

Louisiana State University Design Standards

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INTRODUCTION

1 GENERAL

- 1.1 The Design Standards presented herein are intended to assist architects, engineers, design professionals, contractors and LSU staff in understanding the standards of the University in the development, construction, maintenance and repair of facilities. These standards are to be used in the design and construction of new and remodeled buildings, site enhancements and infrastructure.
- 1.2 These are NOT SPECIFICATIONS. The legal responsibility for project document preparation shall continue to reside with the Design Professional.
- 1.3 LSU's intent is to build cost-effective buildings and infrastructure without restricting the Design Professional's latitude for innovation. Architects and other designers are encouraged to propose innovative and cost-effective variations that meet or exceed these Design Standards. However, any deviation must be brought to the attention of the Planning, Design & Construction department for review prior to incorporation into the project.

2 REFERENCES & RESOURCES

- 2.1 Master Plans
 - 2.1.1 LSU Master Plan
 - 2.1.2 LSU Master Plan Appendices
 - 2.1.3 LSU Hilltop Arboretum Master Plan
 - 2.1.4 LSU ADA Compliance Plan
- 2.2 Guidelines & Standards
 - 2.2.1 LSU Design Guidelines
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 - 2.2.3 LSU Site and Landscape Guidelines & Standards
 - 2.2.4 LSU Wayfinding Guidelines
 - 2.2.5 LSU Interior & Exterior Room Signage Guidelines
 - 2.2.6 LSU Room Numbering Guidelines

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DIVISION 00 – PROCUREMENT & CONTRACTING

1 DOCUMENTS

1.1 The designer is responsible for using the most up-to-date information required by LSU; this may include the following documents.

1.1.1 Bid Documents (if applicable)

1.1.1.1 Advertisement / Invitation to Bidders

1.1.1.2 Instructions to Bidders

1.1.1.3 Bid Form

1.1.2 Contract Documents

1.1.2.1 Contract between Owner and Contractor

1.1.2.2 Plans & Specifications including all addenda

1.1.2.3 General Conditions, AIA 201

1.1.2.4 Supplementary Conditions

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DIVISION 01 - GENERAL REQUIREMENTS

1 BARRICADES, TEMPORARY FACILITIES AND CONTROL

- 1.1 The contractor shall install fences and/or barricades as necessary for the protection and safety of pedestrian and vehicular traffic and for protection of trees and shrubbery (see Division 2). Fences shall be detailed and shown on the contract documents. Unless otherwise stated on the construction drawings, construction fences shall be 6' chain link fencing with a lockable access gate for (see Division 2).
- 1.2 If the construction period exceeds 90 days, then 4' chain link fencing shall be installed at the drip-line of each tree as an additional protective barrier. These barriers shall be maintained by the Contractor for the duration of the project.
- 1.3 In the case that a designated crossing or any portion of a designated pedestrian route cannot be maintained, Contractor shall be responsible to provide necessary signage to redirect pedestrian travel, as necessary, to ensure an alternate safe route. See Traffic Control Plan.
- 1.4 Construction access route in/out of the project site and location of a staging area are to be shown in the construction drawings. Contractor's work zone, equipment and material storage will be restricted to the specific areas indicated on the plans. It is the responsibility of the Contractor to keep the project site and staging area secured. Proposed location of dumpsters, portable toilets, field operation trailer, lay down areas, storage containers, perimeter construction fence, etc. are to be shown in the staging plan.
- 1.5 Contractor is to maintain pedestrian access to the building's main entrance during construction. If the building's main entry is to be affected by construction, Contractor is to provide temporary access through an alternate entry and make any necessary accommodations to meet ADA requirements.
- 1.6 Unless otherwise stated on the construction documents, the construction fence is to have a fence screen wrap with pre-approved LSU Graphics. Production proof from vendor needs to be pre-approved by LSU before going into production.
- 1.7 Unless otherwise stated on the construction documents, a project identification sign on a 2x frame is not required. Instead, a 4 ft. x 4 ft. project identification banner installed over the construction fence screen is acceptable. Project identification banner is to be located near staging area access gate and include project name, project rendering (if available), Designer and General Contractor's company logos, LSU Planning Design & Construction and Facility Planning and Control logos, as applicable. Production proof from vendor needs to be pre-approved by LSU before going into production.

