORY 3, MULTI-PAIR VOICE BACKBONE CABLES UTILIZING AN INDEPENDENT OPEN CABLING. THIS MAY REQUIRE GELLED FILLED CABLE FOR UNDER SLAB INSTALLATIONS.

d) FOR EACH VOICE CROSS-CONNECT, PROVIDE THE APPROPRIATE COLOR ICON AT EACH PATCH PANEL PORT AT THE TC'S AND/OR TR.

e) COMPLETE ALL CROSS-CONNECTS FOR ANALOG CENTRAL OFFICE FACILITIES AND ALARM LINES TO 110-TERMINATION BLOCK.

f) CROSS-CONNECTS SHALL BE COMPLETED AS PER CONSTRUCTION SCHEDULE.

D. OPTICAL FIBER CABLE:

a) ARMORED FIBER OF THE PROPER RATING WILL BE RUN BETWEEN EACH CLOSET.

b) CABLES FOR DIRECT BURIAL, AERIAL, OR OTHER OUTSIDE APPLICATIONS SHALL BE DESIGNED SPECIFICALLY FOR THE INTENDED PURPOSE.

c) ALL OPTICAL FIBER INSTALLATIONS SHALL BE INSTALLED USING OPEN CABLING METHODS. LIMIT CABLE-BENDING RADIUS TO 20 TIMES THE CABLE DIAMETER DURING INSTALLATION, AND 10 TIMES THE DIAMETER AFTER INSTALLATION. PROVIDE ALL REQUIRED TOOLS, MATERIALS, CONSUMABLES, AND EQUIPMENT NECESSARY FOR FIELD MOUNTING OF SC CONNECTORS.

d) DO NOT EXCEED THE MAXIMUM PULL TENSION SPECIFIED BY THE CABLE MANUFACTURER. USE APPROPRIATE LUBRICANTS AS REQUIRED TO REDUCE PULLING FRICTION. AVOID KINKING AND TWISTING OF CABLES DURING INSTALLATION.

e) LABEL EACH END OF EACH CABLE AS TO SOURCE AND DESTINATION. TERMINATE OPTICAL FIBERS IN CONSISTENT, CONSECUTIVE MANNER AT EACH END USING FUSION SPLICED FACTORY TERMINATED PIG-TAILS. LABEL OPTICAL FIBER RACEWAY CABLE WITH YELLOW "CAUTION - OPTICAL FIBER CABLE" TAGS EVERY 10 FEET. LEAVE 10 FEET OF SLACK AT EACH FIBER TERMINATION POINT. NEATLY COIL SLACK OPTICAL FIBER CABLE ON TOP OF RACK ABOVE OPTICAL FIBER PATCH PANEL ENCLOSURE AT EACH RACK LOCATION.

f) OPTICAL FIBER CABLE TERMINATIONS SHALL UTILIZE ENCLOSURES AND COMPONENTS IN QUANTITIES CONSISTENT WITH THE REQUIRED FIBER COUNTS AT EACH END OF EACH SEGMENT.

g) DURING INSTALLATION OF OPTICAL FIBER CABLE DO NOT ALLOW PULLING TENSION TO EXCEED CABLE MANUFACTURER'S SPECIFICATION FOR THE CABLE BEING INSTALLED. ONLY THE STRENGTH MEMBER OF THE CABLE SHALL BE SUBJECTED TO THE PULLING TENSION.

h) CLEAN ALL OPTICAL FIBER CONNECTOR TIPS PRIOR TO INSERTING THEM INTO MATTING RECEPTACLES OR BULKHEADS. INSTALL ALL DUST COVERS

i) USING APPROVED METHODS, PULL CABLE INTO CONDUIT, OR PLACE INTO RACEWAY OR CABLE TRAY AS SPECIFIED. A PULL CORD (NYLON; 1/8" MINIMUM) SHALL BE CO-INSTALLED WITH ALL CABLE INSTALLED IN ANY CONDUIT.

j) WHERE CABLES ARE INSTALLED IN AIR RETURN PLENUM, RISER RATED CABLE SHALL BE INSTALLED IN METALLIC CONDUIT.

k) BACKBONE AND HORIZONTAL CABLES SHALL BE INSTALLED AND BUNDLED SEPARATELY IN ANY PATHWAY.

l) CABLES ABOVE CEILINGS OR BELOW ACCESS FLOORS SHALL BE INSTALLED IN CABLE TRAY OR OPEN-TOP CABLE HANGERS.

m) CABLE SLACK AND SERVICE COILS SHALL BE STORED PROPERLY ABOVE THE CEILING OR UNDER THE ACCESS FLOOR. PATHWAY FILL RATIO IN CONDUIT, TRAY, RACEWAY, ETC. SHALL NOT EXCEED 40% OF PATHWAY CROSS-SECTIONAL AREA.

n) A SERVICE COIL OF AT LEAST 1 METER IS RECOMMENDED WITHIN WORKSTATION OUTLETS, AND AT LEAST 2 METERS IS RECOMMENDED FOR TELECOMMUNICATIONS ENCLOSURES. MAIN TRUNK AND OSP CABLES SHALL ALSO HAVE A LARGE DIAMETER SERVICE COIL IN THE SPECIFIED LOCATION.

o) RECOMMENDED MAXIMUM SPACING OF CABLE SUPPORTS ABOVE THE CEILING IS 60 IN.

p) BACKBONE CABLES SPANNING MORE THAN THREE FLOORS SHALL BE SECURELY ATTACHED AT THE TOP OF THE CABLE RUN WITH A WIRE MESH GRIP AND ON ALTERNATING FLOORS OR AS REQUIRED BY LOCAL CODES.

q) VERTICAL RUNS OF CABLE SHALL BE SUPPORTED TO MESSENGER STRAND, CABLE LADDER, OR OTHER APPROVED STRUCTURE TO SUPPORT THE WEIGHT OF THE CABLE. DO NOT EXCEED MAXIMUM CABLE VERTICAL RISE LIMITS.

r) CABLES THAT ARE DAMAGED DURING INSTALLATION SHALL BE REPLACED BY THE CONTRACTOR.

E. RACKS AND ENCLOSURES:

a) FREESTANDING EQUIPMENT RACKS AND ENCLOSURES SHALL BE PROTECTED FREE OF ALL DUST, DEBRIS AND OTHER ENVIRONMENTAL ELEMENTS DURING CONSTRUCTION UNTIL SUBSTANTIAL COMPLETION WALK-THROUGH.

b) EACH RACK, ENCLOSURE SHALL HAVE A DEDICATED #6 AWG GROUND WIRE TO A GROUNDING BUSBAR OR BUILDING GROUND AS DEFINED BY NEC.

c) AN ISOLATION PAD WILL BE INSTALLED PRIOR TO FASTENING THE RACK TO THE FLOOR

d) SECURE RACKS AND ENCLOSURES TO FLOOR USING RACK INSTALLATION KIT.

F. CATEGORY 6A JACKS

a) REFER TO SPECIFIC MANUFACTURER'S GUIDELINES FOR TERMINATION OF JACKS AND DRESSING CATEGORY 6A CABLES INSIDE WALL OUTLETS AND SURFACE HOUSINGS. DUE TO THE LARGER SIZE OF CATEGORY 6A CABLE, SERVICE COILS IN OUTLET BOXES AND SURFACE HOUSINGS ARE NOT RECOMMENDED.

b) TERMINATE JACKS ACCORDING TO MANUFACTURER'S INSTRUCTIONS.

c) ALL JACK WILL BE WIRED UTILIZING T568B.

d) TO ASSURE 10GBASE-T PERFORMANCE, MAINTAIN WIRING PAIR TWISTS AS CLOSE AS POSSIBLE TO THE POINT OF TERMINATION. ALSO MINIMIZE THE LENGTH OF EXPOSED PAIRS FROM THE JACKET TO THE IDC TERMINATION POINT DURING INSTALLATION.

e) THE LENGTH OF WIRING PAIR UN-TWIST IN EACH TERMINATION SHALL BE LESS THAN 0.5 INCHES (13 MM).

f) JACKS SHALL BE PROPERLY MOUNTED IN PLATES, FRAMES, OR HOUSINGS WITH DUST CAPS FULLY INSTALLED OVER IDC CONTACTS.

g) HORIZONTAL CABLES EXTENDING FROM MOUNTED JACKS SHALL MAINTAIN A MINIMUM BEND RADIUS OF AT LEAST 4 TIMES THE CABLE DIAMETER, UNLESS SPACE IS RESTRICTED. NOTE: REFER TO SPECIFIC MANUFACTURER'S RECOMMENDATIONS FOR RESTRICTED CABLE BEND RADIUS.

h) CABLE TERMINATIONS SHALL MINIMIZE TENSILE OR BENDING STRAIN ON IDC CONTACTS AFTER ASSEMBLY OF FACEPLATE OR HOUSING TO THE WALL OUTLET.

G. CATEGORY 6A PATCH PANELS

a) PROPERLY MOUNT PATCH PANELS INTO THE DESIGNATED RACK, CABINET, OR BRACKET LOCATIONS WITH THE #12-24 SCREWS PROVIDED.

b) TERMINATE CABLES BEHIND THE PATCH PANEL ACCORDING TO MANUFACTURER'S INSTRUCTIONS.

c) TO ASSURE PERFORMANCE, MAINTAIN WIRING PAIR TWISTS AS CLOSE AS POSSIBLE TO THE POINT OF TERMINATION. ALSO MINIMIZE THE LENGTH OF EXPOSED PAIRS TO THE TERMINATION POINT DURING INSTALLATION.

d) THE LENGTH OF WIRING PAIR UN-TWIST IN EACH TERMINATION SHALL BE LESS THAN 0.5 INCHES (13 MM), AND SHALL BE KEPT TO A MINIMUM.

e) EACH TERMINATED AND DRESSED CABLE SHALL BE MAINTAINED PERPENDICULAR TO THE REAR COVER USING THE RECOMMENDED CABLE MANAGEMENT HARDWARE.

f) HORIZONTAL OR BACKBONE CABLES EXTENDING FROM THE REAR PANEL TERMINATIONS SHALL MAINTAIN A MINIMUM BEND RADIUS OF AT LEAST 4 TIMES THE CABLE DIAMETER.

g) PANELS SHALL BE PROPERLY LABELED ON THE FRONT AND CABLES SHOULD BE INDIVIDUALLY LABELED ON BACK

H. OPTICAL FIBER CONNECTORS, HORIZONTAL AND BACKBONE

a) METHOD OF CONNECTOR TERMINATION SHALL BE FACTORY TERMINATED PIGTAIL FUSION SPLICED

b) INSTALLED FIBER CONNECTORS SHALL HAVE PROPER CABLE SUPPORT, ROUTING AND STRAIN RELIEF.

c) INSTALLED CONNECTORS SHALL BE INSPECTED 100% FOR POLISH QUALITY, AND CONTAMINATION.

d) FIBERS TERMINATED FROM OSP CABLE SHALL HAVE BREAK-OUT KITS INSTALLED WHERE APPLICABLE.

e) FUSION SPLICES FOR PIGTAIL CONNECTIONS SHALL BE PROTECTED IN A SUITABLE ENCLOSURE.

I. GROUNDING AND BONDING SYSTEMS: BASIC GUIDELINES

a) TELECOMMUNICATIONS GROUNDING AND BONDING SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH NEC REQUIREMENTS, AND PER THE GUIDELINES OF ANSI EIA/TIA 607. INSTALLATION OF THE SYSTEM SHALL BE BY A LICENSED ELECTRICIAN.

b) THE TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB) SHALL BE BONDED TO THE BUILDING MAIN ELECTRICAL SERVICE GROUND (GROUNDING ELECTRODE CONDUCTOR OR GEC), USING APPROVED LUGS OR EXOTHERMIC WELD METHODS. BONDING TO THE GEC OR TMGB WITH SHEET METAL SCREWS IS PROHIBITED.

c) THE TELECOMMUNICATIONS BONDING BACKBONE SHALL BE A MINIMUM 6 AWG COPPER WIRE CONDUCTOR. A TELECOMMUNICATIONS GROUNDING BUSBAR (TGB) SHALL BE INSTALLED IN THE TR ON EACH FLOOR, AND SHALL BE BONDED TO THE TBB. ALL METAL RACKS, CABINETS, AND ENCLOSURES SHALL BE BONDED TO THE TGB.

d) TELECOMMUNICATIONS EQUIPMENT SHALL BE GROUNDED ACCORDING TO MANUFACTURER'S INSTRUCTIONS AND IN ACCORDANCE WITH APPLICABLE CODES.

e) ALL METALLIC PATHWAYS, INCLUDING CONDUIT, RACEWAY LADDER OR CABLE TRAYS SHALL BE ELECTRICALLY CONTINUOUS AND SHALL BE BONDED TO GROUND ON EACH END.

f) OSP CABLE ENTERING THE BUILDING OR BACKBONE CABLES HAVING METAL SHEATHS SHALL HAVE ISOLATION PROTECTION. ISOLATION PROTECTORS SHALL BE BONDED TO THE TMGB.

J. PROTECTION

a) THE ELECTRICAL PROTECTION IS GOVERNED BY THE APPLICABLE ELECTRICAL CODES.

b) TERMINATIONS FOR ENTRANCE FACILITY COPPER CABLE SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS' SPECIFICATIONS AND MEET LOCAL AHJ REQUIREMENTS. ALL COPPER INTER-BUILDING BACKBONE CABLES AND ANTENNAS REQUIRE PROTECTION DEVICES.

c) THE ENTRANCE FACILITIES INCLUDE CONNECTIONS BETWEEN CABLING USED IN THE OUTSIDE ENVIRONMENT AND CABLING AUTHORIZED FOR IN-BUILDING DISTRIBUTION.

d) THESE CONNECTIONS MAY BE ACCOMPLISHED VIA A SPLICE OR OTHER MEANS.

e) IN THE ENTRANCE FACILITY THAT CONNECTS WITH THE ACCESS PROVIDER, YOU ARE REQUIRED TO ALWAYS CONTACT ACCESS PROVIDERS TO DETERMINE THE NEEDS AND POLICIES OF THE INSTALLATION.

K. FIRE STOP

a) BEFORE BEGINNING INSTALLATION, VERIFY THAT SUBSTRATE CONDITIONS PREVIOUSLY INSTALLED UNDER OTHER SECTIONS ARE ACCEPTABLE FOR INSTALLATION OF FIRESTOPPING IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS AND TECHNICAL INFORMATION.

b) SURFACES SHALL BE FREE OF DIRT, GREASE, OIL, SCALE, LAITANCE, RUST, RELEASE AGENTS, WATER REPELLANTS, AND ANY OTHER SUBSTANCES THAT MAY INHIBIT OPTIMUM ADHESION.

c) PROVIDE MASKING AND TEMPORARY COVERING TO PROTECT ADJACENT SURFACES.

d) DO NOT PROCEED UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

e) INSTALL THROUGH-PENETRATION FIRESTOP SYSTEMS IN ACCORDANCE WITH PERFORMANCE CRITERIA AND IN ACCORDANCE WITH THE CONDITIONS OF TESTING AND CLASSIFICATION AS SPECIFIED IN THE PUBLISHED DESIGN.

f) COMPLY WITH MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION OF FIRESTOPPING PRODUCTS.

g) KEEP AREAS OF WORK ACCESSIBLE UNTIL INSPECTION BY AUTHORITIES HAVING JURISDICTION.WHERE DEFICIENCIES ARE FOUND, REPAIR FIRESTOPPING PRODUCTS SO THEY COMPLY WITH REQUIREMENTS.

h) REMOVE EQUIPMENT, MATERIALS, AND DEBRIS, LEAVING AREA IN UNDAMAGED, CLEAN CONDITION.

i) CLEAN ALL SURFACES ADJACENT TO SEALED OPENINGS TO BE FREE OF EXCESS FIRESTOPPING MATERIALS AND SOILING AS WORK PROGRESSES.

3.3 LABELING

A. GENERAL:

a) ALL LABELS SHALL BE PERMANENT, MACHINE GENERATED LABELS PRODUCED BY A LABELING MACHINE. PATCH PANEL LABELS SHALL BE A PERMANENT POLYESTER MATERIAL WHITE IN COLOR WITH LABEL LETTERING BLACK IN COLOR. WORK AREA OUTLETS SHALL BE LABELED WITH FLEXIBLE NYLON WHITE IN COLOR WITH LABEL LETTERING BLACK IN COLOR. NO HAND WRITTEN LABELS WILL BE ACCEPTED.

b) LABELING INFORMATION WILL BE REVIEWED AT PRE-INSTALL MEETING, AND THE OWNER SHALL APPROVE THE LABELING SCHEME PRIOR TO THE INSTALLATION OF ANY CABLING.

c) SURFACES SHALL BE CLEANED BEFORE ATTACHING LABELS. ALL LABELS SHALL BE ATTACHED FIRMLY AND VERTICALLY PLUMB ON EQUIPMENT, FACEPLATES, PATCH PANELS TERMINATION BLOCKS, ETC.

d) ALL LABELING OF CABLES, EQUIPMENT, AND COMPONENTS SHALL BE INCLUDED IN AS-BUILT DOCUMENTATION, FLOOR PLAN DRAWINGS, AND SCHEMATIC DEIGNS.

B. CABLING

a) ALL STRUCTURED CABLES (HORIZONTAL AND BACKBONE) SHALL BE LABELED AT BOTH ENDS WITHIN 6" OF CABLE TERMINATION POINT. WHERE VOICE BACKBONE CABLES EXTEND BEHIND TERMINATION BLOCKS, CABLE LABELS SHALL BE PLACED AT A LOCATION ON THE CABLE WHERE THE LABELS ARE VISIBLE FROM THE FRONT OF THE TERMINATION BLOCKS.

b) LABELS SHALL HAVE AN ADHESIVE BACKING AND SHALL WRAP COMPLETELY AROUND THE CIRCUMFERENCE OF THE CABLE JACKET. LABEL AND LETTERING SIZES SHALL BE OF APPROPRIATE SIZE IN REGARDS TO CABLE DIAMETER.

C. EQUIPMENT RACKS, TERMINATION HARDWARE, AND FACEPLATES

a) ALL COMMUNICATIONS EQUIPMENT RACKS, CABINETS, FIBER ENCLOSURES, AND TERMINATION HARDWARE SHALL BE CLEARLY LABELED AT THE TOP, LEFT-HAND CORNER OF THE EQUIPMENT.

b) EQUIPMENT RACKS AND CABINETS SHALL HAVE ¾" TO 1" HIGH LETTERING AND SHALL BE LABELED WITH THE TELECOMMUNICATIONS ROOM NUMBER FOLLOWED BY AN ALPHANUMERIC CHARACTER IN SEQUENCE FOR EACH RACK/CABINET. (I.E. TR2-A REPRESENTS THE FIRST RACK/CABINET IN TELECOMMUNICATIONS ROOM #2)

c) FIBER ENCLOSURES SHALL HAVE 3/8" TO ½" HIGH LETTERING AND SHALL BE LABELED WITH THE TELECOMMUNICATIONS ROOM NUMBER FOLLOWED BY AN ALPHANUMERIC CHARACTER OF THE RACK/CABINET AND THE ENCLOSURE NUMBER (I.E. TR1-B-1 REPRESENTS THE FIRST ENCLOSURES, SECOND RACK/CABINET IN TELECOMMUNICATIONS ROOM #1). ADDITIONALLY, EACH STRAND OF FIBER SHALL BE IDENTIFIED WITH THE TERMINATION LOCATION OF THE OPPOSITE END AND THE FIBER POSITION NUMBER ON THE OUTSIDE (OR INSIDE) FRONT COVER AND TOP, LEFT-HAND CORNER OF THE ENCLOSURE UNDER THE ENCLOSURE LABEL.

d) MODULAR PATCH PANELS SHALL HAVE 3/8" TO ½" HIGH LETTERING. EACH PATCH PANEL PORT SHALL BE LABELED WITH THE ROOM NUMBER OF THE DATA OUTLET FOLLOWED BY A '-' FOLLOWED BY A LETTER AND NUMBER DESIGNATION. (I.E. 100-A1 100-A2 100-A3 100-B1 ETC)

e) SEQUENTIALLY THROUGH ALL COMMUNICATIONS ROOMS. HORIZONTAL VOICE.

f) DATA OUTLETS SHALL HAVE 3/16" ROOM WHERE CABLES ARE TERMINATED FOLLOWED BY A '-' FOLLOWED BY A LETTER AND NUMBER DESIGNATION. (I.E.

100-A1 100-A2 100-A3 100-B1 ETC) HIGH LETTERING WITH THE LABELING METHOD AS INDICATED. DATA OUTLETS SHALL BE IDENTIFIED WITH THE

g) THE RACK/CABINET NUMBER, THE PATCH PANEL NUMBER, AND THE JACK POSITION NUMBER SHALL MATCH ON BOTH ENDS. THE CONTRACTOR SHALL TERMINATE ALL CABLING IN A SEQUENTIAL METHOD.

3.4 TESTING

A. .CATEGORY 6A CABLE TESTING

a) PERMANENT LINK TESTING SHALL BE COMPLETED ON ALL HORIZONTAL (STATION) CABLES. THE CONTRACTOR WILL BE RESPONSIBLE TO SUPPLY A LINK WARRANTY.

b) CATEGORY 6A CABLING SYSTEMS SHALL BE TESTED AS AN INSTALLED HORIZONTAL PERMANENT LINK CONFIGURATION. JACKS AND FACEPLATES SHALL BE ASSEMBLED COMPLETE AND PROPERLY MOUNTED INTO OUTLET BOXES. PANELS SHALL BE TERMINATED COMPLETE AND FULLY DRESSED WITH PROPER CABLE MANAGEMENT

c) ALL WIRING SHALL BE CERTIFIED TO MEET OR EXCEED THE SPECIFICATIONS AS SET FORTH IN TIA/EIA-568B FOR CATEGORY 6A REQUIREMENTS FOR PERMANENT LINK. ALL TEST WILL BE PERFORMED TO 250MHZ.

d) FIELD TESTING SHALL INCLUDE THE FOLLOWING PARAMETERS FOR EACH PAIR OF EACH CABLE INSTALLED:

a) NAME OF THE PERSON PERFORMING THE TEST.

b) TEST EQUIPMENT MANUFACTURER AND MODEL NUMBER.

c) CABLE I.D. THE TEST SHEETS WILL BE IN NUMERICAL ORDER BY CABLE ID.

d) DATE OF TEST.

e) WIRE MAP (PIN TO PIN CONNECTIVITY AND POLARITY CHECK)

f) LENGTH (IN FEET)

g) INSERTION LOSS.

h) NEAR END CROSSTALK (NEXT).

i) POWER SUM NEAR END CROSSTALK (PSNEXT).

j) EQUAL-LEVEL FAR END CROSSTALK (ELFEXT).

k) POWER SUM EQUAL-LEVEL FAR END CROSSTALK (PSELFEXT).

l) RETURN LOSS.

m) DELAY SKEW.

n) ATTENUATION TO CROSSTALK RATIO (ACR).

e) A “PASS” INDICATION SHALL BE OBTAINED FOR EACH LINK, USING AT MINIMUM A LEVEL III TESTER THAT COMPLIES WITH TIA/EIA-568-C.2 FIELD TEST REQUIREMENTS.

f) RECORD TEST RESULTS FOR EACH CABLE AND TURN OVER TO THE GENERAL CONTRACTOR UPON COMPLETION OF THE JOB. CORRECT MALFUNCTIONS WHEN DETECTED, AND RE-TEST TO DEMONSTRATE COMPLIANCE. NOTE: TEST EQUIPMENT SHALL BE A TYPE III CABLE TESTER.

B. OPTICAL FIBER TESTING:

a) TEST PROCEDURES SHALL BE AS DESCRIBED BY THE TIA/EIA-568-C.0: COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING STANDARD, PARTS 2 AND 3 AND TIA/EIA-526-14-A-1998 - OPTICAL POWER LOSS MEASUREMENTS OF INSTALLED MULTIMODE FIBER CABLE PLANT-OFSTP-14A

b) PREINSTALLATION TESTING:

a) TEST EACH CONDUCTOR OF EVERY OPTICAL FIBER CABLE ON THE REEL WITH A LIGHT SOURCE AND A POWER METER.

b) OBTAIN THE CABLE MANUFACTURER POWER METER TEST RESULTS FOR EACH REAL USED ON THE PROJECT. USING THE ATTACHED OPTICAL FIBER TEST FORM RECORD THE READINGS AND THE MANUFACTURER’S REEL NUMBER. PRIOR TO COMPLETION OF PROJECT, TURN OVER THE COMPLETED OPTICAL FIBER TEST FORM, OPTICAL FIBER CABLE REEL ID TAGS AND OPTICAL FIBER CABLE MANUFACTURER’S TEST RESULTS.

c) ACCEPTANCE TESTING:

a) EACH TERMINATED FIBER STRAND IN THE HORIZONTAL OR BACKBONE INFRASTRUCTURE SHALL BE TESTED INDIVIDUALLY AS A PERMANENT LINK. A FIBER PERMANENT LINK IS DEFINED AS A LENGTH OF INDIVIDUAL FIBER STRAND WITH A CONNECTOR TERMINATED ON EACH END.

b) TESTING FOR MULTIMODE SHALL BE AT 850 AND 1300 NANOMETERS. TOTAL LINK INSERTION LOSS (DB) SHALL BE WITHIN THE SPECIFIED LINK LOSS BUDGET.

c) TIER 1 TESTING FOR EACH INSTALLED SINGLEMODE LINK SHALL BE PERFORMED AS AN OPTICAL POWER INSERTION LOSS MEASUREMENT, AS DEFINED BY ANSI/TIA/EIA-526-7. TESTING FOR SINGLEMODE SHALL BE AT 1310 AND 1550 NANOMETERS. TOTAL LINK INSERTION LOSS (DB) SHALL BE WITHIN THE SPECIFIED LINK LOSS BUDGET.

d) TIER 2 TESTING, IF REQUIRED FOR EACH INSTALLED SINGLEMODE OR MULTIMODE LINK, SHALL BE PERFORMED AS AN OTDR MEASUREMENT, AS DEFINED IN TIA-TSB-140. WE REQUIRE TIER 2 TESTING ON ALL FIBERS INSTALLED IN THE FACILITY FOR FUTURE TROUBLESHOOTING.

e) MULTIMODE OPTICAL FIBER ATTENUATION SHALL BE TESTED ON ALL INDIVIDUAL FIBERS OF EACH CABLE SEGMENT USING AN LED LIGHT SOURCE AND POWER METER TO DETERMINE THE ACTUAL LOSS. THESE TESTS SHALL BE PERFORMED AT THE 850NM AND 1300NM WINDOWS IN BOTH DIRECTIONS. TEST SET UP AND PERFORMANCE SHALL BE IN ACCORDANCE WITH ANSI/TIA/EIA-526-14A, METHOD B.

f) A REFERENCE POWER MEASUREMENT SHALL BE OBTAINED BY CONNECTING ONE END OF TEST JUMPER 1 TO THE LIGHT SOURCE AND THE OTHER END TO THE POWER METER. AFTER RECORDING THE REFERENCE POWER MEASUREMENT, TEST JUMPER 1 SHALL BE DISCONNECTED FROM THE POWER METER WITHOUT DISTURBING THE LIGHT SOURCE AND ATTACHED TO THE CABLE PLANT. THE POWER METER SHALL BE MOVED TO THE FAR END OF THE CABLE PLANT AND ATTACHED TO THE CABLE PLANT WITH TEST JUMPER 2.

g) READINGS MUST NOT BE HIGHER THAN THE “OPTIMAL ATTENUATION LOSS.” THE OAL WILL BE CALCULATED USING THE MANUFACTURER’S FACTORY CERTIFIED TEST RESULTS, (DB/KM) CONVERTED TO THE ACTUAL INSTALLED LENGTHS PLUS THE MANUFACTURER’S BEST PUBLISHED ATTENUATION LOSSES FOR THE CONNECTOR AND/OR SPLICE INSTALLED ON THIS PROJECT. (0.30+/-0.30 FOR CONNECTORS AND 0.10 FOR SPLICES). THE CONSTRUCTION MANAGER SHALL USE THE OAL FOR COMPARISON WITH THE END TO END POWER LOSS TEST RESULTS PRIOR TO ACCEPTANCE.

h) TEST RESULTS: MUST BE COMPLETED AND TURNED OVER TO THE GENERAL CONTRACTOR PRIOR TO ACTIVE EQUIPMENT INSTALLATION. SPECIFIC DUE DATES FOR OPTICAL FIBER WILL BE ESTABLISHED AT PRE-INSTALL MEETING.

3.5 DOCUMENTATION

A. TEST RESULTS

a) ALL TEST RESULTS ARE TO BE SAVED AND DELIVERED ELECTRONICALLY. TEST DOCUMENTATION SUBMITTED ON DISK SHALL BE CLEARLY MARKED ON THE COVER WITH THE WORDS “PROJECT TEST DOCUMENTATION”, THE PROJECT NAME, AND THE DATE OF COMPLETION (MONTH AND YEAR). FOR MULTIPLE BUILDINGS, THE BUILDING NAME, INCLUDING FLOOR OR WING I.D. SHOULD ALSO BE INCLUDED ON THE TEST RESULTS DISK.

b) FILE NAMES OF THE TEST RESULTS RECORDED FOR EACH LINK SHALL MATCH THE OFFICIAL IDENTIFICATION. TEST RESULTS SHALL INCLUDE A COMPLETE RECORD FOR EACH LINK, INCLUDING TYPE OF TEST, CABLE TYPE, CABLE/PORT I.D., MEASUREMENT DIRECTION, REFERENCE SETUP, DATE, AND TECHNICIAN’S NAME(S).

c) THE TEST EQUIPMENT NAME, MANUFACTURER, MODEL NUMBER, SERIAL NUMBER, SOFTWARE VERSION AND LAST CALIBRATION DATE SHALL ALSO BE PROVIDED IN THE TEST RESULTS DOCUMENTATION.

d) WHEN REPAIRS AND RE-TESTS ARE PERFORMED, THE PROBLEM CAUSE AND CORRECTIVE ACTION TAKEN SHALL BE NOTED, AND BOTH THE FAILED AND PASSED TEST DATA SHALL BE DOCUMENTED.

e) THE OWNER, ENGINEER, LEAD PROJECT MANAGER, OR OWNER’S REPRESENTATIVE RESERVE THE RIGHT TO REQUEST VERIFICATION OF TEST RESULTS WITH A RE-TEST OF INSTALLED CABLES, ON A SAMPLING BASIS. RE-TESTING SHALL BE AT THE EXPENSE OF THE INSTALLER UNLESS OTHERWISE NOTED IN THE CONTRACT DOCUMENTS.

B. AS BUILT DRAWINGS

a) DEVIATIONS FROM THE APPROVED DRAWINGS, WHETHER OR NOT A CHANGE ORDER IS SUBMITTED, SHALL BE CLEARLY DENOTED AS BUILT ON THE WORKING HARD COPY DRAWING BY THE TELECOMMUNICATIONS CONTRACTOR. AS-BUILT DRAWINGS SHALL BE RETURNED PROMPTLY TO THE OWNER OR DESIGN AGENT FOR COMPLETION OF DRAFTING REVISIONS TO THE ORIGINAL DESIGN. SEE “DOCUMENTATION – CHANGE ORDERS” BELOW. MANUFACTURER’S WARRANTY REGISTRATIONS MAY ALSO REQUIRE AS-BUILT DRAWINGS.

b) FLOOR PLAN DRAWINGS SHALL AT MINIMUM INCLUDE DETAILED CABLE AND PATHWAY LAYOUTS, EXACT LOCATIONS OF WORKSTATION OUTLETS, AND CABLE DISTRIBUTION HARDWARE LOCATIONS. WORKSTATION OUTLETS SHALL HAVE ALPHANUMERIC IDENTIFIERS ON THE DRAWINGS AS SPECIFIED BY THE END USER OR OWNER.

C. CHANGE ORDERS

a) ANY DEVIATION FROM THE APPROVED CONTRACT DRAWINGS OR SPECIFICATIONS SHALL BE SUBMITTED AS A WRITTEN CHANGE ORDER.

b) EXECUTION OF WORK, TO PERFORM CHANGES, SHALL NOT PROCEED WITHOUT PRIOR WRITTEN APPROVAL. ANY CHANGES DONE WITHOUT WRITTEN APPROVEAL WILL BE AT NO COST TO USF . IF THE WORK IS SHOWN TO BE INCORRECT THE CONTRACTOR WILL HAVE TO CORRECT THE PROBLEM AT NO COST TO USF .

c) SIGNIFICANT CHANGES MAY REQUIRE A WRITTEN QUOTATION OF ADDITIONAL LABOR AND MATERIALS FROM THE TELECOMMUNICATIONS CONTRACTOR.

d) IT IS THE RESPONSIBILITY OF THE OWNER OR OWNER'S REPRESENTATIVE TO BEAR THE ADDED COST OF ANY SUBSTANTIAL CABLING SYSTEM DESIGN CHANGES. THE CONTRACTOR WILL NOT PROCEED WITH ANY CHANGE ORDERS WITHOUT WRITTEN APPROVAL BY THE OWNER'S REPRESENTATIVE OF USF IT. ANY CHANGES NOT APPROVED BY THE OWNER'S REPRESENTATIVE OF USF IT WILL BE RESPONSIBILITY OF THE CONTRACTOR AND AT NO COST TO USF .

e) FIELD CHANGES THAT ARE COMPLETED WITHOUT ISSUANCE OF REVISED DRAWINGS SHALL BE CLEARLY DENOTED ON THE WORKING AS-BUILT DRAWING. REFER TO "AS-BUILT DRAWINGS" ABOVE.

D. PUNCH LISTS AND CORRECTIVE ACTION

a) AS REQUIRED IN THE CONTRACT DOCUMENTS, THE TELECOMMUNICATIONS CONTRACTOR SHALL CORRECT PUNCH-LISTS ITEMS DETERMINED TO BE IN VIOLATION OF DRAWINGS, SPECIFICATIONS, CODES, STANDARDS OR REGULATIONS.

b) THE CONTRACTOR SHALL BE RESPONSIBLE FOR TIMELY RE-WORK OF FAULTY CABLING OR HARDWARE INSTALLATIONS.

c) THE OWNER RESERVES THE RIGHT TO WITHHOLD FINAL PAYMENT UNTIL PUNCH LIST ITEMS ARE RESOLVED SATISFACTORILY.

3.6 MANUFACTURER'S WARRANTY

A. THE MANUFACTURER WARRANTS CATEGORY 6A CABLING, OPTICAL FIBER CABLING AND CONNECTING COMPONENTS FREE OF DEFECTS IN MATERIAL OR WORKMANSHIP.

B. CATEGORY 6A AND OPTICAL FIBER CABLING AND COMPONENTS ARE WARRANTED TO PERFORM THE INTENDED APPLICATION UPON COMPLETION OF PROPER INSTALLATION AND TESTING.

C. WARRANTY COVERAGE INCLUDES APPLICATION ASSURANCE AND COMPLIANCE TO APPLICABLE PERFORMANCE SPECIFICATIONS.

D. INSTALLED CATEGORY 6A CABLING SYSTEMS MAY BE GRANTED A FULL CHANNEL WARRANTY UNDER THE CONDITIONS STATED BELOW.

a) A CERTIFIED INSTALLER REGISTERED WHO HAS COMPLETED A MANUFACTURER'S TRAINING PROGRAM PERFORMS THE CONSTRUCTION.

b) CONTRACTORS PERFORMING THE CERTIFIED INSTALLATION ARE PROPERLY REGISTERED IN THE MANUFACTURER'S WARRANTY PROGRAM.

c) CABLE USED IN THE INSTALLATION IS QUALIFIED AND RECOGNIZED BY CONNECTIVITY MANUFACTURER.

d) INSTALLED LINK SYSTEMS ARE PROPERLY DOCUMENTED AND TESTED WITH A "PASS" RESULT. THE COUNTY REQUIRES A LINK TEST AND THE USE OF MANUFACTURER PATCH CORDS TO RECEIVE A CHANNEL WARRANTY.

e) FIELD TEST EQUIPMENT USED FOR CATEGORY 6A CABLING IS MINIMUM LEVEL III CLASSIFICATION, AND COMPLIES WITH TIA/EIA-568-C.2 REQUIREMENTS.

f) REQUIRED TEST RESULTS, SUBMITTED ELECTRONICALLY, AND PROJECT DOCUMENTATION INCLUDING AS-BUILT DRAWINGS, ARE SUBMITTED TO THE MANUFACTURER BY THE REGISTERED CONTRACTOR.

3.7 MOVES, ADDS AND CHANGES

A. MOVES, ADDS AND CHANGES INITIATED BY THE OWNER, END USER, PROJECT MANAGER, OR DESIGN AGENT, WHICH ARE BEYOND THE SCOPE OF WORK IN THE ORIGINAL CONTRACT, SHALL REQUIRE A REVISED QUOTATION BY THE TELECOMMUNICATIONS CONTRACTOR TO USF IT.

B. IT IS THE RESPONSIBILITY OF THE OWNER OR OWNER'S REPRESENTATIVE TO BEAR THE ADDED COST OF ANY SUBSTANTIAL CABLING SYSTEM DESIGN CHANGES.

C. MOVES, ADDS AND CHANGES SHALL EITHER BE ISSUED IN REVISED DRAWINGS, OR OTHERWISE SHALL BE CLEARLY DENOTED ON AS-BUILT DRAWINGS.

D. MOVES, ADDS AND CHANGES THAT AFFECT INSTALLATIONS COVERED IN A MANUFACTURER'S WARRANTY SHALL BE PERFORMED BY A CERTIFIED CONTRACTOR THAT IS PROPERLY REGISTERED IN THE MANUFACTURER'S WARRANTY PROGRAM.

3.8 SYSTEM MAINTENANCE AND REPAIR

A. MAINTENANCE OF THE CABLING INFRASTRUCTURE IS TO BE DONE BY AUTHORIZED PERSONNEL ONLY, OR VOID OF MANUFACTURER'S WARRANTY MAY RESULT. IT IS THE RESPONSIBILITY OF THE OWNER OR END USER TO UTILIZE A CERTIFIED INSTALLER TO MAINTAIN WARRANTY COVERAGE ON EXISTING OR NEW CABLING INFRASTRUCTURE.

B. THE TELECOMMUNICATIONS CONTRACTOR SHALL FURNISH A QUOTATION FOR TIME AND MATERIAL TO PERFORM MAINTENANCE AND REPAIRS. THE OWNER HAS THE FIRST RIGHT OF REFUSAL OF SELECTING A SUITABLE CONTRACTOR OR QUALIFIED INTERNAL PERSONNEL TO PERFORM MAINTENANCE AND REPAIRS ON STRUCTURED CABLING.

C. ADDITIONS OF NEW CABLING, EITHER HORIZONTAL OR BACKBONE, SHALL BE COMPLETED, TESTED, AND DOCUMENTED INTO PERMANENT BUILDING RECORDS. NEW CABLING INSTALLATIONS INTENDED TO BE COVERED BY THE MANUFACTURER'S WARRANTY SHALL ADHERE TO THE DOCUMENTATION SUBMITTAL AND SYSTEM CERTIFICATION PROVISIONS STATED ABOVE.

3.9 CLEANUP

A. THE COMMUNICATIONS CONTRACTOR SHALL CLEAN UP ALL DEBRIS RELATED TO THIS WORK ON A DAILY BASIS, OR AS OTHERWISE REQUIRED, LEAVING THE JOB SITE IN A CLEAN, SAFE CONDITION.

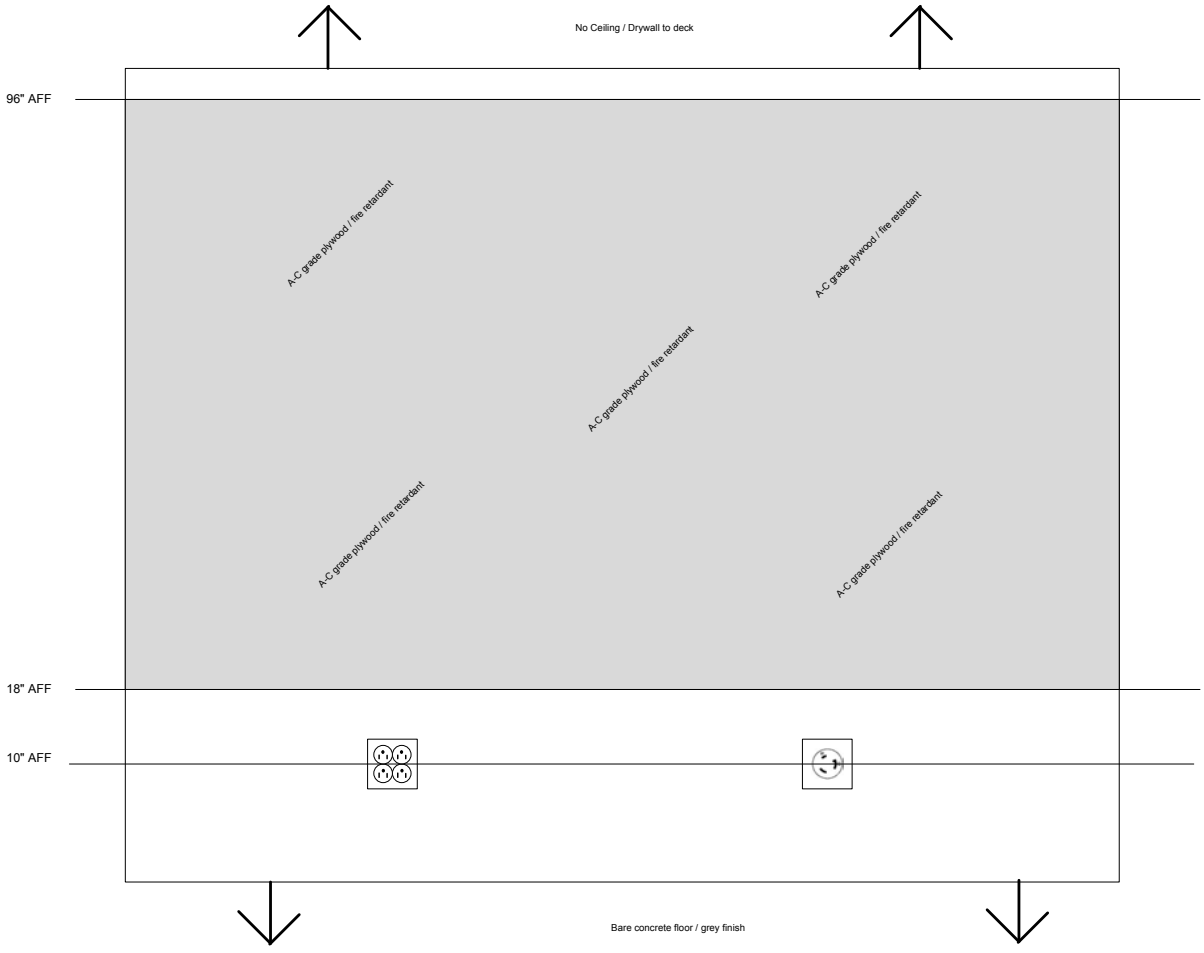
B. PROTECT ALL EQUIPMENT FROM DAMAGE DURING CONSTRUCTION. EQUIPMENT NOT PROTECTED SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

27 XX XX

COMMUNICATIONS ROOM (Telecommunication Room (TR) Entrance Facility (EF))
BUILDING SPECIFICATIONS

Telecommunication Rooms (TRs) and Entrance Facilities (EFs) are dedicated to providing voice and data services for both convenience and life safety. As a result the University of South Florida requires that no equipment unrelated to these services be housed in this space. A/V amplifiers, fire panels, and all building control systems that may anticipate occupying any space within shall coordinate equipment footprint with IT before doing so. Pipes, conduits, cables, etc that MUST pass through this space shall be coordinated with USF IT relative to the path they follow.

Each TR and EF shall be fitted with plywood to wrap the entire room. Plywood specifications shall be a ¾" AC grade plywood with a gray fire retardant finish.



TR and EF floors shall be finished with sealed or painted concrete floors, color gray.

TR and EF floors shall have a distributed load rating of 250 lbs per square foot.

TR and EF lighting shall satisfy a minimum illumination of 50 foot-candles measured 3 feet off the floor.

Each TR and EF room shall MAINTAIN a maximum room temp of 74 degrees Fahrenheit after all equipment has been installed. Anticipated BTU's will be provided by USF IT to aid in calculating adequate cooling.

TR and EF electrical outlets shall be included on emergency power if available.

MTR, TR, and EFs shall be equip with a minimum of (1) L-5-30 twist lock receptacle for every two-rack design configuration. A minimum of two standard outlets (as shown in image) shall also be included for convenience as well as other systems potentially housed within these rooms. Exact locations to be coordinated with USF upon room layout design.

TR and EF room sizes shall be calculated as such:

Minimum size TR and EF serving a floor space up to 10,000 square feet shall be no less than 10 feet wide and have a depth no less than 10 feet with an out swing door. (depth shall increase by 2 feet in the event the door cannot swing out due to egress requirements.)

Minimum size TR and EF serving a floor space of 10,000 to 18,000 square feet shall be no less than 10 feet wide and have a depth no less than 12 feet with an out swing door. (depth shall increase by 2 feet in the event the door cannot swing out due to egress requirements.)

Minimum size TR and EF serving a floor space greater than 18,000 square feet shall be no less than 10 feet wide and have a depth no less than 14 feet with an out swing door. (depth shall increase by 2 feet in the event the door cannot swing out due to egress requirements.)

Structural building supports shall not be located in the floor space of any TR or EF. If it must, minimum size measurements shall be taken from that point to the opposing wall.

A fire extinguisher shall be located in each TR and EF near the door.

Water and sewer facilities shall not occupy any space within the TR and EF.

Sprinkler pipes and cooling condensation installed in and through the TR and EF shall be installed with a drip pan below to funnel any leaking water or condensate away from racks and equipment.

TRs and EFs shall not be fitted with acoustical ceiling and shall contain finished walls from floor to deck above.

EFs shall have a minimum of 2 – 4" conduits from nearest communications manhole. Conduits shall be fitted with plastic bushings and be clean and dry, clear of all debris, and contain a min 250lb test pull line.

TRs and EFs shall contain a minimum of 3 – 4" sleeves between them. Conduits shall be fitted with plastic bushings and contain a pull string.

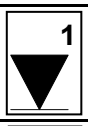
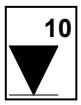
USF IT will assist design team in room layouts for each designated TR and EF space.

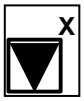
Horizontal Structured Cabling (Data)

All data infrastructure shall be provided, installed, and terminated to completion by USF IT.

USF IT will match finishes employed by electrical outlets. (i.e. white, off white, ivory, stainless, ect. For finished wall plates.)

All pathways and penetrations for structured cabling shall be provided by general contractor. This includes all cable trays and conduits to location.

Item Number	Symbol	Description	Typical Installed Locations
1		1 CAT 6A cable, 3 Port Faceplate	Break Room or Courtesy Phone Location. Wireless location. Projector location.
2		2 CAT 6A cables, 3 Port Faceplate	Laboratory with locations around the perimeter.
3 standard		3 CAT 6A cables, 3 Port Faceplate	Normal Work Area of 100 sqft or less.
4		4 CAT 6A cables, 4 Port or 6 Port Faceplate	Computer Laboratory.
5		6 CAT 6A cables, 6 Port Faceplate	A/V classroom standard, as needed by customer
6		8 CAT 6A cables, multimedia outlet	As needed by customer.
7		10 CAT 6A cables, multimedia outlet	As needed by customer.
8		12 CAT 6A cables, Multimedia Outlet Box	As needed by customer.
9		14 CAT 6A cables, Multimedia Outlet Box	As needed by customer.
10		2 CAT 6A Data, Above Ceiling	For Wireless Access Points.