2 ACCESS, DAMAGE TO EXISTING STRUCTURES AND TRAFFIC RESTRICTIONS

- 2.1 The Contractor shall be permitted access to the site at the University's convenience. The Contractor shall be responsible for any repair and/or replacement of existing lawns, ditches, concrete sidewalks or gutters, fencing or any other structures, including utilities damaged by the Contractor's operations. The Contractor shall conduct a pre-construction site survey to document the existing conditions of the project site, access routes, and/or any adjacent areas that could be affected during construction and to report any damage that had not been previously identified. If no such damage is recorded, then any structures over which the Contractor has crossed during construction which are later found to be damaged shall be considered to have been damaged by the Contractor and shall be repaired and/or replaced by the Contractor at no cost to the University. The structure(s) must be returned to their original condition to the satisfaction of LSU.
- 2.2 The University shall designate areas for parking. The construction operations of the Contractor may not cause any obstruction to the free flow of traffic on the streets of the campus without the prior authority of the University.
- 2.3 Any work performed by LSU Facility Services to repair any damage done to LSU property and/or to address any traffic control matters not addressed by the Contractor will be charged to the Contractor's MOT Account. See Temporary Utilities for information on Contractor's MOT Account.
- 2.4 Traffic Control Plan

- 2.4.1 Contractor is to provide a Traffic Control Plan (TCP) prior to mobilizing into the project site. All construction activity impacting roadways (vehicular access) or sidewalks (pedestrian access) shall have a written Traffic Control Plan (TCP) and access plan. The TCP and access plan is to be submitted at the preconstruction conference (or Prior) for review and comment by the Office of Parking and Transportation Services.
- 2.4.2 The responsibility and implementation costs for any TCP required before, during, or after the project construction activity, shall be the responsibility of the Contractor. These costs shall include all labor and equipment necessary to meet the requirements of the TCP, including all reimbursement costs to the Office of Parking and Transportation Services for special traffic direction, construction parking enforcement, or other personnel utilized to provide and assure the safety of LSU during the construction.
- 2.4.3 The TCP shall follow the standards found in the Uniform Manual for Traffic Control Devices issued by the State Department of Transportation (DOTD), except as modified by the Office of Parking and Transportation Services.
- 2.4.4 Cost and convenience should always be subordinated to the safety of the students, faculty, employees, and visitors on the LSU campus.
- 2.4.5 Provide flagmen and police escorts and traffic control when required by authorities having jurisdiction and as needed to provide public safety during construction operations.

3 TOILETS

- 3.1 The Contractor shall provide and maintain temporary toilets as necessary for use of workmen, unless otherwise noted. Locate toilets within staging area or where directed by LSU, and keep toilets in sanitary condition.

4 PROTECTION AND SECURITY

- 4.1 The Contractor shall at all times be responsible for ensuring the safety of all occupants and users of the building from injury or damage resulting from any contact with the work, workmen, or equipment. The Contractor shall at all times be responsible for protecting building, property and contents during construction.
- 4.2 Contractor is to coordinate in advance any operations that may result in high levels of noise, vibration, odors, or any other activity that may cause disturbance or nuisance to occupants of the building or to anyone in close proximity to the project site. Contractor is to notify User Agency's representative and the Architect at least (3) working days in advance of proposed disruptive operations.
- 4.3 Contractor is to adequately seal work zones and take necessary measures to ventilate areas directly to the outside to minimize disturbance or discomfort caused by odors emitted by certain products during their installation and/or schedule the work outside of normal working hours, to the extent possible.
- 4.4 The use of products that create harmful fumes, vapors, gases, or mists are prohibited. If Contractor has any questions regarding a product, Contractor is to notify Architect and LSU PM prior to use. LSU PM will consult with LSU Environmental Health and Safety for their evaluation.
- 4.5 Contractor is to provide laminated identification badges for all Contractor personnel working on the project site and require all personnel to wear a uniform shirt identifying plainly the company name.

5 DEMOLITION AND WORK RESTRICTIONS

- 5.1 The Contractor shall perform all demolition necessary or required to complete the work shown on the drawings or described in the specifications. Take special precautions to protect existing work which is to remain in place or to replace or repair any damage to such work.
- 5.2 The Contractor shall establish construction waste management plan to ensure 50% (by volume) is diverted from the waste stream (salvaged, recycled, or reused). Separate containers shall be provided onsite by the contractor for source separation by all job-site personnel.
- 5.3 Quantities shall be tracked and final documentation and verification of landfill diversion records should be provided to LSU with final application for payment. Final report of construction debris tonnage (and volume)

shall be submitted to LSU Recycling. This department can also provide contacts for recycling materials. Designer shall add a spec outlining the expectation of the management plan.

5.4 Environmental Health and Safety

5.4.1 Contractors are notified that Louisiana State University buildings may have existing asbestos containing material (ACM). Prior to the commencement of any work on a project, to determine which requirements of LAC 33:111.5151 (Emission Standard for Asbestos) apply, the owner or operator of a demolition or renovation shall thoroughly inspect the affected building or part of the building where the activity will occur for the presence of asbestos. The inspection shall be performed by an inspector accredited by the Louisiana Department of Environmental Quality. The inspection will identify all asbestos containing material, and all suspect (for asbestos) material involved in the scope of work. All suspect (for asbestos) material is assumed to be asbestos containing, and shall be handled as asbestos containing unless sampling proves otherwise. Once the inspection is complete, a copy of the inspection report shall be provided to LSU PDC and LSU EHS.

5.4.2 Caution shall be taken during all phases of the renovation, demolition, and construction process to prevent any contact or disturbance of suspect ACM that was not previously identified. If suspect ACM is discovered by a contractor which was not previously identified (all pipe insulation within enclosed walls is expected to contain asbestos), the contractor shall: stop work, assume the material contains asbestos, and notify LSU EHS by telephone at 225-578-0534 or 225-578-5146 and also via e-mail at mcobb9@lsu.edu.

5.4.3 If the material is asbestos containing, two notifications to the Louisiana Department of Environmental Quality (LDEQ) are required in accordance with LAC 33:III.5151.F.2.d.xvi & e. The notification to LDEQ shall be provided as soon as possible. The notification shall include the date and hour the unexpected suspect asbestos material was discovered.

5.4.4 Notifications

5.4.4.1 LDEQ Office of Environmental Services: DEQ.AsbestosNotifications@la.gov

5.4.4.2 LDEQ Regional Office responsible for inspecting the project: CROasbestos_admin@la.gov

5.4.5 At the completion of any renovation of a space or new construction, the architect shall provide a signed statement that no asbestos containing building material (ACBM) was specified as a building material in any construction documents, or to the best of his or her knowledge, no ACBM was used as a building material in the space or building. This is in accordance with LAC 33:III.2735.A.7 – Exclusions, and a copy shall be submitted to LSU EHS for filing in the asbestos management plan.

5.4.6 Contractors are notified that Louisiana State University buildings may have hazardous material. Hazardous materials include but are not limited to light bulbs, PCB light ballast, paint, solutions, and any unknown material in a container. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify LSU EHS by telephone at 225-578-5146 or 225-578-5640 and also via e-mail at lpepitone@lsu.edu.

5.4.7 It is the general contractor's responsibility to make sure their subcontractors are aware of the possible presence of asbestos containing and hazardous materials.

5.4.8 LSU EHS will need equipment information on all projects that affect the LSU Title V Air Permit. EHS will need data on new equipment, and data on modification or replacement of existing equipment. Equipment included in the request includes: boilers or water heaters operated by natural gas, generators operated by diesel or natural gas, fuel or chemical storage tanks, cooling towers, and any equipment with an exhaust stack. This information shall be reported to Lisa Pepitone at 225-578-5146 or lpepitone@lsu.edu

5.5 In addition to calling Louisiana One Call, Contractor is to submit a Utility Locate Request Form to obtain an Excavation Permit from LSU Facility Services prior to any digging at project site. Form is to be submitted at least 48 hours in advance.

5.6 Contractor is to submit a Utility Shutdown Request Form to LSU Facility Services two weeks in advance to any utility shutdown. Any required shutdown are preferred when school is out of session. Any shutdowns shall be coordinated with LSU PM through the Architect.