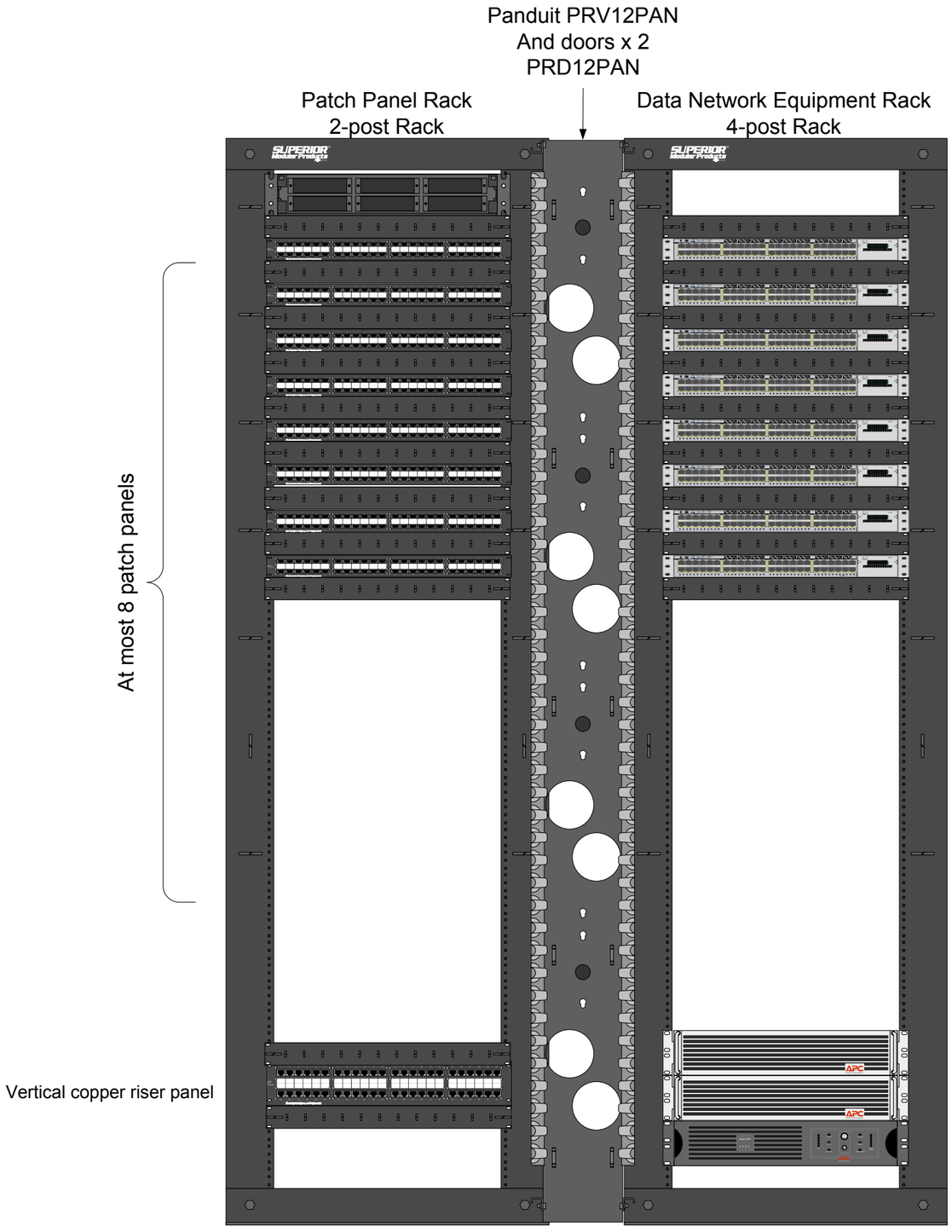
11		Symbol inside of square shall indicate floor mounted location	
12		Symbol inside of circle shall indicate ceiling mounted location	

Typical building designs shall include one standard (3-data) communication outlet for every office.

One (2-data) communication outlet approximately every 100 square feet of workable space or coordinated to specific user requirements.

Typical 2-Rack TR Layout

USF Edition V1 (July 1, 2024)



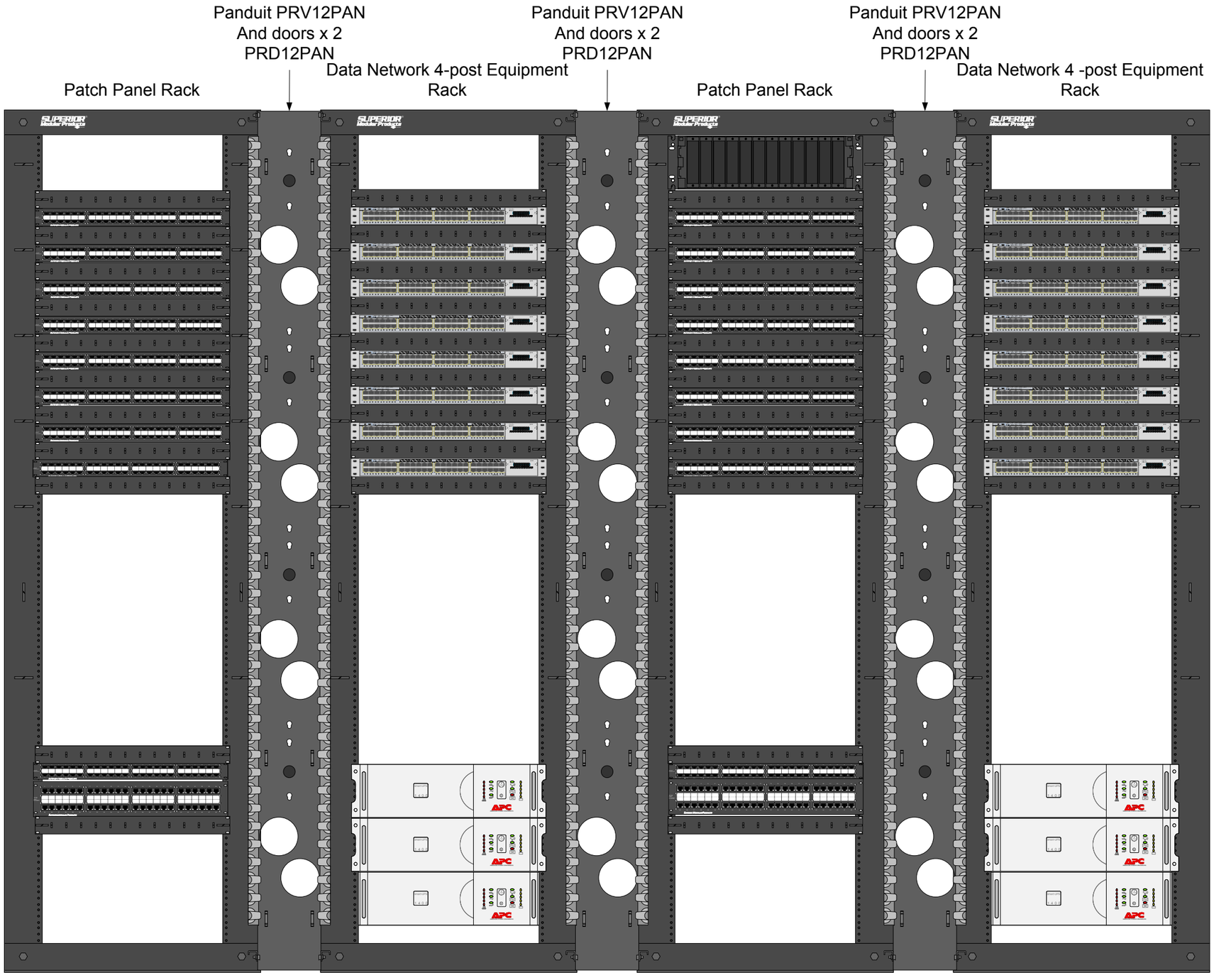
Notes:

1. Accommodates 1 – 384 cables
2. Power and cooling requirements:
   Max Power: 3,000 W
   Max Cooling: 10,500 BTU/h
3. At most 8 patch panels.
4. Each patch panel has at most 48 connections (to match up with 48-port switches)
5. Wire management above and below every patch panel
6. Wire management above and below every 48-port switch
7. Switches should be aligned with the patch panel they service
8. Effort should be made to keep a single patch panel serviced only by the adjacent switch
9. In order to accommodate future horizontal wiring expansion, the vertical copper riser panels should be positioned near where indicated.
10. UPS requires single L5-30 outlet, preferably on a generator-backed circuit if available.

Equipment list:

2-post rack: CMR45 - OCC Rack Max 45RU cable management rack
4-post rack: AR204a – APC NetShelter 4 Post Open Frame Rack 44U #12-24 Threaded Holes
48-port Cat6a patch panels: Hubbell UDX48EU1
Vertical wire manager: PRV12 – PAN Panduit Patchrunner Vertical Cable Manager
Vertical wire manager doors: PRD12-PAN (qty 2) – Panduit Patchrunner Dual-Hinged Door
Horizontal wire manager: Ortronics OR60400131 Cable Manager
Copper Riser patch panel: DCC2482/2502 – Optical Cable Corporation Telco Panel
Fiber LIU: OCC RTC-series LIU’s

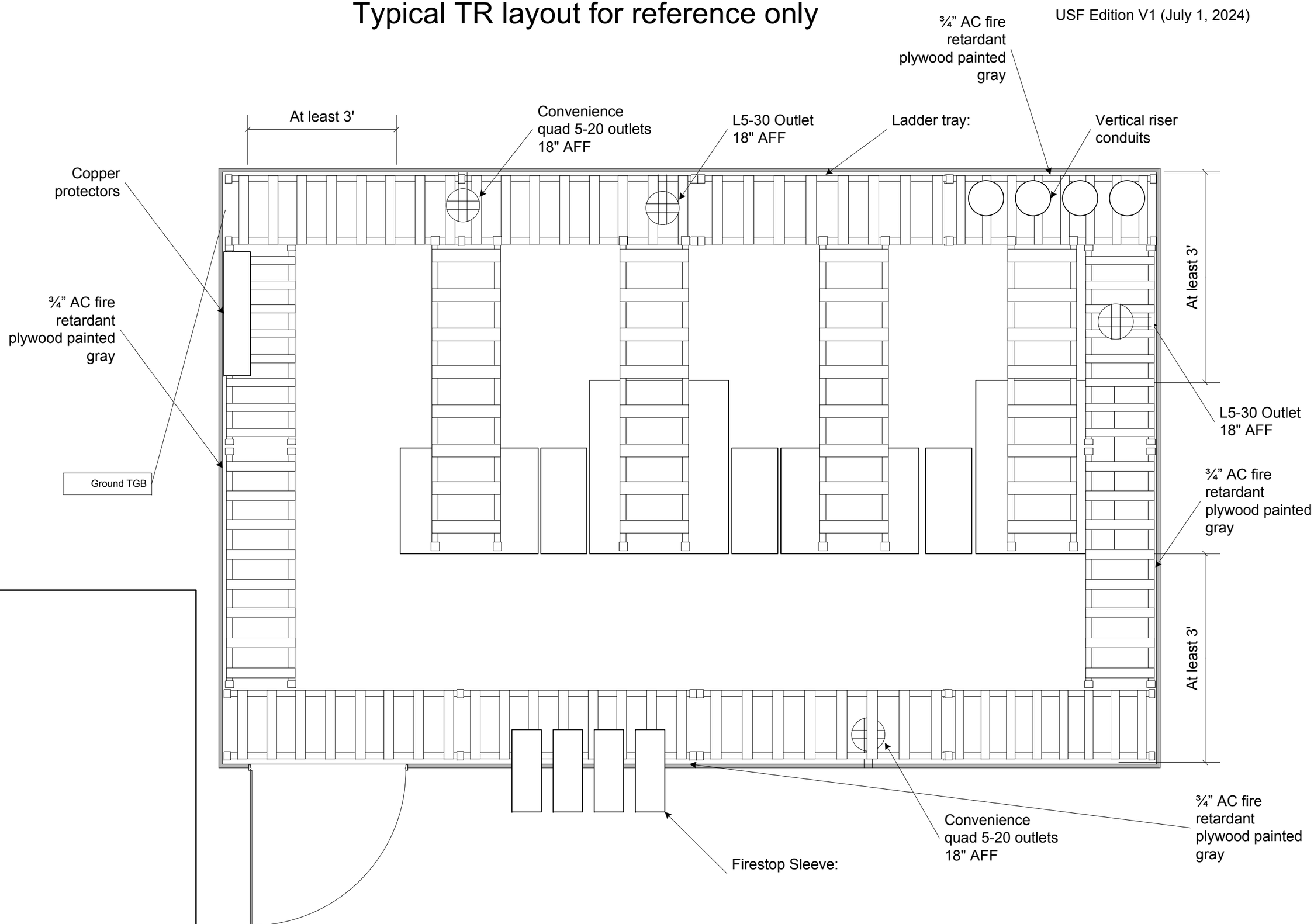
Typical 4-Rack TR Layout



Notes:

1. Accommodates 1 – 768 cables
2. Power and cooling requirements:
   Max Power: 7,604 W
   Max Cooling: 21,000 BTU/h
3. At most 8 patch panels per rack.
4. Each patch panel has at most 48 connections (to match up with 48-port switches)
5. Wire management below every patch panel
6. Wire management below every 48-port switch
7. Switches should be aligned with the patch panel they service
8. Effort should be made to keep a single patch panel serviced only by the adjacent switch
9. In order to accommodate future horizontal wiring expansion, the vertical copper riser panels should be positioned near where indicated.
10. UPS's requires single L5-30 outlet each, preferably on a generator-backed circuit if available.

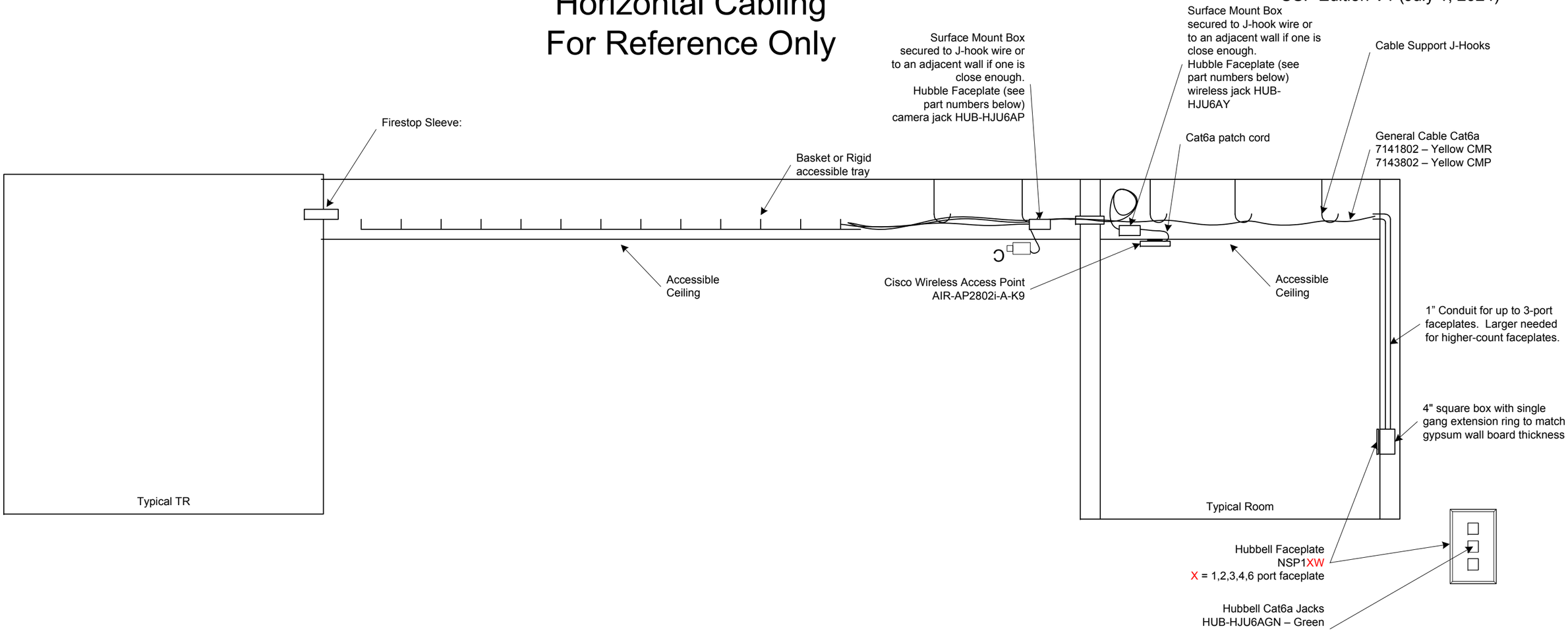
Typical TR layout for reference only



Notes:
- Ground bar
- Room dimensions
- Power
- Plywood
- Air Conditioning

Horizontal Cabling
For Reference Only

USF Edition V1 (July 1, 2024)



Vertical Cabling Materials

IDF

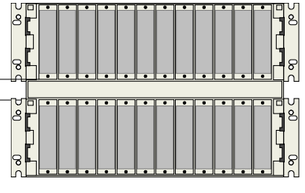
Singlemode Fiber:

IDF

24ct SM

24ct SM

BDF



DESIGN & CONSTRUCTION GUIDELINES

DIVISION 28 ELECTRONIC SAFETY & SECURITY

DIVISION 28 ELECTRONIC SAFETY & SECURITY
SECTION 28 31 00 FIRE ALARM AND SMOKE DETECTION SYSTEMS 2

SECTION 28 31 00 FIRE ALARM AND SMOKE DETECTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. An addressable fire alarm and smoke detection system.

1.2 REFERENCES

A. Current code and statues adopted during time of permitting.

1.3 REGULATORY REQUIREMENTS

A. System: Underwriters Laboratory (UL) listed.
B. Conform to requirements of National Fire Protection Association (NFPA) 101 and the USF Fire Code Official (FCO).

1.4 DESCRIPTION OF SYSTEM

A. The system shall be an addressable, microprocessor based fire alarm control system with transient protection on each circuit and walk-through test capability. The system shall have the capability to control and supervise all the addressable devices and non-addressable appliance and auxiliary control circuits. Each component of the system shall be UL listed for its use. The system shall have a Dynamic LCD display and be located in a constantly attended location while the building is being occupied. The system shall be designed with an addressable Emergency Voice Evacuation (EVAC) throughout, and shall be connected to the campus Mass Notification System (MNS), The system shall be connected to a Federal Signal panel.
B. 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. MNS systems shall be installed to provide for individual building activation for message annunciation. 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.
C. 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.
D. New system installed must be serviceable by multiple vendors. The system shall 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.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in smoke detection and fire alarm systems with five (5) years documented experience.
B. Installer: Company specializing in smoke detection and fire alarm systems with five (5) years documented experience with projects of equivalent scope of work and size and certified by the Florida State Licensing Board as fire alarm installing contractor. The actual installer shall be licensed to install fire alarm systems and shall be certified by the system manufacturer to install the system. Proof of certification and licensure shall be provided upon request.
C. Qualified installers for the MNS must be a direct sales division, or a trained and authorized vendor of Federal Signal MNS System that has demonstrated design, installation, sales, and service maintenance of the system with a minimum of five (5) years' work experience on projects of similar size and scope. 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. Installer must show

proof of availability to provide replacement parts for key components within a 24 hour express order timeframe.

1.6 SUBMITTALS

A. Submit digital files and one (1) set of shop drawings and product data.
B. Provide complete point to point wiring diagrams, data sheets, and equipment ratings, layout, dimensions, and finishes. Indicate the location of surge protection devices.
C. Submit manufacturer's installation instructions.
D. Submit manufacturer's certificate that the system meets or exceeds specified requirements per NFPA 72.
E. Submit copy of Contractor's license before work begins.
F. Submit battery calculations indicating the required battery, including the specified spare capacity.
G. Submit voltage drop calculations.
H. Provide training for four (4) people on the operation, maintenance, and repair of the system at the Contractor's expense. Training shall be certified by the manufacturer and be at different times for each person. Include transportation, room and board where needed.
I. For Mass Notification System (MNS), submit review with description of function, complete shop drawings, wiring diagrams, parts list, and component specifications with description of function, programming and sequence of operations. The drawings must indicate the exact location of all installed components, wiring paths and connections/interfacing with other systems.

1.7 PROJECT RECORD DRAWINGS

A. Contractor shall provide digital files and one (1) set of record drawings to the Owner upon completion of project.
B. Record document shall include the location of end-of-line devices, surge protection devices and exact conduit and wire routing. Numbers and types or conductors shall be indicated for each circuit.

1.8 OPERATION AND MAINTENANCE DATA

A. Provide digital file and one (1) set of operation and maintenance data prior to the completion of construction for all point devices CPUs, and all other equipment.
B. Include operating instructions, and maintenance and repair procedures.
C. Provide manufacturer representative's letter stating that the system is operational.
D. Maintain system for a minimum of one (1) year, after complete acceptance by the Owner, in accordance with NFPA 72.
E. Provide, at the end of the first year after construction completion, a yearly certification as outlined by the State Fire Marshal's Rule 4A-48.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Products shall be delivered to job site in manufacturer's original shipping packages.
B. Provide storage and protection of products, as needed.

PART 2 – PRODUCTS

2.1 MANUFACTURER'S

A. Fire Alarm System:
   1. Notifier System
B. Mass Notification System (MNS):
   1. Federal Signal
   2. Acceptable devices supporting the MNS are manufactured by EDCO with indicator light or approved equivalent.

NOTE: Approval of manufacturer's equipment does not in any way relieve the Contractor from meeting the performance criteria as outlined in the Plans and Specifications.

2.2 FIRE ALARM CONTROL PANEL (FACP)

A. Control panel construction shall be modular with solid state, microprocessor based electronics and shall conform to all requirements made necessary by the USF Fire Code Official (FCO). It shall display only those primary controls and displays essential to operation during a fire alarm condition. Keyboards or keypads shall not be required to operate the system during fire alarm conditions. A local audible device shall sound during alarm, trouble or supervisory conditions. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel. This audible device shall also sound during each keypress to provide an audible feedback to ensure that the key has been pressed properly. The panel shall be complete with all required cards for the points necessary for all the devices indicated, plus capability for expansion to 40% more points, minimum, without the requirement for additional cabinet. Each circuit shall not exceed 70% capacity. Horns must be zoned, not "T" tapped. Provide the necessary hard wired circuits for all the indicating appliance and auxiliary control devices. Provide a two spare indicating appliance circuit in addition to the required indicating appliance circuits to serve the appliances shown on the drawings. Indicating appliance circuits shall be sized for the addition of 30% more devices on each circuit without the requirement for a new circuit.

B. The following primary controls shall be visible through a front access panel:
   1. 80 character liquid crystal display.
   2. Individual red system alarm LED.
   3. Individual yellow supervisory service LED.
   4. Individual yellow trouble LED.
   5. Green "power on" LED.
   6. Alarm acknowledge key.
   7. Supervisory acknowledge key.
   8. Trouble acknowledge key.
   9. Alarm silence key.
   10. System reset key.
   11. Printer Board.
   12. Device Zones labeled on inside door of FACP.

C. The control shall provide the following:
   1. Setting of time and date.
   2. LED testing, alarm, trouble, and abnormal condition listing.
   3. Enabling and disabling of each monitor point separately.
   4. Changing operator access levels.
   5. Walk test enable.
   6. Running diagnostic functions.
   7. Displaying software revision level.
   8. Displaying historical logs.
   9. Displaying card status.
   10. Point listing.
   11. Speaker silence switch.

D. For maintenance purposes, the following lists shall be available from the point lists menu:
   1. All points listed by address.
   2. Monitor point list.
   3. Signal/speaker list.
   4. Auxiliary control list.
   5. Feedback point list.
   6. Pseudo point list.
   7. LED/switch status list.

2.3 DEVICES AND ACCESSORIES

A. Manual Station: Semi-flush mounted, supervised, normally open single action manual station. Manual stations shall be single action and shall be constructed of cast metal or Lexan with raised white lettering and a smooth high gloss finish. The station shall have a hinged front with key lock. Stations which utilize screwdrivers, Allen wrenches, and other commonly available

tools shall not be accepted. Stations shall be keyed alike with the fire alarm control panel. When the station is operated, the handle shall lock in a protruding manner to facilitate quick visual identification of the activated station. Stations shall be the addressable type.

B. Heat Detector: Easy installation, low profile with wide base to cover mounting plate and box. Detectors shall be white and have a dangling disk to indicate element operation. Detectors will be fixed temperature with thermostats rated at 135 ºF, except when the plans call for a 194 or 200 ºF rating. The detector shall be the addressable type for use with an addressable system and shall be UL listed for this purpose.
C. Heat detectors installed in hazardous environments shall be the explosion proof type.
D. Smoke Detectors: NFPA 72: photoelectric type with plug-in base, supervised visual indication of detector actuation, suitable for mounting on 4 inch outlet box.
E. Detectors shall be listed to UL Standard 268 and shall be documented compatible with the control equipment to which it is connected. Detectors shall be listed for this purpose by Underwriters Laboratories, Inc. The detectors shall obtain their operating power from the fire alarm panel supervised detection loop. The operating voltage shall be 24 VDC (nominal). Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal to be generated at the control panel. Detectors shall be the addressable type for use on an addressable type system.
F. Each detector shall have a flashing status indicating LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady and at full brilliance. The detector may be reset by actuating the control panel resent switch.
G. To minimize nuisance alarms, voltage and RF transient suppression techniques shall be employed as-well-as a smoke verification circuit and an insect screen. The detector design shall provide full solid-state construction and compatibility with other normally open fire alarm detection loop devices (heat detectors, pull stations, etc.). The detector head shall be easily disassembled to facilitate cleaning.
H. Smoke Detector Sensitivity Adjust (Simplex True Alarm or equal): Means shall be provided for adjusting the sensitivity of any or all analog intelligent smoke detectors in the system from the System keypad or from the keyboard of the video terminal. Sensitivity range shall be within the allowed UL window.
I. Alarm Verification: Each of the Intelligent/Addressable Smoke Detectors in the system may be independently selected and enabled to be an alarm verified detector. The Alarm Verification Function shall be programmable from 5 to 50 seconds and each detector shall be able to be selected for verification during the field programming of the system, or any time after system turn-on. The Alarm Verification shall not require any additional hardware to be added to the Fire Alarm Control Panel (FACP). The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.
J. Horns: Moisture repellent, fire retardant speaker or horn designed for smooth frequency response with minimal distortion. Horn/Speakers shall be listed and approved for use as a fire alarm indicating appliance. Horn/Speakers shall all sound the same general alarm sound. Outdoor speakers shall be weatherproof and listed for use as an outdoor fire alarm indicating appliance.
    1. Sound Level: 87 dB at 10 feet not to exceed 120 dB.
K. Visual Flashing Lamps (Xenon Strobe): Visual indicating appliances shall be comprised of xenon flashtube and be entirely solid state. These devices shall be UL listed and be capable of either ceiling or wall mounting. The Lexan lens shall be pyramidal in shape to allow better visibility. Separate alarm indicating circuits shall be provided for strobes. The maximum strobe pulse duration shall be 0.2 seconds with a maximum duty cycle of 40%. The intensity shall be a minimum 100 candela and the flash rate shall be at least 1 Hz but not to exceed 3 Hz. Strobe must meet current Americans with Disability Act (ADA) requirements.
L. Audio/Visual Alarm Indicating Appliance: Audio/Visual units shall provide a common enclosure for the fire alarm audible and visual alarm devices. The housing shall be designed to accommodate either horn, bells, chimes, or speakers. The unit shall be complete with a tamper resistant, pyramidal shaped Lexan lens with "Fire" letter visible from 180 degree field of view. The front panel or bezel which is constructed of cast metal may be inverted so that the lens is

below the audible device. The lamp assembly shall incorporate a built-in reflector for more efficient light propagation and a special shock-mounting arrangement to resist Bulb failure due to vibration. Lamp shall be provided with a 4-wire connection to insure properly supervised in/out system connection. Unit shall be complete with all mounting hardware including blackbox. Audio/Visual unit shall be UL listed for its intended purpose. The visual flashing lamps shall meet the specification indicated above in Part E.

1. Minimum dB: 87 dB at 10 feet per UL 464.

M. Duct Smoke Detectors: Duct smoke detectors shall be of the solid state photoelectric type and shall operate on the light scattering photodiode principle. The detectors shall be designed to ignore invisible airborne particles or smoke densities that are below the factor set alarm point. No radioactive materials shall be used. Detectors shall be the addressable type for use on an addressable type system. Detectors shall be provided with the capability of performing automatic fan shutdown either directly from the detector or via the main control panel. All required wiring and supervision shall be provided for all required fan shutdown. Provide all relays and supervise relays as required. Duct Smoke Detector remote test switches shall be installed within 6 ft above finish floor.

N. Provide all required auxiliary control circuits for door release, dampers, valve closure and other required control functions indicated on the drawing or otherwise specified. All auxiliary control circuits shall be indicated on the annunciator as a separate zone or shall be addressable so the device can be identified quickly and accurately.

O. Provide wall mounted, magnetic door holder/automatic door release devices. Door holder shall have a minimum 25 pounds holding force.

P. Monitor Module (Individual Addressable Module)
   1. Addressable Monitor modules shall be provided to connect one supervised circuit of a conventional alarm initiating device (any N.O. dry contact device), such as tamper switches and water flow switches, to the Fire Alarm Control Panel (FACP).
   2. The Monitor Module shall mount in a 4 inch square, 2-1/8 inches deep electrical box.
   3. The conventional alarm initiating device may be wired for Style D or Style B operation. The Monitor module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches that are subject to installation errors are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.
   4. For difficult to reach areas, the Monitor Module shall be available in a miniature package and shall be no larger than 2-3/4 inches by 1-1/4 inches by 1/2 inch. This version need not include Style D or an LED.

Q. Water Flow Switches:
   1. Flow switches shall be integral, mechanical, non-coded, non-accumulative retard type.
   2. Flow switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30 seconds.
   3. Flow switches shall be located a minimum of 1 foot from a fitting that changes the direction of the flow and a minimum of 3 feet from a valve.
   4. Water flow switches shall be rated for the location installed. Provide an individually addressable control module for each flow switch to provide an addressable device. The control module shall be installed in a dry location. Flow switches shall be rated for use outdoors where installed outside.

R. Sprinkler and Standpipe Valve Supervisory Switches:
   1. Each sprinkler system water supply control valve riser or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
   2. Each Post Indicator Valve (PIV) or main gate valve shall be equipped with a supervisory switch.

3. Mount switch so as not to interfere with the normal operation of the valve and adjust to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
4. The mechanism shall be contained in a weatherproof aluminum housing that shall provide a 3/4 inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
4. Switch housing to be finished in red baked enamel.
6. The entire installed assemble shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or it the unit is removed from its mounting.
7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.
8. Tamper switches shall be rated for the valve type installed. Provide an individually addressable control module for each tamper switch to provide an addressable device. The control module shall be installed in a dry location. Tamper switch shall be rated for use outdoors where installed outside.

2.4 BATTERY BACK-UP

A. The system shall be battery back-up for 24 hours with 5 minutes of alarm capabilities (per NFPA 72) with all system indicating appliances operating, including strobes. Provide battery with 30% spare capacity for the potential addition of indicating appliances.
   1. Provide battery calculations clearly indicating 30% spare capacity. Calculations shall be submitted for approval.

2.5 LIGHTNING PROTECTION

A. Provide Isolated Loop Circuit Protectors.
B. Provide lightning protection at all points entering and leaving the building (including walkways) and at the FACP location shown on the drawings. The 120 volt power circuit shall be provided with lightning protection.
C. Loop protection shall be manufactured and listed for use with the fire alarm system.

2.6 DIGITAL ALARM COMMUNICATOR TRANSMITTER (DACT)

A. Provide required monitoring and signaling capability for connection of the fire alarm control panel to the USF Police Department (UPD). Provide conduit and cabling from the fire alarm control panel to the Digital Alarm Communicator Transmitter (DACT).
B. Telephone line capture requirements and external devices shall be the responsibility of the Contractor. Coordinate all telephone line work with the Owner. The Contractor shall provide and install 120 volt electrical power (via emergency panel if available), associated circuit breaker, appropriate electrical connections, both "Alarm" and "Trouble" signal wire between FACP and DACT, all conduit, four pair telephone wire (color coded eight (8) conductor cable), and connectors as needed to connect two (2) separate four pair phone lines per DACT to telephone terminal boards. The Contractor shall be responsible for all other requirements associated with DACT installation and integration into the Fire Alarm System.
C. Provide Silent Knight 5104 Fire Communicator mounted in the telecommunications room and wire to FACP for monitoring from the USF Police Department.

2.7 PRINTER

A. Provide for the connection of a printer. The printer shall communicate with the control panel using an interface complying with Electrical industries Association Standard EIA-232D. Provide a minimum 300 dpi printer internal to the FACP or an external printer. External printers shall be provided with all required interconnections and cabling.

2.8 NETWORK COMMUNICATIONS

A. Provide the capability to add a network communications card for communications via the University's network system. The card shall be capable for communications and connectivity via Category 5 UTP or fiber optic cable.

2.9 MASS NOTIFICATION SYSTEM (MNS) INTERFACE

A. Provide Federal Signal unit UVRI-U Mass Notification System (MNS) fully compatible and completely integrated with the existing campus-wide Federal Signal System and shall include all building-based equipment, wiring, audio visual (AV) devices, transmitters, receivers, network connections, conduit, power supplies, battery back-up, surge suppression, etc. to provide a fully-functional and operational system without manual operation or activation.
B. For new buildings located adjacent to an outdoor area subject to frequent assembly, additional devices shall be installed to broadcast verbal messages to the outdoor area and vicinity.
C. For buildings where the fire alarm system is used for voice notification of the MNS, 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 Federal Signal or an approved equivalent. Substitutions are not permitted.
D. 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.
E. Power supplies must be dedicated and provided with breaker clips.

PART 3 - EXECUTION

3.1 SEQUENCE OF OPERATION

A. ENTIRE BUILDING
   1. All pull stations, heat detectors, and smoke detectors shall, when placed in an alarm mode, sound the building general alarm, flash strobe lights, shut down AHUs, release door holders, and annunciate the address of the initiating device to the FACP.
   2. Activate all programmed indicating circuits until silenced.
   3. Actuate all programmed strobe units until the panel is reset.
   4. Annunciate the active initiating devices.
B. All pull stations, heat detectors, smoke detectors, and duct smoke detectors shall, when placed in a trouble mode, indicate the address of the device experiencing trouble to the FACP and the remote monitoring stations.
C. All tamper switches, water flow switches, smoke detectors, and duct smoke detectors shall, when placed in a trouble mode, indicate the address of the device experiencing trouble to the FACP, FAA and UPD via the DACT.
D. Duct smoke detectors shall shut down their respective units on alarm or detection of smoke via a separate, supervised relay circuit to the AHU motor controller. The relay shall be located not more than 3 feet from the controller. Duct smoke detectors shall sound a supervisory signal to the FACP and shall not sound the general alarm.
E. All required elevator recall and power shut down function shall be provided in accordance with NFPA-72, paragraphs 3-8.15 and 3-8.16. Provide required control circuit for elevator power shutdown. The elevator pit and elevator equipment room smoke detectors and heat detectors shall not sound the general alarm, but shall annunciate at the FACP and the remote monitoring station.

3.2 PROGRAMMING

A. The system shall be fully programmed and completely operational prior to acceptance. The FACP and CPU shall have the capability to be fully programmable by Owner's personnel.
B. The Manufacturer shall provide the necessary documentation and training to allow the Owner's personnel to maintain the changed software.
C. Program data shall be stored in non-volatile memory with battery back-up. Program data shall not be lost due to temporary outages, surges, dips, etc.
D. Program bypasses
   1. All bypasses must be "log in by password" only. No active bypass buttons
   2. Log in password should be changed to: 11111
   3. Programming password should be changed to: 00000
   4. Our bypasses are as follows:

a. Zone 99 Horn Strobes
b. Zone 98 Speakers
c. Zone 97 AHU
d. Zone 96 Elevators
e. Zone 95 Fire Doors
f. Zone 94 Flow, and Tamper

E. The "On Board" fire alarm dialers are not used at USF. A Silent Knight 5104B is required to be installed next to the new panel.
1. Active duct detector test switches to be installed, and mounted no higher than eye level.
2. All installed modules to be marked with device address, and mounted below the ceilings. Devices such as smoke detectors, etc. are also marked with device address.
3. Horn Strobes need to be marked, circuit, and power supply panel number. EOL marked on all devices that have the EOL resistor. Use two (2) different fire approved wire colors for each circuit. If more than one (1) circuit, please use varying colors. If multiple colors are not available, please label each junction box.

F After install is complete installer should provide the following:
1. A thumb drive with the fire alarm program.
2. Alarm panel points list, including addresses.
3. Device counts including horn strobes, and speakers.

G. The MNS shall be programmed to use the following frequencies, Tx: 465.5875 tpl: 206.5 Rx: 460.5875 tpl: 206.5

3.3 EXECUTION

A. INSTALLATION OF FIRE ALARM AND DETECTION SYSTEMS
1. Install fire alarm and detection systems as indicated, in accordance with equipment manufacturer's written instructions and complying with applicable portions of National Electrical Code (NEC) and National Electrical Contractors Association (NECA) "Standard of Installation" and NFPA-72.
2. Wiring Systems and Materials
a. Wiring shall be in accordance with requirements of the NEC and NFPA 72. The fire alarm system, including components, conduit, boxes and wiring shall be completely installed and wiring and conduit shall be properly tagged and color coded. The Electrical Contractor shall make final connections as shown and required by the equipment manufacturer's wiring instructions.
b. Color Code - The color codes of the fire alarm cabling shall conform to the following:
i. Initiation Device Addressable Loop: Red.
ii. Indicating Appliance - Audible: Red (+) and Black (-).
iii. Indicating Appliance - Visual: Purple (+) and Orange (-).
iv. AHU Fan Shut-Down: Gray - White.
v. Remote Indicator/Test: Black, Red, Blue, Purple.
vi. Auxiliary Control Circuit: White - White + I.D. Tag.
vii. Duct Smoke Detector Power: Black - Blue + I.D. Tag.
viii Spare Wires: Any different color, must be same throughout the building.
ix. Color codes must be adhered to, no deviations will be accepted.
3. All wiring to be installed in conduit with continuous ground.
4. All junction box covers shall be painted red. All lengths of conduit shall have at least one red stripe.
5. AHU shutdown relays and equipment control relays shall be mounted within 3 feet of controlled device. AHU shutdown relays shall be wired on a separate circuit.
6. Visual flashing lamps and speakers shall be wired on alternate circuits to provide coverage in the event of the failure of one circuit. Provide the required number of circuits for the indicated number of alarm indicating devices.
7. Provide conduit, wire and circuit breaker to connect fire alarm control panels to emergency circuit. The fire alarm circuit breaker shall be accessible to authorized personnel only and shall be marked FIRE ALARM CIRCUIT CONTROL. Provide handle lock for circuit breaker handle.

8. Provide a disable switch for system speakers at the Fire Alarm Control Panel. Label switch "ALARM SILENCE SWITCH". (If the switch is left in the disable position during normal system operation, a trouble signal shall sound at the control panel.)

B. INSTALLATION OF MASS NOTIFICATION SYSTEMS
1. The MNS shall be compliant with the applicable sections of the current Florida Fire Prevention Code, the current Florida Building Code, the National Fire Protection Association NFPA 72, the Americans with Disabilities Act (ADA), the Common Alerting Protocol (CAP), and the Safety Act Certification from DHS.
2. The installation is subject to review by the USF Building Code Official, the Florida State Fire Marshal (SFM), USF Emergency Manager, and designated representatives of the USF 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.
3. Locate the MNS system in the Telecommunications Room, adjacent to the FACP whenever possible. When installation in the Telecommunications Room is not possible, equipment shall be located in common corridors, facilities mechanical or electrical type spaces, or similar type common spaces. Departmental server rooms, private offices, and other similar user secured spaces must not be used.
4. Wire pathways must be concealed in all finished areas where at all possible. Exposed items and the manner of finish must be approved by the Owner prior to installation.
5. 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.
6. Stairwells shall not be penetrated or used as pathways.
7. All MNS wiring shall be run in minimum conduit size of 3/4 inch EMT.
8. All conduit fittings shall be steel, compression type. Die cast type is not permitted.
9. "MNS" label must be applied intermittently along conduit in unfinished areas and inside box covers.
10. Each system shall be powered by a dedicated circuit and attached to the backup emergency generator, where provided.
11. All system components for AV messaging and the common area displays shall be installed on 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.
12. Each system shall be provided with surge suppression devices to the fire alarm, on all power supplies, and connections that extend beyond the building envelope (like antennae).
13. When installed MNS component cabinets are equipped with locks, the Contractor shall provide the Owner with four (4) keys. When possible, the Contractor will install MNS component cabinets keyed the same as existing MNS component cabinets on campus.

3.4 QUALITY ASSURANCE

A. NEC Compliance - Comply with NEC as applicable to construction and installation of fire alarm and detection system components and accessories.
B. UL Compliance and Labeling - Provide fire alarm and detection system components which are UL listed and labeled. Installation is to be by a UL listed installer.
C. Miscellaneous Compliance - The fire alarm system is to be installed in accordance with the equipment manufacturer's written instructions and comply with all applicable portions of the NECA's "Standard Installation" and all local codes and ordinances.

3.5 FIELD QUALITY CONTROL

A. All components, parts, and assemblies supplied by the Manufacturer shall be guaranteed against defects in materials and workmanship for a period of 12 months commencing with the date of substantial completion. Warranty service shall be provided by a qualified factory trained representative of the equipment manufacturer. Service response time shall be a maximum of 4 hours before arrival to site.

B. Testing: The Contractor shall perform all electrical and mechanical tests required by the equipment manufacturer's form and NFPA 72. All test and report cost shall be in the contract price. A checkout report shall be prepared by the installation technicians and submitted in triplicate, one (1) copy of which will be registered with the equipment manufacturer. The report shall include, but not be limited to:
   1. A complete list of equipment installed and wired.
   2. Indication that all equipment is properly installed and functions, and conforms to these specifications.
   3. Test result of individual initiating devices and indicating appliances.
   4. Serial numbers, locations by zone and model number for each installed detector.
   5. Response time on thermostats and flame detectors (if used).
   6. Technician's name, certificate number and date.
   7. Upon completion of the MNS installation and after satisfactory testing of the Fire Alarm system, the Contractor shall 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.

C. Documentation: After completion of the tests and adjustments listed above, the Contractor shall submit the following information to the Owner.
   A copy of the test report described in this specification and a Certificate of Compliance prepared as per NFPA 72, and State Fire Marshal's Rule 4A-48 to be complete at final test. Affix to FACP a standard service tag, as described in Rule 4A-48 for fire alarm contractors by the Office of the State Fire Marshal. Final tests and inspection shall be held in presence of the Owner's representatives and the USF Fire Code Official (FCO), to their satisfaction. The Contractor shall supply personnel and required auxiliary equipment for this test without additional cost to the Owner. To assure that wire size, power supply, number of devices on a circuit, etc. are suitable to support 100% of devices being in alarm or operated simultaneously, this test shall include the following:
   1. Place all sensors and monitor modules in alarm. Each shall display its address and alarm condition. At least the first 10 devices on each circuit shall also have their alarm LED's lighted.
   2. Operate all control modules for the alarm or operated condition. Each module shall display its address and condition.
   3. Reset all alarmed and operated devices. The panel shall display the address or zone of any off-normal devices.
   4. Test all sensors for alarm verification by momentarily testing for alarm. The sensor shall not initiate an alarm. Then, test by placing the sensor in alarm such that it remains in alarm for the selected verification time. The sensor shall initiate an alarm.
   5. Acceptance of the system shall also require a demonstration of the stability of the system. This shall be adequately demonstrated if the system operates for a 90 days test period without any unwarranted alarms. Should unwarranted alarm(s) occur, the Contractor shall readjust or replace the detector(s) and begin another 90 days test period. As required by the Engineer, the Contractor shall recheck the detectors using the fire test after each readjustment or replacement of detectors. This test shall not start until the Owner has obtained beneficial use of the building under tests.
   6. If the requirements provided in the paragraph above are not completed within 30 days after beginning the tests described therein, the Contractor shall replace the system with another acceptable manufacturer and the process repeated until acceptance of the equipment by the Owner.
   7. Before final acceptance of work, the Contractor shall deliver digital file and one (1) set of a composite "Operating and Shop Maintenance Manual." Each manual shall contain, but not be limited to:

a. A statement of guarantee including date of termination and name and phone number of the person to be called in the event of equipment failure.
b. Individual factory issued manuals containing all technical information on each piece of equipment installed. In the event that such manuals are not obtainable from the manufacturer, it shall be the responsibility of the Contractor to compile and include them. Advertising brochures or operational instructions shall not be used in lieu of the required technical manuals.
c. One (1) copy of all approved shop drawings, instruction sheets, operating instructions, and spare parts bulletins.

8. A training session, for personnel selected by the Owner, shall be presented by a fully qualified, trained representative of the equipment manufacturer who is thoroughly knowledgeable of the specific installation.
9. Provide a written description of standard control panel functions and user instructions at each FACP. These instructions shall be written in standard laymen's English so that an unfamiliar operator can accomplish basic functions such as reset.
10. A training session for the MNS 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 two (2) sessions at one (1) hour each, must be scheduled with the Owner to accommodate a day and evening shift attendance and must be video recorded by the Contractor. Prior to final acceptance of the MNS, the Owner must be provided a reproducible accurate system "Record Documents" package in electronic and hardcopy form. Drawings shall be compatible with AutoCAD, meeting the USF CAD Guidelines and shall 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.

D. Warranty: All equipment and systems related to the Fire Alarm shall be warranted by the Contractor for a period of one 1 year following the state of final acceptance. The warranty shall include parts, labor, prompt field service, pick-up, and delivery.
1. Provide 1 year of testing as per NFPA 72, which shall consist of:
a. At the end of the one-year warranty period, provide a Test and Written report which certify that all initiating devices have been tested and which indicate the result of the inspection as required by the Owner. Provide the required certification tag. Problems discovered during this testing and inspection shall be covered under the warranty. It is the Contractor's responsibility to perform this testing prior to the end of the year warranty or provide an extended warranty if the test is performed after the warranty period was scheduled to expire.
2. For the MNS, the Contractor shall warranty all equipment and systems for a period of not less than two (2) years following the date of final acceptance. The warranty shall include parts, labor, and prompt field service, pickup, and delivery. A procedure and checklist for no less than two annual re-certifications of the system shall be provided.