- 5.7 LSU Facility Service forms can be found at www.lsu.edu/fs by selecting “Forms” under “About” dropdown menu.
- 5.8 Any work performed by LSU Facility Services related to Utility Locate Requests/Excavation Permits and/or Utility Shutdown Requests may be charged to the Contractor’s MOT Account. See Temporary Utilities for information on Contractor’s MOT Account.
- 5.9 Unless otherwise stated in the Construction Documents, Contractor is to limit work to normal business hours (7:00 a.m. to 5:00 p.m.), 7 days a week except Fridays afternoon and Saturdays of Home Football games, unless specifically granted otherwise by the Owner in writing. Any and all requests for changes in work hours or work days must be presented to the Architect at least (3) working days prior to the requested change. In addition, Contractor is required to start cleaning the project site on Noon of the Friday before a home football game. Residential Life projects may have different restrictions to accommodate the needs of residential students. Such as limiting working hours from 8:00 a.m. – 7:00 p.m. Monday through Friday and weekend hours from 9:00 a.m. to 6:00 p.m., unless otherwise indicated.
- 5.10 Contractor is to review academic calendar and limit work during Dead and Exam week to quiet work.
- 5.11 Contractor is to comply with any limitations on the use of public streets or any other restrictions imposed by the authorities having jurisdiction.
- 5.12 Contractor is to provide advanced notice for any activity that could create dust, noise, or strong odors. See Protection section.
- 5.13 Smoking, E-cigarettes, or the use of tobacco products are not allowed on LSU Campus.

6 TRASH AND DEBRIS REMOVAL

- 6.1 The Contractor shall not permit trash and debris to accumulate in the building or on the ground in the vicinity of the building. They shall establish and maintain a regular daily routine for removing trash and debris and hauling it away from the premises. The University shall have first salvage rights to any material or equipment removed from campus buildings. Any ornamental iron work, decorative light fixtures or hardware of historic nature shall be turned over to Facility Services
- 6.2 The Contractor shall be responsible for the removal and offsite disposal of all trash and debris from the campus originating from his project.
- 6.3 The use of LSU dumpsters is prohibited.

7 CUTTING AND PATCHING

- 7.1 Cutting and patching for all work in the project shall be the responsibility of the Contractor. They shall make neat and substantial joints between existing and new work, including patching, painting, finishing, etc. Patching shall be done to match existing construction as closely as possible. All work shall be left in a complete and finished condition, including existing surfaces affected by work in this contract.

8 WARRANTY PERIOD

- 8.1 All workmanship, materials, and equipment shall be guaranteed for a period of one year from the date of the official acceptance of the Contract, unless a longer period is stated in the specifications or in manufacturer's literature.
- 8.2 When items of equipment or material fail to perform or to give satisfactory service during this warranty period, the Owner may require that corrections be made even to the extent of installing new equipment or materials. When this becomes necessary, the warranty period shall extend for a period of one year from the date of acceptance of the new installation. The extended warranty period shall apply only to those items which have not performed satisfactorily.

9 ELECTRONIC SUBMITTALS

- 9.1 For purpose of clarity, Contract Documents include
 - 9.1.1 Paper and Digital Construction Drawings
 - 9.1.2 Paper and Digital Text Documents that include Construction Specifications (Specs), and Operation’s Manual (O&M)

- 9.2 These guidelines are exclusively for electronic deliverables. Guidelines for submittals other than electronic media are specified elsewhere in the Contract Documents
- 9.3 Unless specified otherwise in the Contract Documents, the Consultant shall submit electronic deliverables at the following stages of the project
 - 9.3.1 Programming
 - 9.3.2 Schematic Design
 - 9.3.3 Design Development
 - 9.3.4 Construction Documents
 - 9.3.5 Project Closeout
- 9.4 Electronic deliverables for Programming, Schematic Design, Design Development, Construction Documents and Project Closeout must be in Adobe Acrobat (pdf) and/or dwf formats. "CAD files larger than 10 megabytes shall be in dwf format. DWG files are required for Project Closeout.
- 9.5 Electronic submittal shall include pdf and/or dwf files of all CAD layouts. This assures that paper prints match digital files. Each respective CAD file will be named to relate to its sheet number within the plan set. For example, the pdf file for the sheet numbered A1-1.dwg shall be named "A1- 1.pdf and/or "A1-1.dwf.
- 9.6 All electronic deliverables shall be identical to the paper copies. That is, electronic deliverables are digital versions of paper documents and include:
 - 9.6.1 Construction Drawings
 - 9.6.2 Project Specifications
 - 9.6.3 Operations Manuals