END OF SECTION 28 31 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 31 EARTHWORKS

DIVISION 31 EARTHWORK
SECTION 31 05 00 EARTHWORK 2
SECTION 31 10 00 SITE CLEARING 5
SECTION 31 60 00 FOUNDATION 6

SECTION 31 05 00 EARTHWORK

1.1 SITE GRADING

A. Rough Grading: Slopes shall not be steeper than one (1) vertical to five (5) horizontal in general open lawn and other grassed areas. Steeper slopes will be permitted only on a case-by-case basis where special need warrants. Tops and bottoms of banks and other break points shall be rounded to provide smooth and graceful transitions. In areas of walks without ramps, slopes shall not be steeper than one (1) vertical to twenty (20) horizontal. Ensure ramped areas comply with the requirements of the Americans with Disability Act (ADA) and Florida Accessibility Code, and meet the intent of the FBC, Chapter 468.

B. Finish Grading: This operation shall consist of the final dressing to provide a uniform layer of the topsoil and/or nutrients required under Section 32 90 00, Landscaping for the placement of plant materials or of the subgrade in preparation of pavement construction. This work shall achieve elevations within 0.1 inch of required elevation so that the proper thicknesses of overlayments can be provided.

1.2 EXCAVATING AND BACKFILL

A. EXCAVATING

1. General for Site: Excavation is to be unclassified and is to be performed as authorized excavation regardless of type, nature or condition of the material encountered as necessary to establish the lines and grades to be shown on the drawings. Once subgrade elevations have been reached, Architect/Engineer (A/E) is to inspect and determine suitability of subgrade material for intended purpose. If unsuitable, additional excavation can proceed the same as authorized and paid for at the same unit price established in the bid. It is to be stipulated that excavations beyond the limits needed to establish required grades without the specific direction of the A/E will be regarded as unauthorized.
   a. Unauthorized excavations and any required remedial work will be at the contractor's expense.
   b. Excess excavation and material not suitable for backfill and embankment operations shall be removed from the University with the exception that the University reserves the right to select and claim up to the first 2,000 cubic yards. It is to be stipulated that the contractor shall deposit said material, if owner elects, to a location on the campus designated by the Owner at no additional cost. Provisions for maintaining workmen safety within excavations is the sole responsibility of the Contractor.
2. Trenching: Trench excavations shall be the same as that for general site excavation except that width shall be only to the extent normal for the utility system being installed. A/E is to define normal trench widths and restoration limits paid for with appropriate details in the plans. For excavation beyond normal widths, A/E is to define special backfill requirements at contractor's expense. Trenching shall establish bottoms to the required lines and grades such that proper bedding of the utility can be accomplished in accordance with the material manufacturer's recommendations. All trench bottoms are to be maintained dry until properly backfilled and compacted.
   a. A/E is to ensure all applicable safety codes/regulations are followed for sheeting, shoring and side slope requirements. Trench excavations shall be guarded at all times. It is to be stipulated that if trenches are to be left open while unattended for any reason, or beyond work hours, they shall be barricaded with high visibility yellow safety net staked with 2 X 4 posts (and 2 X 4 top rail at edges of, or crossing sidewalks) 4 feet from the trench edges.

B. BACKFILL

1. General for Site and Structures: A non-plastic, clean, granular material composed of sand, fractured rock or gravel obtained from the excavation activities or, if necessary, from offsite borrow shall be provided. The material shall be substantially free of clays, organics including loam, peats and wooden materials and trash, which may be compressible. Quality backfill shall also be void of masonry, rubble and roadway products. Blending of admixtures to improve gradation uniformity and stability is permissible. Provide laboratory verification that intended backfill materials are suitable for the intended purpose. Backfill

materials shall be generally placed in 12 inches maximum lifts, loose measure. Specify thinner lifts under structures, pads and pavements as appropriate.

2. Trenches: Specify select backfill material of equal quality or better stipulated for general site. Initial placement of material in trenches should be limited to 6-inch lifts to ensure that adequate compaction and support is achieved under the haunches of the pipe to the springline. Placement should then proceed in 6 inches lifts to facilitate proper compaction to 1 foot above the pipe. The remainder of the trench can usually be backfilled and amply compacted in 12 inches lifts. However, the ability to achieve density requirements must be maintained.

1.3 EXCESS MATERIAL DISPOSAL

A. Excess excavation, backfill, and other construction wastes shall be disposed of off campus to a site secured by the contractor. No on-site burning or burying of wastes will be permitted and no additional cost to the Owner for disposal is to be charged. Excess earth materials not needed for other work shall not be stockpiled temporarily on the site and construction rubble and debris shall be placed in Contractor supplied dumpsters to be picked up on regular intervals. Reference is made to Section 32 05 00, Subparagraph 1.2.B, Backfill for Owner's first option to excess quality fill materials.

1.4 SOIL COMPACTION

A. Quality control testing is to be provided to ensure that fill materials are properly placed and compacted to yield the necessary densities for the support capabilities needed. The A/E is to determine the testing program suitable for the work to be pursued and make recommendation to the Owner. A/E is to assist Owner in selecting a qualified testing laboratory to perform the testing activities and evaluation of the contractor's work. The Owner will pay for all initial tests conducted. It is to be stipulated that where tests indicate work fails to meet the requirements specified, the contractor, at his expense, shall perform remedial work and retest to verify that the material placement meets the specification requirements.

B. Compaction Requirements: Specify that soil compaction be evaluated based on the densities determined by Standard Proctor Tests.

1. General Site: Cuts and embankments not intended to support subsequent work or structures should be compacted to a firmness equal to the adjacent undisturbed soils. See Section 32 90 00, Landscaping, for further direction on like areas.
2. Under Structures: Soil preparations intended to support site related structures shall be compacted to a density of at least 100% of the maximum laboratory density as determined by American Association of State Highway and Transportation Officials (AASHTO) T-99. Compaction under building foundations and structures shall achieve the density requirements established in the geotechnical evaluations and recommendations.
3. Utility Trenches: Compaction of trench backfill shall achieve the density as stipulated for site structures in Section 31 05 00, Subparagraph.1.4.B.2 above.
4. Pavements: Areas subject to vehicular traffic shall be prepared in accordance with the provisions of the Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, latest edition. Densities to be achieved shall be at least 98% of the maximum density as determined by AASHTO T-180.

1.5 SOIL TREATMENT

A. Provide soil treatment for termite control under all sides of foundation walls, building slabs on grade, and sidewalks that adjoin new or existing buildings.

B. Ensure applicator is a professional pest control operator licensed in the State of Florida in accordance with all applicable regulations governing the application of soil treatment solutions.

C. Treatment materials applied shall be Environmental Protection Agency (EPA) approved for the application of effective termite control. The product shall be applied in accordance with the manufacturer's recommendations and the technical data and application instructions are to be submitted to the Owner prior to commencing. Ensure that the soil treatment is not applied until all excavation, filling, compacting, and grading operations are complete in the areas to be treated.

D. Treatment warranty shall be for a period of not less than five (5) years from the date applied. A/E is to ensure warranty includes provisions for re-treatment and repair or replacement of any damage caused by infestation or evidence of infestation within the warranty period without cost to the Owner or his successor or assigns.

END OF SECTION 31 00 00

SECTION 31 10 00 SITE CLEARING

1.1 CLEARING THE SITE

A. All objectionable growth within the site area planned for building and landscaping improvements shall be cleared. All debris resulting from any clearing, stripping, grubbing, and demolition activities shall be removed from the Campus at frequent intervals to prevent unsightly accumulation.
   1. Protection of Trees: Trees designated to remain shall be documented on the plans and tagged in the field. The contractor is to be responsible for protecting the top, trunk, and root system of these trees. Protection shall be by barricading with 4 X 4 posts with 2 X 4 rails (minimum 2 rails per side), installed at the drip line of the tree. No equipment, stockpiling of materials, work or parking is to be permitted within the barricades. Root zones shall be protected, where determined by an arborist or USF Landscape Architect, as necessary by root pruning at outside edge of barricades.
   2. Stripping: Remove all organics, grasses, roots and topsoil to its full depth to the limits of the areas to be graded. Topsoil free of tree roots, brush and other debris can be stockpiled within the site for subsequent landscaping needs. All material in excess of subsequent needs shall be removed from the campus.

1.2 GRUBBING

A. The removal of trees and shrubs shall include the removal of stumps and roots. No stump or root greater than 3 inches in diameter shall remain in the areas where underground structures, utility lines, footings and pavements are to be constructed. Grubbing in open areas shall remove stumps and roots greater than 3 inches in diameter to a depth of 2 feet below finished grade.

1.3 DEMOLITION

A. Structural: Structures to be abandoned along with their foundations shall be removed to a minimum depth of 1 foot below bottom of new foundation work. Where such is to occur at locations of proposed new structures, A/E is to define the extent of foundation removal on the drawings. If any slab is to remain under fill for new structures, it is to be broken to facilitate groundwater percolation.
B. Selective Removal
   1. Asbestos: The University may assume the responsibility for asbestos abatement prior to building renovations, or it may be made a part of the construction contract. However if asbestos is encountered as the work progresses, the work must stop in the immediate area until properly abated. Specific reference is made to Appendix A, Section 4, Asbestos Survey & Abatement. The Contractor shall give notice of such occurrence to the USF FM-Design & Construction (FM-DC) Project Manager and the USF FM-Environmental Health & Safety (FM-EHS).
   2. Re-locatable Items: A/E is to ensure that special concern is given equipment that is to be removed, relocated, and reinstalled. The work shall be clearly defined in the plans to direct the contractor to:
      a. Disconnect and move to new location(s).
      b. Restore, remove, and/or cap utilities at old location(s).
      c. Schedule work with USF FM to minimize hardship from any outage. USF PM will coordinate and shall be given 2 weeks notice.
      d. Include in base price scope any and all new piping, valves, fittings, ductwork, and wiring necessary for a complete and satisfactorily working reinstallation.

END OF SECTION 31 10 00

SECTION 31 60 00 FOUNDATION

1.1 FOUNDATION TYPES

A. The University's building construction has experienced a wide array of foundation systems to address the various soil and subsurface conditions for cost effective support of the building loads. These systems comprise spread footing, grade beams, mat foundations, precast driven piles, and auger cast piles. No wooden pile systems are allowed except in appropriate marine applications.
   1. Use of stone vibratory columns in proximity of USF water wells is prohibited; review and approval of the USF Civil Engineer and the Building Official is required for consideration of stone vibratory columns on campus.
   2. Use of vibratory sheet piling in proximity of building structure, buried utilities and parking & roadways require the USF Civil Engineer and the Building Official review & approval.

1.2 DESIGN

A. As part of basic services, the A/E is to provide the foundation system design. The design shall be conducted by a Professional Engineer, registered in the State of Florida, experienced and actively engaged in the practice of Structural Engineering Design. The drawings shall bear the seal and signature of this Engineer.
B. The A/E, along with his structural consultant, shall determine the best-suited foundation system for the building. This determination shall be based on a review and consideration of the subsurface geotechnical reports, foundation systems of adjacent buildings, and potential adverse impacts on neighboring structures imposed by foundation systems installation. Further reference is made to Section 02 06 00, Subparagraph 1.2.

1.3 LABORATORY SERVICES

A. An independent laboratory shall be employed through the A/E Additional Services provisions to perform quality control testing of the foundation system installation. The laboratory, in cooperation with the A/E and A/E's consultant, shall develop the testing program with costs and make recommendations to the Owner. The testing program shall include continuous inspection services where needed, such as the case of pile driving work.

1.4 PAYMENTS

A. Payments for Laboratory Services: The testing laboratory shall be responsible to the A/E, as Additional Service. The Owner will pay all first time costs for the tests and analysis performed from the project funds. The A/E is to present the invoices to the Owner for actual costs without fee mark-up. Invoices are to reference the specific tests performed and the deliverables presented, such as field reports. Copies of the field reports are to be submitted to the A/E, responsible contractor, and the Owner prior to invoicing for those specific services.
B. Payment for Foundation Systems:
   1. Payment for mat, spread footings, and grade beam systems shall be a lump sum as part of the base bid.
   2. Payment for subsurface grouting and piling work shall be on a unit cost basis. A base bid amount shall be provided based on a predetermined estimated quantity. The specifications shall state that the predetermined amounts are based on the piling depths and/or grout quantities shown on the drawings and/or soil reports. The proposal form, in addition to lump sum amounts, shall make provisions for per linear foot costs for piling and cubic yard costs for grouting to be added to, or deducted from, the base bid for quantities differing from those predicted. The specifications are also to stipulate that no payment will be made to the contractor for extra work performed for his own use. The specifications shall define the method of calculating the adjusted costs for actual work performed. In the case of driven piles, provisions shall also be included for defining and determining the costs for pile splices, if required. The methods of calculating the actual costs shall be formulated in the best interest of the University, particularly with regard to receiving full value for deleted work.

END OF SECTION 31 60 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 32 EXTERIOR IMPROVEMENTS

DIVISION 32 EXTERIOR IMPROVEMENTS
SECTION 32 01 90. 33 TREE PRESERVATRION AND REPLACEMENT REQUIREMENT 2
SECTION 32 16 00 PAVEMENTS 5
SECTION 32 80 00 IRRIGATION SYSTEM 7
SECTION 32 90 00 LANDSCAPING 10

SECTION 32 01 90.33 TREE PRESERVATRION AND REPLACEMENT REQUIREMENT

1.1 General:

Healthy trees shall be preserved as much as possible during design and construction phases. If the tree is less than 8-inch in diameter, transplant the tree to avoid removal. Consult USF Landscape Architect (USF-LA) for destinated location.

1.2 USF Tree Protection Requirement:

A. Develop a tree protection plan:
   1. Answer the questions to decide if the tree is savable or not: Is the tree a desirable species? Is the tree healthy? Will it provide shade where desired? Remaining life expectance? If the tree is left growing in a small space, will it survive? Will it be the desirable size when it reaches maturity? Will it have enough growing space to develop a full canopy and root zone?
   2. Study how the tree is going to be affected during the construction.

B. Protection During Construction:
   3. Avoid any possible compaction activity within dripline.
      a. Prohibit placement of any heavy objects inside dripline.
      b. Prohibit any vehicular/machinery traffic inside dripline.
      c. Prohibit any placement or accumulation of material toxic to trees: including but not limited to lime rock, concrete waste, cement truck wash and paint wash.
   4. Provide rigid Barricade at the dripline.
   5. Provide high visibility screening (E.G.: Mesh barrier/safety fencing. Fluorescent yellow - green color is preferred).
   6. If the tree is in low spot, install silt fence around to minimal silt buildup.
   7. Avoid prolonged direct exposure to engine exhaust (prolonged stationary heavy equipment or vehicles, stationary diesel generator, etc.)
   8. Plan crane activities out of tree canopy areas.
   9. If trees are wounded during construction. Clean the wound area to be have a smooth edge. Remove the loose bark. Inform USF Landscape Architect the damage ASAP.
   10. Trenching:
      a. Consult USF Landscape Architect for any trenching approval.
      b. For any trenching that cannot be avoided within dripline, root pruning at least 2 weeks before construction starts was required. Hire an International Society of Arboriculture (ISA) certified arborist.
      c. Provide temporary drip irrigation during feeder root development (i.e. after root pruning was finished).
      d. Weed all groundcover and grasses within the dripline to reduce competition. Cover with 2 - 4 inches of mulch.
      e. Minimize exposure of roots to air; Stage work to backfill the exposed roots at the earliest.
   11. Tree Trimming:
      a. Consult USF Landscape Architect for any trimming approval.
      b. Hire an International Society of Arboriculture (ISA) certified arborist for trimming work.
      c. All trimming shall comply with Best Tree Care Practices: ANSI A300
      d. Cut even and clean just beyond the branch collar of the branch to be trimmed.
      e. Trim to create a natural look, reduce volume of moss.

1.3 USF Tree Transplanting Requirement:

A. Before Transplanting:
   1. Hire an International Society of Arboriculture (ISA) certified arborist.
   2. Trim the tree per arborist's direction.
   3. Initial root pruning to develop feeder roots. State root pruning in 1/4 segments of the root ball phased in 2-week increments to minimize shock and promote feeder root development. Fertilize and water at each root pruning. Plan for 8 weeks to root prune and develop feeder roots prior to transplanting.

4. Hydrate tree with a water wand the day before the move. Jet the tree with 50-100 gallons of water.
5. Refer to the table below for the minimal root ball size to be preserved for transplanting.

Small Trees (Ball & Burlap)

Tree caliper	Minimal root ball diameter	Minimal root ball weight
2-2.5 inch caliper	32 inch	800 lb
3-3.5 inch caliper	40 - 44 inch	1200 lb

Spaded Trees

Tree caliper	Minimal root ball diameter	Minimal root ball weight
2-2.5 inch caliper	32 inch	800 lb
3-3.5 inch caliper	40 - 44 inch	1200 lb

6. Hydrate and dig the receiving hole(s) and remove the dirt. Use the same tree spade to dig the receiving hole as is used to harvest the tree. This is to ensure the holes are nearly the same size.
7. Dig, tie, shape and root prune the tree before transport. Install in new location under the supervising of the arborist. Root ball shall be slightly higher than the surrounding ground.

B. After Transplanting:
   1. Drench the tree with water for 3-7 days to dissolve any air gaps between the receiving hole and root ball to eliminate all the air gaps.
   2. Because transplanting causes loss of 80-95% of feeder roots, give the tree the best chance to rebound from transplant shock by promptly doing the following:
      a. Roto-till a “donut” area from margin of root ball to the extremis of the tree canopy to a depth of at least 8 inches.
      b. Distribute at least 20 – 40 pounds of biochar over both tree root ball and the donut area you have rototilled.
      c. Stabilize the tree with earth screws and rope and garden hose.
      d. Apply 5-10 gallons of root stimulator or composted seaweed (freshwater macro algae) to the donut area.
      e. Give the tree its best chance to rebound quickly with plenty of loose aerated, mulched, moist soil around the root ball for enhance new roots growth.
      f. Mulch the donut area with organic mulch such as wood chips, or bark mulch. Do not use stones. The mulch should not exceed 8 inches.
   3. Water the tree for at least three years weekly. With climate change frequent spring and fall watering has become essential.
   4. Misting the canopy of deciduous trees on hot summer days is very desirable.
   5. Remove the tree stabilizers in the fall when leaves are off the new tree.
   6. No fertilize for the first year.

1.4 USF Tree Replacement Requirement:

A. Any trees removed from a site that are 6 – 24 inches in diameter will be replaced with equivalent total diameter of trees, 4 – 6 inches diameter, staked and irrigated. Palms are not considered as suitable tree replacement.
   1. Example: Removal of 3 (three) trees 12 inches in diameter each would require replacement of 36 inches. Could be with 9 (nine) trees that are 4 inches in diameter or 6 (six) trees that are 6 inches in diameter.

B. Trees over 24 inches in diameter will be replaced with 1.5 (one point five) times the diameter, 4 – 6 inches in diameter, staked and irrigated.
   1. Example: Removal of a 28 inches diameter tree would require replacement of 42 inches.
   2. Example: Could be 11 (eleven) trees that are 4 inches in diameter or 7 (seven) trees that are 6 inches.

C. Replacement trees to be Florida Grade #1 or Florida Fancy Live Oak with a center leader, unless approved otherwise by USF Landscape Architect.

D. Location can be on site or elsewhere on campus where needed and consistent with the latest

Campus Master Plan.

E. Consult with USF Landscape Architect to locate trees or bank for future consideration.

END OF SECTION 32 01 90. 33

SECTION 32 16 00 PAVEMENTS

1.1 WALKS AND RAMPS

A. Walks and ramps are normally to be constructed of concrete pavement. Walks, restricted to pedestrian use only, may be a minimum of 10 feet wide for high use and 6 feet wide for low use and a minimum of 4 inches thick. Sidewalks 8 feet or greater must meet the specifications in Section 32 16 00 Paragraph 1.1.B, Walks and Ramps, or as approved by the Owner. Fibermesh reinforcement shall not be used as a substitute for welded wire fabric. Concrete shall be of Class C, air entrained, and shall achieve a minimum compressive strength of 3,000 psi in 28 days. Reference is made to Section 31 05 00, Paragraph 1.1, Site Grading.

B. In addition to pedestrian use, where walks are likely to be subjected to bicycle, cart or service vehicle use, the walks shall be a minimum of 10 feet wide and 6 inches thick. Welded wire fabric shall be included. Fibermesh reinforcement shall not be used as a substitute for welded wire fabric. Concrete used shall be the same as that for pedestrian use, except that the minimum compressive strength shall be 4,000 psi in twenty-eight (28) days. The Architect/Engineer (A/E) is to also stipulate in the specifications that all concrete walks are to be kept protected and covered from the effects of rain and vandalism until set hard. Any damage is subject to being replaced at the contractor's expense.

C. Use of fly ash in concrete require USF-FM approval. A/E to coordinate the USF-FM review with the USF Sustainability Manager when fly ash is considered as admixtures in reinforced concrete work in pursuit of Leadership in Energy and Environmental Design (LEED) credit.

D. Where walks are to be featured as part of the building entry or patio areas, paver units such as brick masonry or interlocking pavers can be considered in lieu of concrete. The A/E is to get specific approval for use of this architectural alternative material. If used, the specifications and drawings are to include specific directives and details for the proper preparation and placement of the bedding material and paver.

E. Finishes and Joints: All concrete walks are to receive a medium-heavy broom finish. Joints are to be spaced at equal distance intervals equal to the width of the walk such that square segments are formed. Joints that are considered to be contraction joints can be sawed or tooled. Expansion joints shall be tooled, separated with 1/2 inch asphalt impregnated fiberboard, sealed at the top with an elastomeric sealant, and spaced at the joint interval closest to 50 feet spacing. Joints are to be accurately depicted on the drawings. Where replacement work or new work joins old, make connection at the next full joint in the existing walk. Where walk or ramp surfaces are highlighted for traffic-warning purposes, use "traffic yellow" silicone acrylic concrete stain, as manufactured by H&C Concrete; do not use paint.

1.2 VEHICLE USE AREAS

A. Design: Roadways, parking lots and service drives are to be designed in accordance with the applicable guidelines and standards:
   1. Florida Department of Transportation (FDOT) Manual of Uniform Minimum Standards for Design, Construction and Maintenance of Streets and Highways.
   2. Federal Highway Administration, Manual on Uniform Traffic Control Devices (MUTCD).
   3. American Association of State Highway and Transportation Officials (AASHTO) Guidelines.
   4. FDOT Standard Specifications for Road and Bridge Construction, latest edition.
   5. FDOT Roadway and Traffic Design Standards (Standard Indexes)

B. Materials.
   1. General: Except for loading docks, ramps, and aprons which are to be constructed of concrete as outlined in Section 32 16 00, Paragraph 1.1, Walks and Ramps, roads, parking, and service drives are to be constructed of bituminous flexible pavement.
   2. Subgrade: Subgrade stabilization is to be provided for all flexible pavement areas. Stabilize subgrades in accordance with FDOT methods A or B. Depth shall be 8 inches minimum in parking lots and 12 inches minimum under roads and service drives. The Limerock-Bearing Ratio (LBR) is to be at least 40.
   3. Base Materials: In high, well drained soils not influenced by the water table, bases are to be constructed of either crushed concrete, soil cement or lime rock from an FDOT

approved quarry. In other damp soil areas or regions subject to high fluctuations in the water table, the base material shall be either crushed concrete or soil cement. The bearing value (LBR) shall be 100 except for soil cement which shall be designed to have a compressive strength of 300 psi minimum for parking areas and 500 psi minimum for roads and service drives. Base thickness shall be 6 inches minimum in parking areas and 8 inches for roads and service drives.

4. Structural Course: Specify SP-12.5 Structural Course per FDOT Standard Specifications for Road and Bridge Construction, latest edition in roads and service drives where uniform placement can be provided by machine. Compacted thickness shall be 1-1/2 inches minimum for parking areas and 2 inches minimum for roads and service drives.
5. Friction Course: Specify Type SP-9.5 Friction Course asphaltic concrete in roads compacted thickness shall be 1 inch minimum.
6. Curbs and Gutters: All asphaltic paving is to be contained by a curbing system. Unless matching existing, specify Type E for medians, Type F for low side pavement edges, and Type D where drainage is away from the curb. Where it is preferable to not have a curb back, border the edge of flexible pavements with a flush ribbon curb, or where drainage needs routing use drop or shoulder gutter curb.

1.3 CONSTRUCTION

A. Methods: Construction processes for roads and parking lots are to be in strict conformity with FDOT Standard Specifications for Road and Bridge Construction, latest edition. Any deviations will only be considered in advance on a specific case-by-case basis.

B. Quality Control: An independent testing laboratory is to be employed to perform quality control testing to ensure that the roadways and parking lot materials and material placement are in compliance with the plans and specifications. The A/E is to procure this testing service as provided for under Sections 31 60 00, Foundation and 32 16 00, Pavements.

1.4 PARKING LANDSCAPED ISLANDS

A. A minimal 10' landscape buffer shall be provided at the perimeter of the parking lot. Trees and planting shall be planted with irrigation in the landscape buffer. Tree amount and spacing shall be determined by tree type. Consult USF Landscape Architect and Section 32 90 00, Landscaping for tree types.

1. Landscape islands shall be provided at both ends of a parking aisle. Landscaped island shall be provided at no more than 15 parking spaces intervals. Landscape island shall be at minimum, parking space in size.
2. One tree along with other planting materials or sod shall be planted in the island. Consult USF Landscape Architect and Section 32 90 00, Landscaping for tree types; irrigation shall be provided in accordance with Section 32 80 00, Irrigation.

END OF SECTION 32 16 00

SECTION 32 80 00 IRRIGATION SYSTEM

PART 1 – GENERAL

1.1 General Provisions

A. General - SYSTEM WILL BE ON RAW WATER.
B. DESCRIPTION OF WORK:
   1. Extent of underground irrigation system is shown on drawings.

1.2 QUALITY ASSURANCE:

A. Manufacturer Qualification: Provide underground irrigation system as a complete unit produced by acceptable manufacturer, including heads, valves, controls, and accessories.

1.3 WARRANTY AND GUARANTEE:

A. The Contractor shall furnish a certificate of warranty registration and written guarantee of work and materials and a one-year period from the date of final acceptance of the Site Irrigation System by the Owner or his representative.

1.4 SUBMITTAL:

A. Product Date: Submit manufacturer's technical data and installation instructions for underground sprinkler system. Include catalogue cuts of controller, valves, sprinkler heads, and valve boxes.
B. Record Drawing: After completion of piping installation, the irrigation contractor shall furnish the Owner's representative a record drawing showing all sprinkler heads, valves, and the zone numbers with GPM, manual drains and pipelines to reasonable scale, and provide a minimum of two dimensions taken from fixed, obvious objects to each automatic and manual control valve will be presented to the Owner's representative at the time of walk-through for acceptance and testing for proper operation.
C. Instruction sheets and parts lists covering all operating equipment will be bound into a folder as an Operations and Maintenance Manual, and furnished to the Owner or his representative in two (2) copies.
D. The valve boxes will have a number on each valve to match the number, which is in the controller which should also match the record drawing.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products with one of the following:
   1. Rain Bird Sprinkler Manufacturing Company for controllers, rain sensors, control valves, spray heads, bubblers, and drip lines and fittings.
   2. Hunter Industries for turf rotors, and battery nodes for control valve.
   3. Carson or Rain Bird for irrigation valve and electrical joint boxes.

2.2 MATERIAL

A. Pressure Pipe: All irrigation pipes are to be schedule 40.
B. Swing Joint: K-Flex pipe and street elbows.
C. Pipe Fittings: (American Society for Testing and Materials) ASTM D 2466 socket fittings with ASTM D 2564 solvent cement.
D. Valves: Manufacturer's standard, of type and size indicated, and as follows:
   1. Automatic Circuit Valves: Glove valves operated by low-power solenoid, normally closed, manual flow adjustment.
   2. Mechanical isolation Valves: Gate valve and ball valve.
E. Sprinkler Heads: Manufacturer's standard unit designed to provide uniform coverage over entire area of spray shown on drawings at available water pressure, as follows:
   1. Pop-Up Spray: with screw-type flow adjustment and stainless steel retraction spring. 1800 series plastic nozzles shall be used.
   2. Hunter PGP-04 Ultra Rotors in large turf areas.
   3. Pop-Up Rotary Spray: Gear drive.

4. Bubblers: 1400 series bubblers with flow rate applicable to species and caliper of tree, point source flooding emitter, on flexible pipe.
5. Dripline: 0.9 GPH, 12 in. spacing.

F. Valve Box: 7-inches Round boxes, 10-inches Round Vb Green boxes, 12 H x 21 L x 15 W inches Rect Vb Green Boxes.
G. Controllers to be Rain Bird ESP-LXME with IQ System Cartridge.
H. Electrical Piping: Schedule 20 purple pipe of reclaimed water pipe. Junction boxes for all electrical connections.
I. Electrical wire: 18/12 irrigation wire with a separate 14 AWG ground wire. Wire connectors to be weatherproof wire connectors when two or more wires connect.
J. Rain Bird wireless rain sensors are required.

PART 3 – EXECUTION

3.1 SYSTEM DESIGN:

A. Design Pressures: As indicated on drawings, at connection to raw water system and/or in irrigation legend.
B. Location of Heads: Design location is approximate. Make minor adjustments as necessary to avoid plantings and other obstructions.
C. Minimum Water Coverage: Layout as necessary to obtain full head to head coverage. Do not decrease number of heads indicated unless otherwise acceptable to Owner.

3.2 TRENCHING AND BACKFILLING

A. General: Excavate straight and true with bottom uniformly sloped to low points.
B. Underground Utilities: All underground utilities are to be located and marked before trenching.
C. Minimum Cover: Provide 18 inches minimum cover over top of main and 12 inches cover over the lateral piping.
D. Backfill: Backfill with clean material from excavation. Remove organic material as well as rocks and debris larger than 1 inch diameter. Place acceptable backfill material in 6 inches lifts, compacting each lift.
E. At Walkways: Jack piping under paving material as necessary.

3.3 INSTALLATION

A. General: Unless otherwise indicated, comply with requirements of Florida Building Code.
B. Connection to Main: point of connection needs to be approved by Owner. Mechanical isolation valve at point of connection to main.
C. Valves: Install in valve box, arranged for each adjustment and removal. A mechanical isolation valve must be in front of each automatic valve. Ball valve is for up to 2-inch pipe. Gate valve is for pipe over 2-inch.
D. Wiring: Maintain a color coded wire, white for ground wire. Install at least two extra wires for future use.
E. Connections: Use recommended weatherproof type wire connections.
F. Piping: Lay pipe on solid subbase, uniformly sloped without humps or depressions.
   1. Install PVC pipe in dry weather when temperature is above 40 degrees F (4 degrees C) in strict accordance with manufacturer's instructions using purple primer on all pipes and fittings.
   2. Allow joints to cure at least 24 hours at temperature above 40 degrees F (4 degrees C) before testing, unless otherwise recommended by the manufacturer.
G. Sprinkler Heads: Flush circuit lines with full head of water and install after hydrostatic test is completed.
   1. Heads for turf shall be installed at grade unless approved by Owner.
   2. Locate all heads to maintain a minimum distance of 4 inches from walls and 4 inches from other boundaries, unless otherwise indicated.
   3. Heads for planting area shall be installed at the grade that when system functions, no coverage is blocked by planting. Otherwise use riser.
   4. Heads on risers: exposed risers to be painted black.
   5. Bubblers and drip shall be on its own zone separate from sprays or rotors.
   6. Drip line shall be installed that at least one emitter per plant and the emitter is no more than

3 inches outside of root ball edge. No shared emitter between plants. Drip line shall be installed with U-bend stakes at every 10 feet and the location when direction changes.

3.5 TESTING

A. General: Notify owner or his representative in writing when testing will be conducted. Conduct tests in their presence.
B. Hydrostatic Test: Test water piping and valves before backfilling trenches to a hydrostatic pressure of not less than 150 psi. Piping may be tested in sections to expedite work. Remove and repair piping, connections, valves that do not pass hydrostatic testing. Test pressure must be held for a minimum of 2 hours.
C. Operational Testing: Perform operational testing after backfill and sod is in place, and sprinkler heads are adjusted to their final position.
    1. Demonstrate to Owner or his representative that system meets coverage requirements and automatic control function properly. Provide drawing to assist in demonstration.
    2. Head to head coverage requirements are based on operation of one circuit at a time and the GPM of the valve system to maintain recommended 5 feet/second. Maintain head to head coverage.
D. Upon completion of grading, sodding, and rolling of sod areas, carefully adjust lawn sprinkler heads so they will be flush with or not more than 1/2 inch above finish grade.

3.6 WARRANTY

A. All Materials and labor shall carry a one-year warranty.

END OF SECTION 32 80 00

SECTION 32 90 00 LANDSCAPING

1.1 GENERAL PROVISIONS

A. Work Included:
   1. LANDSCAPING
      a. Describe work to be done usually stated to include all labor, materials, services, equipment, and facilities required to complete work indicated on the Drawings and written Specifications, including maintenance and guarantee. Generally show work items in list form.
      b. Pre-Construction Meeting: Owner, contractor and subcontractor shall have a meeting on site before any construction starts.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Drawings such as demolition and preservation, site plan, site utilities, grading, irrigation, and general provisions of the Contract, including General and Supplemental Conditions and Division 1 General requirements, apply to this section.

1.3 SUBMITTALS

A. Submit applicable information such as:
   1. Fertilizer labels and application rates.
   2. Herbicide labels and application rates.
   3. Soil amendment labels.
   4. Top Soil
   5. Potting mix labels
   6. Mulch materials.
   7. Verification of all plant materials sources. Preferred sources of sod and plants are within 150-mile radius of project site.
   8. All other decorative materials, such as gravels.

1.4 COORDINATION

A. Coordinate all landscaping work with Owner.
B. Landscape installer is required to coordinate landscaping with other applicable contractors, such as irrigation contractor.

1.5 SUBSTITUTIONS

A. No substitution unless approved by Owner.

1.6 QUALIFICATIONS

A. All landscape work shall be undertaken by a licensed and experienced landscape contractor.
B. The landscape contractor shall provide a minimum of three references to Owner that indicate the installer's abilities and a minimum of three (3) years of experience in the installation and successful completion of commercial landscapes. The Owner shall have permission to contact the references listed on the submitted documents to verify the claims stated therein. If the installer is not qualified, as determined by the Owner's review and verification of the supplied documents, the Owner shall have the right to terminate the Contract.

1.7 INSPECTIONS OF TREES AND PLANT MATERIAL

A. All trees need to be tagged by Owner or Owner's representative. The Landscape contractor shall inform the Owner at least three weeks before proposed date to nursery or growing site. Require and establish procedure for the accomplishment of approval of pre-tagged or pre-selected material at nursery or growing site.
B. All planting need to be approved by Owner or Owner's representative before planted. Inform Owner or Owner's representative at least a day before to set up the on-site inspection schedule.

1.8 TOPSOIL

A. If existing soil is compacted and/or contains more than 10 percentage of foreign objects,

remove existing soil and provide new top soil for planting.

B. Flower pots/containers shall be filled with Miracle-Gro potting mix for any new planting.

1.9 GRADES AND STANDARDS OF PLANT MATERIAL

A. All plant materials are subject to rules and regulations of "Florida Grades and Standards for Nursery Plants" as published by the Division of Plant Industry, Florida Department of Agriculture and Consumer Services.

B. All plant materials shall be Florida No.1 or better as graded by most current version of "Florida Grades and Standards for Nursery Plants".

C. Plant materials shall be free of insects and diseases.

D. Sod shall be well matted with enough roots. Weeds or other grasses shall be no more than 15% in the sod material. Sod shall be sufficiently thick to secure a dense stand of live grass. Sod shall be live fresh and uninjured at the time of planting.

1.10 WARRANTY

A. All planting materials shall carry a one-year warranty.

1.11 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery all planting materials on the same day of scheduled planting. Storage them under the shade and provide enough water to minimize stress.

B. All planting materials shall be handled in a manner to prevent breaking or other damage. Care shall be given to keep native soils on planting material' roots as much as possible.

C. Trees:

1. Trees shall be protected from excessive vibration, avoiding being thrown or bounced off mobile equipment to the ground. Trees shall not be dragged, lifted, or pulled by the trunk or foliage parts in a manner that will loosen the roots in the ball. To avoid damage when setting the tree in the hole, lift the tree with straps or rope around the root ball, not the trunk. For trees grown in large container, carefully cut the container, and peel the container off the root ball.

D. Palms:

1. Palm leaves shall be tied together to prevent leaf damage and to facilitate handling. Palms with slender trunks should have splints attached to the trunks and leaf bundles to prevent the palms from snapping during handling. Use of splints is also recommended for palm species with large, heavy crowns, but soft wood, such as Phoenix canariensis.
2. Palms shall be lifted only by means of nylon slings wrapped around the trunk. Never attach chain, cables, or ropes directly to palm trunks; such practices can result in injury and possibly fatal diseases.
3. Palms should be planted as soon as possible into their final site. However, if palms must be held for some time before they can be planted, they should be "healed-in" in an upright position with the leaf bundles untied until they can be moved to their permanent site. For shorter time periods, simply storing the palms upright and keeping the rootballs moist may be adequate.

1.12 TRANSPORTATION

A. Cover all planting materials to prevent water loss during the transportation. The cover shall be tightly secured so air moves over the cover and does not penetrate under it. Trees shall be securely tied to truck so they will not roll around.

B. During transport on truck or trailer, palms should be well supported along their entire length. Unsupported crowns may crack or damage the bud, resulting in reduced survival rates.

1.13 SITE CONDITIONS

A. Remove all unsuitable soil, such as rubble fill, which would be detrimental to plant growth, would prevent proper drainage conditions, or would cause obstructions to roots.

B. Coordination of site grades: Plantings coordinated with the schedule for finish grading and sodding operations.

C. No vehicular access on any new sodding area. Limit vehicular access on any existing lawns. If any damage to existing or new lawns by landscape options, repair the lawn to the condition

acceptable by Owner.

1.14 SOIL AMENDMENTS

A. Any soil amendments shall be approved by Owner before application.

1.15 HERBICIDES, INSECTICIDES, FUNGICIDES AND OTHER PESTICIDES

A. Herbicides, Insecticides, fungicides, and other pesticides shall contain no chemicals or ingredients harmful to landscape plants. Before any application, contact Owner for approval.

1.16 MULCH

A. Enviro-Mulch is to be used in plant beds (except for groundcover beds).
B. Enviro-mulch can be purchased through Bay Mulch. Phone Number: 352-588-5200.
C. For Groundcover beds, Mini Pine Bark Nuggets (Fine Pine Mulch) is required. The individual mulch size shall not be more than quarter inch.

1.17 SOD

A. Argentine Bahia, Emerald Zoysia, St. Augustinegrass are the three varieties used on campus. Sod type shall be the one specified by the project. Confirm with Owner areas to be irrigated versus non-irrigated and select sod species accordingly.

1.18 PLANT MATERIALS

A. All material shall be true to named genus, species, and variety as established by the American Joint Committee on Horticultural Nomenclature publication "Standard Plant Names" as per the recommendations and requirements of American National Standards Institute (ANSI) Z60.1, "American Standard for Nursery Stock".
B. Plant species shall be same as specified on drawings. No substitute is allowed unless approved by Owner.

1.19 SITE PREPARATION

A. Prior to beginning any construction or excavation, all utilities must be located and field marked. Call Florida Sunshine allowing minimum and maximum notification times as required.
B. Contact Owner for layout approval before any excavation or planting.
C. Take every precaution to prevent utility disturbance. In the event that existing utilities or trace wires are disturbed by construction activities, proper repair them to like or better condition than before damage occurred.

1.20 PREPARATION OF PLANTING SOIL BACKFILL

A. Carefully stripe the topsoil before any excavation. Before mixing, clean topsoil of roots, plants, sods, stones, and other extraneous materials harmful to plant growth. Store topsoil on site with protection to be free from debris.
B. Any unsuitable soil materials as mentioned above and in Section 32 90 00, Paragraph 1.13, Site Conditions shall be disposed out of Owner's property legally.

1.21 SOIL PREPARATION

A. Prepare soil so after planting, the finish grade is matching existing, or as specified by drawings.

1.22 EXCAVATION FOR TREES AND SHRUBS

A. Tree planting pits: Dig the planting pit at least three times widest dimension of the root ball. Did the pit to the depth so that the top of the tree root ball shall be 2-4 inches above surrounding finished grade. The root ball shall rest on undisturbed soil or recompacted soil.
B. Shrub planting pits: at least as wide as the plant container. Dig the pit to the depth so that the top of the shrub root ball shall be 1-2 inches above surrounding finished grade.

1.23 PLANTING TREES, PALMS AND SHRUBS

A. Plants shall be planted in accordance to the landscape plan and details as well as adhering to current recognized horticultural practice. In addition to the planting details, the following practice shall be taken. Circling root shall be cut.

1. Planted trees shall exhibit no circling root condition or evidence of untreated root bound.
2. Prune trees only as directed by owner or owner's representative. All pruning shall be done in accordance with ANSI A300. Pruning shall be done with sharp instruments. No flush cuts are allowed.
3. Remove any synthetic materials from root ball. String, rope, synthetic burlap, plastic, strapping, and other materials that will not decompose in the soil shall be removed at planting. Mixing those materials in the backfill soil is prohibited.
4. When backfilling, avoid any air pocket as much as possible. Never step firmly on the backfill. Water thoroughly immediately to remove any large air pocket.

1.24 PLANTING GROUND COVER

A. Spacing: Triangular unless shown otherwise on drawings. Equally spaced.
B. Water thoroughly immediately after planting.

1.25 SODDING

A Preparation of ground: Remove existing contents, prepare the bed so that after sodding, the finished grade meeting the existing grade or as specified in the drawings.
B. Placement and Watering: All sod shall be laid back and rolled to existing sod grades.
   1. Water thoroughly right after sodding.
   2. Water for minimum of 60 days or final acceptance whichever is first.
   3. Contractor's responsibility to maintain the sod until the final acceptance.

1.26 MULCHING

A. Mulching shall be in accordance to the landscape plan and details.
   1. Mulch ring for individual trees shall be 4 inches in depth. Mulch ring shall be out of root ball edge. No more than 1 inch in depth of mulch shall cover the root ball.
   2. Shrub beds mulching requires minimum 3 inches in depth. Elevation of mulch shall be 1 inch lower than the adjacent walks, curbs and other improvements.
   3. Ground cover bends mulching requires a 1-2 inches in depth. Elevation of mulch shall be 1 inch lower than the adjacent walks, curbs and other impovements.

1.27 LANDSCAPE MAINTENANCE

A. It is the contractor's responsibility to maintain the landscape until the date of final acceptance.

1.28 INSPECTION AND ACCEPTANCE

A. Final Acceptance: Please inform Owner at least one week ahead of the anticipated finishing date to schedule the final walk through. During the walk through, Owner will inspect the condition and give any punch list for Contractor to correct. Contractor will correct the punch list items within three weeks after the walk through date unless agreed by Owner. The walk through date will be the final acceptance date.

1.29 PROJECT WARRANTY

A. One year warrant for all plant materials and labor. Before the one year period ends, Contractor shall contact the Owner to schedule another walk through. Contractor shall replace the plants that not survived in the one year period at Contractor's own expense.

1.30 PROJECT CLEAN UP ADJUSTMENT AND RESTORATION

A. Maintenance and care of all existing plant material inside construction area is the responsibility of the Contractor. Existing plant material not properly maintained will need to be replaced with like materials at Contractor's expense.
B. All existing plant materials outside of the construction fence, but impacted by the project, shall require replacement or repair to like or better condition than before damage occurred, at Contractor's expense.

END OF SECTION 32 90 00

DESIGN & CONSTRUCTION GUIDELINES

DIVISION 33 UTILITIES

DIVISION 33 UTILITIES
SECTION 33 00 00 SITE UTILITIES 2

SECTION 33 00 00 SITE UTILITIES

PART 1 – GENERAL

1.1 RELATED WORK

A. Refer to Section 22 05 19, Meters and Gages for Plumbing Piping for meter requirements.
B. Refer to Section 31 05 00, Earthwork, Paragraph 1.2, Excavating & Backfill for related excavation and backfill requirements.
C. Refer to Section 31 05 00, Earthwork, Paragraph 1.4, Soil Compaction for related compaction requirements.
D. Refer to Section 31 10 00, Site Clearing, Subparagraph 1.1.A.1, Protection of Trees for protection of trees.

1.2 IDENTIFICATION

A. The Architect/Engineer (A/E) is to consult with the Owner and review Owner files to establish a general working knowledge of the extent, type, and probable locations of all existing utilities. The A/E is to use this information to help define and direct the scope of the site-specific survey and utility locating work. All existing utilities, proposed alterations thereto and new utilities lines are to be shown on the Civil Site Plans.
B. The A/E is to ensure that the plans and specifications provide ample notation for the contractor to properly notify all utility owners through the "Sunshine 811" service and the University directly prior to any digging.

1.3 CONNECTION TO EXISTING SYSTEMS

A. Specify that any connection to existing utility systems must first be scheduled with the USF Facilities Management-Operations (FM-OPS) so disruption of services is minimized.
B. It is to be amply noted in the plans and specifications that the Contractor is not authorized to operate any valve of an existing utility system. When needed, such activity is to be requested of the FM-OPS who will perform the necessary operation. Ample advanced notice is to be required to schedule this service. Two days is the normal minimum notice period, but could be a lot stronger depending on complexity and extent of impact on services and operations.

PART 2 – MATERIALS

2.1 SUBMITTALS

A. Stipulate and define shop drawings to be submitted by the Contractor for verifying products furnished are in compliance with the specifications. Provide enough copies for A/E's use plus one approved set to the Owner.

2.2 WATER DISTRIBUTION

A. Quality Assurance
   1. It is required that the design of potable water distribution systems comply with Chapter 62-555, Florida Administrative Code (F.A.C.).
   2. It is required that all new and relocated water main pipe, fittings, valves, fire hydrants, and related products that will come into contact with drinking water be in conformance with the National Science Foundation / American National Standards Institute (NSF/ANSI), International Standard 61 and comply with the applicable American Water Works Association (AWWA) Standards.
B. Pipe: Pipe provided is to be Ductile Iron Pipe (DIP) conforming to ANSI A-21.51 and AWWA C-151. For pipe to be buried, provide Pressure Class 350 for less than 12 inches and Pressure Class 250 for pipe equal to and larger than 12 inches. For pipe to be above ground, provide Class 53. The interior of the pipe shall have a standard thickness cement mortar lining with seal coat conforming to ANSI A-21.4 and AWWA C104. The exterior is to have a factory applied bituminous or coal tar varnish coating.
C. Fittings: Fittings are to be either cast iron or ductile iron and of a pressure class compatible with the pipe. Fittings are to also have the same interior and exterior treatments as required for the pipe.

D. Joints: Joints for below grade DIP and fittings shall be push-on or standard mechanical joint type with rubber gaskets complying with AWWA C111. All fitting joints and pipe joints below grade where needed shall be mechanically restrained. Joints for above grade piping shall be flanged.
E. Valves:
   1. Gate Valves: For valves 3 inches and larger, provide resilient seat gate valves complying with AWWA C509 such as U.S. Pipe Metroseal. Minimum working pressure shall be 150 PSI. The interior and exterior shall be epoxy coated in compliance with AWWA C550. Where installation is below grade, valves are to have a two (2) inch operating nut housed in a cast iron slip sleeve valve box.
   2. Check Valves: Provide Iron-body, bronze mounted swing check, horizontal installation conforming to AWWA C508.
F. Backflow Preventers: Backflow preventers are to be provided in accordance with the University's Environmental Health & Safety Guidelines. Specify, Reduced Pressure (RP) assemblies for low hazard applications and double check valve assembly for high hazard conditions. A/E is to consult with Owner to determine the degree of hazard. Acceptable manufacturers: Conbraco Industries, Watts Industries.
G. Water Meters: Each new build service connection shall include an inline, full flow meter for measuring domestic consumption. The meter is to be ahead of and coupled with the backflow prevention assembly. The design of the full assembly is to give due regard to subsequent maintenance operations including ease of disassembly via use of unions, couplings or other appropriate fittings. A/E is to confirm meter size and type with the USF Facilities Management-Operations (FM-OPS). Refer to Section 22 05 19, Meters and Gages for Plumbing Piping for meter details.
H. Water Sampling Ports: For new and extended potable water distribution systems requiring permit and Health Department clearances, A/E is to specify and show on the drawings the locations of all required sample ports. A/E is also to verify if any of the sample ports are to remain as permanent installations. In such cases, A/E is to confirm size, type, and configuration with the FM-OPS.

2.3 SANITARY SEWERS

A. Quality Assurance: It is required that the design of wastewater collection and transmission systems be in accordance with the standards and criteria set forth in the Florida Administrative Code, F.A.C. 17-604.
B. Pipe and Fittings:
   1. Gravity Systems: Gravity sewer piping and fittings are to be plastic polyvinyl chloride (PVC) conforming to the requirements of American Society for Testing and Materials (ASTM) designation D3034, SDR-35. Joints for gravity systems are to be push-on elastomeric gasket type.
   2. Force Mains: For sanitary force mains, provide plastic polyvinyl chloride (PVC) conforming to the requirements of American Society for Testing and Materials (ASTM) designation D3034, SDR-35. The pipe and fittings shall have a minimum pressure rating of 150 psi, utilize standard push-on or mechanical gasket sealed joints.
   3. Valves: Valves are to be acid resisting bronze body eccentric plug valves as manufactured by DeZurik, Series 100. The plug shall be resilient (NBR) rubber coated suited for wastewater applications. Sizes 3 inches and smaller shall have lever actuators and NPT connections. Sizes 4 inches and larger shall have gear reduced handwheel actuators and be flanged or mechanical joint connected. Below grade installations shall be placed in a vault.
   4. Manholes: Specify manholes to be precast concrete manholes conforming to ASTM designation C478. Wall thickness shall be eight (8) inches and the bottom barrel section is to be monolithic with the bottom. Pipe connections shall be made watertight with rubber boots casted integral into the wall sections. Specify an asphaltic seal coating to be applied to the interior and exterior surfaces. Invert channels are to be provided to facilitate smooth directional changes in flow. Provide details in the plans and also show the manholes to be properly bedded on gravel consisting of crushed granite or blast slag stone.

5. Manhole Cover: All sanitary manhole covers shall be watertight cast iron with embossed word: "SANITARY."

2.4 STORM SEWER SYSTEM

A. Pipe: Stormwater drainage pipe shall be either round reinforced concrete culvert pipe conforming to ASTM designation C76, or reinforced concrete horizontal elliptical pipe conforming to ASTM designation C507. The pipe joints are to be rubber gaskets meeting the ASTM C 443 Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets, ASTM C 361 Standard Specification for Reinforced Concrete Low-Head Pressure Pipe, or ASTM C 1628 Standard Specification for Joints for Concrete Gravity Flow Sewer Pipe, using Rubber Gaskets requirements. Specify special bedding requirements where warranted.

B. Structures: Specify stormwater structures at all changes in pipe direction, points of drainage entry and connection points of branch piping. Stormwater structures are to be constructed of either precast or cast-in-place reinforced concrete conforming to Florida Department of Transportation (FDOT) Roadway and Traffic Design Standards, Standard Indexes. Where grating is required in bicycle and pedestrian use areas, stipulate that the grating shall be reticuline steel. Cast iron grates are to be used in all other areas outside of pedestrian and bicycle ways. When structures are placed in vehicle use areas, grating, if used, is to be specified as traffic bearing. Also specify, where steel grating is used, it shall be hot dipped galvanized coated.

2.5 GAS SERVICE

A. Where gas services are required for laboratory, food preparation, and hot water needs, the A/E is to consult with the franchised gas service supplier. A/E is to advise Owner, and show the proposed gas service lines on the Civil Site Plans to ensure coordination with other site improvements and prevention of conflict. The associated work is to be indicated as provided by others on the plans.

2.6 HOT/CHILLED WATER

A. See Division 23, HVAC for specific requirements regarding piping, valves, fittings, manhole materials, and placement. Show all site related mechanical improvements on the Civil Site Plans for proper coordination with other utilities and resolution of conflicts.

2.7 SITE ELECTRICAL

A. See Division 26, Electrical for specific requirements regarding conduits, cabling, manholes, site lighting, transformers and switching materials, placement, and meters. Show all site related electrical improvements on the Civil Site Plans for proper coordination and resolution of conflicts.

1. Develop installation specifications for all utility systems satisfying manufacturer's recommendations and other related Division 2, Sitework requirements. Coordinate with the USF Electrical Engineer prior to design for project requirements, utility source, and medium voltage distribution design and specifications.
2. Specify that dry trench conditions are to be maintained to facilitate effective installations by well pointing where needed.
3. The A/E is to make sure that any new or modified system is not put into service until the agency approval/clearance letter has been received.

PART 3 – EXECUTION (Not used)

END OF SECTION 33 00 00

USF UNIVERSITY OF SOUTH FLORIDA

DESIGN & CONSTRUCTION GUIDELINES

APPENDIX A
ENVIRONMENTAL HEALTH AND SAFETY DESIGN GUIDELINES
(TAMPA CAMPUS)

EDITION: **FEBRUARY 11, 2021**
USF FACILITIES MANAGEMENT - ENVIRONMENTAL HEALTH & SAFETY

APPENDIX A – ENVIRONMENTAL HEALTH & SAFETY DESIGN GUIDELINES

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SECTION 1 REGULATORY COMPLIANCE REQUIRED BY CONTRACTORS

1.1 Contractors must comply with all applicable Federal, State, and Local laws, regulations, codes, and requirements associated with safety and environmental protection throughout the duration of all projects associated with the University of South Florida.

It is the Contractors' responsibility to immediately report any known regulatory non-compliance, significant injury (internal or external), property damage, and/or discharge of any hazardous material/pollutant to University of South Florida property to the designated USF-Project Manager (USF-PM) or Facilities Management-Environmental Health & Safety (FM-EH&S) (813-974-4036).

Per USF Policy 6-016 (Environmental Health & Safety Compliance), USF reserves the right to restrict or suspend any activity, equipment or area that is determined to pose a danger/negative impact to the environment, life, health, or safety. The equipment, activity or area found to be dangerous to life, health, safety or non-compliant with applicable regulations may not be reinstated until Environmental Health and Safety has conducted a follow up inspection and has determined that the equipment and/or area is in compliance.

1.2 When applicable, safety programs must include the following (Note: The list below is not exhaustive and it is the Contractors' responsibility to identify and comply with all pertinent codes, standards, regulations, and laws):

- **a.** Hazard Communication Standard
- **b.** Lockout/Tagout Policy
- **c.** Personal Protective Equipment Program
- **d.** Use of Equipment including guards
- **e.** Confined Space Entry Program
- **f.** Hearing Conservation Program

g. Respiratory Protection Program
h. Construction Standards Safety Program
i. Crane Safety/Lift Plans
j. Trenching and Excavation Safety Program
k. Asbestos Awareness Training
l. Bloodborne Pathogen Training

SECTION 2 NOISE, VIBRATION AND DUST CONTROL

Contractors shall control noise, vibration and dust generated by all construction and renovation activities. At no time shall noise and vibration exceed OSHA standards/County ordinances, or disrupt academic, research, or administrative operations. In occupied buildings noise and dust control must be provided, and methods of control specified.

SECTION 3 WASTE DISPOSAL

3.1 The contractor shall assure that ALL waste materials generated during the project are managed and disposed of in accordance with all Federal, State and Local regulations. Regulated hazardous wastes will be removed from campus by the Contractor in consultation with FM-EH&S.

3.2 Any waste material left by a contractor will be properly disposed of by the University and the contractor assessed for disposal costs, plus a handling charge of one-thousand dollars ($1,000.00) or twenty-five percent (25%), whichever is higher.

SECTION 4 ASBESTOS SURVEYS AND ABATEMENT

4.1 Before any renovation/demolition projects are implemented, the designated University Project Manager must obtain proof of asbestos absence by securing the assistance of FM-EH&S in making this determination. Proof of asbestos absence requires an up-to-date survey of the affected area by one of the University's contract Licensed Asbestos Consultant firms or by bulk sampling conducted by qualified FM-EH&S personnel. An Architect's letter (or Architect's certificate) exemption to surveying for asbestos only applies to the Asbestos Hazard Emergency Response Act (AHERA) Asbestos-Containing Materials in Schools rule and does not apply to the requirements of the asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) regarding renovation and/or demolition projects.

4.2 It is the university's procedure to abate all asbestos containing material (ACM) that may be impacted by renovation and/or demolition activities. However, if at any time during a renovation and/or demolition any previously unknown suspect asbestos containing material is encountered, work must stop until an appropriate survey action/abatement is completed. Suspect or presumed asbestos containing materials include such materials as surfacing materials (e.g., fireproofing, plaster ceilings and walls, ceiling tiles, etc.), thermal system insulation (e.g., pipe and boiler insulation, etc.), and miscellaneous materials (e.g., resilient flooring material, floor tile mastic, transite panels, joint compound, fire doors, etc.).

4.3 Regarding asbestos abatement projects, the professional services of a Florida Licensed Asbestos Consultant firm to conduct air monitoring/project oversight and a Florida Licensed Asbestos Contractor shall be utilized anytime a response action (e.g., encapsulation, enclosure, and/or removal) is conducted on asbestos containing material (ACM). Any exception to the use of an Florida Licensed Asbestos Consultant firm to conduct monitoring at the time of asbestos encapsulation, enclosure, and/or removal by a Florida Licensed Asbestos Contractor must be pre-approved by FM-EH&S personnel. The USF-PM coordinates scheduling of asbestos abatement

projects with licensed consultants and contractors. The University's Asbestos Coordinator, or similar designee, in FM-EH&S should be notified before proceeding with any abatement work.

SECTION 5 LEAD CONSTRUCTION REQUIREMENTS

The **CFR Title 29, Part 1926.62** (OSHA Lead Standard for the Construction Industry) requires the contractors to undergo detailed appropriate worker training and protection and worker exposure air monitoring during any construction activity that may generate lead dust, mist, or fumes (e.g., removing lead contaminated paint, welding galvanized steel, etc.). The Environmental Protection Agency's (EPA) Lead Renovation, Repair, and Painting (RRP) Rule, requires the adherence to additional specific lead-safe work procedures during any maintenance or construction activity resulting in the disturbance of a painted surface considered to be lead-based (confirmed by approved testing methods) in any facility visited by children under the age of six (6) twice weekly for three (3) hours or more. Construction activities involving lead-based paint need to be reviewed by FM-EH&S to ensure proper lead-safe procedures are conducted for removal and/or surface preparation prior to recoating/repainting. Before proceeding in any renovation or construction project involving lead or potential lead exposure, contact FM-EH&S for safety guidelines.

SECTION 6 FIRE PROTECTION

The following is a summary of the applicable Florida codes and standards related to Fire Protection. It is the Contractors' responsibility to identify and comply with all pertinent codes, standards, regulations, and laws related to fire protection.

6.1 Adoption of Fire Prevention and Life Safety Codes are outlined in the **Chapter 69A-3.012** (Standards of t he National Fire Protection Association and Other Standards Adopted), Florida Administrative Code (**F.A.C.**).

6.2 **Chapter 633** (Fire Prevention and Control) F.S. requires the State Fire Marshal to establish Uniform Fire Safety Standards for all State owned and State leased buildings. The Uniform Fire Safety Rules and Standards requirements are located within **Chapter 69-A** (State Fire Marshal) **F.A.C.**

6.3 **Chapter 69A-60 F.A.C.** establishes the Florida Fire Prevention Code, which adopts National Fire Protection Association **NFPA 1** (current edition, Fire Code) and **NFPA 101** (current edition, Life Safety Code) code documents as part of the required Uniform Fire Safety Standards. The applicable chapters of the Florida Fire Prevention Code establish specific needs for each designated occupancy.

SECTION 7 FIRE AND SECURITY MONITORING SYSTEMS

All alarm systems installed for the University will use only standardized hardware approved by the Fire and Security Monitoring Systems Committee. Departments or individuals in newly constructed buildings, or renovated buildings requiring alarm systems must submit an application for approval in accordance with **USF Policy 6-014** (Security Alarm Monitoring Systems).

SECTION 8 LABORATORIES, EQUIPMENT, RESEARCH, AND SHOP AREAS

8.1 SAFETY SHOWERS, EMERGENCY EYE WASHES, AND COMBINATION UNITS

8.1.1 The design guidelines for safety showers, emergency eyewashes, and combination units have been adopted from the following source: the **ANSI Z358.1** (current version), (Standard for Emergency Eyewashes and Shower Equipment), American National Standards Institute. These

standards shall be used to establish the minimum requirements set forth by the USF Building Design Guidelines for new construction and renovations, unless otherwise reviewed/approved by the FM-PM and FM-EH&S.

8.1.2 Safety showers, emergency eyewashes, and combination units shall be located as close to hazardous materials and associated operations/activities as possible and practical. The emergency equipment should be in a well-lighted location no more than ten (10) seconds unobstructed walking distance and located on the same level as the hazard, within fifty-five (55) feet. Laboratories using highly corrosive materials shall have emergency equipment immediately adjacent to the hazard (no more than ten feet). A highly, visible sign shall be positioned by the emergency equipment to identify its location. Safety showers and emergency eyewashes shall be located near each other to allow for dual use during an emergency.

8.2 CHEMICAL FUME HOODS, EXHAUST SYSTEMS, AND LABORATORY VENTILATION

8.2.1 The design guidelines for chemical fume hoods, exhaust systems, and laboratory ventilation must meet and/or comply with the minimum requirements of the latest versions of the following sources:

- **ANSI/AIHA Z9.5** (current version), (Laboratory Ventilation), American National Standards Institute /American Industrial Hygiene Association
- **NFPA 45** (current version). (Standard on Fire Protection for Laboratories Using Chemicals), National Fire Protection Association
- **ANSI/ASHRAE 110** (current version). (Method of Testing Performance of Laboratory Fume Hoods), American Society of Heating Refrigeration and Air-conditioning Engineers
- **ACGIH Manual of Recommended Practice** (current version), Industrial Ventilation American Conference of Governmental Industrial Hygienists
- **SEFA** (current version), (Laboratory Fume Hoods Recommended Practices), Scientific Equipment and Furniture Association

These standards shall be used to establish the minimum requirements set forth by the USF Building Design Guidelines for new construction and renovations, unless otherwise reviewed/approved by the FM-PM and FM-EH&S. In the event of potentially conflicting requirements/specifications between the referenced sources, regulatory/code requirements will take precedent and any additional voluntary standard based requirements will be reviewed/approved by the FM-PM and FM-EH&S in consideration of intended application(s) and/or associated safety factors.

Please note, in general, ductless fume hoods are not approved for use at USF and should not be proposed in the absence of substantial justification and user commitment to use and maintain such fume hoods in strict compliance with manufacturer requirements.

8.2.2 Chemical Fume Hoods

The minimum installation and performance requirements for chemical fume hoods include the following:

8.2.2.1 In general, fume hoods should maintain an average face velocity of eighty to one-hundred (80-120) feet per minute [with sash at normal operating height (approximately eighteen (18) inches) for constant air volume hoods with a bypass feature] with no face velocity measurement more than plus or minus twenty percent (20%) of the average; however, exceptions may apply and proposed variations must be reviewed/approved by the USF-PM and FM-EH&S.

8.2.2.2 Each hood shall have a continuous monitoring device (flow alarm, flow indicator, or face velocity indicator). The monitoring device shall, by visible and audible signal, give warning when the airflow through the hood has deviated from the predetermined range in **Subparagraph 8.2.2.1** hereinabove.

8.2.2.3 The commissioning process requires the testing methodologies and acceptance standards set forth by **ANSI/ASHRAE 110** (current version), Method of Testing Performance of Laboratory Fume

Hoods (American Society of Heating Refrigeration and Air-conditioning Engineers) be successfully completed before occupant use of the hood.

8.2.2.4 Chemical fume hoods shall be located away from primary laboratory exits and from areas of high traffic, to the furthest extent feasible.

8.2.2.5 Chemical fume hoods shall be constructed of non-combustible; nonporous materials selected to resist corrosion for the service intended.

8.2.2.6 Glass within the sash must be at least seven/thirty-second (7/32) inches thick laminated safety glass.

8.2.2.7 Electrical outlets and utility controls shall be located on the outside of the hood.

8.2.2.8 A back baffle device shall be provided for proper adjustment of airflow through the fume hood. This device should be adjustable from the outside of the hood.

8.2.2.9 Chemical fume hoods may include a sash stop mechanism to minimize unsafe hood operation, provided it can be manually overridden.

8.2.3 Laboratory Exhaust Systems

The minimum installation and performance requirements for laboratory exhaust systems include the following:

8.2.3.1 Ducts from all laboratory fume hoods and local exhaust systems shall be constructed entirely of noncombustible materials. No laboratory ventilation system ductwork shall be internally insulated.

8.2.3.2 Fans, motors and their controls shall be located outside the laboratory building or in a roof penthouse or roof mechanical equipment room to prevent any leaks from migrating into the building or to prevent personnel come coming into contact with exhaust airflow. Fans shall be located and arranged so as to afford ready access for repairs, cleaning, inspection, and maintenance.

8.2.3.3 Automatic fire dampers shall not be used in laboratory hood exhaust systems. Fire detection and alarm systems shall not be interlocked to automatically shut down laboratory hood exhaust fans.

8.2.3.4 Controls and dampers where required for balancing or control of the system shall be of a type that in the event of a failure, will fail open to assure continuous draft.

8.2.3.5 Duct velocities of laboratory exhaust systems shall be high enough to minimize the deposition of liquids or condensable solids in the exhaust systems during normal operation. Duct velocities should be maintained between 1500-2000 linear feet per minute to ensure that fine particles are transported and excessive condensation will not occur.

8.2.3.6 Exhaust stacks shall never have a rain cap or anything else that adversely affects the creation of a vertical discharge plume of the exhaust air. A minimum velocity of three-thousand (3,000) feet per minute is usually adequate to ensure for proper discharge of exhausted air and will prevent rain from entering the stack.

8.2.3.7 The exhaust stack shall be in a vertical up direction at a minimum of ten (10) feet above the adjacent roofline, high bay, penthouse, or other obstacle. The stack shall be located with respect to openings and air intakes of the building or adjacent buildings to avoid re-entry of exhausted air.

8.2.3.8 Air exhausted from the general laboratory space and chemical fume hoods shall not be recirculated.

8.2.4 Laboratory Ventilation

The minimum installation and performance requirements for laboratory ventilation include the following:

8.2.4.1 The ventilation rate in laboratories shall be sufficient, combined with other controls, to control air contaminants generated by the activity. Laboratory units and laboratory hoods in which chemicals are present shall be continuously ventilated under normal operating conditions. Six to twelve (6-12) room air changes/hour is normally adequate general ventilation if local exhaust systems such as hoods are used as the primary method of control; however, exceptions may apply and proposed variations must be reviewed/approved by the FM-PM and FM-EH&S.

8.2.4.2 Air supply systems for rooms containing chemical fume hoods shall not create room air drafts at the face of the hood greater than thirty percent (30%) of the average face velocity of the hood. All sources of air currents (supply air discharge, infiltration air) shall be located as far as practical from the fume hood.

8.2.4.3 Laboratories must be maintained at a slightly negative pressure with respect to adjoining areas (some exceptions apply). The preferred method of ensuring that air flows into a laboratory space is using a ten percent (10%) "offset" between the volumetric airflow of the total room supply and the total room exhaust (the exhaust being the larger value).

8.2.4.5 No laboratory ventilation system ductwork shall be internally insulated. Sounds baffles or external acoustical insulation at the source should be used for noise control.

8.2.5 Perchloric Acid Fume Hoods

Special consideration and criteria exist for Perchloric acid fume hoods. The minimum installation and performance requirements for Perchloric acid fume hoods include the following:

8.2.5.1 All interior hood materials, exhaust ductwork, fans, sealant, gaskets, and lubricants shall be resistant and non-reactive to perchloric acid and have impervious surfaces.

8.2.5.2 Baffles shall be removable for inspection and cleaning.

8.2.5.3 Perchloric acid hoods must be provided with a spray-type wash down system that will wash the interior of hood, interior of hood ducts, fan, and stack. This system shall include a watertight hood with depression and water collection trough.

8.2.5.4 The Perchloric acid fume hood and related exhaust system shall be separate from other fume hoods and exhaust systems.

8.2.5.5 Perchloric acid hoods shall be located to ensure the shortest, most direct exhaust system. The ductwork shall have no sharp bends, no flexible connectors, and no horizontal runs.

8.2.5.6 The hood shall be permanently labeled, "Perchloric Acid Hood."

8.2.6 Local Exhaust Ventilation

Local exhaust ventilation (e.g., "snorkels" or "elephant trunks"), other than fume hoods, shall be designed to adequately control exposures to hazardous chemicals. An exhausted manifold or manifolds with connections to local exhaust may be provided as needed to collect potentially hazardous exhausts from gas chromatographs, vacuum pumps, or other equipment which can produce potentially hazardous air pollutants. The contaminant source needs to be enclosed as much as possible, consistent with manufacturer specifications and operational needs, to maximize control effectiveness and minimize air handling difficulties and costs. Local exhaust ventilation will be reviewed/approved by the FM-PM and FM-EH&S in consideration of intended application(s) and/or associated safety factors.

8.3 CHEMICAL STORAGE FACILITIES

The design guidelines for chemical storage facilities have been adopted from the following source: Di Berardinis L.J. et al. **Guidelines for Laboratory Design** (current edition), John Wiley & Sons Inc. New York. This resource shall be used to establish minimum requirements set forth by the USF Design & Construction Guidelines (USF-DCG) for new construction and renovations, unless otherwise reviewed/approved by the FM-PM and FM-EH&S.

8.3.1 General Storage Installation and Performance Requirements

The minimum installation and performance requirements for chemical storage areas include the following:

8.3.1.1 Current chemical storage needs and handling locations shall be determined from expected users. If possible, current figures should be increased by a factor of one-point-five to two (1.5 to 2) to allow for growth.

8.3.1.2 Minimum quantities of chemicals should be stored in laboratories. A laboratory complex shall have a central chemical storage area for large supplies of chemicals, if feasible. In all instances, the quantity of chemicals stored in laboratories shall not exceed Maximum Allowable Quantities.

8.3.1.3 Cabinets, shelves, special storage equipment, and drawers shall be installed to provide separation of incompatible chemicals. Shelves shall be installed at or below eye level and securely fastened to the wall, ceiling, or floor. Island shelves shall be secured from tipping (i.e. braced across the top to other walls/shelves. Open shelves for chemicals shall be located out of normally traveled routes. Shelves shall be of sturdy construction with a recommended raised-lip edge of one-half to three-quarter (1/2 to 3/4) inch.

8.3.5 Specific Chemical Hazards

The following types of storage equipment are required for specific chemical hazards:

8.3.5.1 Shelves or cabinets for low to no hazard reagents and chemicals.

8.3.5.2 Corrosion resistant cabinets shall be available for acid and base storage. The cabinet shall adequately provide separation to prevent cross mixing of acids and bases.

8.3.5.3 Locked or secured cabinets shall be provided for storage of highly toxic materials, select agents, radioactive materials and controlled substances that require security control.

8.3.5.4 Flammables and combustibles shall be stored in an Underwriters Laboratories (UL) approved flammable storage cabinet. If the laboratory requires that it keep its flammable or combustible chemicals at a low temperature, a UL-approved refrigerator rated for flammable storage shall be provided.

SECTION 9 MISCELLANEOUS - PLUMBING, CROSS-CONNECTION AND BACKFLOW PREVENTION, DRINKING WATER SYSTEMS, HVAC, FOOD SERVICE AREAS

9.1 SOLDER AND PIPING: Per the requirements of the Safe Drinking Water Act (SDWA), solder and flux may not contain more than zero-point-two percent (0.2%) lead. Pipes and fittings may not contain more than zero-point-two five percent (0.25%) lead.

9.2 CROSS-CROSS-CONNECTION AND BACKFLOW PREVENTION: Follow the minimum requirements and guidelines specified by the following:

- **Chapter 62-555** (Permitting, Construction, Operation and Maintenance of Public Water Systems), Florida Administrative Code

- **AWWA M14** (current version), (Recommended Practices for Backflow Prevention and Cross-Connection Control); American Water Works Association
- **USC Manual of Cross-Connection Control** (current version), University of Southern California. Los Angeles, CA. 2012

There shall be no submerged inlets on construction or renovation sites (e.g. Hoses connected to potable water lines in standing water; water hookups lacking vacuum breakers, double check valves, etc.).

9.3 PUBLIC DRINKING WATER SYSTEM PERMITTING AND CONSTRUCTION REQUIREMENTS: Follow the **Chapter 62-555** (Permitting, Construction, Operation and Maintenance of Public Water Systems), Florida Administrative Code. Additional information may be obtained from the FM-EH&S or Florida Department of Health-Hillsborough County at (813) 307-8059.

9.4 PUBLIC DRINKING WATER SYSTEM DISINFECTION/CLEARANCE REQUIREMENTS: All newly constructed buildings and renovations/repairs (depending on the scope) must have water mains/distribution systems disinfected and cleared for public use. Contractors are to follow the disinfection guidelines in **AWWA C651** (current version), (Standards for Disinfecting Water Mains), American Water Works Association and the clearance procedures specified in Exhibit A Drinking Water Disinfection & Clearance Procedures.

9.5 HEATING, VENTILATION AND AIR CONDITIONING (HVAC) REQUIREMENTS: Follow the basic design recommendations for humid climates found in the current **ASHRAE Handbook of Fundamentals** (current version), (American Society of Heating Refrigeration and Air-conditioning Engineers) and **ANSI/ASHRAE Standard 62.1** (current version), (Ventilation for Acceptable Indoor Air Quality), American Society of Heating Refrigeration and Air-conditioning Engineers, guidelines.

9.6 FOOD SERVICE AREAS IN NEWLY CONSTRUCTED OR RENOVATED BUILDINGS: Comply with the **Chapter 64E-11** (Food Hygiene), **Florida Administrative Code**. New construction and renovation plans/drawings require Florida Department of Health (FDOH) approval.

A NEW WATER MAIN DISINFECTION AND CLEARANCE PROCEDURES

(Contractor is to do the following except when specifically directed otherwise.)

Note: In the below procedures, the bacteriological testing portion is a three day process. It is advised that the below work be scheduled to start on a Monday, but not later than Tuesday, so that the bacteriological samples are delivered to the Lab on Wednesday but no later than Thursday of any week in order to get the results back in that week.

WET-TAP CONDITION:

1. **Excavate/expose** main line at tap location. Over excavate a pocket to maintain any trench water below pipe work. Use pump if need be.
2. **Clean** main pipe and rinse off with 1% chlorine solution. Spray excavated work area with 1% chlorine solution.
3. **Sanitize** tapping sleeve by submerging in 1% chlorine solution. Tapping sleeve is to be full saddle type.
4. **Pressure test** saddle and tap valve installation with potable water (150 psi for 2 hours).
5. Tap the main line if approved. All tools and tapping equipment are to be rinsed, soaked or sprayed with 1% chlorine solution.

Line Extension from the tap or an existing valve:

1. **Construct** branch line(s) or extension(s) with sample/injection port at starting end, intermediate sample ports (if required) and blow-off/sample port at downstream end(s). Branch line is to be kept separated from connecting valve(s) unless connected with a temporary backflow prevention device.
2. **Flush** branch line(s) with potable water. If not connected to tap valve with BFPD, use jumper connection to closest fire hydrant with BFPD at hydrant. AWWA Guidelines calls for a velocity of 2.5 fps minimum to properly clean the new pipe work. The Guidelines provide a list of the blow-off sizes needed with a residual pressure of 40 psi to achieve the required flow.
3. **Pressure test** new line(s) at 150 psi for 2 hours. Set up is to be able to measure water lost while maintaining 150 psi. If means to measure water loss is not provided, then a 0 pressure loss is required. Test is to be witnessed by the Engineer of Record (EOR) or his designee. If pressure test fails, repair and retest.
4. **Disinfect** the new line(s) by the displacement method with a pre-mix of the specified chlorine concentration through the injection port until observed at the downstream end. Provide a least 2 vessels (i.e. 55 gal. drums for the mix) such that one is being mixed while the other is being pumped alternating back and forth between them. The chlorine concentration shall be a minimum of 25 ppm but not more than 50 ppm for a 24 hour soak time. Under extenuating circumstances, a 200 ppm chlorine concentration for a 3 hour soak time will be considered but must be prior approved. These chlorine concentrations must be controlled and will be verified.
5. After soak time, measure residual chlorine level. A drop below 10 ppm for the 24 hour process or 50 ppm for the 3 hour process indicates that the new pipe work has not been properly cleaned. Repeat flushing and disinfection steps above. (the system has to be able to maintain a healthy condition. A drastic reduction in chlorine levels is an indication that an unhealthy condition exists)

6. **Re-flush -** After soak time with proper residuals, flush lines until parent system ambient chlorine concentration is reached.
7. **1st Day Bac-T Sampling** - Have USF Facilities Management-Operations (FM-OPS) collect first day bacteriological samples at beginning, intermediate and end sample ports. Sample port locations should be shown on the drawings. (Schedule with FM-OPS ahead of time)
8. **2nd Day Bac-T Sampling -** Prior to sampling, measure residual chlorine level. If level has dropped below 0.2 ppm, repeat Steps 7, 12 and 13. If residual drops again below 0.2 ppm after the first day sampling (an unhealthy condition is indicated), then repeat Steps 7 and 9 - 13. If residual is 0.2 or greater, have FM-OPS collect second round of samples with downstream samples being collected before full pipe volume exchange occurs. FM-OPS will transport to the Lab.
9. **3rd Day -** Receive Lab results. If both day's results do not pass, re-flush and resample as described above. If two consecutive days of good results are still not received, flush, re-chlorinate the line and resample as described above.
10. For a regulated line (a line requiring a permit from the Health Dept.), copies of the bacteriological results and pressure test results (if performed by USF personnel on behalf of the Engineer of Record) are to be turned over to the Engineer of Record (EOR). The EOR is to prepare Certificate of Completion, combine Bac-T and pressure test results and submit to USF for review and signing. Package is then to be returned to the EOR for submitting to the Health Dept. under his cover for "Clearance".
11. After Clearance is received from the Health Dept. or given by USF (if it is not a regulated main), connect branch line to main valve as follows (there is a 60 day window for this before the Bac-Ts become invalid): If BFPD was used at tap valve, remove device. Control trench water such that it does not reach any of the sanitized pipe work. Soak connecting pieces in 1% chlorine solution and install. Turn on tap/branch valve and observe for leaks in connecting pieces and re-tighten if necessary.

B BUILDING PLUMBING DISINFECTION AND CLEARANCE

(Contractor is to do the following except when specifically directed otherwise.)

Note: In the below procedures, the bacteriological testing portion is a three day process. It is advised that the below work be scheduled to start on a Monday, but not later than Tuesday, so that the bacteriological samples are delivered to the Lab on Wednesday but no later than Thursday of any week in order to get the results back in that week.

1. **Pressure test** new line(s) at 150 psi for 2 hours. A 0 pressure loss is required. Test is to be witnessed by the Engineer of Record (EOR), Building Code Official or his designee. If pressure test fails, repair and retest.
2. **Flush Building System** with potable water. Before this process can start, the building plumbing is to be connected to the distribution system through an approved BFD, meter, and Health Dept. cleared service line. AWWA Guidelines calls for a velocity of 2.5 fps minimum to properly clean the new pipe work.
3. **Drain System -** After successful pressure testing, drain the building plumbing including all water heaters.
4. **Disinfect** the Building Plumbing by the displacement method with a pre-mix of the specified chlorine concentration through the injection port (building side of the BFD) until observed at all downstream end points. Provide a least 2 vessels such that one is being mixed while the other is being pumped alternating back and forth between them. Vessel size should be based on plumbing volume and pump rate such that an uninterrupted flow can be maintained. Expect the plumbing volume to be displaced several times before the mix can be verified at all fixtures.

The chlorine concentration shall be mixed for a 50 ppm dosage for a 24 hour soak time. The chlorine concentration must be controlled and will be verified. Maintain building system pressure during the soak period.

5. After soak time, measure residual chlorine level. A drop below 10 ppm for the 24 hour period indicates that the new pipe work has not been properly cleaned. Repeat flushing and disinfection steps above. (the system has to be able to maintain a healthy condition. A drastic reduction in chlorine levels is an indication that an unhealthy condition exists)
6. **Re-flush -** After soak time with proper residuals, flush lines until parent system ambient chlorine concentration is reached.
7. **1st Day Bac-T Sampling -** Have a Lab collect the first day bacteriological samples at the injection point, and the designated downstream fixtures. Representative sample point locations will be designated by the University.
8. **2nd Day Bac-T Sampling -** Prior to sampling, measure residual chlorine level. If level has dropped below 0.2 ppm, repeat Steps 6, 7 and 8. If residual drops again below 0.2 ppm after the first day sampling (an unhealthy condition is indicated); then repeat Steps 1 and 3 - 8. If residual is 0.2 or greater, have the Lab collect second round of samples with downstream samples being collected before full pipe volume exchange occurs.
9. **3rd Day -** Receive Lab results. If both day's results do not pass, re-flush and resample as described above. If two consecutive days of good results are still not received, flush, re-chlorinate the system and resample as described above.
10. After 2 consecutive days of acceptable bacteriological results are received, the Building Code Administrator will authorize the system to be put into service.

USF UNIVERSITY OF SOUTH FLORIDA

DESIGN & CONSTRUCTION GUIDELINES

APPENDIX B
UNIVERSITY POLICE DEPARTMENT DESIGN GUIDELINES
(TAMPA CAMPUS)

EDITION: **SEPTEMBER 17, 2018**
USF UNIVERSITY POLICE DEPARTMENT

APPENDIX B – UNIVERSITY POLICE DEPARTMENT

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SECTION 1 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

1.1 These guidelines are intended to assist in the creation and maintenance of a built environment that will decrease the opportunity for crime, increase the perception of safety, and develop a sense of ownership at the University of South Florida. This concept is called Crime Prevention through Environmental Design (CPTED), which has been successfully implemented throughout the campus.

1.2 The conceptual thrust of CPTED is that the physical environment can be manipulated to produce behavioral effects that will reduce the incidence and fear of crime, thereby improving the quality of life. These behavioral effects can be accomplished by reducing the propensity of the physical environment to support criminal behavior. CPTED involves the effort to integrate design, citizen and community action, and law enforcement strategies to accomplish surveillance consistent with the design and use of the environment. All building designs will be submitted to the USF Police Department (USF-UPD) for a CPTED review.

SECTION 2 CPTED CONCEPTS

CPTED CONCEPTS fall into the four following interrelated and overlapping categories: natural access control, natural surveillance, natural territorial reinforcement, and activity support.

2.1 NATURAL ACCESS CONTROL: Access Control is a design concept directed at decreasing the crime opportunity and increasing the perception of risk of exposure for unintended users. Natural access control limits access and increases natural surveillance to restrict criminal intrusion, especially into areas where the criminal will not be easily observed. Natural access control limits access by, and increases natural surveillance of, unintended users by directing normal access to observable areas and preventing access to un-observable areas. Examples are as follows:

2.1.1 The use of doors, fences, gates, changes in pavement texture, grade changes, lighting, landscaping, motif, and signage to guide the public to and from building and site entrances and exits in order to discourage access to an area by all but its intended users.

2.1.2 Walls or landscaping can be used to prevent and/or discourage public access to dark or unmonitored areas (such as open areas beneath stairwells in buildings or parking structures).

2.2 NATURAL SURVEILLANCE: Natural Surveillance is a design concept directed at keeping unintended users under observation. Designing for natural surveillance means providing ample opportunity for legitimate users, engaged in their normal activities, to observe the space around them. Areas can be designed so they are more easily observed through the following:

2.2.1 The placement and design of physical features to maximize visibility. This includes orientation, doors and windows, site entrances and exits, walkways, parking lots, landscape trees and **shrubs, fences and walls, signage, and any other physical obstructions.**

2.2.2 The placement of persons or activities to maximize surveillance possibilities (for example, placing a receptionist's desk so that it provides a view of the approach of the front entry of an office or building).

2.2.3 The use of uniform lighting standards for illumination of parking lots, walkways, entrances, exits, and related areas during both day and night hours.

2.2.4 Redesigning space to increase the perception or reality of natural surveillance.

2.3 NATURAL TERRITORIAL REINFORCEMENT: Natural Territorial Reinforcement is a physical design that can create or extend a sphere of influence so that users develop a sense of proprietorship - a sense of territorial influence, and potential offenders perceive that territorial influence. Natural Territorial Reinforcement is a concept intended to clearly delineate a space as public, semi-private, or private and to create appropriate ownership of that space. Examples of this concept include the following:

2.3.1 Defining the ownership of space with sidewalks, shrubs, low hedges, grade changes, or other methods in order to create a sense of "ownership", which fosters behaviors that challenges abuse of that space.

2.3.2 Defining private and semi-private space in order to create an environment where unintended users stand out and are more easily identified, which also aids natural surveillance. Persons with a vested interest in such spaces are more likely to challenge these "outsiders", which increases the perception of risk for the unintended user.

2.3.3 Providing clear border definitions of controlled spaces.

2.3.4 Providing clearly marked transitional zones that indicate movement from public to semi-public, to private space.

2.3.5 Redesigning the use of space to provide natural barriers to conflicting activities.

2.4 ACTIVITY SUPPORT: Activity support is the strategy of placing safe activities in vulnerable locations. Safe activities serve as magnets for normal users who become part of the natural surveillance system. Examples of this concept include the following:

2.4.1 Relocating gathering areas to locations with natural surveillance and access control, or to locations away from the view of would-be offenders.

2.4.2 Placing safe activities in unsafe locations to bring along the natural surveillance of these activities and to increase the perception of safety for normal users and risk for potential offenders (i.e., public gathering area placed with a view of a parking lot).

2.4.3 Placing unsafe activities in safe spots to overcome the vulnerability of these activities with the natural surveillance and access control of the safe area (i.e., restrooms near entrances, lobbies or reception areas).

SECTION 3 THE PROCESS: The University of South Florida Police Department CPTED representative should be present at the appropriate meetings throughout the entire project life. This would include the site identification meeting, conceptual drawing unveiling, to the 50% and 100% drawing presentations. This will afford the CPTED representative, in conjunction with the staff of USF Facilities Management (USF-FM), the opportunity to provide external cultural and environmental factors that could be used to enhance the design concept, as well as those that should be avoided to reduce the propensity of criminal behavior and victimization. These discussions will also identify areas of inherent risk that will be housed within the structures, thus providing the CPTED representative the opportunity to provide strategies to enhance the safety of these areas without target hardening. The benefit of this approach is to maximize the safety strategies with as little impact as possible on the aesthetic intent of the architect and the functionality expected by the structure tenant.

USF UNIVERSITY OF SOUTH FLORIDA

DESIGN & CONSTRUCTION GUIDELINES

APPENDIX C
STUDENT HOUSING DESIGN GUIDELINES
(TAMPA CAMPUS)

EDITION: **JANUARY 29, 2021**
USF HOUSING & RESIDENTIAL EDUCATION

APPENDIX C - STUDENT HOUSING DESIGN GUIDELINES

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EXHIBIT 1	**DOOR & HARDWARE FACILITY SPECIFICATION GUIDELINE**	FEBRUARY 5, 2014

APPENDIX C - STUDENT HOUSING DESIGN GUIDELINES

DIVISION 01 GENERAL REQUIREMENTS

01101 ADA PREFERENCES

1. Frontal approach kitchens and bathroom sinks as opposed to side approach.
2. Stoves should have accessible (front mounted) knobs and at least one microwave per accessible kitchen should be at wheelchair height.
3. Door hardware/closures should accommodate slight touch activation, card access or proxy activation.
4. Auto door opening devices are required at each main entrance door operated with the Housing & Residential Life card access system, **CCure9000.**
5. Ample sized showers (roll in) to accommodate showering in the wheelchair.
6. Showers should have accessible wand type shower heads.
7. ADA apartment/room doors are to have kick plates on both sides of the doors.
8. ADA apartment/room doors should have peep holes at accessible height.
9. ADA room closets should have accessible height shelving.

01102 MAINTENANCE SPACE

1. Provide space for a maintenance shop for the building mechanic(s).
2. In a complex of buildings, provide shop space in a common building or in its own detached structure on site.
3. Overall area of the maintenance space should be a minimum five-hundred (**500**) square feet.
4. Location of the maintenance shop should be on a first floor level, near an elevator for access to entire building.
5. Location should also be near a direct entry point or service area and the building away from residential living space.
6. There should be a fenced in located inside the shop area to secure high cost parts/materials such as parts for AC, plumbing, electric, doors, extra thermostats, boxes of air filter, couplers, faucet sets, stems, switches/outlets, light fixtures, door hardware, and secured chemical stock.
7. Maintenance space should have an unfinished concrete floor.
8. One eye wash station, utility sink and a wall mounted first aid supply box should be supplied for each shop.
9. There should be ten (**10**) lockers furnished for personal items/tools.
10. Vehicle accessibility to the maintenance shop is also necessary.
11. Entry doors should be double-wide with no less than a six (**6**) feet opening with a door closure arms with a hold open feature.
12. Maintenance shop should be an air-conditioned space.
13. Standard **110 V** room/service outlets.
14. No less than one wall should be designated for workbench
15. Workbench size should be no less than six to eight (**6** to **8**) feet in length.
16. Two duplex outlets @ four (**4**) feet at each end of work bench area.
17. One (**1**) **208 V** outlet/service for testing equipment.
18. Water/Sewer-shop sinks with hot and cold water and drains.
19. One phone and two data ports and wireless access, with one desktop computer supplied.
20. Above the work bench should be a mirrored sized peg board mounted onto furring strips.
21. There should be tool storage (hand tools, hand power tools, sewer machine, etc.).
22. Maintenance shop should have exhaust hood to maintain adequate ventilation to the outside.
23. Vehicle (pickup, electric vehicle or electric golf cart; vehicle must have a storage/tool box attached) Parking for any vehicle must have a designated space within a secure area outside adjacent to the shop with exterior duplex **110 V GFI/WP** and lighting.
24. Toilet Facilities must be located in a convenient area within the complex for use by the mechanic/housekeeping staff. Location should not be near or within any residential living areas or accessible only through a residential living area.
25. Housing & Residential Education will provide furniture, and shop equipment.

01103 HOUSEKEEPING SPACE

1. Custodial closets should be no less than ninety-five (**95**) square feet.
2. There should be a custodial closet located within each "living unit depending upon the building design" (This space would support the common bathrooms, corridors, kitchens, lounges, lobbies, within this living space. These space locations are critical to have equipment/supplies within a relative close location to emergency needs such as bi-hazard spills, water leaks or sewage backups).
3. Custodial closets should be power vented to exhaust chemical scents.
4. Closets should have 1-piece (wall surround) mop sink units located at floor level, wall space for J-Fill dispensers and broom caddies/holder, small **2**-shelf shelving unit and space to accommodate a maid's cart, vacuum, dehumidifier, wet vac equipment and a case of toilet paper.
5. Custodial closets should have multiple **110 V** outlets.
6. Custodial closets should be unfinished concrete flooring.
7. Custodial closets should have motion sensing lighting controls.
8. There need to be a Custodial Supervisor Office that is centrally located on the bottom floor, be no less than two-hundred-sixty (**260**) square feet and have a finished floor of laminate.
9. Location of the custodial office should be near an elevator for access to entire building and near a direct entry point or service area away from residential living space.
10. Custodial office should be an air-conditioned space with a finished drop ceiling tile with standard **110 V** room/service outlets.
11. Custodial office should have motion sensing lighting controls.
12. One phone and two data ports and wireless access, with one desktop computer supplied.
13. Within close proximity to the custodial supervisor office there should be a custodial break room of no less than four-hundred (**400**) square feet with furnished lockers for staff personal property, standard **110 V** room/service with multiple outlets, slop sink, one (**1**) eye wash station and a wall mounted first aid supply box should be supplied.
14. Custodial break room should have a unisex bathroom adjacent for staff use.
15. Custodial break room should have motion sensing lighting controls.
16. There will also be a need for housekeeping storage space on the bottom floor of the building with direct exterior access double doors that open up to six (**6**) feet and open up on a delivery space on the exterior of the doors for deliveries.
17. Storage areas should be no smaller than two-thousand (**2,000**) square feet and have two two-hundred (**200**) square feet fenced in areas with gate access to separate and secure supplies, materials and chemicals.
18. Storage room should have water/electric connections for commercial washer/dryer appliances to clean micro-cleaning pads/buffer pads.
19. Storage area should have an unfinished concrete floor and one set of six (**6**) feet interior doors for supplies and materials to be moved through and in to ten building.
20. Each building should have and additional one (**1**) designated custodial closet on the first floor of each individual residential building to store emergency supplies/equipment for access by the live-on staff during emergency situations that develop in the evening and weekend hours on.
21. Custodial closet doors should have a door closure arm with a hold open feature.

01104 COMMUNITY BUILDING

Services offered by a community building may vary depending on the program written for any particular complex, but can include the following types of spaces.

1. **Offices:**
   - **a.** Offices should have picture rail around the perimeter of the room at door/window height.
   - **b.** Depending upon lay-out of room may require more than one set of phone/data jacks for moving of work station or potential for two work stations.
2. **Front Desk:**
   - **a.** The front desk or service desk should be at standing height on customer side, with one lower ADA location and at sitting height on working side with counter depth to accommodate cash register, computer and such office equipment.

b. The desk should contain at least two sets of phone/data jacks with two sets of four-plex- power outlets.
c. The working side of the desk must be in proximity of the back side of any mailroom mail boxes.
d. Depending upon community building design the desk may require locking doors and windows so it could be secured from other areas that may be "open" during hours the desk is "closed".
e. A "panic button" alarm is required in a secured location behind the desk.
f. Cameras are required with coverage of the entire front desk operations for safety.
g. Key Cabinet to be provided to contain space for keys numbering three times the number of beds within the complex. Key cabinet is to be in a secure room or closet convenient to working side of "front desk".
h. High secured keys will be stored in a Key Trak system for live-on staff security and access.

3. **Mail Room:**
   a. Number of mail boxes is to equal the number of beds in the complex plus five percent (**5%**) additional for expansion.
   b. Size-nominal three by five inches (**3"** x **5"**)
   c. Combination locks.
   d. Workers side of mail boxes to be placed in conjunction with workers side of front desk.
   e. Workers side of mailboxes to be trim finished.
   f. Box identification: Mailbox doors to have window for inserting box number tab. Box numbers will be assigned by post office. Box number tab to be supplied with boxes by contractor. Working side of mailboxes to have means of inserting box number tabs.
   g. Number of mail boxes to be ten deep (Top to Bottom)
   h. Number sequence to be top to bottom and left to right on customer side.
   i. Customer side of mail boxes to be enclosed from weather, with lockable doors.
   j. Storage Room: There is to be a storage room adjacent to the "front desk" and entry door. Storage room to be of approximate equivalent size of an office room within the community building.
   k. Any mailroom that is installed must have a heavy duty gated lockable fenced area contained in the mailroom to secure packages.
   l. Mailrooms must be provided large wall mounted shelving units for sorting and organizing throughout the space.
   m. Mailrooms should have security cameras installed with views of front desk, main mailroom entry points and mail/package storage area.

01106 QUESTIONS

For questions or to view examples, contact the Department of Housing & Residential Education, Associate Director for Facilities Maintenance at (813) 974-3446.

DIVISION 02 SITE WORK

02601 DUMPSTER ENCLOSURES

1. There is to be two eight (**8**) yard dumpsters location to each fifty to seventy-five (**50** to **75**) beds.
2. Dumpster enclosures should be located on the residents path of travel as convenient to residents a possible but yet must be accessible to the large dumpster trucks.
3. Dumpsters enclosures to be designed to hold two dumpsters (1-Recycling, 1-Waste)
4. Enclosures are to be constructed of CMU surfaces to compliment the project.
5. Enclosures are to have adequate space around the enclosure to place temporary dumpsters during opening and closing events.
6. Single enclosure size **9' - 8"** x **12' - 9"** (only if required by design limitations).
7. Double enclosure size **9' - 8"** x **21 '- 4"**
8. Eight inch steel bollards (three per dumpster) filled with concrete are to be at the inside rear of the enclosure to keep dumpsters from being shoved into the wall of the enclosure, located not less than **8"** off the inside wall. Bollards are to be painted traffic yellow.
9. Gates to be of heavy steel frame hung from steel-posts not attached to the CMU enclosure. Faces of enclosure gates have normally been covered with pressure treated lumber slates.

10. Enclosure gates are not to meet in the middle by three (**3**) feet to allow residents to enter enclosure to deposit trash.
11. Gate bars are to be set into holes in the pavement to keep the gates closed as well as to keep gates in open positions. Receiver holes are to be "over drilled" so as to insert metal pipe to receive the stake. Gates must swing past ninety (**90**) degrees in staked open position.
12. There needs to be a dedicated **110 V** outlet and keyed hose bib with remote shut-off required at each location or within fifty (**50**) feet of enclosure for cleaning and pressure washing.
13. Dumpster/compactor locations used in a trash system should be located close to the main collection point within the building.
14. Any roll type of compactor/shorty container should include a battery operated tow machine to maneuver the canister to the main compactor.

Note: If a trash chutes system built into a project it should be based on an exterior wall. The compactor should be located on the first floor with easy access in and out of the room from the exterior of the building. This will also aid in odors and noises penetrating residential living areas. Any trash chute access rooms located on the interior living spaces should have a sealed one by six (**1" x 6"**) inch wood sealed baseboard and epoxy finish applied to the walls and floors to assist in cleaning of waste and spills.

02602 BICYCLE RACKS

1. Due to the popularity in the past five years bicycle racks must be provided for at least fifty percent (**50%**) of building occupancy.
2. Bike rack hoops/loops are to meet USF specifications in residence hall area and match existing locations.
3. Hoops are to be thirty-six (**36**) inches O.C. as opposed to manufacturing specifications (36-inch allows more bikes per linear foot).

DIVISION 03 CONCRETE
DIVISION 04 MASONRY
DIVISION 05 METALS

Not Used

DIVISION 06 WOOD AND PLASTICS

06201 FINISHED CARPENTRY

1. Painted wooden baseboard is preferred, especially in corridors. One by four (**1 x 4**) inch, or one by six (**1 x 6**) inch chamfered board. It assists in the damaging of walls during move in and move out and high usage of handcarts/trucks.
2. Vinyl or ceramic base is acceptable elsewhere as appropriate. Vinyl base is to incorporate to form inside and outside corners.

06401 ARCHITECTURAL WOODWORK

1. Kitchen and Bath Cabinets – plywood in base cabinets and particleboard allowed in upper cabinets. Refer to Architectural Woodwork Institute (AWI). *Architectural Woodwork Standards, First Edition*. Section 400.
2. Common kitchen as in traditional halls, suite type halls, or community building kitchens are to have open cabinets without doors-fully laminated plywood casework similar to a "shadow box" look, unless otherwise approved.

DIVISION 07 THERMO AND MOISTURE PROTECTION

1. Attic spaces should be sealed, conditioned and insulated.

DIVISION 08 DOORS, WINDOWS AND GLAZING

Note: Please also refer to the **Exhibit 1** (Door & Hardware Facility Specification Guideline) herein attached.

08201 DOORS

1. Residence Hall doors are normally six-feet eight-inches (**6' - 8"**) (to keep residential proportions).
2. Main Entry doors may be seven-feet zero-inch (**7' - 0"**) for architectural purposes, and provided with automatic openers.

   Note: Conduit should be installed to all main entry doors for future ADA, and card access systems upgrades to allow for wiring runs.

3. Building entry/exit doors are to be three-feet six inches (**3' - 6"**) wide (to ease the damage caused by the frequent mass move-in/move-out).
4. Doors from lobbies/stairs to living areas to be three-feet six inches (**3' - 6"**) whenever possible.
5. All bedroom and service doors to be a minimum three-feet (**3' - 0"**) clearance.
6. Electric strikes are to be used on card access doors. The strike to be used is the **HES Genesis**, surface mount series **9000**, model **9600-12/24/630.**

   Note: Due to excessive door usage, a one-half-inch thick by two-inch wide by twelve-inch long (**1/2" x 2" x 12"**) replaceable aluminum shim plate should be mounted between the electric strike and door frame to allow for future repairs upon mounting screw failures.

7. Interior wood doors are to be engineered composite lumber core, and wood laminates. NOTE The Residence **ServiAll** interior doors to have **Sargent** mortise lock sets.
8. Public or common (gang) non-latching toilet doors to have keyed dead bolt with thumb latch inside that can retract the deadbolt but not extend it.
9. Public toilet doors with privacy latching will have mortise lockset, keyed outside with thumb latch for privacy inside.
10. Fan coil closet doors, janitorial closet doors, electrical closet doors, mechanical closet doors, and elevator equipment rooms are to have storeroom function Sargent mortise lock set hardware.
11. Community building doors, mail rooms, laundry rooms and office annex entry designs & occupancy may dictate by code and type of hardware.

08501 WINDOWS

1. Residence Hall windows in living spaces and community kitchens shall be operable by the Resident.
2. Common spaces, (except community kitchens) i.e. lobby, lounges, community bathrooms, and laundry rooms are to be fixed windows.
3. Operable windows shall have screens on them. Ground floor windows, or any window with operable portion within ten (**10**) feet of finished grade, shall have operable security screens with the ability to open in a panic situation from the inside and self-latching from the outside when pushed closed from the outside. Kane security screens or equal.
4. Window Treatments- Window treatments may vary with space and window design. In general, vinyl vertical blinds are the window treatment of choice.
   a. Windows that are fixed or have vertical sliders, the blinds are to be vertical.
   b. Windows that are single hung horizontal, the blinds are to be horizontal.
5. Quality window treatments are of importance as they receive rough treatment. Architect, Facilities Planning and Residence Services must discuss window treatments for each individual project. Bedrooms, living rooms, community rooms, offices, and lobbies must all be individually consistent.

DIVISION 09 FINISHES

09601 FLOORING

Note: Adhesives use for any carpet, etc. is to adhere under wet conditions and must be non-asbestos in nature or ingredient.

1. Corridors are to be carpet squares, porcelain or laminate.
2. Bedrooms are to be laminate only.

   Note: Corridor and bedroom floor treatment is to be discussed with Housing & Residential Life for each individual project.

3. Bathrooms are to be ceramic or porcelain tile.
4. Apartment kitchens are to be laminate or porcelain.
5. Common use kitchens, as in traditional dormitory or suite halls, are to be carpeted, with thirty-six (**36**) inches of ceramic/porcelain tile in front of the kitchen counter space.
6. Multipurpose room kitchens are to be ceramic/porcelain tile.
7. Multipurpose room is to be laminate.
8. Lounges are to be carpet squares.
9. Lobbies are to be of ceramic/porcelain or laminate and carpet square areas as appropriate to size and design.
10. Janitorial, electrical, mechanical, communications closets; mechanical, maintenance, and housekeeping rooms to be clear sealed concrete.

09901 PAINT

1. Interior paint: Flat paint is not to be used. Satin finish is the minimum finish to be used and semi-gloss is preferred in corridors and student spaces.
2. Doors and door frames are to be semi-gloss or gloss finish paint.

   Note: Majority of paint surfaces within the Housing & Residential Education inventory is of Sherman Williams brand yet we are currently moving towards and incorporating the **Valspar** ® product line.

   Note: Drawdowns with color formulas and manufacturer are to be provided to the owner with closeout documents.

DIVISION 10 SPECIALTIES

10101 TACK AND WHITE BOARDS

1. Tack board strips/bars in length of six (**6**) feet will be provided by contractor in each lobby across from entry to each elevator unit at a uniformed height off the floor to meet code compliance.
2. Tack board strips/bars in a length of one-inch by four-feet (**1" x 4'**) will be located on the right side of all designated residence assistance room entry doors at a uniformed height off the floor to meet code compliance

   Note: All tack board strips/bars are to be in a well-lighted area.

10401 SIGNAGE

1. Room signage is to be numerical and braille tactile.
2. Color, size and font shall conform to USF Housing & Residential Education standards.
3. Provide clear window for three by five inch (**3" x 5"**) card.
4. Provide note clip (See PM and RSAD).

10801 TOILET ACCESSORIES

1. Public Restrooms dispensers/holders are to be uniformed to current housing standards.

   a. All public restroom facilities must comply with current ADA requirements/codes, where applicable.
   b. Toilet tissue: **9"** Twin Jumbo Roll Tissue Dispensers, **Palmer Fixture**, model **R27TS**.
   c. Tork RB600 Paper Towel dispenser: will touch-free **Amera-Products Inc**. model **71002**.
   d. Hand soap dispenser: 1250 ml, **Buckeye Chemical Symmetry** model **390-9901100**
   e. Hand Sanitizer: GremX 8071, Dispenser **Cintas Signature Series**
   f. Finishes are to include garment hooks, shelves, standard mirror sizes, sanitary napkin disposals (Women bathroom only) and wall hung paper towel waste receptacles.

2. Residential Apartment Restroom (Student and Staff Apartments) will have robe hooks, shelves, mirrors, towel bars that reflex a standard residential style finish along with tissue paper holders.
3. Residential Suite Restrooms will have robe hooks, shelves, mirrors, and towel bars that reflex a standard residential style finish. Each residential suite restroom will have **9"** Twin Jumbo Roll Tissue Dispensers, **Palmer Fixture**, model **R27TS**.
4. Residential Shared "gang" Restrooms will have robe hooks, shelves, mirrors, towel bars that reflex a standard residential style finish.

   a. Paper towels dispenser: Touch free **Amera-Products Inc**. model **71002**.
   b. Hand soap dispenser: 1250 ml, **Buckeye Chemical Symmetry** model **390-9901100**.

   Note: Castor and Beta: Georgis-Pacific Toilet Paper Roll, Pacific Blue Ultra (TM), Coreless, 2 Ply Dispenser **GEORGIA-PACIFIC**

5. Towel bars will be installed in all bathrooms. "Hinge-It" towel racks will be installed on the back of each bedroom door for additional towel storage. Model: **Commercial Rack** – code **#08001**, white epoxy.

   Note: "**Hinge-It**" is a specific product that mounts on the door hinges. It can be found at "**Hingeit.com**."

6. Medicine cabinets may be installed in staff apartments only, or open "architectural" shelving may be substituted.

   Note: Sanitary napkin dispensers are not installed in any residence hall bathrooms.

DIVISION 11 EQUIPMENT

11101 APPLIANCES

1. Common area laundry room washers and dryers will be designated at a ratio of approximately thirty-five to forty (**35** to **40**) persons to one (**1**) washer and one and one-quarter (**1.25**) dryers. Dryers are double stacked and preferred to be gas.
2. Residential apartments should have no less than a standard thirty inch (**30"**) self-cleaning stove/oven, apartment sized refrigerator of no less than sixteen to seventeen (**16 - 17**) cubic feet.
3. Staff apartments should have an under counter dish washer, garbage disposal, and full sized stack washer dryer; or standard washer and dryer, if design and space allow.
4. Common area kitchens are to be provided a thirty inch (**30"**) stove with oven (self-cleaning), space and a full sized refrigerator.
5. Community room kitchens should be provided a thirty inch (**30"**) stove with oven (self-cleaning), full sized refrigerator nineteen to twenty (**19 - 20**) cubic feet and microwave.

   Note: If code requires fire suppression system over stove in this type of community kitchen, discuss alternatives with Housing & Residential Education.

DIVISION 12 FURNISHINGS

12501 WINDOW TREATMENTS

1. Vertical blinds are preferred.
2. Slider windows are preferred.
3. Solar reflective window panes are preferred.
4. Inward tilting windows are also preferred on any floor above ground level to assist in cleaning.

   Note: Consideration to double pane windows with interior blinds should be reviewed in new construction.

12601 FURNITURE

1. Furniture style and manufacturer will be determined by Housing & Residential Education in conjunction with Facilities Planning.

   Note: Furniture with padded bottoms should be reviewed to protect floor surfaces.

Note: Common area or classroom furniture should be of a lighter weight for setups and breakdowns.

Note: Due to weight and size wardrobes or armoires should not be considered in student room locations.

DIVISION 13 SPECIAL CONSTRUCTIONS

Not Used

DIVISION 14 CONVEYING SYSTEMS

14201 ELEVATORS

1. **Design and installation specifications will require warrantied elevator manufacturers and not generic fabricated parts**.
2. The elevator manufacturer shall include a five year renewable maintenance contract.
3. Elevators shall NOT be installed in an exterior exposed space subject to excessive moisture, rain, flooding, or weather damage.
4. Elevators shall not be located at the lowest point of a floor, causing water from floor-washing to fall into the elevator shaft.
5. Elevators shall use vandal-resident car stations and hall stations. Lighting and ceilings in elevator cab shall be resistant to abuse and/or unauthorized access and removal.
6. If, proprietary controls are accepted, training and computer software must be available to Housing & Residential Educations designated service contractor.
7. Possibility of a freight elevator in a larger facility should be considered upon planning.
8. Light fixtures/panels should secure bulbs to limit passenger access and vandalism.
9. Cab cameras should be considered during planning.

DIVISION 15 MECHANICAL

15401 PLUMBING

1. Commodes will be wall mounted with elongated Kohler, American Standard, Toto, or equal. Flush valves shall be of Sloan or Toto types. All components shall be of "name brand" so as to be readily available for maintenance replacement without having to re-plumb or having to install new wall hangers.
2. Floor mounted commodes are to be **Toto 744** series **# CST744A-11** with elongated bowls for the main intent to obtain the commode with the enlarged freshwater inlet and enlarged waste discharge with siphon action.
3. Public toilets and shared "gang" toilets will have seats only. Apartments and suite toilets will have seats with lids.
4. Urinals are to be used only in men public toilets and shall be equipped with battery powered automatic flush valves, preferably the same manufacturer as the urinal.
5. A public toilet is defined as one for use by non-residents of the building, i.e. visitors, guests, or building staff. Each residence hall (traditional, suite or apartment) will have one unisex public toilet, typically in the lobby area. Design and capacity of the building may dictate separate men and women toilet or more than in just the lobby area.
6. Any gathering space within a residence hall or within a residence complex shall have public toilet/toilets and be equipped with battery powered automatic flush valves, preferably manufactured by the same company as the urinal, faucet and toilet.
7. All public restroom facilities must comply with current ADA requirements / codes, where applicable.
8. Domestic water meters shall be as per USF Physical Plant's specification along with the remote monitoring equipment. Conduit and wire shall run between the meter and the nearest communications closet containing the equipment necessary to get the data on the USF network.
9. There should be lockable hose bib connections located on the exterior entrances/exits of the building, and periodical around the perimeter of the building for access in pressure washing or water supply.

10. Shower enclosures with solid secure base foundations should be reviewed in new construction.
11. Shower units should have sink connections to allow for custodial shower cleaning with hand wands connections.
12. Showerheads should provide a dual low flow option for water savings.
13. Bathroom faucets should have water saving aerators installed.
14. Domestic water shut off valves should be installed wherever possible (entire floors, suites, stacks, individual rooms/apartments) to isolate specific equipment or locations and not affect adjacent residential units.
15. Hot water tanks/exchangers should be located for access to anode rod maintenance and away from residential living areas upon any tank failures/leaks.
16. Hot water tanks/exchangers are to be installed on the bottom floor of a residential building only.
17. Domestic water lines and valves should be labeled and tagged for identification over the length span.
18. Attic stock should be supplied at the turnover which includes flusher valves, commodes and fixtures.
19. Water lines should be of a scheduled thick copper gauge only.

15501 HVAC EQUIPMENT

1. Energy/utilities management control systems should be installed to individual room and common area units for monitoring which should be compatible with current housing inventory.
2. Owner will require independent commissioning.

   Note: USF Physical Plant remotely monitors and reads BTU meters, domestic water meters and electrical meters but does not control the operation of residence hall air handlers.

3. BTU meters and associated equipment to allow monitoring and reading at USF's Physical Plant are to be of manufacture, design, and installation as instructed by physical plant's requirements.
4. Design of mechanical room space, pipe location and spacing will take into consideration the installation and maintenance of said devices and valves:

   a. Floor drains.
   b. Ball type shut off valves on all domestic, heating, chilled, hot and cold water lines.
   c. Adequate access to change filter media.
   d. Adequate lighting in all areas of the room.
   e. Wall mounted fire extinguisher brackets.
   f. Exhaust fans.

5. Rigid conduit and wire will be installed from the BTU equipment to the nearest communication room containing the equipment necessary to get the data on to the USF network.
6. Each apartment or bedroom (depending upon the building, i.e., apartment, suite, or traditional) needs to control its own environment. Simple and inexpensive thermostats are to be provided in the student spaces for their use and control of that space.
7. Common area thermostats are to be placed where the students and general public cannot access, i.e. in the local air handler closet and be equipped with temperature sensors tied to energy management control systems.
8. Residence Halls are occupied **24/7/365** days a year and the residents are to have control of their environment. Energy management systems are required for residence hall.
9. Programmable low profile thermostats, with set point bands, in bedrooms, suites and apartments and temperature sensors in all common areas.
10. All systems should be tied to one energy control system which is compatible with current systems within the Housing existing inventory.
11. HW & CW lines should have shut off valves installed wherever possible (entire floors, suites, stacks, individual rooms/apartments) to isolate specific equipment or locations and not affect adjacent residential units.
12. There should be attic stock leftover to include valves, controls and inline pumps.
13. HW & CW lines and valves should be labeled and tagged for identification purposes over the length span.

14. Water lines should be of a scheduled thick copper gauge only.
15. Exhaust fans should be wrapped and insulated when installed on rooftops.
16. Exhaust fan/ductwork in bathrooms must be located close to the shower assembly.
17. Ductwork insulation should not be wrapped too tight to decrease the R-factor on the duct.
18. Environmental control software systems should uniform existing systems within Housing currently.

15901 HEAT EXCHANGER

1. Provide re-circulating pump for entire domestic hot water system. Isolate copper piping for electrolysis.
2. Provide heat recovery and storage for domestic hot water from hot water system.

15902 TEST ADJUSTING AND BALANCE

1. Test and balance shall be conducted with bedroom doors closed.
2. System design shall take into consideration that door(s), (specifically bedroom doors) in an apartment or living unit will be closed at all times.

DIVISION 16 ELECTRICAL

16501 LIGHTING

1. Parking lot lighting will have test override switch on the contactor located on the site electrical room for lighting control.
2. Site lighting type shall be of twelve (**12**) feet poles conforming to (CPTED).
3. Residential and Common areas will have occupancy sensors and controls.
4. In Greek Village, all new exterior site lighting fixtures shall match the existing fixtures.

16701 FIRE ALARM AND SMOKE DETECTION SYSTEMS

1. Fire Alarms systems and components shall be of Notifier brand only.

16901 POWER

1. There should be electrical outlets installed on each stairwell floor interior in order to use cleaning equipment within the stairwell towers(s).
2. Rigid conduit and wire will be installed from the BTU equipment to the nearest communication room containing the equipment necessary to get the data on the USF network.
3. Electric meters shall be as per USF Physical Plant's specification along with the remote monitoring equipment.
4. Conduit for main entry/exit door future upgrades should be ran upon construction.
5. Residential breaker boxes should be oversized to allow for easier change out and additional switches to be installed.
6. Emergency generators should be securely placed away from main residential living areas due to noise during exercises. If possible generators should be located behind a wall structure to assist in noise reduction upon weekly exercising.

DIVISION 17 COMMUNICATIONS

17101 DATA

1. There will be one phone and two data ports for each bed in each bedroom.
2. In apartments there will be an additional phone and two data ports in the living room.
3. Community lounges, kitchens and lounge/kitchens will have one phone and two data ports.
4. Housekeeping offices and storage rooms will have one phone and two data ports; custodial closets will not.
5. Maintenance offices, shops, and storage rooms will have one phone and two data ports.
6. Maintenance and electrical rooms containing meters to be monitored by physical plant will have appropriate data lines and terminations to monitor water, electric and BTU meters.

7. Lobbies and **24** hour desk locations will have one phone and two data ports in an appropriate location for a possible night clerk monitoring station.
8. Offices and other such spaces will follow the USF IT specs for one phone and two data ports.
9. Conduit for data lines should be run during construction for all future entry/exit door upgrades and camera installation.

17201 TELEPHONES

1. There will be one phone and two data ports for each bed in each bedroom. Where design permits can use wireless connections instead of hardware.
2. In apartments there will be an additional phone and two data ports in the living room.
3. Community lounges, kitchens and lounge/kitchens will have one phone and two data ports.
4. Housekeeping offices and storage rooms (excluding janitorial closets) will have one phone and two data ports.
5. Maintenance offices, shops, and storage rooms will have one phone and two data ports.
6. Maintenance and electrical rooms containing meters to be monitored by physical plant will have appropriate data lines and terminations to monitor water, electric and BTU meters.
7. Lobbies will have one phone and two data ports in an appropriate location for any night clerk monitoring station.
8. Offices and other such spaces will follow the USF IT specs for one phone and two data ports.
9. Entry phones: each entry with card access shall have an entry phone. Entry phones to be used in accordance to USF IT specs.

17301 CABLE TELEVISION

Note: Housing and Residential Education contracts and operates its own in house CATV Service.

1. One CATV port per bed (residence hall, suite, and apartment), with wiring in conduit to corridor wire tray. Each port will be “homerun” no “daisy chaining”. Sharing of lines/ports is not acceptable.
2. In apartments, each living room will have one “homerun” CATV port.
3. Offices, office lobbies, residence lobbies, lounges, kitchen/lounges, community laundry rooms, Maintenance shop/offices and housekeeping offices will have CATV ports.
4. Both termination ends will be labeled with room numbers.
5. Design of system is to be reviewed and approved by the Housing & Residential Education contracted CATV provider.

17401 HOUSING ACCESS CONTROL SYSTEM

1. The Housing & Residential Education Department has an access control system (**Current-CCure 9000**).
2. Security cameras should be tied in to the access control system at every entry/exit location wherever possible.
3. Card access systems should have backup power supply or connectivity upon power drops on campus.

Additional Comments:

USF Housing and Residential Education is committed to a positive partnership with all parties during the development, planning and construction in order to allow for the he best quality living complex/environment to be constructed on the campus. We continue to commit **100%** towards the “experience” our students undertake upon living on campus. In order to service and maintain any facility in the future we request that:

1. The University should consider hiring a company to photograph daily all plumbing, mechanical and electrical installation as a historical documentation and archive for future maintenance repairs/replacement.
2. Consideration for our department to come on site during construction to walk through and document systems, materials and structural components that are enclosed behind walls after construction.
3. Allow our hardware manufacture (Sargent) to come onsite to review and oversee all hardware installation for our department.

EXHIBIT 1- DOOR & HARDWARE FACILITY SPECIFICATION GUIDELINE

DOOR AND HARDWARE FACILITY SPECIFICATION GUIDELINE

- SECTION 08411
- SECTION 08110
- SECTION 08210
- SECTION 08710

The purpose of this document is to support the equivalence of door hardware specifications for University of South Florida. Products detailed herein are the standard of quality to be used on new projects and renovations. Exceptions would include owners request for continuations of existing systems: i.e. - Existing key system.

It is the intent of this document to provide guidelines for the architect's specification section 08710, for product groups and the hardware schedule. These items are to be coordinated to meet the requirements of life safety codes, ADA requirements and applicable building codes.

All aluminum door hardware shall be provided in compliance with this specification guideline, and such shall be noted in sections 08710 and 08410.

The door hardware section 08710 preamble is to include the following:

"Prior to installation of hardware, the project architect shall contact the manufacturers' representatives to arrange and hold a jobsite meeting to instruct the installing contractors' personnel on the proper installation of their respective products. Seminar shall be attended by installers of hardware (including electrical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedule, templates and physical product samples." "The manufacturer's representative(s) for the life safety and security products shall inspect and approve the installation of the products they represent. Any identified installation or product issues shall be directed to the attention of the Architect for the purpose of generating the final punch list."

SECTION 08411 – Storefront Doors and Frames

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
ALUM DOORS	YKK AP	35H	None

Product Notes and Applications:

Florida Product Approval:	All products to have valid product approval tested with hardware specified in 08710
Interior Frames:	YHS50 at immediate doors jambs adapt down to YES45 in non impact applications for sidelites
Door Profile:	• 5" door stile, 1-3/4" thick • 5" top rail ~ 10" bottom rail
Welding:	Corner Construction: Fabricate door corners joined by concealed reinforcement secured with screws and sigma deep penetration welding.
Exterior Frames:	YHS50 at immediate doors frames, adapt down to YES45 in non impact applications for sidelites
Door Profile:	• 5" door stile, 1-3/4" thick • 5" top rail ~ 10" bottom rail
Welding:	Corner Construction: Fabricate door corners joined by concealed reinforcement secured with screws and sigma deep penetration welding
Extrusions:	ASTM B 221 (ASTM B 221M), 6063-T5 aluminum alloy
Anodized Finishing:	Prepare aluminum surfaces for specified finish; apply shop finish in accordance with the following:

Anodic Coating:	Electrolytic color coating followed by an organic seal applied in accordance with the requirements of AAMA 612-02. Aluminum extrusions shall be produced from quality controlled billets meeting AA-6063-T5. **a.** Exposed Surfaces shall be free of scratches and other serious blemishes. **b.** Extrusions shall be given a caustic etch followed by an anodic oxide treatment and then sealed with an organic coating applied with an electrodeposition process. **c.** The anodized coating shall comply with all of the requirements of AAMA 612-02: Voluntary Specifications, Performance Requirements and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum. Testing shall demonstrate the ability of the finish to resist damage from mortar, salt spray, and chemicals commonly found on construction sites, and to resist the loss of color and gloss. **d.** Overall coating thickness for finishes shall be a minimum of 0.7 mils. High Performance Organic Coating Finish: Fluoropolymer Type: Factory applied two-coat 70% Kynar resin by Arkema or 70% Hylar resin by Solvay Solexis, fluoropolymer based coating system, Polyvinylidene Fluoride (PVF-2), applied in accordance with YKK AP procedures and meeting AAMA 2605 specifications.
Colors:	Selected by Architect from the following: **a.** Standard coating color charts. **b.** Custom coating color charts. **c.** Color Name and Number:
Finishes Testing:	Apply 0.5% solution NaOh, sodium hydroxide, to small area of finished sample area; leave in place for sixty minutes; lightly wipe off NaOh. Do not clean area further.
Samples:	Submit samples with test area noted on each sample.

SECTION 08110 – Hollow Metal

Substitutions or Alternates are permitted as a substituted equal.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Hollow Metal Frames	Curries	M Series	CECO SU Series

Product Notes and Applications:

Interior Frames:	
Profile:	Varies
Gauge:	• 16 @ openings up to and including 4'-0" wide • 14 @ openings over 4'-0" wide
Steel:	A60 galvanized
Welding:	Continuous face welded, dressed and ground smooth, full width hinge reinforcement on all top butt hinge preps, prime paint
Exterior Frames:	
Profile:	Varies
Gauge:	14
Steel:	A60 galvanized
Welding:	Continuous face welded, dressed and ground smooth, full width hinge reinforcement on all top butt hinge preps, prime paint.
Notes:	• Frames shall include shipping bar at bottom to insure frame integrity during shipping. All shipping bars shall be removed prior to frame installation. Install frames per manufacturers and SDI (Steel Door Institute) standards and instructions. • Fire rated frames require metal applied label indicating rating designation. • Reinforce frames for surface mounted hardware and cut-out, drilled and tapped to receive mortised hardware. • Electrified Openings: Doors shall be pre-wired with sufficient number of concealed wires to accommodate electric function of specified hardware. Provide Molex type standardized plug in connectors to accommodate up to twelve wires. • Hardware locations are to be Curries standard. No other hardware locations are acceptable from any manufacturer's supplied frames.

SECTION 08110 – Hollow Metal

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Hollow Metal Doors	Curries	707 Series 747 Series Trio-E	CECO Legion Medallion Trio-E

Product Notes and Applications:

Interior Doors:	
Series:	707N Gauge: 18
Steel:	Cold-rolled
Edges:	Seamless - tack weld, grind smooth, fill and touch-up paint
Exterior Doors:	
Series:	Trio-E Gauge: 16 gauge
Steel:	A60 galvanized
Edges:	Seamless - tack weld, grind smooth, fill and touch-up paint
Notes:	• Fire rated doors require metal applied label indicating rating designation. • Doors shall be internally reinforced for surface mounted hardware and cut-out, drilled and tapped to receive mortised hardware. • Electrified Openings: Doors shall be pre-wired with sufficient number of concealed wires to accommodate electric function of specified hardware. Provide Molex type standardized plug in connectors to accommodate up to twelve wires. • Hardware locations are to be Curries standard. No other hardware locations are acceptable from any manufacturer's supplied doors.

SECTION 08210 – Wood Door

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Wood Doors	Graham	GPD PC Series GPD FD 45 GPD FD 60 GPD FD 90	Marshfield

Product Notes and Applications:

Construction:	Manufacturers Standard
Core:	engineered composite lumber core Mineral @ 45, 60 and 90-minute rated openings
Face veneer:	Wood veneer
Edges:	Wood veneer
Matching:	Pairs within the same opening
Warranty:	Lifetime of installation
Notes:	• Pre-fit for opening size and pre-machine for hardware as specified. • Fire rated doors require metal applied label indicating rating designation. • Doors shall be internally reinforced (Blocking) for attachment of hardware without the use of through bolts. • Electrified Openings: Doors shall be pre-wired with sufficient number of concealed wires to accommodate electric function of specified hardware. Provide Molex type standardized plug in connectors to accommodate up to twelve wires. • Hardware locations are to be Curries standard. No other hardware locations are acceptable from any manufacturer's supplied doors.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Butt Hinges	McKinney	TA2714 TA2314 T4A3786 T4A3386	No Substitution

Product Notes and Applications:

Notes:

- Interior wood doors.
- Interior and exterior hollow metal doors.
- Out swinging lockable doors shall have NRP hinges.
- Exterior lockable doors shall have NPR hinges.
- Width of hinges shall be sufficient to clear trim and wall conditions as shown on the drawings.
- Size: 4 ½" x 4" for doors up to 3'-0" in width, 5" x 4 ½" for doors over 3'-0" in width. Provide heavy weight hinges (.180) at high traffic doors.
- *Electric Hinges: Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Locate electric hinge at center location. Provide McKinney MG-16 mortar guard for each electric hinge specified. Provide Molex type standardized plug in connectors to accommodate up to twelve wires.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series	Acceptable Alternative Manufacturers
Pivots	None Accepted	None

Product notes and applications:

Notes:

- Permission to use door pivots must be submitted in writing by USF Housing in the event that they are required.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Continuous Hinges	McKinney	MCK 25HD	No Substitution

Product notes and applications:

Notes:

- Hinges shall be full door height less ½" for clearance.
- All hinges shall be Full Mortise "gear type".
- Aluminum is the base for material of hinges.
- *Electrified Hinge: Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide Molex type standardized plug in connectors to accommodate up to twelve wires.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series	Acceptable Alternative Manufacturers
Power Transfers	NONE	

Product notes and applications:

Notes:

- No power transfers are required. Hinges will transfer all power to electrified hardware items.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Flush Bolts	McKinney	FB M / FB W Series Manual DPS Series Dust Proof Strike	Rockwood 555 / 557 Series, Manual Flush Bolts 570 Series Dust, Proof Strike

Product notes and applications:

Notes:
- Manual or automatic flush bolts as necessary for code compliance. Install with dust proof strike.
- Provide extended top rod for oversized doors when using manual flush bolts.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Cylinders and Keying	Sargent 6300 LFIC 10-6300 LFIC	Standard Signature	NONE

Product notes and applications:

Notes:
- Cylinders shall be supplied as required Signature and Standard type as determined by USF.
- Key blanks shall be supplied as per the requirements of USF Housing.
- Key blanks and cut keys drop shipped directly to USF Housing from Sargent
- Manufacturing, New Haven, CT
- All cylinders and cut keys shall be furnished as per the requirements of USF Housing.
- Cylinders shall be an integral part of the locks as manufactured by specified lock supplier. Substitution of foreign made cylinders or components will not be allowed and also will be cause for rejection of supplier.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Locks and Latches	Mortise Locksets	Sargent 8200 Series x LJ-32D trim design	NONE

Product notes and applications:

Notes:
- Each building will need to be verified to the existing locksets that will need to matched.
- Install custom strikes to match existing frame preparations when new lock is scheduled to be installed in existing frame. Existing frames to be modified to accept new custom strikes.
- Locking Function Descriptions

  Mortise Type

  8215 LJ Passage Function
  8265 LJ Privacy Function
  8204 LJ Storeroom Function
  8237 LJ Classroom Function
  8255 LJ Entry Function

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Electric Strikes	HES	9500/9600 Series with Smart Pac III	None

Product notes and applications:

Notes:
- Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide Molex type standardized plug in connectors to accommodate up to six wires.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Exit Devices	Sargent	80 Series x ETJ Trim Design Stainless Steel Lever	NONE

Product notes and applications:

Notes:

- Use 8800 Wide Stile rim exit devices for all openings possible. Functions will be determined by USF Housing on a door by door basis.
- Single doors: Use rim exit device only.
- Pairs of doors: Use rim exit devices with keyed removable mullion except where egress is required then use vertical rods or electrified functions are specified.
- Cross corridor doors / Interior: Use vertical rod exit devices, less bottom rod as preferred securing device. Concealed rods on hollow metal doors, surface rods on wood doors.
- 16- cylinder dogging as per USF Housing requirements
- LD- (Less dogging) on all other Panic Rated Devices not requiring cylinder dogging.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Removable Mullions	Sargent	980 Series	

Product notes and applications:

Notes:

- Types: Lockable, steel, key removable. Key is not required to reinstall the mullion.
- Provide multi wire connectors when electric or monitor strikes are used. This allows mullion removal without damaging electrical connections.
- Preferred method of securing exterior pairs of doors when using rim exit devices.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Push/Pulls	McKinney	P053 Series Push Plates OP4514 Series Door Pulls PB812 Series Push/Pull Bars	Rockwood 70C Series Push Plates BF168 Series Door Pulls BF15847 Series Push/Pull Bars

Product notes and applications:

Notes:

- Mounting methods to be concealed type wherever possible.
- Provide decorative thru bolts at free ends of push / pull bars and pulls when used with exit devices.
- Push plate size: 4" x 16" minimum, except when limited by door stile.
- Acceptable materials: Stainless Steel

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Coordinators	McKinney	CSM Series Coordinator	Door Controls: International: 600 Series Rockwood: 1600 Series: Coordinator

Product notes and applications:

Notes:	• Provide filler bars for total opening width, closer mounting brackets, carry bars, and special preparation for top latches where applicable.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Door Closers	Sargent	351 Series 1431 Series	NONE

Product notes and applications:

Notes:	• Closers shall have non-ferrous covers, heavy duty forged steel arms, and separate valves for adjusting backcheck, delayed action, closing and latching cycles and adjustable spring to provide sizes 1 through 6. • Provide non-sized closers, adjustable to meet maximum opening force requirements of ADA. • Provide drop plates, brackets, or adapters for arms as required to suit details. • Mount closers on room side of corridor doors and inside of exterior doors. Where possible install closers on door for optimum aesthetics. • Provide forged heavy duty parallel arms (P-10) on high traffic doors. Non-hold open types. • All closers are to have pressure relief valves.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Low Energy Operators	Gyrotech	GT Series	None

Product notes and applications:

Notes:	• Provide wall-mounted actuator switches by the same manufacturer as the operator. Provide weather-resistant types at exterior applications. Locate in accordance with ANSI A117.1. • Conform to ANSI/BHMA standard A156.19 and meet UL requirements for fire rated openings.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Protection Plates	McKinney	KP50 Series Protection Plates EG01 Series Edge Guards	Rockwood K1050 Series Protection Plates 300 Series Edge Guards

Product notes and applications:

Notes:	• Size: Kick plates 10” high, Mop plates 6” high, Armor plates 36” high. • Width: 2” less door width (LDW) at single doors when mounted on push side. • 1” LDW at pairs and when mounted on pull side. • Material: Stainless steel 0.050” thick with countersunk holes, beveled four edges (B4E).

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Overhead Stops / Holders	Sargent	590 Series 690 Series	None

Product notes and applications:

• **Notes:**	• Install overhead stops where conditions limit the use of wall stops and floor stops would be a tripping hazard. • Use special template closers to allow offset arms for surface applied stops.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Wall and Floor	McKinney	WS03 Series Wall Stop FS01 Series Floor Stop ADH01 Series Door Stop/Holder	Rockwood 400 Series Wall Stop 441 Series Floor Stop 490 Series Door Stop/Holder

Product notes and applications:

• **Notes:**	• All stops shall be cast. Wrought stops are not acceptable

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Magnetic Holders	Rixson	FM-990 Series	None

Product notes and applications:

• **Notes:**	• Wired to release upon activation of fire alarm. Verify required voltage.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series		Acceptable Alternative Manufacturers
Thresholds and Gasketing	McKinney	MCK2005 Series Stop Threshold MCKS88 Series Smoke Gasket MCK18062 Series Door Sweep MCK346 Series Rain Drip	Pemko 2005_T Series Stop Threshold S88D Series Smoke Gasket 18062CNB Series Door Sweep 346C Series Rain Drip

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series	Acceptable Alternative Manufacturers
Key Cabinet	Lund D-1140	None

Product notes and applications:

Notes:	• Provide floor standing key cabinet with one hook for each lock or cylinder plus an additional 50 percent expansion. • Key cabinet shall be set up and indexed ready for owner's use.

SECTION 08710 – Door Hardware

Substitutions or Alternates not permitted unless noted below.

Item Description	Preferred Manufacturer and Catalog Series	Acceptable Alternative Manufacturers
Card Access	Software House C-Cure 9000	NONE

Product notes and applications:

Notes:	• Specifications for access control to be provided by USF Housing.

SECTION 08710 – Door Hardware
Substitutions or Alternates not permitted unless noted below.

FINISHES AND BASE MATERIALS:

A. BASE METALS: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes.

B. FINISHES: Verify requirements for individual projects

1. Standard: Comply with BHMA A156.18.

2. BHMA Designations: Comply with base material and finish requirements indicated by the following:

- **a.** BHMA 600 (USP): Primed for painting, over steel base metal.
- **b.** BHMA 626 (US26D): Satin chromium plated over nickel, over brass or bronze base metal.
- **c.** BHMA 628 (US28): Satin aluminum, clear anodized, over aluminum base metal.
- **d.** BHMA 630 (US32D): Satin stainless steel, over stainless-steel base metal.
- **e.** BHMA 652 (US26D): Satin chromium plated over nickel, over steel base metal.
- **f.** BHMA 689 (ALUM): Aluminum painted, over any base metal.

C. FINISH SCHEDULE:

HARDWARE ITEM	FINISH AND BASE MATERIAL
1. Exterior Butt Hinges:	BHMA 630 (US32D)
2. Interior Butt Hinges:	BHMA 652 (US26D)
3. Continuous Gear Hinges:	BHMA 628 (US28)
4. Pivot Sets:	BHMA 626 (US26D)
5. Flush Bolts:	BHMA 626 (US26D)
6. Locks and Latches:	BHMA 630 (US32D)
7. Cylinders:	BHMA 626 (US26D)
8. Exit Devices	BHMA 630 (US32D)
9. Removable Mullions	BHMA 600 (USP)
10. Push / Pulls:	BHMA 630 (US32D)
11. Coordinators:	BHMA 600 (USP)
12. Closers:	BHMA 689 (ALUM)
13. Automatic Operators:	BHMA 689 (ALUM)
14. Protection Plates:	BHMA 630 (US32D)
15. Overhead Stops / Holders:	BHMA 626 (US26D)
16. Wall and Floor Stops:	BHMA 626 (US26D)
17. Magnetic Holders:	BHMA 628 (US28)
18. Thresholds and Gasketing:	BHMA 628 (US28)
19. Key Cabinet:	BHMA 600 (USP)
20. Electric Strikes:	BHMA 630 (US32D)
21. Magnetic Locks:	BHMA 630 (US32D)

USF UNIVERSITY OF SOUTH FLORIDA

DESIGN & CONSTRUCTION GUIDELINES

APPENDIX D
INFORMATION TECHNOLOGIES DESIGN GUIDELINES
(TAMPA CAMPUS)

EDITION: **APRIL 9, 2007**
USF INFORMATION TECHNOLOGY

APPENDIX D – INFORMATION TECHNOLOGIES

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A COPY OF THESE SPECIFICATIONS IS REQUIRED TO BE ON EVERY JOB SITE

SECTION I GENERAL STANDARDS

A CONTRACTOR REQUIREMENTS (EIA/TIA 568-B.2-1 Standard for Category 6 and Specifications for Inside and Outside Plant Wiring Practices)

1. **Qualifications:** Final qualification to determine a successful contractor will be made by **USF Information Technologies** designated representative only. There will be a pre-qualifying procedure. This procedure will involve checking and verifying references. Contractor shall submit for approval, before work begins, three (**3**) references of work of a similar type and scale. References must contain names and telephone numbers of contact personnel.

Contractor shall also submit names of technicians that will perform work specified herein, with documentation of schools and coursework (with Dates) indicating proficiency with the installation of telephone/data cable and fiber optic cable. The **USF Information Technologies** designated representative; prior to the issuance of any purchase order or work authorization by Facilities Planning or general contractor shall approve this submittal. The contractor installing the telecommunications facilities and equipment herein specified shall be an experienced **TELECOMMUNICATIONS CONTRACTOR**. **Experienced "meaning that the contractor has been in this type of business for a minimum of two (2) years and have personnel that have been trained and certified in the installation of telecommunications specified above**.

Contractors must have a BICSI Registered/Certified Communications Distribution Designer (RCDD) on staff. Please furnish copy of current registration with submittal. Supervisor or Lead Tech on every project must have current Registered BICSI RCDD and/or Registered BICSI Technician Certification.

2. **License and Codes:** The successful Contractor must have applicable licenses (including but not necessarily limited to low voltage) and follow municipal codes for the areas in which projects are accomplished, to include NFPA, NEC, TIA/EIA/ANSI and BICSI.

3. **Safety Procedures:** HARD HATS and all other appropriate safety equipment shall be worn during all construction procedures. The vendor shall furnish appropriate safety equipment for their employees and construction site, to include safety zoning and the securing of all equipment and tools at all times. Must have first aid and safety training certificate provided to the University of South Florida Information Technologies' representative prior to every project.

4. **Damages:** Any and all damages to property done by a Contractor will be the responsibility and liability of the Contractor. The USF Information Technologies Representative will designate all Telecommunications repair and USF Information Technologies approved and qualified contractors "ONLY" are to be used.

5. **Work Rules:** Contractor's employees must keep in mind during all contacts with client personnel that client satisfaction is paramount. **Contractor's employees' speech, actions, dress and attitude must not detract from client satisfaction at any time. Contractor employees must keep in mind, however, that they are representing USF Information Technologies and such contacts and avoid actions or speech that would reflect unfavorably on the department**. During the execution of this contract, contractor personnel reflect upon the **USF Information Technologies**. **Contractor commits to maintaining high standards of professional conduct, neat and clean appearance of vehicles, equipment and personnel, and honest business practices are required**. Parties agree that lackadaisical attitude of personnel, unwashed or battered vehicles, and misstatements on reports or invoices, and delayed payment of bills relating to such contracts are examples of unacceptable behavior. **USF Information Technologies requires all contractor personnel to dress appropriately for the task at hand**. **USF Information Technologies** requires all technicians who perform fieldwork to drive a contractor-provided vehicle, which is clearly marked as belonging to the contractor. The vehicles can be any type preferred by the contractor as long as the vehicles are clearly marked, in good operating order, and have a good appearance. **USF Information Technologies shall retain the right to request the removal of any of the contractor's personnel at any time**.

B QUALITY, CRAFTSMANSHIP, AND COMPLETENESS

It is expected that the work completed under these specifications will be on the **highest professional quality and craftsmanship**. All systems furnished herein shall be complete and in compliance with manufacturer's recommendations and designs. Contractor shall supply all components of the specified system as recommended by the manufacturer, whether specifically designated in these specifications or not.

C CODE COMPLIANCE

The Contractor is responsible for compliance with all Federal State and Local codes that are applicable to electrical and telecommunications wiring and fire codes. If there is any conflict between these specifications and codes, the most stringent requirement shall apply.

SECTION II SPECIFICATIONS

A OUTSIDE PLANT

1. All copper and fiber cables, to all buildings will only be installed by USF Information Technologies Dept.
2. A USF Design Representative shall be utilized in order to meet all needs for present and future technologies.
3. Install copper cable and fiber optic cable from new facility or building to the closet serving wire center. The University has six (6) wire centers located on the Tampa Campus. These locations are:

   - ANDROS OFFICE CLASSROOM (AOC),
   - EDUCATION BUILDING (EDU),
   - ENGINEERING BUILDING II (ENB),
   - PSYCOLOGY BUILDING (PCD),
   - MAPLE DORM (MAP) and
   - FLORIDA MENTAL HEALTH BUILDING B (MHB).

   The St. Petersburg Campus Wire Center is located at DAVIS HALL (DAV).

   The Sarasota-Manatee Campus Wire Center is located at the USF Sarasota-Manatee Campus (SMC).

   The project must include necessary conduits, manholes, pull boxes, copper cable, and fiber to serve the building or facility.
4. Any personnel shall not enter any USF Telecommunication's Maintenance Holes without prior authorization and presence of USF IT Designated Representative.
5. **Approved Manhole specifications are as follows:**
   Type "A" Manhole, five-feet width by ten-feet six inches length by six-feet six-inches height (**5'-0" W x 10'-6" L x 6'-6" H**). These are the same specifications as the GTE Model #GTS-8395, a pre-cast 2-piece (see **Exhibit A**). Manholes must include racks for cable, grounding buss bar, sump drain, and expansion plugs installed in non-used conduits.
6. **Approved Hand hole specifications are as follows:**
   Brooks Products-Orlando hand holes or approved equivalent shall be used where applicable. USF Information Technologies will determine the use of hand holes in conjunction with Facilities Planning and Construction. Hand holes vary in size from four-feet by four-feet by four-feet (**4' x 4' x 4'**) to eight-feet by thirteen-feet by four-feet (**8' x 13' x 13'**), all will include H.20 standards as to **drive over** characteristics.
7. **Approved Conduit specifications are as follows:**
   Schedule 40 PVC twenty (**20**) feet sections for straight runs and 90 degree thirty-six to forty-eight (**36 – 48**) inches radius: **Factory made sweeps for turns**.
8. **Approved Inner duct specifications are as follows:**
   Smooth wall or longitudinal **ribbed** inner duct, preferably **tricolor** (three (**3**) inner ducts in four (**4**) inch conduit w/color scheme of **1-orange**, **1-blue**, **1-white**), two (**2**) one-half (**1/2**) inches and one (**1**) one (**1**) inch, inside diameter with "**mule tape**" or polyethylene pull rope installed.

B ENTRANCE FACILITIES

1. Install four (**4**) each, four (**4**) inch Schedule 40 PVC conduits from the serving manhole (designated by USF Information Technologies Representative) to the telephone entrance (**EF-Entrance Facility**) room. The conduit will be stacked two (**2**) on two (**2**) and held in position by conduit positioning members designed for such purpose.
2. The conduits shall be **concretely incased from the serving manhole line to the building entrance**. The **Minimum concrete coverage** around the conduit shall be two (**2**) inches. The conduit and concrete encasement shall be placed no less than twenty-four (**24**) inches below finished grade.
3. The conduits shall transition from Schedule 40 PVC to rigid metallic, **four (4) inch inside diameter** for building entry. The metallic conduit shall extend out a **MINIMUM of six (6) inches from the point of building penetration**. The **MINIMUM bend radius** of the **four (4) inch metallic conduit** shall be **forty-eight (48) inches**.
4. The conduits shall enter the Main Cross-Connect Frame/Entrance Facility and form a single line under the entrance backboard, **no more than four (4) inches** from the wall. The conduits shall be stubbed up above the finished floor **no less than six (6) inches**. The **conduits shall be fitted with bushings** to prevent cable damage when pulled during installation. The conduits shall be capped and sealed to prevent water and debris from entering.
5. Each conduit shall be left clean and dry and also left with a minimum of two-hundred-fifty (**250**) pound test x one-quarter (**1/4**) inch polyethylene Pull line. The other two conduits shall be clean and dry and one conduit will have three (**3**) Plastic Inner-ducts installed for the purpose of pulling fiber optic cable; Innerducts shall be two (**2**) one-and-one-half (**1 1/2**) inches and one (**1**) one (**1**) inch. **Each Inner-duct shall have** its own two-hundred-fifty (**250**) pound test x one-quarter (**1/4**) inch polyethylene pull line installed. Conduits shall be **indelibly labeled** as to their purpose.
6. The Contractor or Sub-Contractors are responsible for establishing with USF Information Technologies representative, the location to which the conduit will be placed for connection to USF Information Technologies Manhole System.

C ENTRANCE CABLE PROTECTION

1. Twisted pair cable shall be equipped with transient voltage and sneak current protection for any inter-building cable. These protectors shall be specified: CIRCA 1880B1-100-75 or CIRCA 1880ENAI/NSC100G. An approved equivalent with in-built 110-tupe cross connect can be accepted with USF IT Representative written approval. **Protector Mounts shall be used.** Each pair of cable protected shall be equipped with solid-state protector units with sneak current, solid state MOV protection.
2. Protection Modules shall be equipped at a 50% analog (1st 50 pairs) and 50% digital (2nd 50 pairs) ratio. The analog module required by the University of South Florida is AT&T model 4C1S-230 (Com Code 104-386-545) or approved equivalent. The digital module required is AT&T 4C3S-75 (Com Code 105-581-086) or approved equivalent. The C3S-75 protectors shall be installed on the high end of the cable count at each cable end (2nd 50 pair).

D ENTRANCE CABLE SPECIFICATIONS

1. **Twisted Pair**

   Twisted pair cable shall be twenty-four (**24**) AWG solid conductors and manufactured expressly for telephone use. The individual pairs must be color coded to the BELL SYSTEM/Telephone Industry Standards. Inner-building cable shall be filled, for the purpose of water intrusion prevention, and composed of aluminum/steel sheath. Use AT&T Type ASP or approved equivalent.

   Cable shall be sized and installed according to the schematic diagram for twisted pair. Twenty-Four (**24**) core single mode fiber switch facility to building distribution facility. **Only**

from Telecommunication Room to Telecommunication Room be Multi-Mode fiber and that will be twelve (12) Core only.

Cables shall transition from outside (filled) cable to the protection units with properly equipped and installed splice enclosure units. Use AT&T Type 2000FR, 3M Better Buried, or approved equivalent. Use appropriate connectors for splices: AT&T 710 Bridge Connector or approved equivalent.

2. Fiber Optics

Fiber Optic cable shall be **62.5/125 um** or **50/125 um** Multi-mode or **8.3/125 um** Single Mode (See USF Representative), multi-fiber filled (for water intrusion prevention) cable with non-metallic components. It shall consist of 62.5 um core, 125 um cladding 250 um coating, and 900 um buffering. **Maximum loss:** 3.75 dB/km at 850 nm and 1 dB/km at 1300 nm. **Minimum Bandwidth:** 160 MHz-km at 850 nm and 500 MHz-km at 1300 nm. **Numeric Aperture:** .275. Cable must meet FDDI standards. Minimum cable pulling tension is two-hundred-fifty (**250**) pounds. Minimum bend radius is twenty (**20**) times the cable diameter.

Cable shall be sized and installed according to the schematic diagram for fiber optic cable. Twenty-Four core single mode fiber switch facility to building Entrance facility.

Cable shall transition from outside, filled cable termination units through approved splice case or appropriate fiber breakout methodology that permanently prevents cable fill material from leaking. Fiber Optic Cable shall be terminated with ST ceramic connectors (AT&T C2000A series or approved equivalent) or SC connectors. All fibers will be terminated in AT&T 100A2, 200A, 400A1 (sized according to cable) or approved equivalent termination Housings.

E ENTRANCE FACILITY (EF) AND TELECOMMUNICATION ROOM (TR) ARCHITECTURAL FINISHES

1. Every building will have a main "**Entrance Facility**" and every floor per building will have its own individual (single/group) "**Telecommunication Room**". Each EF (Entrance Facility) and TR (Telecommunication Room) telephone room shall be finished in the following manner:
2. There shall be no drop ceiling in telecommunications room or Entrance Facility.
3. Flooring shall be tile or vinyl with a distributed load requirement of two-hundred-fifty (**250**) pounds per square foot.
4. Lighting shall be a minimum fifty (**50**) foot-candles measured three (**3**) feet off of the floor with non-EMI generating lights on a separate switch inside room and sheet rock finished walls painted with a white or off white color.
5. Room sizes for the EF's are a minimum of one-hundred-ten to one-hundred-twenty (**110-120**) square feet.
6. TR's will be a "minimum" depth of five (**5**) feet and a "minimum" width of eight (**8**) feet with double doors to allow placement into hallways.
7. **A fire extinguisher** (CO_2 or type dependent on local fire codes) hung **INSIDE** each **EF** and each **TR**.
8. **All EF/TR and all their contents will be BONDED AND GROUNDED IN COMPLIANCE WITH THE ANSI-J-607A Industry Standard, as well as local, State and National codes**.

F ENTRANCE FACILITY and TELECOMMUNICATION ROOM ENVIRONMENTAL REQUIREMENT

Each of the Entrance Facility (EF) and Telecommunication Room **shall maintain** for 7 day / 24 hours of an ambient temperature of sixty-four to seventy-five (**64 - 75**) degrees Fahrenheit for the purposes of data distribution equipment (Ethernet Hubs and Routers, Switches, etc.).

G ENTRANCE FACILITY BACKBOARD

1. The entrance facility backboard will consist of two (**2**) four-feet by eight-feet by three-quarter-inch (**4' x 8' x 3/4"**) AC Grade plywood boards, securely fastened in a horizontal position to the designated wall. They shall be painted with **gray, fire-retardant paint, designated for such purposes**.

2. There shall be two (Emergency Power if available) surface mounted, grounded, Quad-plex outlets, one for each sheet of plywood supplied. Each electrical quad outlet shall be an isolated circuit non-switched, two (**2**) of **120V/20A.** The electrical outlets shall be at the center, bottom of each sheet of plywood, no more than two (**2**) inches from the bottom. A rack mount power strip will be installed at the bottom of every rack.

H CONDUIT FOR ENTRANCE FACILITY (EF) AND TELECOMMUNICATIONS ROOM (TR)

Provide two (**2**) four (**4**) inch EMT conduits between each EF and each connecting TR. Each conduit shall be left clean and dry and left with a minimum two-hundred-fifty (**250**) pound test pull line. Conduits shall be indelibly labeled as to their purpose (Example: Telecom IDF Room xxxx). Plastic bushings shall be placed on the ends of the conduit to protect the wires.

I TELECOMMUNICATIONS ROOM (TR) BACKBOARD

1. The telecommunication room backboard will consist of two (**2**) four-feet by eight-feet by three-quarter-inch (**4' x 8' x 3/4"**) plywood board AC Grade, securely fastened in a horizontal position to the designated wall. They shall be painted with gray, fire-retardant paint minimum of two (**2**) coats, designed for such purpose.

2. There shall be two (emergency power if available) surface-mounted, grounded, quad-plex electrical outlets. Each quad shall be an isolated non-switched circuit, two (**2**) of **120V, 20A**. The outlets shall be located at the center, bottom of each sheet of plywood, no more than two (**2**) inches from the bottom. If emergency power is available please include BDF and IDF electrical outlets on Emergency Generator panel.

J CABLE TERMINATION BLOCKS/PROPER TOOLS

1. All telephone cable shall be terminated on connecting blocks, at the EF, and TR's. This shall include wiring blocks, connecting blocks, and all label inserts. The general layout shall be as described in the diagrams provided (see **Exhibit B & C**). All termination of said cable will be ordered by room number e.g., Room 1 upper left of data patch panel and voice frame and Room 100 lower right of data patch panel and voice frame. Room numbers shall increment from left to right.

2. Voice cables shall be terminated on **110A** type blocks, which require jumper cables to be punched down on the blocks. **All 110C connecting blocks, c3, c4, and c5 will be terminated on the 110 block, with a 110 IMPACT TOOL, Model 788J1 or equivalent "ONLY." And Category 6 with proper tool.**

K INFORMATION OUTLETS (VOICE-DATA JACKS)

1. For each information outlet location designated, provide a Standard 3 Port Category 6 three (**3**) data jack colored YELLOW mounted in an ivory triplex outlet cover. Wireless Access Locations shall be designated with yellow icons. Terminations shall be in conformance with EIA/TIA 568B.2. Faceplates shall be matching ivory to the electrical outlet and at the same height as electrical outlets located in the vicinity.

2. All information outlets shall be marked at the point of manufacture with engraved letters indicating that the top jack is voice and the bottom jacks are data. For horizontally mounted information outlets, the left jack shall be voice and the right jacks are data. Conduits provided for outlets must have protective caps on end of conduit. The minimum requirement for all outlets is one (**1**) inch EMT conduit, for all outlets.

L INFORMATION OUTLET FOR WALL MOUNTED HEIGHT

All locations designated for hanging wall jacks shall be fitted with the information outlet as described in "INFORMATION OUTLET." The outlet boxes shall be mounted forty-two (**42**) inches above the finished floor.

M LABELING

1. All labeling shall conform to ANSI/TIA/EIA-606-A
2. Faceplates shall be labeled in the upper right corner so as it may be visible from the top.
3. Data cables on the backside of a standard outlet configuration shall be designated as data 1, data 2, etc.
4. All voice termination fields shall be designated blue, printed labeling.
5. All data patch panels modified or installed new shall be installed with printed labeling.
6. Backbone cabling shall be designated in accordance with ANSI/TIA/EIA-606-A with printed labeling.
7. All fire penetrations installed new or modified shall be labeled with date/contractor name.
8. All twisted pair terminations on **110** termination strips shall be marked with the jack number.
   - For example: 103-A. Placed on the top left incrementing to the right, then down to next row.
9. Each information outlet and its associated termination at the EF, or TR shall be labeled according to the following scheme:
10. ROOM NUMBER-POSITION IN ROOM CLOCKWISE FROM MAIN DOOR.
    - For example, the first jack to the left from the door in room J101 would be labeled: J101-A.
    - For example, the second jack to the left from the door in room J101 would be labeled: J101-B.
    - For example, the third jack to the left from the door in room J101 would be labeled: J101-C, etc.
11. **Riser Cable:** All riser cable will be labeled at both terminating ends of the cable. The information will consist of the following format: EF Room #XXXX-TR Room #XXXX or in reverse order at the TR location or anywhere else it may terminate. The numbering scheme will start will the number "one" and be labeled as follows:
    - 4th floor IDF riser pairs will be 401 through 600
    - 3rd floor IDF riser pairs will be 201 through 400
    - 2nd floor IDF riser pairs will be 1 through 200
12. **Fiber Cable:** All fiber cable will be labeled with the same format as riser cable. Additional Outside plant labeling will contain Node locations and numbers. EF Room #XXXX/ TR Room #XXXX or in reverse order at the TR location. Building Node pairs XXXX/Building EF pairs XXXX or in reverse order at the Building EF.

N SECURITY, FIRE ALARM, ELEVATORS AND PAY PHONES

1. Security, fire alarm, elevators and pay phone lines and station cable terminate at the bottom right of all 110-station blocks and marked S, F, E or P/T. With multiples, use the following example:
   - S1, S2, etc., F1, F2, etc., E1, E2, etc.
2. A minimum diameter of one (**1**) inch EMT conduit is to be used for all outlets. All conduits provided for outlets must have protective caps on end of conduit and be grounded and bonded according to all Federal, State and local codes to include the NFPA, NEC, EIA/TIA/ANSI as well as BICSI codes.

O COMMUNICATIONS LEGEND

The Architect or Engineer of Record shall utilize the following symbols in the Communication's Legend to designate low voltage locations.

ITEM	SYMBOL	DESCRIPTION	TYPICAL INSTALLED LOCATIONS
1	a	1 Voice, 3 Port Faceplate	Break Room or Courtesy Phone Location.
2	b	1 Voice/ 2 Data, 3 Port Faceplate	Normal Work Area of 100 sqft or less. Also at head end of Laboratory or Classroom.
3	c	2 data, 3 Port Faceplate	Laboratory with locations at every 8 ft around the perimeter.
4	d	4 data, 4 Port or 6 Port Faceplate	Computer Laboratory.
5	e	6 data, 6 Port Faceplate	Computer Laboratory.
6	f	1 Voice/ 4 Data, 6 Port Faceplate	Podium location for classrooms and meeting rooms.
7	g	2 Voice/ 4 Data, 6 Port Faceplate	As needed by customer.
8	h	1 Voice/ 12 Data, Multimedia Outlet Box	As needed by customer.
9	i	12 Data, Multimedia Outlet Box	As needed by customer.
10	j	16 Data, Multimedia Outlet Box	As needed by customer.
11	k	18 Data, Multimedia Outlet Box	As needed by customer.
12	L	Miscellaneous, indicate in notes	As needed by customer.
13	WL	1 Data, Above Ceiling	For Wireless Access Points.
14		Floor Mount Outlet, Add above indication for number of voice and data locations	
15		Wall Mount, Indicate height AFF (Above Finished Floor)	

P GENERATOR BACKUP

When Generator Back-up for the building is available, all telecommunication rooms (MDF, IDF and BDF) and equipment rooms shall have a minimum of one (**1**) dedicated circuit that is connected to the generator for an Uninterruptible Power Supply (UPS). The circuit shall be sized to support the Voice Over Internet Protocol (VoIP) equipment and Data Networking Equipment for continues services during electrical outage for Enhanced 911, Card Access, and Elevator Lines. In addition, the receptacle type and amperage rating shall be specified in accordance with the UPS requirements submitted by Information Technologies Representative.

SECTION III TESTING

A OUTSIDE PLANT AND RISER CABLES

1. All twisted pair riser cables and protection units shall be continuity and resistance tested and certified by the Contractor. Test Results will be provided indicating each pair and its condition (good, short, ground, etc.). Installed cable must meet DC resistance; capacitance, impedance and attenuation parameters set by approved cable manufacturer.

2. Twisted pair shall have no more than two (**2**) pair per one-hundred (**100**) that fail, and no more than one (**1**) pair per twenty-five (**25**) pair binder group that fail. Results of said test will be submitted to USF Information Technologies for building records, electronically or on a Compact Disk (CD).

B INFORMATION OUTLET CABLING & RISER CABLES

Contractor shall certify all station wire as appropriate to comply with ANSI 568B.2 Category 6 requirements. Results of said test will be submitted to USF Information Technologies for building records, electronically or on a Compact Disk (CD).

C FIBER OPTIC CABLE

1. All fiber optic cable shall be tested with a light source and meter at both 850 nm and 1300 nm. All fibers must test within the combined loss budget attributable to the cable length (3.75 dB/km at 850 nm and 1 dB/km at 1300 nm) plus the connectors (.25 dB per connector) and any splices (.25 dB per splice). In no case shall the loss budget for any single fiber optic run (connector to connector) be greater than 5 dB at 850 nm.
2. Contractor shall submit a record of all tests made indicating the fiber number and the loss at both wavelengths. Results of said test will be submitted to USF Information Technologies for building records, electronically or on a Compact Disk (CD).

SECTION IV CERTIFICATION/ACCEPTANCE

All facilities will be inspected and tested by Owner or Owner's agent. A list of facilities failing to meet specification will be provided to Contractor for correction. Only after all failures have been corrected and re-inspected by Owner or Owner's agent and certified within specification will all facilities be accepted.

SECTION V WARRANTY

All cable, terminations, and components of this cabling specification shall be warranted by the Contractor to perform as new for a period of three (**3**) years from date of system acceptance.

SECTION V NOTES

1 All cabling will be done according to TIA/EIA 568-B.2-1 Standards and wiring to be terminated to 568B Standard.

2 SC connectors will be used for all Single Mode Fiber (Secor Cam Locks) or (3M hot melt connectors.)

3 ST connectors will be used for all Multi Mode Fiber (Secor Cam Locks) or (3M hot melt connectors.)

4 Hitachi Brand Cable is to be for all inside/outside Fiber & CCTV cabling and will terminate onto a rack-mounted patch panel or cabinet.

5 Data cables in telephone closet will be terminated onto a rack mounted cat 6, flexible snap in style patch panel not a 110 block with specified cable management.

6 A Rack Mounted power strip is to be installed on the bottom of every installed rack.

7 A Ladder rack will be installed horizontally across every MC (Main Cross-Connect located in the main equipment room) / TR (Telecommunication Room housing the cross-connect between the backbone and horizontal cable) Back Board and out to the 19-inch rack to about three to four (**3 - 4**) feet **(**See **Exhibit D**)

8 **"AS BUILTS" As Builts and test results are required to be turned into the University of South Florida Information Technologies Department for the purposes of Documentation updates.**

9 The color scheme shall comply with ANSI 606A, for all riser cable labeling designation strips is **"White"**, and the color scheme for voice station cable labeling designation strips is **"Blue"**.

10 **Approved Manufacturers:** Superior Modular Products; Hubbell; Wiremold; Middle Atlantic; Panduit; Geist; Ortronics.

ITEM	PART NUMBERS WITH DESCRIPTION
1. Cable	

	ITEM	PART NUMBERS WITH DESCRIPTION	
	Hitachi Cable	30025-8YE CAT 6 HI NET PLUS for Plenum Data; colors are yellow 30025-8GR CAT 6 HI NET PLUS for Plenum voice; colors are Green	
	Superior Essex Cable	66-240-6B CAT 6 DataGain for Plenum Data; colors are yellow 66-240-5B CAT 6 DataGain for Plenum voice; colors are Green	
2.	**Work Area Kits**		
	Superior	FPR-0301 USF-3	Superior Non-Kit Form Superior Kit Form
	Hubbell	IFP13EI USFP3J	Hubbell Non-Kit Form Hubbell Kit Form
3.	**Face Plates**		
	Superior	A106K4 style face plate	Used with standard 106 style face plate
	Hubbell	IFP13XX style face plate	IFP13XX style face plate
4.	**Modules w/Icons 106 Style**		
	Superior	Superior CAT 6; 568B Access Jack KMJA6XX (00 or 01) Access jack T568B wiring UMJA606 UMJA608	
	Hubbell	Hubbell Gray Cat 6 Jack HXJ6GY Hubbell Orange Cat 6 Jack HXJ6OR Hubbell Orange Icon with Computer Symbol - IOR100C Hubbell Gray Icon with Telephone Symbol – IGY100T	
5.	**Modules**		
	Superior	Superior CAT 6; 568B Access Jack Voice Gray - UMJA606V Superior CAT 6; 568B Access Jack Data Orange - UMJA6-08D Superior CAT 6; 568B Access Jack CCTV Violet – UMJA6-10	
	Hubbell	Hubbell Gray Cat 6 Jack HXJ6GY Hubbell Orange Cat 6 Jack HXJ6OR Hubbell Orange Icon with Computer Symbol - IOR100C Hubbell Gray Icon with Telephone Symbol – IGY100T	
6.	**Multi Outlet Box**		
	Superior	Superior SME 10-01	
	Hubbell	Hubbell ISM12EI (12-Port)	
7.	**110 Blocks**		
	Superior 100 Pair Style Wiring Blocks	DCC96/11051XL	
	Superior 300 Pair Style Wiring Blocks	DCC288S1XL	
	Superior Category 6 100 pair Style Blocks	C64-10	
	Hubbell Cat.6 64 Pair 110 Wiring Blocks	6110FTK64WL	
	Hubbell Cat.6 192 Pair 110 Wiring Blocks	6110FTK192WL	
	Hubbell Cat. 6 Connector Blocks	6110CB4PR10	
8.	**Avaya Cable Management**		
		188B2 Back Board	
9.	**Relay Rack Cable Management Panels**		
	Superior	Superior CO3519 Cable Management for front of rack Superior CMB19 Cable Management bar for back of rack	
	Hubbell	Hubbell HC219ME3S Cable Management for front of rack Hubbell MCCSWB19 Cable Management for back of rack	
10.	**Racks**		
	Superior	CMR45 Rack Max 7' x 19" x 6"	
	Middle Atlantic	MK-19-45 MK-LA - Rack Ladder adapter kit	
	Ortronics	EP-06-027-01	
11.	**Multi Port Rack Mount Cabinets**		
	Superior	Superior RTC rack mount/WTC wall mount	
	Hubbell	Hubbell OPTIchannel FCR rack mount/ FTU Wall Mount Cabinets	

	ITEM	PART NUMBERS WITH DESCRIPTION
12.	**Rack Mount Patch Panel**	
	Superior	Superior A48H
	Hubbell	Hubbell UDX48E1U
13.	**Patch Cords**	
	Superior	Superior – Cat 6– Patch Cords
	Hubbell	Hubbell – Cat 6 – Patch Cords
14.	**Cable Runways**	
	Flextray Black	12” Ladder Rack that meet ANSI 569
15.	**110 tools**	
		Category 5 and Category 6 appropriately
16.	**J-Hooks**	
		ERICO – Cat32, Cat64 Panduit – JP2WP-L20, and JP4WP-X20
17.	**Rack Mount power supply**	
		Geist - SP124-10 (12 Outlets) or SP124-20
18.	**Vertical Cable Management**	
		Panduit - WMPVFMHC45
19.	**Communications Poke-Thrus Devices**	
		Wiremold – 4FFATC Dual Service Furniture Feed Wiremold – RC9AM2TC

 CATALOGUE SHEET NO. 5105GTE 1/30/92

THE QUIKSET ORGANIZATION

Attachment 'A'

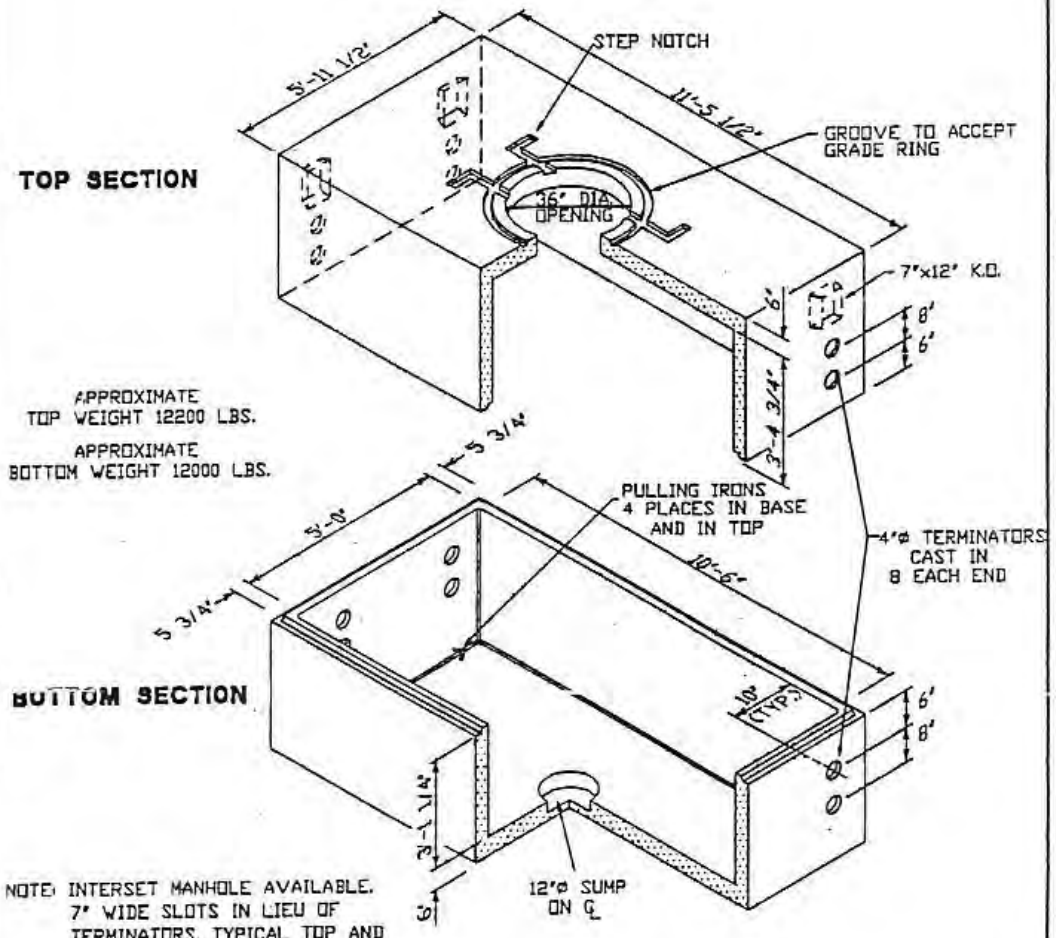
ALL CONCRETE SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF 5500 psi. SEVEN DAY CURE PRIOR TO SHIPPING

STANDARD STRUCTURAL DESIGN IS BASED ON AASHTO HS 20 WHEEL LOADING

THE STANDARD DESIGN IS BASED ON THE TOP AT ANY ELEVATION BETWEEN FINISHED GRADE AND 5'-0" BELOW GRADE.

THE STRUCTURE SHALL BE PLACED ON A COMPACTED GRANULAR BASE TO INSURE UNIFORM DISTRIBUTION OF SOIL PRESSURES.

MINIMUM EXCAVATION SIZE
7'-0" MIN. x 12'-6" MIN. x DEPTH TO SUIT JOB.

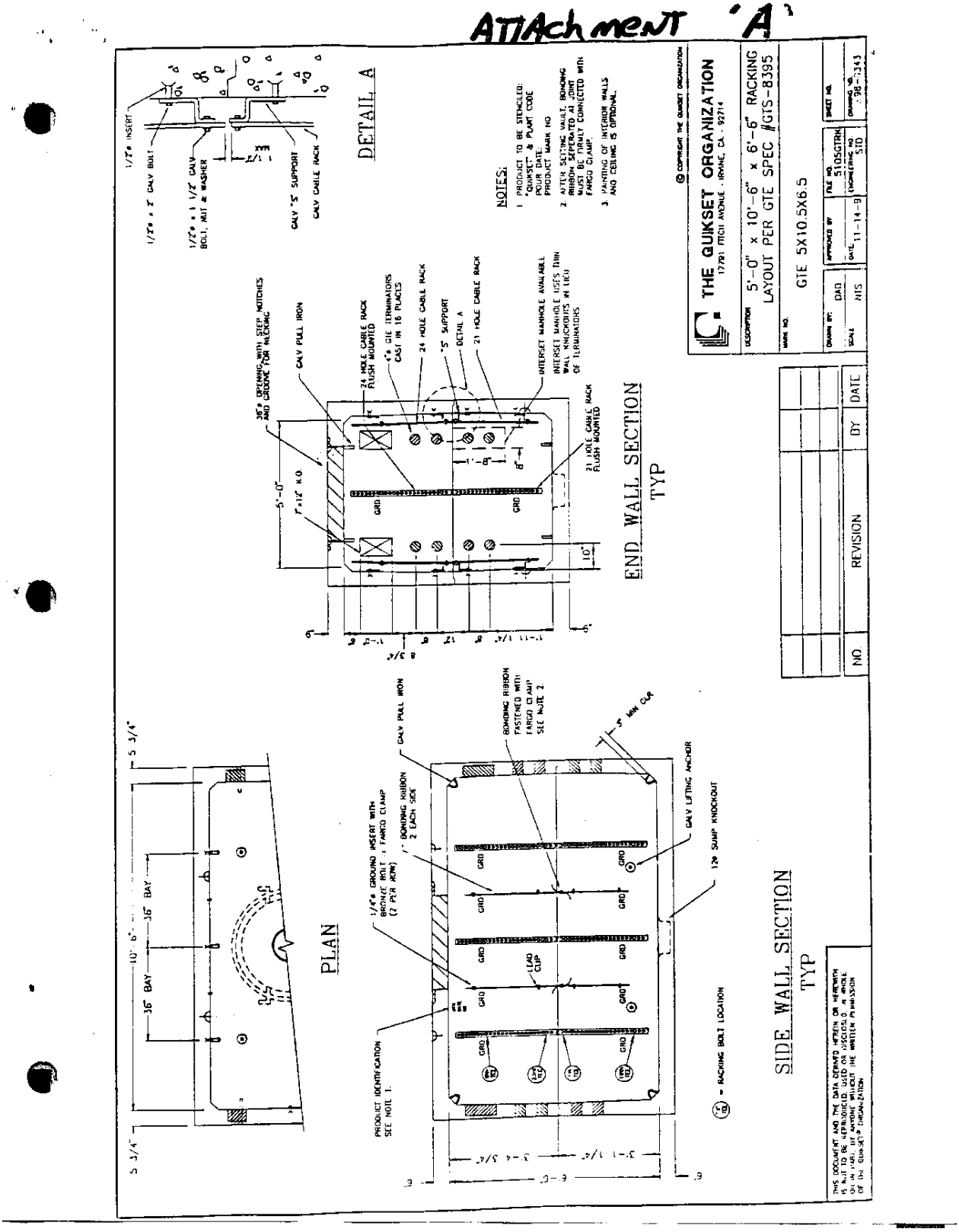


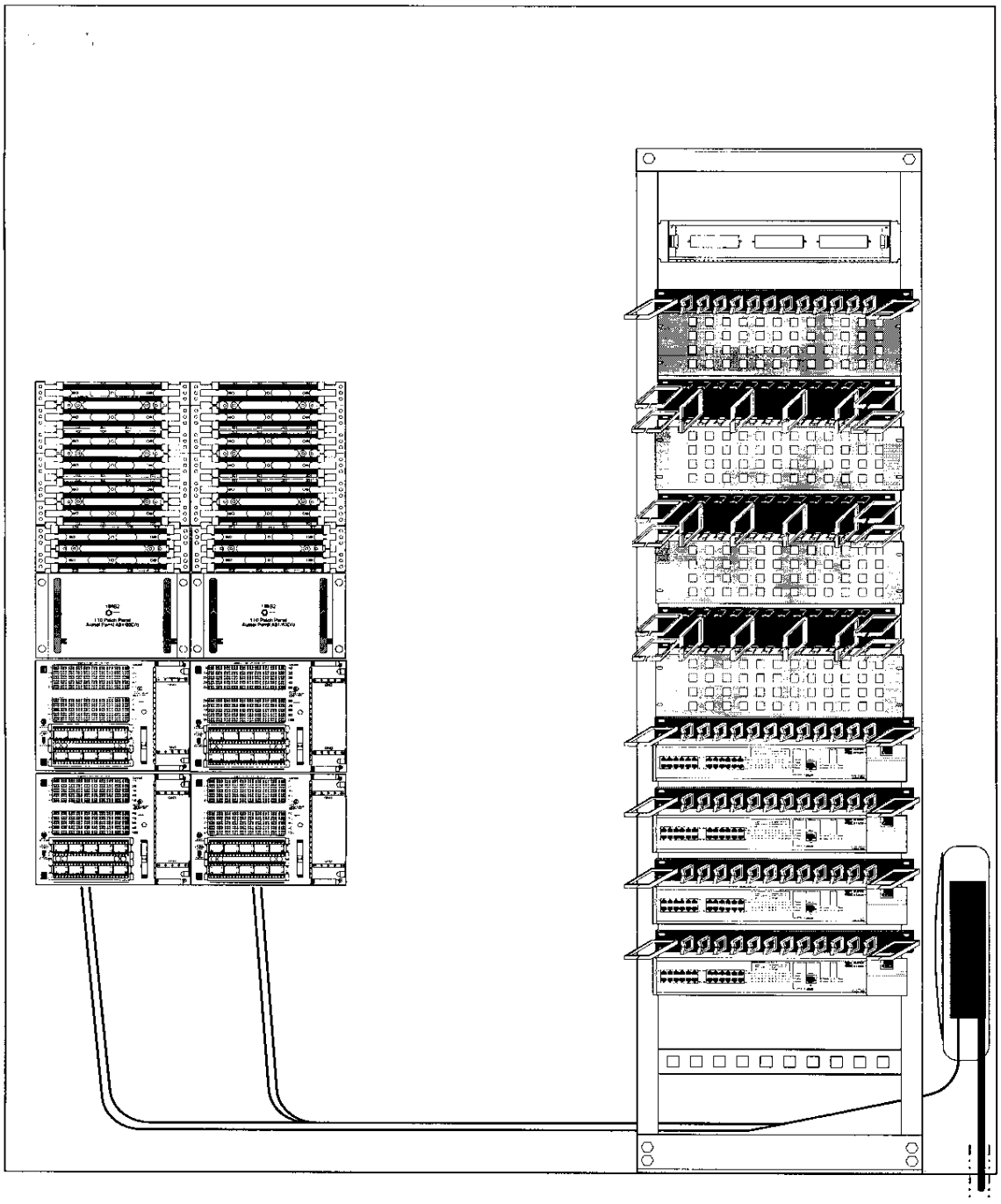
NOTE: INTERSET MANHOLE AVAILABLE. 7" WIDE SLOTS IN LIEU OF TERMINATORS. TYPICAL TOP AND BOTTOM SECTION

GTE 5X10.5X6.5

5'-0"x10'-6"x6'-6" QUIKSET® 2-PIECE MANHOLE

ATTACHMENT 'A'

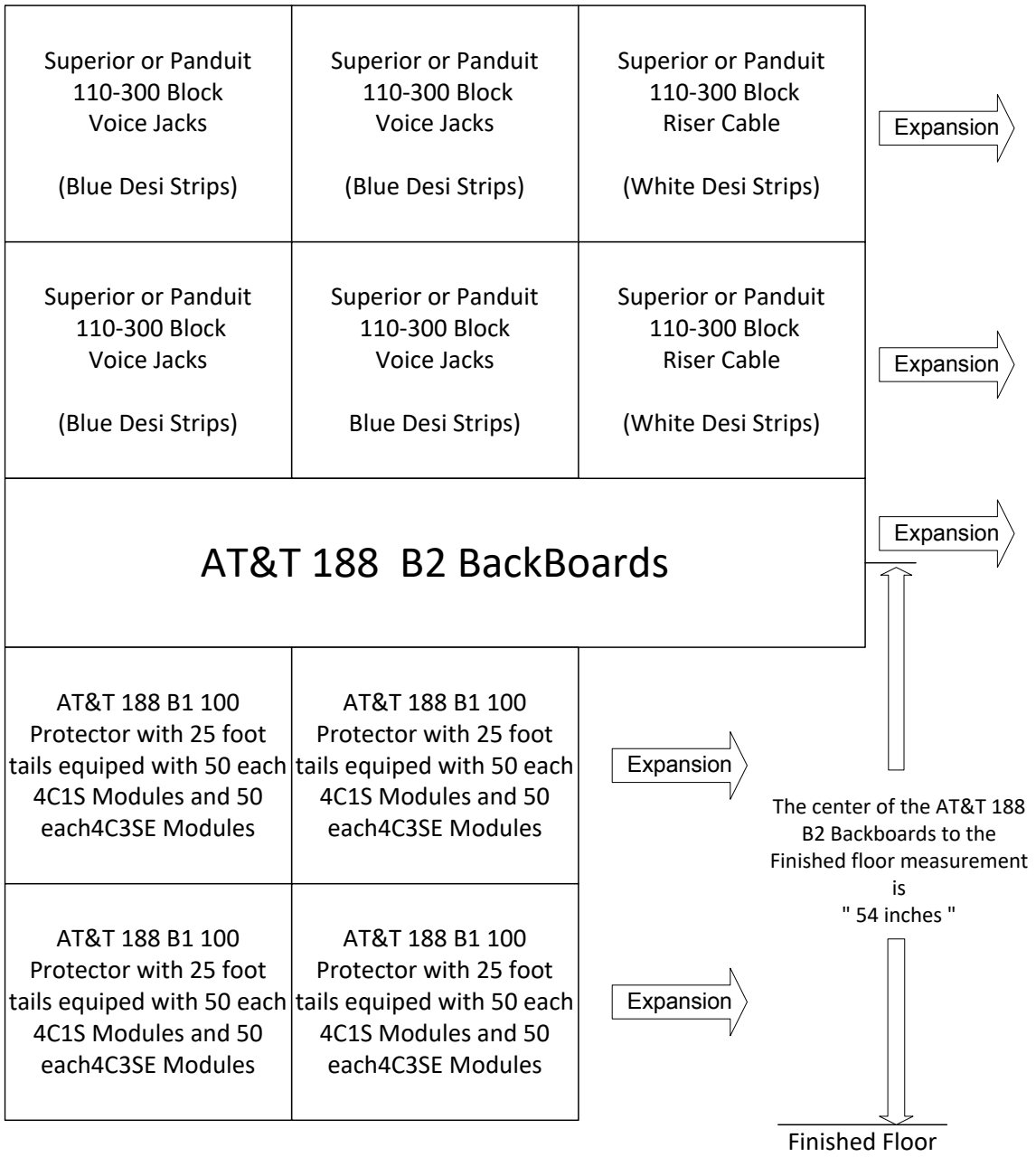




USF EF
Entrance Facility Building
Distribution Frame

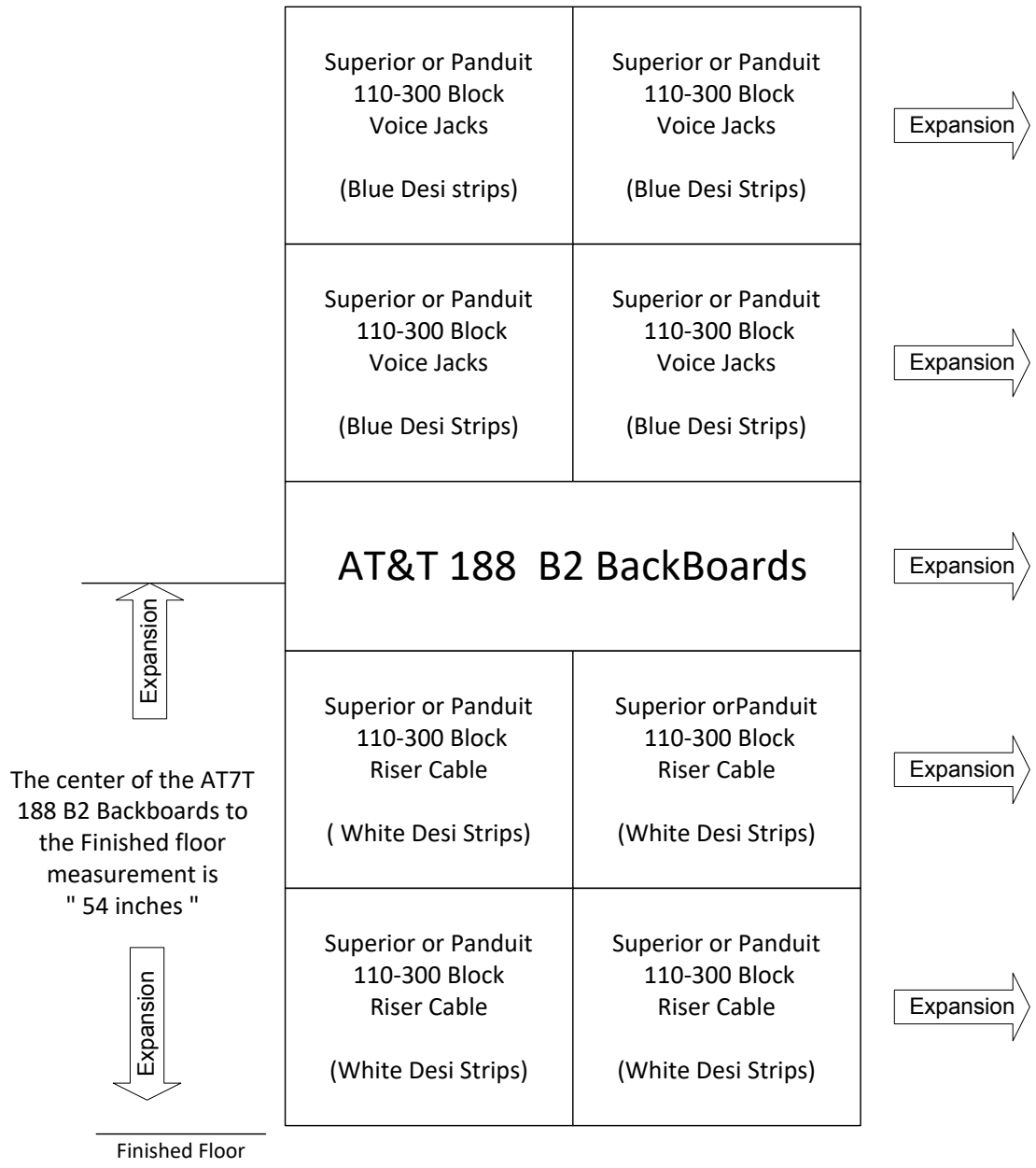
Attachment
" B "

Build 110 Blocks from left to right, 6" from the edge of the Backboard



USF TR Telecommunication Room Distribution Frame Telephone Closet

Attachment " C"



USF UNIVERSITY OF SOUTH FLORIDA

DESIGN & CONSTRUCTION GUIDELINES

APPENDIX E
ACCESS CONTROLS SYSTEM DESIGN GUIDELINES
(TAMPA CAMPUS)

EDITION: **FEBRUARY 18, 2021**
USF FACILITIES MANAGEMENT - OPERATIONS

APPENDIX E – ACCESS CONTROL SYSTEM

INDEX **SECTIONS** **TITLE** **FEBRUARY 18, 2021**

	PART 1	**GENERAL**
		1.1 SCOPE OF WORK
		1.2 ACCESS CONTROL
		1.3 DESCRIPTION OF WORK
		1.4 SUBMITTALS
		1.5 QUALITY ASSURANCE
	PART 2	**PRODUCTS**
		2.1 MANUFACTURER
		2.2 MATERIALS
		2.3 SYSTEM REQUIREMENTS
		2.4 SOFTWARE
		2.5 HARDWARE
	PART 3	**EXECUTION**
		3.1 SECURITY CONTRACTOR
		3.2 PROJECT MANAGEMENT
		3.3 PERSONNEL
		3.4 ACCESS CONTROL SYSTEM - INSTALLATION
		3.5 COMMISSIONING AND TRAINING
		3.6 TESTING
		3.7 WARRANTY, MAINTENANCE AND SERVICE

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The scope of the work included under this division of the Specifications shall include installing a card access system for managing access to buildings. Specifically, this is accomplished by using card readers on the exterior doors of the various buildings. Additional access control may be required at Department Suites Doors and open use classrooms as determined by the user group and educational outreach. The USF ID card will be used for this system. This will require that all students, faculty, and staff who need after-hour access to have a valid USF ID card. All access control doors will be re-keyed with the University Police master key to increase the security. Building occupants will no longer carry exterior door keys.

B. **Definition:**

1. **Contractor:** In this section the Contractor refers to the Access Control Integrator.
1. **Owner/User:** In this section the Owner/User refers to USF.

1.2 ACCESS CONTROLS

A. Contractor is to provide and install Lenel Mercury products and ancillary products needed to fulfill the sequence of operation for each door as shown in the construction documents.

B. Contractor is to provide programming (points and alarms) and commissioning the system.

C. Installation, wiring and conduits from panel to the doors & all hardware tied into the access control system are done by this contractor (including 120 VAC).

D. It is the responsibility of this contractor to coordinate with USF Operational Technology for programming/configuration to properly integrate the door hardware with the access control system to deliver a fully functional system.

1.3 DESCRIPTION OF WORK

A. The Integrated Security Management System (ISMS) shall manage the security operations for a single site or for multiple sites. Installing the ISMS and bringing it to operational status requires the following major steps:

1. Coordinate with Operational Technology to determine operational requirements to comply with campus standards.
2. Install and configure, where necessary, the communications network providing communications between the Client and Server computer workstation.
3. Install and integrate Access Control, Alarm Monitoring, and related security hardware.
4. Configure local access panels and ISMS Server computer system to communicate with one another.
5. Coordinate with Operational Technology to test and confirm functionality after all components of the system have been installed and are communicating and operating properly.

1.4 SUBMITTALS

A. Shop Drawings

1. Provide complete shop drawings which include the following:

a. Indicate all system device locations on architectural floor plans. No other system(s) shall be included on these plans.
b. Include full schematic wiring information on these drawings for all devices. Wiring information shall include cable type, conductor routings, quantities, and connection details at devices.
c. Include a complete access control system one line, block diagram.
d. Include a statement of the system sequence of operation.
e. The shop drawings have to be approved by the engineer of record and USF Facilities Management before any commencement of the work.

B. Contract Close-Out Submittals

The USF Tampa access control system is fully integrated campus wide and familiar to the operational & maintenance technical team. Thus, unless specified otherwise by USF, the product data and owner training is not required.

1. Provide electronic files of manuals including operating instructions, maintenance recommendations, parts list, wiring & connection diagrams modified to reflect as-built conditions.
2 Provide spare parts and attic stock as specified in the contract documents.

1.5 QUALITY ASSURANCE

A. The manufacturers of all hardware and software components employed in the system shall be established vendors to the access control/security monitoring industry for no less than five (5) years.

B. The security system integrator shall have been regularly engaged in the installation and maintenance of integrated access control systems similar in size and scope to that outlined herein for a period of no less than five (*5*) years.

C. The security system integrator shall supply information attesting to the fact that their firm is an authorized product dealer for the system proposed.

D. The security system integrator shall supply information attesting to the fact that their installation and service technicians are competent factory trained personnel capable of maintaining the system and providing reasonable service time.

E. The security system integrator shall provide a minimum of three (3) references whose systems are of similar complexity and have been installed and maintained by the security system integrator in the last five (5) years.

F. There shall be a local representative and factory authorized local service organization that shall carry a complete stock of parts and provide maintenance for these systems. Local shall be defined as an area in a fifty (50) mile radius of installed location.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.1.1 PRODUCTS

A. Approved Field Hardware:

LNL-3300 controller
LNL-4420 controller – elevator controls
LNL-1320 – Dual Reader board
LNL-1300 – Single Reader board
LNL1100 – Digital Input board
LNL-1200 – Digital output board

B. Integrated Security Management System:

Lenel Onguard 7.5 or latest version

2.1.2 CONTRACTORS

A. Any approved Lenel Partner:
(Installers: ADT, IFSS, SIEMENS, etc.).

2.2 MATERIALS

A. This Section covers the provision of an Integrated Security Management System (ISMS) for the University of South Florida Tampa campus including all items and subsystems shown on drawings or otherwise required by these Specifications for USF Building.

B. The requirements for these specifications shall be understood to be the USF Standard. The requirements shall be expanded as necessary to ensure quality. However, unless USF prior written approval is obtained, the requirement herein shall not be deleted or revised.

C. USF shall be hereinafter referred to in this document as the OWNER and the bid respondents shall be referred to as the SECURITY CONTRACTOR. The term OWNER includes direct employees and other appointed OWNER agents such as architects or consultants. These agents may be requested by the OWNER to represent the OWNER in undertaking certain project tasks.

D. If any statement in this or any other specification conflicts with any provision of the General Terms and Conditions of the contract, the provision stated in the General Terms and Conditions shall have precedence. Any questions that require additional interpretation and guidance shall be immediately brought to the OWNER'S attention.

2.2.1 SECTION INCLUDES

A. This section covers the provision of ISMS including all items and Subsystems shown on drawings or otherwise required by these specifications.

1 ISMS Computer, Hardware, software, and control panels for access control and alarm management.
2. Card readers and other security input/output devices for access control and alarm monitoring of secured areas.
3 Automatic Doors & operators:
4 Video Surveillance System.

2.2.2 RELATED SECTIONS

A Conduit, Raceways and Cable trays: Division 27, Communications.

B Fire stopping Penetration through Rated Construction: Division 26, Electrical.

C Electrical, Cabling, and Wiring: Division 26, Electrical.

D Door Hardware: Division 8, Openings.

2.3 SYSTEM REQUIREMENTS

A. The vendors provide hardware installation that will integrate with the existing USF Tampa access control system

2.4 SOFTWARE

2.4.1 Host Server Software and Operator Workstation Software:

A USF Tampa campus operates a campus wide access control system software. All new equipment and system components must be fully integrated into the existing software.

2.4.2 Security Management Software:

A Existing Lenel Onguard 7.5 or latest version.

2.5 HARDWARE

2.5.1 Host Server and Operator Workstations: Existing server and workstations.

2.5.2 Control Panels: Lenel LNL-3300 and LNL-4420 for elevator control. The ISMS control panels shall be intelligent and fully stand-alone processor capable, making all local access control and alarm monitoring decisions without host server dependency. Control panels shall support and provide the following:

A. UL listed under UL 294 and UL 1076; FCC Part 15 and CE compliant.

B. RS232 and RS422 communications ports for cascading/clustering multiple control panels via a single communications port interface to ISMS hosting server or operator workstations.

C. Control panel cabinet shall be of an industrial grade enclosure with knockouts for field wiring and have a key-locked and tamper protected door.

D. Low voltage power supply with uninterruptible battery backup allowing continued operations for a minimum of two (2) hours at full load.

2.5.3 Control Panel Interfaces: The ISMS control panels shall support on board and/or expansion interface boards for access control readers, alarm monitoring, and input/output control. Control panels shall support and provide the following as required:

A. Access Control Reader Interfaces:

1. Shall support hard-wired connections to readers, including power and communications. Connections shall be supported at a minimum distance of two-thousand (2,000) feet (or 610 meters) utilizing 22 AWG 2-pair shielded and unshielded cabling.

2. Shall support supervision, monitoring, and processing of the following:

a. Reader tamper and communications.
b. Status changes from locally wired door sensor and request to exit device.

3. Shall support card only Multi-Technology Aptiq MTMS15-485 style readers of the following technologies:

a. Smart Card
b. Magnetic Stripe

B. Access Control Card Readers:

1. Reader Technology: As specified by selected card technology and application requirements; compatible with ISMS control panels and commercially available from industry leading manufactures that include but not limited to:

a. Aptiq MTMS15-485 (campus standard)

Note: Refer to Appendix C, Student Housing Design Guidelines for USF Housing access control requirement.

2. The specified card and reader manufacturer shall support a full product line that offers multiple models and/or styles to fit various installation and application requirements including:
   a. Card only.
   b. Rugged, weatherized enclosures rated for indoor and outdoor mounting.
   c. Rated for mounting on metal and non-metal surfaces.
   d. Provide audible and visual indicators for reader status and validation of granted and denied access.
3. Provide quantities for each model and/or style indicated on drawings.

C. Electric Door Hardware:

1. Electronic locking devices shall have a separate power supply to support the locks specified below. The unit shall incorporate integral battery charging capabilities and a fused line voltage input for a minimum of eight (8) individual locks. All power supplies shall be equipped with optional battery pack for up to forty-eight (48) hours. The unit shall be equipped with a module to accommodate fire alarm NC contacts when a fire alarm activates.
2. All locks shall be fail-secure unless otherwise specified by the Security Consultant/Designer. Locks specified, as being fail-safe shall be installed in accordance to Section 5-2.1.6.2 of NFPA Life Safety Code 101.
3. The SECURITY CONTRACTOR shall coordinate with Operational Technology for the interconnection of the specified ISMS.
4. Specified Products
   a. Electric Mortise Lock: Sargent 8271.
   b. Exit Device/Crash Bar: Von Duprin.
   c. Electric Strike:
      i. Sargent.
      ii. Von Duprin requires prior approval by Operational Technology for retrofit projects only. Not approved for new building projects.
   d. Magnetic Locks are not allowed on this cam us unless pre-approved in writing by the University Facilities Management Code Enforcement department.
5. Provide quantities for each model indicated on drawings.

D. Door Hardware Configuration:

1. Card access controlled doors shall be equipped with a passive infrared request-to-exit device specifically designed for electromechanical lock release. Device shall be equipped with a DPST (NO & NC) 1-amp contact.
2. Card access controlled doors shall be equipped with a non-illuminating emergency exit button to momentarily deactivate the magnetic lock. The device shall be equipped with DPDT contacts with one side sending a REX to the ISMS control panel and the other directly interrupting power to the magnetic lock. The device shall fit into a single gang electrical box.
3. Card access controlled doors shall be equipped with a touch sense exit device to momentarily deactivate the magnetic locking device. The device shall be 24 VDC and equipped with DPST (NC & NO) contacts.

E. Intrusion Detection Devices:

1. **Door Sensor Contacts:**
   a. Recessed magnetic door contacts shall be provided for all card access doors and doors requiring intrusion detection. Door contacts shall be provided on single doors and both leaves of double doors at locations indicated on drawings. Color to match existing finish.

b. Where building structure makes it impossible to install conduit within the wall or doorframe, the SECURITY CONTRACTOR shall substitute surface-mount contacts with armored cable for the specified contacts.
c. Heavy-duty door contacts with armored cable shall be provided for all Roll-Up Doors where indicated on the drawing.
d. All devices shall be wired point to point and to the nearest ISMS control panel interface.

2. Motion Detectors:
a. WALL MOUNTED or CEILING MOUNTED passive infrared (PIR) motion detectors shall be provided where indicated on drawings. Motion detectors shall be masked or oriented to minimize the likelihood of nuisance alarms caused by environmental conditions.
b. All devices shall be wired point to point and to the nearest ISMS control panel interface.
c. A 12 VDC centralized power supply shall be utilized to power motion detectors.

PART 3 EXECUTION

3.1 SECURITY CONTRACTOR

A. The SECURITY CONTRACTOR shall be a local installation and service organization, currently as a factory authorized representative by the manufacturer of the specified system.

B. The SECURITY CONTRACTOR shall provide a minimum of three (3) references whose systems are of similar complexity and have installed and maintained by the SECURITY CONTRACTOR in the last five (5) years.

C At time of bid, the SECURITY CONTRACTOR shall be licensed by the state or local jurisdiction to perform security work within the state. Contractors who have security licenses or permits pending shall not be considered acceptable for bidding on this project.

D. The SECURITY CONTRACTOR shall assure that all personnel working on the project are registered with the state or local jurisdiction Systems Licensing Board as provided for by Current state statutes.

E. At the time of bid, the SECURITY CONTRACTOR shall provide satisfactory evidence of liability Insurance and Worker's Compensation coverage for employed personnel as required by law.

3.2 PROJECT MANAGEMENT

A. The SECURITY CONTRACTOR shall provide an on-site, factory-trained technician to assist, advice and mange installing personnel.

B All of the SECURITY CONTRACTOR'S personnel and operating forces Including subcontractors and delivery personnel, shall be made aware of, and shall comply at all times, with the regulations, project requirements, and directions of responsible OWNER personnel.

3.3 PERSONNEL

A. The SECURITY CONTRACTOR'S personnel shall be qualified to accomplish all work promptly and satisfactorily. The OWNER shall be advised in writing of all designated service and support personnel responsible for installation as well as pre- and post-warranty service.

B The SECURITY CONTRACTOR'S shall provide proof that designated service and support personnel have successfully completed the appropriate level of both hardware and software training offered by the manufacturer for installation and maintenance of the specified system.

C. STUDENT, STAFF AND FACULTY INTERACTION: All technicians must uphold the highest level of professionalism. USF is an environment where unprofessional conduct is not tolerated. All company employees shall be identifiable by their name and company apparel clearly visible at all times.

3.4 ACCESS CONTROL SYSTEM - INSTALLATION

A General: The contractor shall install all system components and appurtenances in accordance with the manufacturer's instructions, and shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. Provide mounting hardware as required.

B Installation: All low voltage wiring outside the control console, cabinets, boxes, and similar enclosures, shall be plenum rated where required by code. Cable shall not be pulled into conduits or placed in raceways, compartments, outlet boxes, junction boxes, or similar fittings with other building wiring.

C. Device Wiring and Communication Circuit Surge Protection: All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. All communications equipment shall be protected against surges induced on any communications circuit. All cables and conductors, except fiber optics, which serve as communications circuits from security console to field equipment, and between field equipment, shall have surge protection circuits installed at each end.

D. All low voltage wiring outside the control console, cabinets, boxes, and similar enclosures, shall be plenum rated where required by code.

E. All wiring conductors connected to terminal strips shall be wired individually. Each cable or wiring group being extended from a panel or cabinet to a building mounted device shall be identified with the name and name of the particular device as identified and shown on building drawings.

F. All exposed wiring inside and outside the control console, cabinets, boxes, and similar enclosures, shall be dressed down neatly and secures with wiring cleats or wire ties.

G. All exposed metallic flexible conduit and armored cable shall be dressed down neatly and secured with low profile, metal fasteners.

H. All cabinets, boxes, and similar enclosures containing security system components and /or cabling and which are accessible to employees or to the public shall be provided with a lock. Boxes above ceiling level in occupied areas of building shall not be considered to be accessible.

I. All junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamper proof screws.

J. End -of-line resistors shall be installed at the field device location and not at the controller panel location.

K. System devices identified on building drawings are intended to generally indicate areas where such devices are to be located. Security Contractor shall be responsible for determining final location of these devices in accordance with OWNER'S requirements.

L. Riser diagrams are schematic and do not show every conduit, wire box, fitting, or other accessories. Provide such materials as necessary for a complete and functioning installation. Install in accordance with referenced codes and these specifications. Use weatherproof equipment or covers where installed in areas exposed to weather.

M. All control wiring shall be labeled at both ends and wire label shall be indicated in as-built drawing.

3.5 COMMISSIONING AND TRAINING

A Perform commissioning as specified in eth construction documents.

B. The USF Tampa access control system is fully integrated campus wide and familiar to the operational & maintenance technical team. Thus, unless specified otherwise by USF, the owner training is not required.

3.6 TESTING

A. General: The contractor shall perform pre-delivery testing, site testing, and adjustment of the completed ISMS. The contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing. Written notification of planned testing shall be given to the owner at least fourteen (14) days prior to the test and in no case shall notice be given until after the contractor has received written approval of the specific test procedures? Test procedures shall explain in detail, step-by-step actions and expected results demonstrating compliance with the requirements of the specification. Test reports shall be used to document results of the tests. Reports shall be delivered to the owner within seven (**7**) days after completion of each test. The test procedures are determined and written by the A/E.

B. Performance Verification Test: The contractor shall demonstrate that the completed ISMS complies with the contract requirements. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown.

C. The SECURITY CONTRACTOR is required to place entire system into full and proper operation as designed and specified.

1. Verify that all hardware components are installed properly, connected, communicating, and operating correctly.
2. Verify that all system software is installed, configured, and complies with specified functional requirements.

D. The SECURITY CONTRACTOR shall perform final acceptance testing in the presence of OWNER'S representative, executing a point by point inspection against a documented test plan that demonstrates compliance with system requirements as designed and specified.

1. Submit documented test plan to CM/A&E/OWNER at least fourteen (14) days in advance of acceptance test, Inspection and check-off.
2. Conduct final acceptance tests in presence of OWNER'S representative, verifying that each device point and sequence is operating correctly and properly reporting back to control panel and control center.
3. Acceptance by OWNER is contingent on successful completion of check-off; is check-off is not completed due to additional work required, re-scheduled and perform complete check-off until complete in one pass, unless portions of systems can be verified as not affected by additional work. Industry standard is for the architect to determine substantially complete, which includes beneficial occupancy
4. The System shall not be considered accepted until all acceptance test items have been successfully checked off. Beneficial use of part or all of the system shall not be considered as acceptance.

E. The SECURITY CONTRACTOR shall provide system operations, administration, and maintenance training by factory trained personnel qualified to instruct:

1. OWNER will designate personnel to be trained.
2. Provide printed training materials for each trainee including product manuals, course outline, workbook or student guides, and written examinations for certifications.
3. Provide hands on training with operational equipment.
4. Training shall be oriented to the specific system being installed under this contract as designed and specified.

3.7 WARRANTY, MAINTENANCE AND SERVICE

A. Warranty: The ISMS shall be warranted by the contractor for one (1) year from the date of final system acceptance/substantial completion.

B. Maintenance and Service: The contractor shall provide all services required and equipment necessary to maintain the entire ISMS in an operational state as specified for a period of one (1) year after formal written acceptance of the system, and shall provide all necessary material required for performing scheduled adjustments or other nonscheduled work.

C Description of Work: The adjustment and repair of ISMS includes computer equipment, software updates, signal transmission equipment, access control equipment, facility interfaces, and support equipment. Responsibility shall be limited to contractor installed equipment. Provide the manufacturers required adjustments and other work as necessary.

D Personnel: Service personnel shall be qualified to accomplish all work promptly and satisfactorily. Provide proof that Service personnel have successfully completed the appropriate level of both hardware and Software training offered by the system manufacturer. The owner shall be advised in writing of the name of the designated service representative and of any change in personnel.

E Inspections: The contractor shall perform two inspections at six (6) month intervals or more often if required by the manufacturers. This work shall be performed during regular working hours, Monday through Friday, excluding Federal holidays. These inspections shall include:

1. Visual checks and operational tests of the central processor, local processors, monitors, keyboards, system printers, peripheral equipment, ISMS equipment, power supplies, and electrical and mechanical controls.
2. Clean system equipment, including interior and exterior surfaces.
3. Perform diagnostics on all equipment.
4. Check and calibrate each ISMS device.
5. Run system software and correct diagnosed problems.
6. Resolve previous outstanding problems.

F Emergency Service: The owner shall initiate service calls when the ISMS is not functioning properly. Qualified personnel shall be available to provide service to the complete SMCS. The owner shall be furnished with the telephone number where the contractor's service supervisor can be reached at all times. Service personnel shall be at the site within four (4) hours after receiving a request for service. The ISMS shall be restored to proper operating condition after one (1) calendar day.

G Software: Existing USF software.

USF UNIVERSITY OF SOUTH FLORIDA

DESIGN & CONSTRUCTION GUIDELINE

APPENDIX F
ARCHITECTURAL AND LANDSCAPE DESIGN GUIDELINE

EDITION: **SEPTEMBER 17, 2018**
USF FACILITIES MANAGEMENT - PLANNING

APPENDIX F – ARCHITECTURE & LANDSCAPE DESIGN GUIDELINES

INDEX SECTIONS TITLE SEPTEMBER 17, 2018

SECTION 1 **ARCHITECTURAL DESIGN GUIDELINE ELEMENT**
1.1 FRAMEWORK FOR DESIGN GUIDELINES
SECTION 2 **LANDSCAPE ARCHITECTURAL DESIGN GUIDELINE ELEMENT**
2.1 PLAN FRAMEWORK FOR LANDSCAPE ARCHITECTURAL DESIGN GUIDELINES
2.2 LANDSCAPE STANDARDS
2.3 TIMING AND PHASING OF LANDSCAPE IMPROVEMENTS

SECTION 1 ARCHITECTURAL DESIGN

The Architectural Design Guidelines goal is to create a unified architectural environment that defines and creates a coherent series of interconnected and pedestrian-scaled campus open spaces.

1.1 FRAMEWORK FOR DESIGN GUIDELINES

A. The Campus Master Plan seeks to establish a framework that will guide and structure open space systems, visual linkages, movement patterns, appropriate building placement and orientation, and logical distribution of land uses. It is essential that the design of new buildings take into account guidelines for building siting as well as architectural treatment. Poorly sited buildings, no matter how well designed, will always be a detriment to the overall campus environment.

https://www.usf.edu/administrative-services/facilities/planning/campus-planning.aspx

B. The composition of the existing USF campus, its buildings and landscape, reflects the design of many architects and engineers as the campus has developed since 1956. The objective of establishing architectural and landscape design guidelines is to establish design parameters for future development that will help to create a campus of coherence and beauty. These design parameters are established by the Master Plan and the design review process, which consists of budgeting, designer selection, and project design review, as well as the implementation of general and site-specific design guidelines.

C. The Master Plan provides a diagrammatic framework for land use, open space, circulation, parking and building placement. The role of the design guidelines is to assure that the specific designs implemented within the Master Plan framework are consistent with and contribute positively to the overall campus development and to the larger community context. They will be used in an on-going design review process as a mechanism to guide and control the project design.

D. Each new building on campus has two primary functions:

- **a.** To accommodate its program in a manner that is appropriately functional, elegant, and efficient on the use of funds.
- **b.** To enhance and reinforce the overall campus urban design framework including open space, circulation, and to animate the public domain.

E. Each building serves a constituent and a communal need; neither should be compromised in design process. Architectural design for the USF campuses should take into account the unique characteristics of the regional climate. An appropriate design response will help achieve an identity and image for the campus that places it firmly in subtropical Florida.

F. The design guidelines seek to establish general parameters for future buildings that will help create a coherent and attractive campus. The goal is not to exert excessive control over future designers but rather permit the architects' creative freedom in designing individual projects within the larger coherent framework.

1.1.1 Building Placement

A. The urban design framework plan will guide future development on the campus. New buildings should be positioned on their sites in a manner that responds to and reinforces the intent described in the framework plan.

B. Buildings should be carefully sited to establish and/or reinforce a series of open spaces on campus. Each new building adjacent to one of these spaces should be designed so that its mass contributes positively to the definition of the exterior spaces of the campus. This will assure well-defined public open spaces while still allowing architects the flexibility and freedom required to develop creative solutions and meet as yet unknown programmatic requirements.

C. Most importantly, on the Tampa Campus, no new buildings should negatively impact the Greenway, which extends from Lake Behnke and the USF Botanical Gardens at Bruce B. Downs Boulevard to the wetlands at Fletcher Avenue and 50th. Street. The Greenway must be recognized for its functional role in providing suitable stormwater retention/detention area and for its aesthetic role in providing a sense of clarity and orientation to the campus. It is imperative that this designated land be preserved and maintained as open space.

D. The siting of future buildings must take into account the open space configuration that results from the building placement. Buildings should not be sited such that they leave remnant, unusable open space. The intention is not that every open space must have a use, but rather that buildings should be designed with consideration of their role as part of the whole campus fabric. It must be recognized that building walls often frame the edge of a quadrangle or thoroughfare and that these outdoor elements have equal importance in creating a desirable and functional campus setting.

E. Site and building landscaping must be an integral part of building design so that landscape responds in harmony with building to spatial and climatic issues.

F. Orthagonal building placement contributes to the orderly and understandable arrangement of campus buildings, open spaces, connectivity, and wayfinding.

1.1.2 Building Size and Mass

A. All buildings that have over fifty-thousand (**50,000**) gross square feet of space should be designed at a minimum of three (**3**) stories in height. Sprawling single story buildings are not encouraged since they consume large amounts of land area and limit future growth. Buildings less than fifty-thousand (**50,000**) gross square feet should be designed with enough building height and mass to frame adjacent open space and to accommodate future expansion when appropriate.

B. USF projects are expected to maximize the building height for the preservation of open space and future expansion. All projects designs must account for future expansion.

1.1.3 Climate Reponses

A. Critical to the success of architectural design on campus will be the response of building design and associated site landscaping to the climate and culture of the place. East-west building layouts are the ideal orientation for this climate; minimizing the east and west exposures to the sun lower in the sky, southern exposure which can be mitigated with solar devices, and the northern exposure which has the least solar exposure.

Also effective is an organization around well-defined courtyards that offer a shaded microclimate within the larger campus environment. Entries and movement systems must be clearly identified and integrated with overall patterns. Breezeways and arcades are incorporated to provide shade and shelter as well as natural ventilation. Light color exterior and roof materials reduce heat gain. Glass-roofs and skylights are not an appropriate solution for the Florida climate, although clerestory natural lighting with roof overhangs are appropriate solutions.

B. Building design should respond to the unique characteristics of the regional climate by providing appropriate shelter from sun and rain while accommodating natural ventilation. Architecture of colonnades, breezeways, courtyards, sunscreens and shading devices should be encouraged. These should take precedence over enclosed atriums, blank walls, and dark building surfaces, which are more appropriate in northern climates.

C. Arcades should be incorporated in buildings which frame primary public open spaces, such as the Tampa Campus Central Lawn and new buildings within the Interdisciplinary District, which help define the northern edge of the Tampa Campus Greenway. Covered walkways should link building arcades to provide continuity. Entries to buildings should relate directly to arcades and should be clearly visible from adjacent public spaces.

1.1.4 Facade, Edges and Entries

A. Building facades and edges should be designed to reinforce the integrity and vitality of all adjacent open spaces and should support the basic structural organization of the campus. They should, in general, align or work with adjacent facades to reinforce the clarity of the public network and the cohesion of building groups.

B. Building facades adjacent to public open spaces and thoroughfares should be treated as fronts and should activate the public environment.

C. Buildings such as classrooms, academic buildings, etc. should be designed to be explicitly collegiate in character and should include good proportions, highly visible points of entry, and well-crafted expression of human scaled elements such as windows, doors, door frames, steps, ramps and rails. Facades that are oriented to public areas should be lively and should be articulated in a manner that clearly identifies public circulation area and offers clues as to the activities within. The tendency to create windowless inward looking buildings should be discouraged.

D. Building entries should be easily identifiable, and should face primary public open spaces and thoroughfares rather than parking lots. Entries should relate directly to pedestrian pathways and thoroughfares as well as to key visual axes. They should be ordered so that they correspond to the ordering of public spaces and circulation routes within the building. Entries should be prominent, encouraging people to approach and enter the building as well as to linger before class, or wait for a friend or converse with a professor. All major entrances must include bike loops adequate to support the occupants of the building. Lobbies should be transparent in order to provide clarity of orientation both inside and outside the building and to welcome those approaching.

E. Areas of the building requiring security should be securable without compromising the viability of public space, building facades, or continuity of public circulation routes.

F. Arbitrarily individualistic architectural statement inconsistent with the overall campus fabric should not be permitted to compromise a more cohesive campus image.

G. Landscape areas adjacent to buildings must be designed to allow for the areas to be supportive to plant growth and for appropriate planting relative to building scale and massing.

1.1.5 Exterior Wall Materials and Colors

A. In order to have a campus that reflects the image of a great university, a commitment to materials of permanence and quality is required. This does not mean a lack of concern for economy. Quality construction must mean long-term cost effectiveness over the lifecycle of the buildings.

B. Exterior wall materials must be compatible in architectural character with the adjacent context. To help unify the campus visually, masonry materials are required to be used in designs for exterior building surfaces. The term masonry includes natural and manufactured materials such as cut stone, concrete (including panels fabricated from combinations of stone, concrete and related binding materials), brick, and stucco.

C. Material selection should take into account the building's hierarchical classification (i.e. landmark building vs. infill or 'background' building) as well as visibility and texture at the pedestrian level.

D. Metal and architectural glass may also be used to good effect in limited amounts, but they are too severe to be used in large quantities.

E. Building surfaces should generally be light in color. Large areas of dark color, which tend to be more appealing in historic campus settings or northern climates, should be avoided. Colorful elements or accent color are intended to be used where architectural emphasis is desirable.

1.1.6 Landmark Buildings

Buildings that serve a larger public purpose must be statelier and use more refined materials and detailing. This applies to buildings located in highly visible locations. Prominent and/or public building placement within the plan framework as well as their function suggests that they be considered landmarks and thus be budgeted and funded appropriately.

1.1.7 Parking Structures

A. The design of parking structures should be sensitive to scale and form so as not to detract from the campus image. Large blank walls and continuous sloped strip openings should be avoided. Ramped areas should be located within the garage structure so that their form is not visible from the exterior. Louvers or screens should be used to animate facade surfaces and to create an articulated structure that fits in with neighboring campus buildings. Structures should be designed for passive surveillance by maximizing openings and minimizing walls.

B. Where possible, the first-floor level of parking garages should be considered for occupancy uses such as office or service functions that will maintain activity at the ground level.

C. Vertical pedestrian circulation elements and entry/exits should be clearly articulated and visible from adjacent public spaces and nearby circulation routes.

E. Parking structures, unless otherwise specified, should be a maximum of five (5) levels including the roof level.

F. Lighting within the parking structure should be designed to minimize glare towards the exterior. The interior should be uniformly illuminated.

1.1.8 Building Service

A. Service areas should be located and designed to efficiently support building functions.

B. Service areas should, in general, be located away from public open spaces and thoroughfares. If this cannot be done, design treatment should emphasize pedestrian comfort and compatibility, shielded from view.

C. Provide two (**2**) cart parking spaces and one (**1**) state vehicle parking space minimum. One (**1**) additional space for each fifty-thousand (**50,000**) gross square feet.

D. Provide service access, loading and unloading, etc.

E. Provide a protected designated area for recycling containers.

1.1.9 Technical Performance

A. Building projects should be subjected to lifecycle costing to determine the best fit between capital costs, operating costs, and ongoing maintenance costs.

B. Buildings should be designed to reduce maintenance costs and energy consumption.

C. Buildings should not be permitted to emit unacceptably noxious or otherwise unpleasant fumes or gases.

D. Noise from building systems should not be allowed to intrude on adjacent interior or exterior public spaces; noise-generating activities should be located within the building, which should be designed to protect users in other buildings or in public open spaces.

SECTION 2 LANDSCAPE DESIGN

The Landscape Design Guideline goal is to create a spatial order and landscape vocabulary that unifies the campus in a manner that is inviting, safe, and that allows the natural and formal landscapes to complement one another.

2.1 FRAMEWORK FOR LANDSCAPE DESIGN GUIDELINE

A. While the basic open network of the campus is defined by streets and buildings, its character and the way it is perceived are determined largely by the landscape treatment of open spaces. The overall landscape intent should be to create an atmosphere of natural beauty characterized by simplicity, restraint, consistency, and harmony among the various parts of the campus landscape.

B. The objective of landscape design guidelines is to establish general criteria to be used in directing future site and building design efforts as the Master Plan is implemented. Each future project will present its own set of specific and unique opportunities and constraints. The role of the design guidelines is to assure that the specific designs implemented within the Master Plan framework are consistent with and contribute positively to the overall development and the larger context. They will be used in an ongoing design review process as an effective mechanism to guide and control the project design. The guidelines seek to foster a consistency in landscape materials, form, and organization, and will collectively result in a coherent campus environment of high quality. The following guidelines are recommended as a basis for achieving the desired campus landscape.

2.2 LANDSCAPE STANDARDS

2.2.1 Plantings

New plantings and husbandry of significant existing plantings will be an important component of the future campus landscape. Plantings should be both functional and attractive and should achieve the following broad guidelines:

A. Plantings should reinforce the basic structure of the Master Plan, positively shape open space areas, and be functional rather than simply decorative in defining and unifying streets, paths and open spaces.

B. Tree, shrub, and hedge plantings should be appropriate to the scale, uses, and microclimate of the University setting. The use of native plants should be the highest priority in all plantings, and where possible, community associations should be established to promote attractive and sustainable plantings.

C. The dominant landscape character of the campus should be one of informal naturalism. Exceptions to this include major vehicular and pedestrian axes and small courtyard spaces closely associated with buildings. The informal naturalistic approach has the advantage of allowing work to be phased over time and is readily achievable at a maintainable level of perfection, compatible with the remaining islands of native landscape, and widely accepted as an appropriate and desirable aesthetic theme.

D. Broad use of plants in rows and large masses rather than in fussy, detailed plantings is recommended in principal open spaces. The use of exotic materials with unusual habit or color should be discouraged. Likewise, the use of a great variety of plant in close proximity for the sake of horticultural interest is not desirable because such an approach undermines the fundamental idea of unity and ease of maintenance that is central to the plan.

E. To the degree possible, landscape plans should include the use of plant species that are indigenous to the natural plant communities of the region and which promote the use of xeriscape principles. In cases where non-invasive exotic plants are used to enhance the

landscape, plantings should be limited to those non-invasive species that are able to resist periods of drought and which require little fertilization and use of chemicals.

F. Existing non-native invasive plants may be designated for removal from the campus grounds if such exotics are listed on the Exotic Pest Plant Council's list of "*Florida's Most Invasive Species*". As these species are located on the campus, USF staff shall coordinate with the Florida Department of Environmental Protection and other appropriate governmental entities to ensure the proper removal and disposal of these exotic species.

In addition to these broad principles, a number of site-specific guidelines concerning new plantings should be followed.

G. Street trees at the Tampa Campus along the loop road, and ceremonial entry malls off Fowler Avenue and other campus entry roadways should be native Live Oaks and should be planted opposite one another rather than in an alternating staggered pattern. Opposite placement creates a stronger sense of order.

H. All major entrances must include bike loops adequate to support the occupants of the building.

I. At the Tampa Campus, pedestrian corridors including Sessums Mall, the northern and southern edges of the Central Lawn, and the Interdisciplinary Mall should be designed as single landscape units to insure their strength and continuity. Their design should be simple, coherent, and expressive. Tree colonnades should be used to define the corridor edges.

J. Planting at building edges that face streets and campus open spaces should consist of small colorful ornamental trees in a simple mulched or lawn "terrace" around the building. In high exposure areas such as building entrances, plant materials should be selected for color and for year-round attractiveness.

K. Parking and service areas should be visually separated from major streets and visually and functionally separated from public spaces. Brick walls, fences, grading, and screen plantings are recommended as site treatment options for service areas. New buildings should be designed to orient service areas away from pedestrian circulation and building entries.

L. In parking lot islands trees and lighting must be designed so that trees will not obscure lighting. Locate light poles in the parking area out of landscape islands that have trees.

M. Parking lots should be planted with trees in generously sized landscaped islands to provide shade and visual relief with one tree for every 20 (twenty) parking spaces.

N. Islands in parking lots, which measure less than 8 feet in width, shall not be planted with trees.

2.2.2 Walkways

A. Campus walkways should be constructed of six (6) inch thick concrete with bell footing on each side and be sized to accommodate pedestrian flows. A minimum walk width of eight (8) feet should be employed except for very minor low use walks, which may be six (6) feet wide.

B. Walks serving combined pedestrian/service functions should be reinforced for vehicular travel and be a minimum width of ten (10) feet and six (6) inches thick.

C. Specialty pavements should be used for unique places within the campus to identify significant public spaces and activity areas. Specialty pavements include stone, brick and precast concrete pavers as a complement to the predominantly concrete walkways on campus.

2.2.3 Bicycle Ways

The plan recommends identification of bicycle routes through painted graphic symbol on the travel surface. Bicycle route within roadway curbcuts should be a minimum of five (5) feet in width. Any proposed shared bicycle/pedestrian ways in the Tampa Campus Greenway should have a minimum width of ten (10) feet and should clearly identify travel lanes with painted graphics.

- *Standard Bike Lane Intersection Diagram*

2.2.4 Gateways

A. At the Tampa Campus, major campus gateways are Fowler Avenue and Leroy Collins Boulevard, Fletcher Avenue and North Palm Drive, and Bruce B. Downs Boulevard and West Holly Drive should be readily recognized by visitors and include a visitor information booth.

B. Secondary entries to the Tampa Campus should be punctuated by special plantings within the context of the campus street edges.

2.2.5 Campus Edges

Campus edges are generally designated as open spaces and recreation playfield areas behind the perimeter fence line. The landscape character of the public edges along Tampa Campus Fowler Avenue, Bruce B. Downs Boulevard and Fletcher Avenue should be informal, land characterized plantings of trees, dominated by oaks and pine, in open expansive lawn. Massings of smaller ornamental trees that penetrate the edge, add interest to edge walks and bikeways. The landscape should be simple and unified in response to the scale of the edge roadways and the speed of travel along them.

2.2.6 Furnishings

Site furnishings include benches, tables, litter receptacles, bicycle racks, bollard and chain barriers, and newspaper dispensers.

A. Bicycle Racks: Most bicycle parking is currently provided outdoors or in parking garages and typically located near building entrances. Outdoor storage areas should be conveniently sited in proximity to building entries, with good visibility and paved surface, configured with respect to adjacent components of the landscape, and in numbers proportional to demand. The campus standard is a single plastic coated bike loop type, which accommodates all bike types.

B. Seating: Plastic coated metal benches are comfortable and unobtrusive and should continue as the campus standard. The designated bench should be located throughout the campus in appropriate locations such as on the Tampa Campus Central Lawn, the Sessums Pedestrian Mall corridor and along the Greenway.

Opportunities for informal seating such as steps and low site walls incorporated into buildings and site design work should be encouraged.

C. Tables and Chairs: Plastic coated metal standard for tables and chairs should continue. Table furnishings should be inviting and comfortable, and in character with the architectural surroundings. The plan recommends placing movable table and chairs near food service and lounge spaces. Shade, in the form of umbrellas, building shade structures, trellis, or trees, should be provided for table seating areas.

D. Litter Receptacles: Plastic coated expanded metal standard should be established for litter/recycling receptacles. The plan suggests a durable green metal receptacle, clustered in pairs and distinguished by color-coded label for trash and recycling (glass, cans, and trash).

E. Emergency Telephones: Emergency phones should be visibly located in proximity to outdoor gathering spots, near seating, and should provide service for each campus district,

clearly visible and easily accessible from all areas of the campus and at Tampa Riverfront Park.

F. Newspaper Dispensers: Dispensers should be grouped together, aligned and plumb, and located in proximity to major lounge/food service areas or primary classroom buildings such as the Tampa Campus Phyllis P. Marshall Center, Engineering Building II, Cooper Hall, and Health Sciences Center. Placement of a variety of services including papers, telephones, receptacles, and seating in a coordinated composition is encouraged.

2.2.7 Lighting

A. Campus lighting: should be organized in simple patterns that reinforce the basic structure of open spaces and sidewalks. Where lights follow streets or sidewalks, they should be placed in straight rows on one or both sides. When on both sides they should align directly across the route. Walkway lighting will ordinarily require lighting from only one side. Roadway lighting may require lighting on two sides, in which case lights should be placed in a staggered, alternating pattern.

B. Secondary roads, principal roadways, and service areas: should be illuminated with a visible source luminary to reinforce principal campus organization during evening hours. The luminaries should be mounted on USF standard pole assemblies of a thirty-two (32) feet and six (6) inch luminaire mounting height. The luminaire mast arm length from pole is eight (8) feet.

C. Walkways: should be illuminated by visible source luminaries installed on USF standard pedestrian pole assemblies with a luminaire nominal mounting height of ten (10) feet.

D. Specialty lighting: should be provided for athletic fields and courts, building facades, and unique activity spaces such as the proposed amphitheater. Exterior lighting of buildings should be confined to entrance points. Entrance lighting may use exposed or concealed source fixtures. If exposed source fixtures are used, they should be compatible with walkway fixtures.

E. Light sources for roadways and walkways: should be USF standard LED luminaires. Light levels shall adhere to USF Design and Construction Guidelines.

2.2.8 Sculpture and Fountains

A. Potential site for sculpture and fountains include outdoor seating and gathering areas.

B. Appropriate scale and character of sculptural elements is critical to their success. T hey should be understood as objects, which endure over time, and should be of a classical, timeless quality rather than of a style associated with short-lived trends. Their scale should be large enough to fit with surrounding spaces, buildings, and landscaping.

2.2.9 Signage and Graphics

A. Due to the fact that visitors are the most unfamiliar with campuses and require the most assistance, destinations listed on directional signs will reflect Information locations on the north and south sides of campus and visitor-oriented destinations.

B. A formal arrangement of landscape elements and signage are incorporated at key campus entrance points and to create an arrival statement and establish a sense of place. A hierarchy of entrance elements is established to visually distinguish the importance of one entrance over another. These elements will maintain the same vocabulary of form, proportions, and materials at each location, so that they will be recognized and remembered as belonging to the University.

C. Entrances into the campus that directly access major public facilities such as the Tampa Campus hospitals and the Sun Dome will include the facility identification on the entrance signage.

D. To create the perception of association, it is important to implement a consistent system of signs with consistent landscape treatment within the medical area and campus environments. The new sign types will be consistent in form, materials, colors, and placement.

2.3 TIMING AND PHASING OF LANDSCAPE IMPROVEMENTS

A. Highest priority should be placed on the development of the open space framework, primary pedestrian/bikeways and related tree planting and lighting, and campus entries. Priority should also be given to phasing in the Tampa Campus Greenway circulation, stormwater detention ponds, and planting.

B. Replacement of existing non-standard furnishings and lighting with established campus standards in new project areas and sites of highest levels of activity should also be a high priority, again with the goal of establishing campus areas and linkages that appear complete and connected. All new development should contribute to the overall framework and visual coherence of the campus and should include phasing out existing furnishings and lighting that do not comply with established campus standards.

USF UNIVERSITY OF SOUTH FLORIDA

DESIGN & CONSTRUCTION GUIDELINES

APPENDIX G
CAMPUS TREE CARE PLAN (2013-2014)
TAMPA CAMPUS

PATEL COLLEGE OF GLOBAL SUSTAINABILITY
OFFICE OF SUSTAINABILITY
EDITION: **MAY 20, 2014**
UPDATE: **JANUARY 3, 2018**

APPENDIX G – CAMPUS TREE CARE PLAN

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	EXHIBIT 1	BOTANICAL GARDENS	MAY 20, 2014
	EXHIBIT 2	FOREST PRESERVE	SEPTEMBER 2013

SECTION A. PURPOSE

An integral part of Goal II of the **2013-2018 Strategic Plan of the University of South Florida** "will, through its high-impact research and innovation, change lives for the better, improve health, and foster sustainable development and positive societal change" (http://www.ods.usf.edu/plans/strategic). As recognized in the **USF Climate Action Plan** (http://rs.acupcc.org/site_media/uploads/cap/607-cap.pdf) and the **USF Tampa Campus Master Plan** (http://tinyurl.com/TampaMasterPlan), a vigorous and resilient campus tree infrastructure is vital to meeting this goal. A healthy tree infrastructure improves air quality by sequestering environmental carbon, cools the ambient temperature, prevents soil erosion, facilitates wildlife habitat development, encourages multimodal transportation, improves concentration, and reduces aggressive behavior, among other benefits. Moreover, consistent with the University's mission as a teaching institution, trees constitute a valuable instructional resource, particularly but not exclusively in biology, environmental science, and landscape architecture.

The USF campus tree canopy has reached a level of maturity for which proactive measures are necessary to perpetuate a healthy and diverse treescape. To foster a healthy tree campus environment, the University must support a campus tree care plan. The need for such a plan has increased over the past few years as new development has begun to test the edges of desired campus density. Although great efforts have been made to preserve existing trees, this is not always possible. Therefore, it is essential to have policies and procedures in place that define how to replace lost trees in a way that will enhance the resiliency of the campus tree infrastructure. The plan outlined here provides such guidance.

The purpose of the USF Campus Tree Care Plan (**CTCP**) is to establish policies, procedures, and best practices for campus tree management for the Tampa campus of the University of South Florida. The Tampa Campus contains **815 acres** (including subleased lands but excluding the R&D Park) in addition to **735 acres** north of Fletcher Ave., which includes the Ecological Research Area and "The Claw at USF" golf course. Of this total area, **332 acres** of open space are managed by the Grounds Department of USF Physical Plant.

The greater goal of this effort is to create a sustainable campus environment that facilities student success, creates a sense of place for USF students and employees, and provides security as well as opportunities for active and passive recreation. The specific objectives of the CTCP are to:

- improve the efficiency of USF's management of its landscape;
- increase the benefits derived from the campus treescape while reducing costs
- support the Tampa Campus Master Plan
- ensure proper species selection, high-quality nursery stock acquisition, and industry consensus planting procedures;
- promote species diversity and proper age structure in the tree population;
- protect high-value campus trees during construction and renovation projects;
- promote tree health and safety by utilizing the International Society of Arboriculture's best management practices when maintaining campus trees;
- ensure that trees are reasonably replaced when there is mortality due to weather, pest infestations, injury, or construction displacement;
- encourage campus community members to respect and value the campus urban forest;
- create a rich and horticulturally diverse visual landscape that exemplifies the unique composition of Southwest Florida's native environments, as well as the region's historical and cultural traditions; and
- develop a comprehensive educational plan to promote educational and training opportunities to USF's students, staff, faculty, alumni, and neighborhood partners, leveraging the existing resources of the USF Ecological Research Area and the USF Botanical Gardens.

SECTION B. CAMPUS TREE ADVISORY COMMITTEE

The CTCP has been prepared and is updated annually by the USF Campus Tree Advisory Committee (**CTAC**), which is composed of faculty, staff, and students from throughout the University along with external consulting arborists from the Tampa Bay community. The 10 members of the 2012-2013 CTAC include:

- Kathy Beck, Natural Resource Coordinator, City of Tampa Parks & Recreation
- Barbara Donerly, Assistant Director of Facilities Planning and Construction, USF
- Gordon Fox, Associate Professor of Integrative Biology, USF
- Shawn Landry, Director of the Florida Center for Community Design + Research, USF
- Joseph Michalsky, Undergraduate Student, USF
- Rob Northrop, Extension Forester, University of Florida/ Hillsborough County Extension
- Shirley Pearsall, Senior Landscape Architect/Project Manager, URS Corporation
- Bryan Van Sant, Project Manager, Physical Plant, USF
- Laurie Walker, Director of the Botanical Gardens, USF
- Kebreab Ghebremichael, Interim Director of the Office of Sustainability, USF [CTAC Chair, 2012-2013]

SECTION C. SUSTAINABLE CAMPUS DESIGN

Dr. Kiran C. Patel Center for Global Solutions, which opened in January 2011, is the first landscape design project on campus to fully commit to xeric, drought-tolerant, native plants. In late 2011 / early 2012, an additional 2,000 trees (live oaks, cypress, and pine) will be planted across the campus.

In its 2011 Tampa Campus Master Plan update, USF has outlined a cross-campus Greenway, anchored by the USF Botanical Garden at the southwest corner of campus and by the Ecological Research Area in the northeast corner. These two preserves are linked by a "no-build, no-disturb" Greenway belt that protects wildlife, links habitat islands, provides opportunities for recreation, and aggregates storm water for ponds. The Greenway has been incrementally developed through the phased implementation of the long-term storm water management plan, the implementation of related landscape improvements, development of built edges through decisive placement of future buildings along the edges of the Greenway, and completion of circulation routes linking one area of the Greenway to another. These efforts have resulted in joining habitat islands, reducing heat islands, improving students' direct relationship with local flora and fauna, and providing increased opportunities for both active and passive recreation and improved pedestrian flow. In addition, parts of the Greenway (especially the forestry reserve, recreational forest, and Botanical Garden) actively sequester carbon dioxide and thus provide offsets for the campus' carbon footprint.

SECTION D. USF TREESCAPE

A resilient and vigorous treescape is essential to perpetuate the character of the campus and to strive towards a healthy ecosystem. Therefore, the university should:

- strive for a sustainable and resilient treescape that has an uneven age structure and diverse tree species;
- minimize changes to site conditions for established trees, especially native species;
- consider reforestation of areas that have been negatively altered;
- protect existing trees during construction;
- use native or well-adapted species when appropriate;
- select species that are resistant to disease and insects;
- proactively assess existing trees on an annual basis;
- provide required tree maintenance as needed on a regular basis; and
- Employ a certified arborist on staff when feasible. Currently USF is under hiring constraints.

The Landscape Element of the Tampa Campus Master Plan describes general standards for the USF treescape:

> "New trees and husbandry of significant existing trees will be an important component of the future campus landscape. Trees should be both functional and attractive and should achieve the following broad guidelines:
>
> - Trees should reinforce the basic structure of the master plan, positively shape open space areas, be functional in defining and unifying streets, paths and open spaces, and provide distinct visual identity to key open space elements such as gateways and plazas and, with amenities, create an atmosphere conducive to collegial interaction.
> - Tree, shrub, and hedge plantings should be appropriate to the scale, uses, and microclimate of the University setting. Within the naturalistic greenways, the use of native plants should be the highest priority in plantings, and where possible, community associations should be established to promote attractive and sustainable plantings. In the more formal open spaces, a native plant palette should be augmented with colorful 'Florida friendly' non-natives— species that are non-invasive and historically associated with a Florida landscape.

- The dominant landscape character of the campus should be one that combines and contrasts informal and formal naturalism: The informal naturalism of the large open space greenways transition into the more formalized landscapes of the major vehicular and pedestrian axes, gateways and smaller courtyard and plaza spaces closely associated with buildings. The naturalistic approach has the advantage of allowing work to be phased over time and is readily achievable at a maintainable level of perfection, compatible with the remaining islands of native landscape, and widely accepted as an appropriate and desirable aesthetic theme.
- Broad use of plants in rows and large masses rather than in fussy, detailed plantings is recommended in principal open spaces. The use of exotic invasive species should be prohibited. Likewise, the use of a great variety of plants in close proximity for the sake of horticultural interest is not desirable because such an approach undermines the fundamental idea of unity and restraint that is central to the plan.
- To the degree possible, landscape plans should include the use of plant species that are indigenous to the natural plant communities of the region and which promote the use of xeriscape principles. In cases where non-invasive exotic plants are used to enhance the landscape, trees should be limited to those non-invasive species that are able to resist periods of drought and which require little fertilization and use of chemicals.
- Existing non-native invasive plants should be designated for removal from the campus grounds if such exotics are listed on the Exotic Pest Plant Council's list of "Florida's Most Invasive Species." As these species are located on the campus, USF staff shall coordinate with the Florida Department of Environmental Protection and other appropriate governmental entities to ensure the proper removal and disposal of these exotic species. As non-native plants die, to the extent possible they should be replaced by native species.'

"In addition to these broad principles, a number of site specific guidelines concerning new trees should be followed:

- Street trees along the loop road, and ceremonial entry malls off Fowler Avenue and other campus entry roadways should be *Quercus virginiana* (southern Live Oak) and should be planted opposite one another rather than in an alternating staggered pattern. Opposite placement creates a stronger sense of order.
- The Leroy Collins ceremonial entry drive should be planted with a double row of street trees. It should be designed to provide a visual setting for the proposed terminus building and be large enough to ensure easy and economical maintenance. The proposed forecourt in front of the new terminus building should be planted with shade trees and the plaza area adjacent to the buildings should be equipped with walkways, benches, and other special features in order to make it a useable destination for students and faculty.
- Pedestrian corridors including Elm Drive, Sessums Mall, the northern and southern edges of the Central Quadrangle, and the Interdisciplinary Mall should be designed as single landscape units to insure their strength and continuity. Their design should be simple, coherent, and expressive. Tree colonnades should be used to define the corridor edges.
- Planting at building entrances and edges that face streets and campus open spaces should consist of small colorful ornamental trees in a simple groundcover, mulched or lawn "terrace" around the building. In high exposure areas such as building entrances, plant materials should be selected for year round attractiveness.
- Important ceremonial landscapes such as gateways and plazas (including the extended MLK pedestrian plaza) should be designed to include vine-covered pergolas. The use of a consistent vine species— such as bougainvillea for color and jasmine for scent— will unify these signature elements into the larger landscape and serve as a wayfinding element.
- Parking and service areas should be visually separated from major streets and visually and functionally separated from public spaces. Brick walls, fences, and screen plantings are recommended as site treatment options for service areas. New buildings should be designed to orient service areas away from pedestrian circulation and building entries.

Parking lots should be designed to include generously sized landscaped areas— tree islands and medians between parking bays— to provide shade, reduce the heat island effect, offer visual relief,

and function as bio-retention areas, which can serve as an integral part of campus storm water management."

SECTION E. PLANTING STANDARDS

The USF Design & Construction Standards, administered by Facilities Planning and Construction, maintains standards for all new plantings:

1. **Clearing:**
   All objectionable growth within the site area planned for building and landscaping improvements shall be cleared. All debris resulting from any clearing, stripping, grubbing, and demolition activities shall be removed from the University at frequent intervals to prevent unsightly accumulation.

2. **Protecting:**
   Trees designated to remain shall be documented on the plans and tagged in the field. The contractor is to be responsible for protecting the top, trunk, and root system of these trees. Protection shall be by barricading with four **4" x 4"** posts with **2" x 4"** rails (two minimum per side), installed at the drip line of the tree. No equipment, stockpiling of materials, work or parking is to be permitted within the barricades. Root zones shall be protected, where determined by arborist or University representative, as necessary by root pruning at outside edge of barricades.

3. **Stripping:**
Remove all organics, grasses, roots and topsoil to its full depth to the limits of the areas to be graded. Topsoil free of tree roots, brush and other debris can be stockpiled within the site for subsequent landscaping needs. Pile topsoil no more than 4' high. All material in excess of subsequent needs shall be removed from the campus and recycled when possible.

4. **Planting:**
   For each project, procedures for planting all types of trees and shrubs (whether container grown, balled and burlaped, or collected stock, including removal of shipping protections, backfilling, watering, fertilizing, pruning and staking, and application of pre-emergent weed killers) should be outlined before the work begins in consultation with a certified arborist. Instructions shall include but not be limited to the following:

   - http://hort.ufl.edu/woody/documents/EP314.pdf
   - Remove wire and burlap from tops of root balls of trees and large shrubs.
   - Treat all girdling roots before planting.
   - Do not mound mulch on top of root ball.
   - Mulch should be located a distance of **4"-6"** from the trunk.
   - Provide mulch ring in 6" high saucer around all trees and large shrubs outside of root ball.
   - Prune trees only as directed by owner or owner's representative. All pruning shall be done in accordance with ANSI A300. Pruning shall be done with sharp instruments and under the direction of the campus arborist. No flush cuts are allowed.
   - Trees shall be set on undisturbed existing ground at bottom of planting pit.
   - Tree planting hole should be shallower than the root ball, allowing the trunk flair to be seen 1" - 2" above the ground surface.
   - Large shade trees (**> 50'** in height) will have a minimum of **30' x 30'** area and be at least **10'** from the edge of pavement.
   - Medium size trees (**30'**-**50'** in height) will have a minimum of **20' x 20'** area and be at least *6'* from the edge of pavement.
   - Small size trees (**<** 3**0'** in height) will have a minimum of **10' x 10'** area and be at least **2'** from the edge of pavement.

SECTION F. MANAGEMENT GUIDELINES

The following guidelines inform pruning, cleaning, thinning, raising, reducing, mulching, irrigating, and fertilizing trees on campus. For information on palms, refer to the UF-IFAS guidelines.

Pruning:

In accordance with ANSI A300 Pruning Standards, the pruning schedule shall be dictated by tree species, age, function, and location, and shall be under the direction of a certified arborist:

- Trees less than **7** years old should receive structural pruning on an annual or biennial basis.
- Trees **7-20** years old should receive structural pruning every two to five years.
- Trees **20** years old and older receive maintenance pruning every five to seven years to clean dead, diseased, dying, and defective branches from the crown.
- Trees adjacent to roadways, walkways, signs, and street lights should be annually inspected for safety and clearance issues and maintenance pruned as necessary.

- ***Developing a Pruning Plan***
  http://hort.ufl.edu/woody/documents/plan.pdf
- ***Developing a Preventive Pruning Program, Young Trees***
  http://hort.ufl.edu/woody/documents/ch_12_mw04.pdf

To encourage the development of a strong, healthy tree, the following guidelines shall be followed when pruning:

- Pruning shall not be conducted without a clear objective or outcome.
- Prune first for safety, next for health, and finally for aesthetics.
- When removing branches, the pruning cut shall not damage the branch bark ridge and branch collar.
- Internode (heading) cuts should not be used except in storm response and crown restoration procedures.
- Branch reduction or thinning should be used to achieve pruning objectives rather than making large (**>8"** in diameter) branch removal cuts.

1. **Cleaning:**

Cleaning shall be performed to remove dead, diseased, dying, and defective branches, which reduces hazards, promotes, health, and improves appearance. Large branches should be removed with the aid of ropes and rigging equipment to minimize the risk of tree injury from falling debris. Native epiphytic plants— such as Spanish moss, other bromeliads, resurrection fern, and native orchids— should not be removed from campus trees except where they present safety hazards. Trees will be treated for pest problems, as needed, via systemic and or contact pesticides.

- ***Cleaning the Canopy***
  http://hort.ufl.edu/woody/documents/cleaning.pdf

2. **Thinning:**

Thinning shall be performed to reduce the density of branches, which increases light penetration, improves visibility, and decreases wind load:

- Assess how a tree will be pruned from the top down.
- Favor branches with strong, U- shaped angles of attachment. Remove branches with weak, V-shaped angles of attachment and/or included bark.
- Ideally, lateral branches should be evenly spaced on the main stem of young trees.
- Remove any branches that rub or cross another branch, as appropriate to the size and species of tree.
- Make sure that lateral branches are no more than one-half to three quarters of the diameter of the main stem to discourage the development of co-dominant stems.

- ***Thinning the Canopy***
  http://hort.ufl.edu/woody/documents/thinning.pdf

Do not remove more than one-quarter of the living crown of a tree at one time. If it is necessary to remove more, do it over successive years.

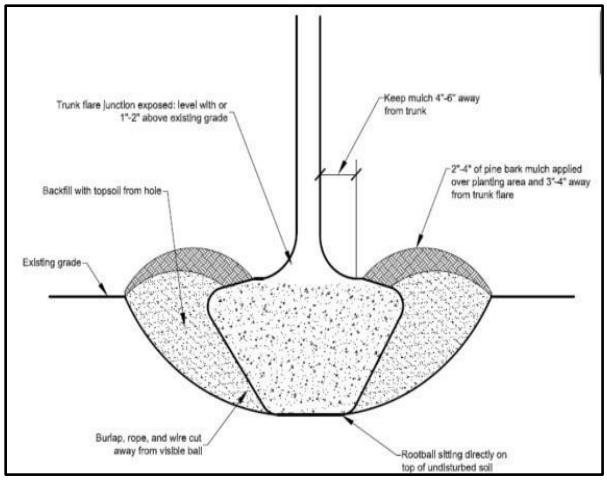
3. **Raising:**
Raising shall be performed to provide vertical clearance from thoroughfares, signs, street lights, and structures:

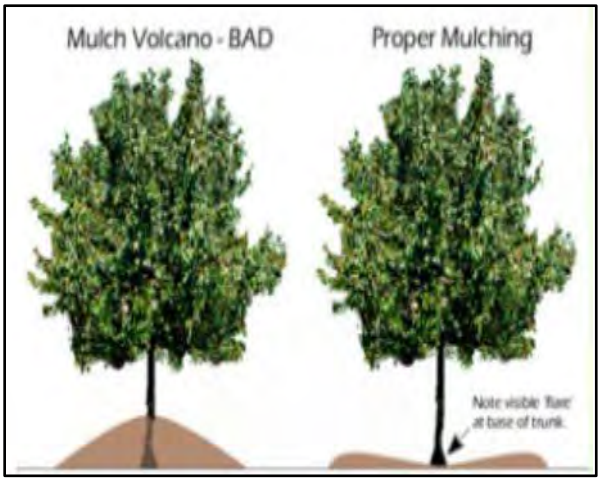
- Always maintain live branches on at least two-thirds of a tree's total height.
- Removing too many lower branches will hinder the development of a strong main stem.
- Remove basal sprouts and vigorous epicormic sprouts.
- ***Raising or Lifting the Canopy***
http://hort.ufl.edu/woody/documents/raising.pdf

4. **Reducing:**
Reduction shall be performed to decrease the overall height of a tree or to decrease the length of an individual branch. Reduction pruning will be used only when absolutely necessary.
- If it is necessary to remove more than half of the foliage from a branch, remove the entire branch. cuts will be made at a lateral branch that is a least one-third the diameter of the stem to be removed.
- ***Reducing the Canopy Pruning***
http://hort.ufl.edu/woody/documents/reducing.pdf

5. **Mulching:**
A layer of mulch will be applied within the established tree footprint up to every two years. Mulch should not be placed over the root ball of young trees. Periodically, drip lines of larger trees and tree groupings are mulched appropriately, as site conditions dictate, with waste wood chips. The use of cypress mulch is strongly discouraged. Refer to guidelines above on planting for more details. (Consult with USF Facilities Management for current USF preferred mulch)

6. **Appropriate mulching:**





7. **Irrigation:**
Irrigation water shall be distributed using the established UF-IFAS irrigation guidelines, which recommend water on a supplemental basis to allow for overall vigor after establishment or stress.

- ***Tree Establishment Research, What We Know and What We Don't Know***
http://hort.ufl.edu/woody/irrigation-research.shtml
- ***Irrigation Management After Planting***
http://hort.ufl.edu/woody/irrigation2.shtml

Size of nursery stock	Irrigation schedule for vigor [1, 3]	Irrigation schedule for survival [2, 3, 4]
< 2 inch caliper	Daily for 2 weeks; every other day for 2 months; weekly until established.	Twice weekly for 2-3 months
2-4 inch caliper	Daily for 1 month; every other day for 3 months; weekly until established.	Twice weekly for 3-4 months
> 4 inch caliper	Daily for 6 weeks; every other day for 5 months; weekly until established.	Twice weekly for 4-5 months

Notes on Irrigation: (disclaimer on irrigation requirements)

1. Delete daily irrigation when planting in winter or when planting in cool climates. Irrigation frequency can be reduced slightly (e.g**. 2-3** times each week instead of every other day) when planting hardened-off, field-grown trees that were root-pruned during production. Establishment takes **3** (hardiness zones **10-11**) to **4** (hardiness zones **8-9**) to **8** (hardiness zones **6-8**) to **12** (hardiness zones **2-5**) months per inch trunk caliper. Never apply irrigation if the soil is saturated.
2. Irrigation frequency can be reduced slightly (e.g. to once or twice each week) when planting hardened-off, field-grown trees that were root-pruned during production.
3. At each irrigation, apply **1-2** gallons (cool climates) or **2-3** gallons (warmest climates) per inch trunk caliper to the root ball. Apply it in a manner so all water soaks into the root ball. Do not water if root ball is wet/saturated on the irrigation day.
4. Trees take much longer to establish than regularly irrigated trees. Irrigate in drought the following summer.

8. Fertilizing:

There is no regular tree fertilization. Specimen or high-value trees may receive prescription fertilization when severe nutrient deficiencies are diagnosed.

SECTION G. TREE REMOVAL

Live trees are generally removed only when required to protect public safety or are detracting from the quality of the landscape. Trees will only be removed after consultation with both Physical Plant and Facilities Planning and Construction.

Storm response and recovery are generally accomplished in-house. In a crisis, the first priority is to remove tree debris that blocks campus thoroughfares, disrupts campus operations, or poses hazards to the campus community. Once these critical needs are addressed, a prioritized recovery plan is implemented during which unsalvageable trees are systematically removed and salvageable, and trees are pruned to restore their health and structure. As the tree planting budget permits, lost trees are strategically replaced to restore the structure and function of the campus urban forest in a reasonable time frame. During storm response and recovery, trees requiring specialized equipment not available in-house are addressed by outside contractors.

SECTION H. PROTECTION AND PRESERVATION

On the site survey map, all trees will be identified whose: root systems are likely to be impacted by construction equipment, cut and fill activities, utility corridors, proposed walks and roads, and potential construction staging areas; and whose branches may be damaged by construction equipment. The trees will be placed in one of the categories below:

1. **Not salvageable:**
   - All trees that are within the footprint, or in close proximity to the footprint of a proposed building. (Note: alternative footprints to save large, valuable trees must be considered).
   - Trees of undesirable species or in very poor health. Examples include, but are not limited to species that have low landscape and educational value, and heavily diseased or damaged

trees that have little chance of recovering desirable form and function, even if protected from construction damage.

2. **Low Priority for Protection:**
   - Small trees (**< 10"** DBH) that fall outside of the building footprint, but are likely to be impacted by construction activities.
   - Larger trees outside of the building footprint with relatively low ecological value. Examples include but are not limited to, trees with poor form, species of relatively low landscape and educational value, or trees with inadequate space to accommodate current or future growth even if the site is ameliorated.
3. **High Priority for Protection:**
   - Medium (**> 10"** DBH) to large (**> 24"** DBH) trees of desirable species with good form, good health, and sufficient room for continued growth.

Avoid locating the general construction site around low and high priority trees where possible by planning all construction activities including new utility corridors, staging areas, new sidewalks and new roads for a minimum clearance of **15'** or more away from the base of trees, and not within the edge of the canopy drip line (greater distances are desirable). High priority trees should receive more consideration than low priority trees in planning corridors, staging areas, walks, and roads.

SECTION I. TREE INVENTORY

In line with the Campus Metabolism Mapping Project conducted by the USF Patel College of Global Sustainability, a digital tree inventory and risk assessment (recording locations, species, DBH, conditions, and other useful information for the campus urban forest) covering the core campus should be developed and the information should be made available online on a dedicated website. The estimated value (in $USD and CO2 offsets) of all trees should be calculated or estimated, and the social, economic, and ecological functions of the campus treescape should be defined. Inventory valuations can be based on the trunk value method established by the Council of Tree and Landscape Appraisers and the International Society of Arboriculture. The inventory should be updated annually, taking advantage of online software applications such as TreeKeeper and iTree. As budget allows, each tree species on campus should be identified with appropriate signage in areas of high foot traffic.

To assist with USF's Tree inventory and evaluation a project proposal was developed by individuals at USF Facilities and Planning, Office of Sustainability, Florida Center for Community Design and Research and the University of Florida/ IFAS Extension, Hillsborough Extension and, the City of Tampa to implement technology and develop and provide technology and training materials to enable citizen-based tree inventory initiatives, and make this technology available to all college campuses and communities in Florida. The project was awarded funding by the Florida Forest Service with in-kind from USF and the City of Tampa. The technology was developed with tree and forest management in mind and the tasks of the project included:

- Implementation of the OpenTreeMap web application (www.opentreemap.org) and mobile data collection tools;
- Development of a visual key of urban tree species found in the Tampa area;
- Creation of training materials that demonstrate the use of the technology and the collection of field data;
- Conducted a student-led testing effort to ensure that students could use the technology and learn to conduct a tree inventory at USF;
- System utilization to inventory neighborhoods within the City of Tampa; and
- Development of plans to train USF students and staff to conduct tree inventory efforts on campus

The project was successfully completed with the launch of the TampaTreeMap.org website. The website is currently open to all potential users who wish to inventory trees within the City of Tampa and the USF campus. Funding to maintain the website system is being provided by the City of Tampa, with assistance by the University of Florida / IFAS Extension, Hillsborough Extension. Principal investigator, Shawn

Landry (USF), is working with Rob Northrop from UF/IFAS to design a training program for City of Tampa neighborhood groups, staff from the City, staff from USF, and students from USF. Funding will be requested of USF in order to support the use of the TampaTreeMap.org tree inventory website and training program. As of the date of this report, over 2,000 individual trees have been inventories within the Tampa and USF areas.

SECTION J. TREE DAMAGE ASSESSMENT

Assessment of trees for lightning strikes, root problems, and other damage should be performed by a certified arborist at USF. Enforcement of protection measures should be performed by project managers and on-site engineers.

SECTION K. PROHIBITED PRACTICES

1. **Bicycles:**
   Bicycles may be parked only at bicycle racks. Bicycles (and mopeds) are not allowed to be locked to any tree at any time.
2. **Signs:**
   No signs shall be affixed to any tree without prior approval of Physical Plant through the Space Impact process.
3. **Topping:**
   Topping, heading, hat-racking, or any other form of inappropriate crown/branch reduction pruning shall not be permitted for non-palm species except in emergency situations or in executing a crown restoration procedure.

SECTION L. EDUCATION AND COMMUNICATION

Currently, the landscape standards are communicated to project managers for inclusion into project specifications. Once approved, this plan will also be provided to USF Facilities Planning and Construction for inclusion into and use within construction projects. Additionally, information and data that accompany this plan will be posted on the Office of Sustainability website. The plan will be distributed to staff members in Physical Plant, including grounds maintenance teams and Facilities Planning and Construction. The plan will also be linked to USF's Climate Action Plan, Action Steps for the Designed Environment.

SECTION M. RESOURCES

- ***Landscape Plants***: Institute of Food and Agricultural Sciences, University of Florida. http://hort.ifas.ufl.edu/woody
- ***Tree Care Information***: Florida Chapter, International Society of Arboriculture. http://www.floridaisa.org
- ***A300 Standards***: Tree Care Industry Association. http://tcia.org/business/ansi-a300-standards

EXHIBIT I: BOTANICAL GARDENS

Laurie Walker
Department of Geography, Environment, and Planning
USF Botanical Gardens
Update: May 20, 2014

A. INTRODUCTIONS

When the USF Botanical Gardens was established in 1969, the Gardens were little more than wilderness, Lake Behnke was small and marsh-like, Fowler Avenue was a two-lane road and the University Mall did not exist. There were no pine trees, only native live oaks and turkey oaks. Very few people knew this small jewel existed. During the 1970s and 1980s, the Gardens served primarily as a teaching and research facility for the Biology Department at the University and was first located near the Police Station.

In the early 1970s, many of the temperate, subtropical and tropical trees and shrubs seen in the Garden today were planted. The greenhouses were moved from near the police station to their present location on site and the Gardens was fenced. A concrete block structure was built to serve as a potting shed and storage structure. This was later remodeled for use as an office building.

During the late 1970s and 1980s, the palm garden was established and the wetland forest and sand scrub beds were planted. The conservatory was built as a venue for classes and workshops and to display flowering specimens from the Garden's plant collections.

The Gardens experienced tremendous growth beginning in the 1990s, with the building of new structures and demonstration gardens. As a result, many new visitors have discovered the USFBG. The Plant Festivals attract plant enthusiasts from around the state to shop for rare and unusual plants. The Gardens serve as an important outreach component of USF. It is a portal the University with an estimated 35,000 visitors annually. Visitors to the Gardens have come from over 70 cities in Florida, 31 states, and 13 countries.

Today, the Gardens are part of the Department of Environmental Science and Policy in the College of Arts & Sciences. It consists of approximately 7 acres of developed gardens connected to an additional 6-9 acres of greenbelt area to the north on the southwest corner of the USF Tampa campus. The Gardens maintains a living collection of over 3,000 taxa of plants and natural habitats including: fruit trees, grasses, begonias, orchids, bromeliads, palms, aroids, gingers, carnivorous plants, cycads, cactus and succulent plants, an herb and scent garden, wetland forest, temperate forest, subtropical shade garden, and Florida upland scrub and sandhill habitats.

B. HISTORY OF THE USF BOTANICAL GARDENS

ca. 1968 – Garden established by Dr. Robert W. Long, Jr., Chairman of the Department of Botany and Bacteriology with the purpose of serving as a teaching and research facility for the Department. Its first location was near the Police Department. Dr. Richard Mansell named Interim Director for six months during Dr. Long's sabbatical at Harvard University.

ca. 1969 - Derek Burch hired as first part-time Director/Assistant Professor. The Garden moved to present location. President Allen provides funds for the relocation, construction of facilities including, a block house, greenhouses, a shade house, an irrigation system for 7 acres, and a fence for entire perimeter.

1969-1974 – Derek Burch establishes basic plantings including rain forest area, temperate forest and fruit tree collection. A student is hired half-time to take care of plants and lead limited tours for school groups and garden clubs

1975 – Full-time gardener position created. Biology Department creates Botanical Garden Advisory Committee (Dick Mansell, Clinton Dawes, Bruce Williamson and Diane TeStrake). Search for new Director is undertaken.

1975 – Frederick Essig hired as Director/Assistant Professor.

1975-1990 – Plantings continue. Computerized plant inventory developed. Palm Garden, Riparian Forest and Florida Scrub displays established. Early plant sales (beginning in 1978) earn about $2,000 annually. Newsletter established to inform university administrators and public of Garden activities. A small membership group of financial supporters develops.

1991 – Decision made to increase Garden outreach to public. Volunteer group established with the aid of USF Women's Club and students. First major plant festival organized, based mainly on participation by local plant societies. Newsletter expanded to 4 times/year. Blockhouse renovated into staff office with donation from Dr. and Mrs. Behnke.

1992-1998 – Board of Advisors established. Volunteer group provides major help in cleaning up Garden and running Plant Festivals; Conservatory renovated to serve as meeting room. New front gate built with gift from Behnkes. Herb Garden, Bromeliad Garden, Carnivorous Plant Bog displays established. Festivals and membership expand rapidly. Half-time curator position created to develop plant collections. Permanent retail plant shop established in 1994. Additional events added: Cactus and Succulent Show, Citrus Celebration, Lavender Festival, Butterfly Festival, Tropical Plant Fair. Program of weekend classes added. Ad hoc community advisory panel convened in 1996 to discuss future of Garden.

1998 – President Castor agrees to upgrade Botanical Garden into a major community-oriented facility and provides funds for a full-time Director and an operating budget. Garden moved to Environmental Science and Policy Program under the guidance of Dr. Renu Khator. National search undertaken for new Director.

1999-2000 -- Brad Carter hired as first full-time Director and given mandate to develop a strategic plan for the USF Botanical Garden. Shade garden, carnivorous bog, and welcome entrance from parking area established. Orchid collection receives first of three major donations. Master plan completed.

2001 – Laurie Walker hired as second full-time Director. Master plan approved by University and included in University master planning.

2002 – Gardens lose funding from College due to state budget cuts. Challenged to become self-supporting.

C. THE MASTER PLAN FOR THE USF BOTANICAL GARDENS

The following notes record the recommendations of a planning session held at the University of South Florida on November 8th and 9th, 2000. The purpose of the session was to prepare a comprehensive master plan for the 6-acre University of South Florida Botanical Gardens and the 3.5-acre greenway area along its north border. Prior to the planning session, the garden planning team prepared a facilities program and a survey map of the existing garden property. The facilities program and property survey served as the basis for planning.

D. PLANNING PARAMETERS

At the outset of the planning session, a number of key parameters were established that guided the subsequent planning approach.

It was established that the location of buildings and parking areas would be confined to the 6-acre existing Botanical Gardens property, and that use of the 3.5-acre area to the immediate north would be limited to trails, temporary structures, natural vegetation and plant displays.

It was established that the 36.5' elevation is the Lake Behnke 100-year flood plan, and that no parking or buildings would be located below this elevation.

It was noted that the existing vehicle entrance is unsafe and could be relocated to the Pine Drive frontage along the south boundary of the Botanical Gardens.

It was agreed that the large specimen dicots, particularly Live Oaks and flowering trees, should be protected to the maximum extent possible in the new plan. Groups of trees were established as more valuable than lone specimens. The palm collection was noted as being easier to move that the large dicots.

It was noted that the lake views available from the Botanical Gardens property should be capitalized on in the plan. The present garden plan does not exploit this site asset.

It was established that it would be highly desirable to have direct linkages between key use area, including the proposed Conservatory facility and the proposed education Center Building; between the multipurpose room and the event garden; between the Conservatory and its back-up greenhouse; between heavily used demonstration education and display gardens and the main building restrooms; and between the garden shop and the main entrance. It was determined that greater visibility of the Botanical Gardens from the surrounding streets would be desirable.

E. PLANNING RECOMMENDATIONS:

1. **Land Use Organization** – It is proposed that the primary Garden buildings be located in the east end of the site, service buildings in the northeast, parking and assess along the south edge, the collections and gardens in the center of the property, and natural areas in the far west and far north areas. This arrangement provides the following advantages:

    - Logical safe access from Pine Drive along a prominent public edge.
    - Buildings and parking are located in an area that does not require the removal of large established dicots.
    - Buildings will have good visibility from surrounding public streets.
    - Collections and gardens will be consolidated in a large contiguous area, not bisected or divided by roads or buildings.
    - Views to Lake Behnke will be available from many areas in the Gardens and the Gardens plan as a whole is oriented towards the lake.
    - Service buildings and access are peripheral and separate from the visitor facilities.
    - Natural areas capitalized on existing undeveloped habitats.

2. **Garden Circulation Pattern** – The garden elements are linked by a set of paths that define a loop system. Two axial paths extend from the Gardens main entrance; one that goes north to the Sandhill Natural area and onethe goes west to the Forested Wetland area. At the end of each of these axial paths is a small shade pavilion that will be a site for interpretive information and a place for teachers to pause on a tour and talk with students. These are called "teaching pavilions." The two teaching pavilions are connected with a third major path that roughly parallels the shore of Lake Behnke. These three paths frame the core of the collections. The paths would be paved and graded for universal access. To the north and west of the core area paths, trails will be developed into the wetland and the Sandhill community.

3. **Vehicular Access and Parking** – It is proposed that the main entrance to the Gardens be relocated on Pine Drive along the south boundary of the Gardens property. Safe sight distances should be established between the entrance and intersections to the east and west. The plan shows a through-driveway arrangement with two exit and entry points. Two-way flow on the driveway is accommodated in the plan, however, it may be determined that a one-way system is preferred for traffic flow reasons not explored in this study. The two-way system offers greater flexibility and is desirable for that reason. The plan provides a pull-off lane for bus and automobile passenger drop-off, and parking spaces for 47 automobiles, including spaces for the disabled. The parking area is parallel to and close to Pine Drive to keep the parking at the perimeter of the property and make economical use of the land.

It is proposed that the street edge between the Gardens parking and the street curb be planted with distinctive, large flowering trees or palms. This will establish a signature identify for the Botanical Gardens along its most prominent edge. The planting should be a strong, singular, unified gesture that is in keeping with the scale of the Pine Drive corridor and recognizes the speed of viewers. Detailed planting along this edge would not be appropriate; bold strokes are required. It is also recommended that a wall be developed along the road edge to visually screen parked cars and provide security. A wall is preferred over a fence because of the level of quality imparted by a wall.

4. **Building Complex** – It is proposed that the Education Center, Conservatory, back-up greenhouse and maintenance buildings be located in the east end of the Gardens property. This will minimize the removal of large dicots and consolidate buildings as a barrier between the street and the interior of the Gardens. The proposed configuration established a strong tie between the parking area and the Education Center and the visitor reception area, and defines a large one-half acre area courtyard devoted to gardens, including perennial garden, herb garden, enabling garden, carnivorous plant bog, and the woody plant collections. The courtyard is surrounded on four sides by a colonnade that would be roofed on three sides and an open trellis for vines on the west side. The courtyard would be fully irrigated and made accessible by a regular pattern of garden paths.

   In the southeast corner of the complex, a walled Event Garden would be developed in close association with the multipurpose room of the Education Center. This garden will provide a semi-private venue for meetings, seminars, workshops, speaker events and revenue generating events. Its location allows clear access from the parking area, and separation from other Gardens areas that may be used simultaneously by visitors and other groups. The Conservatory would be accessible from the Event Garden.

   The Conservatory is proposed as a modular structure that may have a tall ceiling central area with wings subject to climate control. This would allow for the development of partitioned dry, wet, hot and cool areas within the Conservatory. The primary access would be from the west. The yard area to the east of the Conservatory could be used for related outdoor display space or as a service area devoted to Conservatory support. The back-up greenhouse is linked to the Conservatory via the arcade. The area north of the back-up greenhouse is designated for research greenhouses. Maintenance, nursery and production areas are located in the northeast corner of the building complex. A service gate on to Pine Drive to the east would serve these.

5. **Entrance Patio and Shade Garden** – An entrance patio and shade garden is proposed to the immediate north and west of the main pedestrian entrance to the garden. This area takes advantage of an existing group of large Live Oak trees and a large existing Floss Silk tree. New shade plantings are proposed to frame a narrow view from the patio to Lake Behnke. A glimpse of the lake from this location from under the shade of the large oaks will provide a dramatic and enticing first view into the collections arranged between the lake and the Gardens entrance. The patio will be enlivened with a small water feature that will serve as a focal foreground element upon arrival at the Gardens; and make a sensory link to Lake Behnke in the distance. The Shade Garden path defines an informal circuit from which shade-loving plants can be viewed. Benches should be provided because this will be a popular area to sit during hot periods. The garden opens to the two main axial paths, and on the Vista Lawn to the northwest.

6. **Demonstration and Children's Area** – A Home Demonstration area and Children's Garden are located along the west axis path, west of the Shade Garden. A large open pavilion for gatherings, classes and workshops is associated with these gardens and will serve as the bases for teaching activities in this part of the Gardens. The area would include fruit trees, vegetable gardens, flower gardens and a variety of educational displays for homeowners such as composting and pest management.

7. **The Children's Garden for Children** – A dense evergreen hedge is planted along the south edge of this area to prevent children from going into the parking area. The hedge may be developed as a multi-tiered demonstration.

8. **The Core Area Collection** – It is proposed that the area bounded by the Forested Wetland on the west, Lake Behnke on the north, the Building Complex on the east, and the Shaded Garden and the Demonstration Gardens on the south be developed as the core collection of woody plants. The proposed arrangement is to locate the plants in large beds informally arranged on a gently sloping lawn overlooking the lake. Plantings within the beds would be dense and layered with canopy and understory species. While the collections may include Florida natives, it is recommended that the core area collection focus on non-invasive, non-natives, including dicots, palms and cycads. This focus recognizes that the large Forested Wetland and Sandhill area will be the locations where Florida natives will be accommodated. The central lawn around which the core collections will be arranged is also planned as the site for large group gatherings and events. This area is not large enough to meet the demands of the annual Gardens plant sale. It is, therefore, recommended that future plant sale events be held at an offsite location with appropriated vendor space, parking, restroom facilities, water, security, and shade as may be required.

9. **The Vista and Overlook** - It is proposed that successively wider framing plants proceeding from the Shaded Garden to the northwest frame the view from the entrance patio. At the westernmost extent of the view axis on Gardens property, it is proposed that a scenic overlook be developed. The view for the overlook will be directed northwestward to the densely vegetated west shore of the lake, and attempt to avoid focusing on the hospital buildings to the north and Bruce B. Downs Boulevard to the west.

EXHIBIT II: FOREST PRESERVE

USF FOREST PRESERVE WHITE PAPER *

* Approved by the USF Board of Trustees as a part of the Campus Tree Care Plan

Gordon A. Fox, David Lewis, Earl D. McCoy, and Henry Mushinsky
Department of Integrative Biology
September 2013

A. INTRODUCTION

The USF Forest Preserve (FP) is a major asset to the University. It is used extensively for student and faculty research. More than 70 research papers in the peer-reviewed literature have been focused on the FP, as have more than 20 M.S. theses and Ph.D. dissertations. USF researchers from the departments of Anthropology, Civil Engineering, Geography, Geology, and Integrative Biology have conducted research at the FP in the last 5 years. Undergraduate and graduate classes from Anthropology, Geography, Geology, and Integrative Biology have similarly made use of the FP.

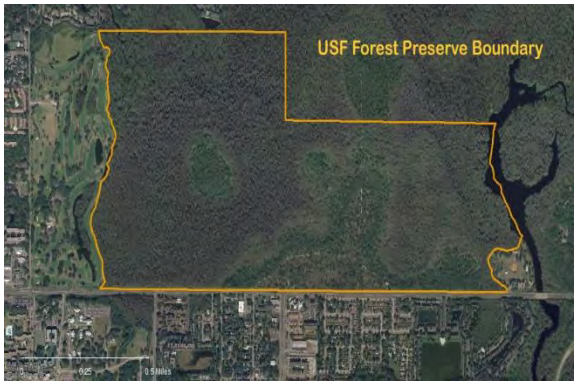


Figure 1. Satellite Image of FP

The FP comprises roughly a square mile of land (Figure 1), located north of Fletcher Avenue, roughly between the Golf Course and Riverfront Park. It has been administered by the Biology (and subsequently, Integrative Biology) Department since 1960s, with the goals of conservation, teaching, and research. Starting in the 1970s, a series of experimental burn plots were established, mainly along Fletcher, and controlled burns were conducted until 2005. Since then it has been difficult to meet the regulatory standards for prescribed fires, and they have not been conducted in the last few years. The FP has been protected for many years by being incorporated in the Master Plan.

B. HOW THE FP IS USED

1. TEACHING

The FP provides a resource unlike any other for courses. In the last several years, the FP has been used by these classes:

- Principles of ecology (PCB3043L)
- Population biology (PCB6462C)
- Statistical ecology (PCB6455)
- Wetland environments (EVR4027)
- Ecosystems of Florida (EVR4930)
- Soils in archaeological research (ANG 6115.001)
- Diversity and evolution of plants (BSC4933)
- Hydrogeology field methods (GLY4947L)
- Ecology of plants (BSC4933)
- Ecohydrology (GLY6824)
- Herpetology (BSC 5425)


Figure 2. Dr. Earl McCoy and students.

Moreover, numerous undergraduate students have participated in unstructured coursework, conducting research in the FP. In a typical year, some 15-20 students gain research experience

through this route. The FP has also provided an important resource for student research. A few examples of student research there within the last several years include:

- Maria del Pilar Lopera Blair (Ph.D. student, IB): gene flow and speciation in *Liatris*.
- Neal Halstead. (M.S., IB): fire in an urban habitat island
- Dave Jennings (Ph.D. student, IB): competition between plants and animals
- Stephanie Butera (Honors thesis, Anthropology): decomposition processes and soil chemistry
- Additional research by Ph.D. students from University of California-Davis and Louisiana State University.

2. FACULTY RESEARCH

A considerable number of short- and long-term faculty research projects are conducted in the FP. One can get an impression of the breadth of these projects by considering the following, all of which have been conducted within the last several years.

- Dr. Erin Kimmerle (Anthropology): changes in experimental gravesites.
- Dr. Mark Ross (Civil & Environmental Engineering): hydrology of Florida sandhills.
- Dr. Ruiliang Pu (Geography): remote sensing to estimate environmental parameters.
- Dr. Jason Rohr (Integrative Biology): causes of amphibian decline
- Dr. Mark Rains (Geology): water availability to vegetation.
- Shawn Landry (Architecture): urban forests.
- Drs. Earl McCoy and Henry Mushinsky: studies of the gopher tortoise

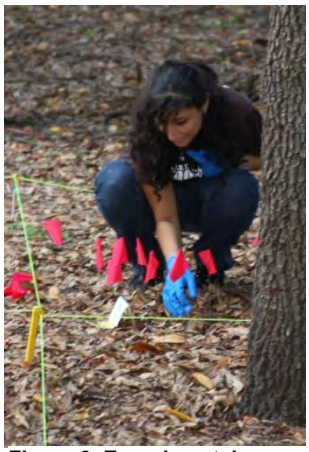


Figure 3. Experimental grave site research.

Figure 4. The sandhill habitat has been the site of much student and faculty research.

Over the years, USF's ability to attract externally funded research grants has been considerably strengthened by the FP. In some cases, the FP itself proved to be the location of funded research, such as in the 2002 NSF grant (for $2.2 million) to E. D. McCoy and H. Mushinsky on "upper respiratory tract disease and environmentally threatened gopher tortoises." In other cases, research at the FP provided the initial data to support the case for external grants.

Perhaps the most telling measure of the FP's importance for research at USF is the list of more than 70 peer-reviewed publications based on research there.

3. SERVICE

In recent years, the FP committee, together with the Botanical Garden, has organized wildflower walks involving dozens of people from the community. Tampa Audubon Society conducted a segment of its Christmas Bird Count in the FP.

The FP directly abuts Riverfront Park. We have cooperated with the Campus Recreation department to develop a self-guided nature walk through the FP, to educate students.

C. THE FUTURE OF THE FP

The FP has, for several decades, been a resource of considerable value to USF as an outdoor classroom, and as the laboratory for many studies. We believe it is possible for the University to get more value from the FP in both of these respects, and in some others as well. The value of the FP in both of these senses stems from the fact that it is a stone's throw from the main campus, yet is large and relatively wild, and has diverse habitats.

Figure 5. The extensive wetlands in the FP are an important part of USF's interaction with the environment of Tampa Bay, and also provide opportunities for teaching and research.

Two other aspects of the FP make it particularly valuable for research. First, it preserves the last remaining sizable patch of sandhill habitat in the area. Many species of animals and plants that depend on this kind of habitat and are present in the FP would otherwise be absent from a substantial area. Second, the FP is near the edge of a substantial "island" of undeveloped land that is surrounded by increasing urbanization. This presents numerous opportunities for research, teaching, and community outreach. This also means that the FP plays an important role in such ecosystem functions as CO_2 uptake and regulation of runoff, and thus its preservation may be increasingly important to the university.

Finally, the Department of Anthropology has special interest in some areas of the FP. These may be important in future research, but in any event the university has a legal obligation to protect the resource.

D. MANAGEMENT ISSUES & RECOMMENDATIONS

There are a number of management issues facing the FP and the university's ability to use it more effectively. Our central recommendations involve institutionalizing USF's support for the FP's mission. Here we outline the particular issues faced by the FP, and recommend ways in which they may be addressed.

1. PUBLIC FACE

At present the FP has no public face save some web pages on the IB Department's web site. There is a fence along Fletcher Ave., and the gates have faded signs telling the public that they may not trespass.

- **Recommendation 1***:* develop an attractive web site for the FP. A well-maintained website will prove useful for those interested in research or teaching there. It will also be an important avenue by which USF can publicize its preservation of this important resource.
- **Recommendation 2***:* install new signage. New signage along Fletcher Avenue and at trails that enter the FP from adjacent properties can be a low-cost way of simultaneously reducing trespassing and publicizing USF's mission.

2. MANAGEMENT

Land management issues include physical maintenance of fencing and fire lanes, control of invasive species (including feral hogs as well as such plant pests as *Melaleuca* and cogongrass), and maintenance of signs.

Figure 6. We need to manage the FP's resources.

Both trespassing and poaching occur in the FP with some regularity. Much of the trespassing is benign, but it requires regular checking both because USF may face liability issues and because some trespassers may cause fires. Similarly, incidents of poaching have occurred in the FP. Here the principle concern is the safety of those involved in teaching or research.

- **Recommendation 3***:* establish a Director of the FP as part of a faculty position. The Director's job would be to expand and coordinate research and teaching in the FP, seek external funding for the FP, and coordinate the use of the FP in public outreach work. We envision this as constituting a significant part of a faculty appointment.
- **Recommendation 4***:* Hire a manager for the FP. At least initially, this can be a half-time position. The manager would report to the Director. The manager will, among other duties, coordinate and conduct much of the regular maintenance work, check many areas for signs of unauthorized use, supervise the maintenance of a database on permitted uses, and prepare and organized prescribed burning.
- **Recommendation 5***:* Provide an annual budget for maintenance and management.

3. PRESCRIBED BURNING

Fire is a key feature of Florida ecosystems, and this is true in the FP. Many of the habitats in the FP are normally fire-dependent. Moreover, many species – especially the threatened gopher tortoises – depend strongly on frequent fire to maintain appropriate habitat. Without fire, the value of the FP to USF will decline. Moreover, without a fire program, the chance of wildfire – started by lightning strikes, cigarettes or sparks from passing vehicles, or by trespassers – greatly increases, and as fuel accumulates, the potential liability to the university increases as well.

Figure 3. The FP has been one of USF's best-kept secrets. It's time to make it one of our best-known assets.

Faculty in the IB Department have conducted prescribed fire in the sandhill portion of the FP, but in recent years regulations and lack of resources have made this quite difficult to do. Because the FP is in an urban setting, permits for prescribed fires can only be issued under a narrow range of weather conditions. However, burning also requires trained and licensed personnel, and proper equipment – none of which the IB Department nor the university have.

- **Recommendation 6***:* Purchase appropriate equipment for maintaining fire lanes, or (more likely) contract with others to provide the equipment.

- **Recommendation 7***:* work with urban forestry professionals to inventory the biological resources of the FP and develop a burning plan.
- **Recommendation 8:** contract with others to conduct the prescribed burning.

4. GROWING THE FP'S USE

Key to the success of the FP will be to develop new opportunities. These include interactions between departments to use the FP in new and creative ways, proposals for research grants, proposals for grants to the FP as an institution, development of small courses, public tours, and interactions with other universities and government agencies.

- **Recommendation 9**: provide university resources and connections to the Director. The Director position needs to be meaningful. The University can provide important support in several ways, for example, by collaborating on fund-raising with the Director.
- **Recommendation 10**: establish an Advisory Board. The board would be composed of representatives of those USF departments with a stake in the FP, as well as representatives from the community. The mission would be to support the Director's efforts to develop new opportunities.
- **Recommendation 11**: seek membership in national organizations of research stations. Doing so will help establish USF's presence in organized environmental research, and will encourage cross-fertilization of ideas with other universities.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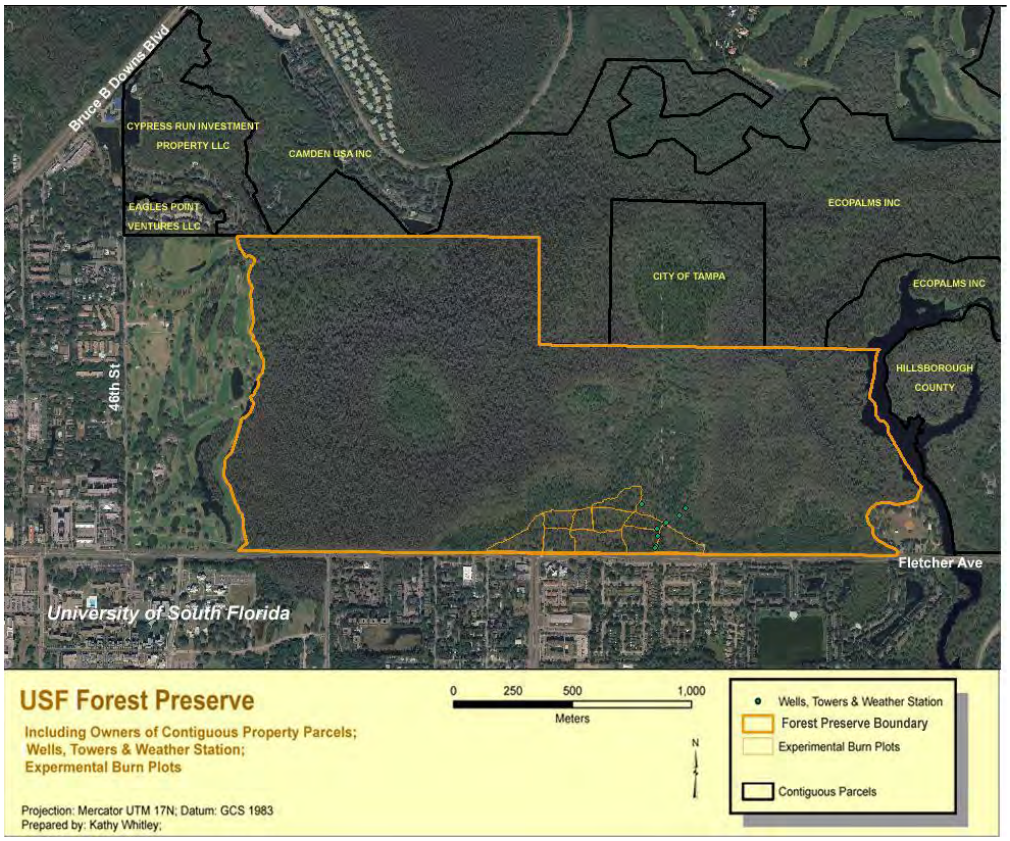
CORRIDOR
PASCO COUNTY
WESLEY CHAPEL
ZEPHYRHILLS
County Line Rd
CRYSTAL
SPRINGS
PARK
HILLSBOROUGH COUNTY
Interstate 275
Interstate 75
Morris Bridge Rd
HILLSBOROUGH RIVER
STATE PARK
TAMPA PALMS
Hillsborough River
Bruce B Downs Blvd
US Highway 301
Lettuce Lake
UNIVERSITY OF
SOUTH FLORIDA
Fletcher Ave
Lake
Thonotosassa
USF Forest Preserve
The USF Forest Preserve is at the base of a series
of connected wildlands in Hillsborough and Pasco Counties
3km
esri
Source: USGS
Source: NASA, NGA, USGS
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstop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COUNTY
46th St
Fletcher Ave
University of South Florida
USF Forest Preserve
Including Owners of Contiguous Property Parcels;
Wells, Towers & Weather Station;
Expermental Burn Plots
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Wells, Towers & Weather Station
Forest Preserve Boundary
Experimental Burn Plots
Contiguous Parcels
Projection: Mercator UTM 17N; Datum: GCS 1983
Prepared by: Kathy Whitley;