10 MEDIA AND DATA TYPE

- 10.1 All electronic deliverables must be submitted on Compact Disks (CDs) and/or DVDs formatted for the PC. Each media disk must be labeled with the project's name, project's number (State ID number), date, and consultant's name.
- 10.2 Compressed files are allowed only if accompanied by a non-proprietary, "self- extracting" file. E-mail submittals are not allowed.
- 10.3 Electronic Text and Graphic Documents shall be in Adobe Acrobat (pdf) and/or AutoCAD dwf formats. PDF files shall be in Version 6 or higher.
- 10.4 CAD drawings shall be in AutoCAD Release 2000 or greater. If a program other than AutoCAD is used to generate the project drawings, the Consultant shall be responsible for all conversion procedures necessary to generate the AutoCAD files. The Consultant shall also be responsible for maintaining the accuracy and inclusion of all items within the drawings during any translation process. DXF format is not allowed.
- 10.5 Data Structure
 - 10.5.1 Store all files in a master folder. The master folder must be titled with the name of the project, date, and its corresponding project number.
 - 10.5.2 The master folder shall contain the following subfolders
 - 10.5.2.1 Specifications
 - 10.5.2.2 Operations
 - 10.5.2.3 Manual
 - 10.5.2.4 XREF's
 - 10.5.2.5 Raster
 - 10.5.2.6 CAD
 - 10.5.3 The RASTER folder shall contain images, logos, graphics, etc.
 - 10.5.4 The CAD folder shall contain subfolders for each discipline, including
 - 10.5.4.1 Civil
 - 10.5.4.2 Landscaping
 - 10.5.4.3 Architecture

- 10.5.4.4 Structural
- 10.5.4.5 Mechanical
- 10.5.4.6 Electrical

10.6 CAD File Names:

- 10.6.1 File name should use format: PROJECTNUMBER_YEAR_SHEETNUMBER PROJECTCODE.EXTENSION (e.g., Architectural Floor Plan Sheet 9 shall be named: 1960191B6_05_A09FP.DWG)
- 10.6.2 Individual files shall be placed in their corresponding subfolder (e.g., "A" sheets in the ARCHITECTURE subfolder)

11 CAD FORMAT

- 11.1 CAD drawings shall be developed in conformance with the "CAD Layering Guidelines" (CLG) published by the American Institute of Architects (AIA), Second Edition. Each drawing file shall include only those layers that are used in the specific file. Unused or empty layers shall be "purged." Layers that are not listed in the CLG shall follow the same format as the CLG.
- 11.2 CAD drawings shall use standard AutoCAD menus, fonts, hatch patterns and line types. Copyrighted or non-Autodesk standard entities are not allowed.
- 11.3 CTB, PCP, PC3 or other files defining layouts, pen table, colors, widths and line styles shall be provided. All unused entities such as layers, line-types, and blocks shall be "purged."
- 11.4 All drawings will be developed in full-scale format (e.g., one foot = one foot) in Model Space, and will be maintained as an integrated whole with individual drawings plotted using Layout/Paperspace.
- 11.5 Layouts: Sheet layouts will have borders developed as "layouts" in Paperspace. Layouts must include project name, project number, name of structure, structure's physical address, state site-code, and state ID number (The site code and state ID can be obtained from Louisiana's Department of Facility Planning and Control). Viewports in Layouts must be "locked" so that they retain their scale factors.
- 11.6 Nominal dimensions are not allowed in the generation of electronic drawings.
- 11.7 Title page shall contain a Vicinity Map, a project summary that includes square footage and an outline of applicable codes.
- 11.8 Sample Title Block

SHEET NO		
TS1	Title Sheet, Notes, Abbreviations, Symbols	1960191B6_05_TS1.DWG
SP-2	Site Plan	1960191B6_05_SP02.DWG
A-3	Demolition of Second Floor Plan	1960191B6_05_A03DFP2.DWG
A-4	Admin Office Enlarged Floor Plan	1960191B6_05_A04EFP.DWG
A-5	Interior Elevation	1960191B6_05_A05IE.DWG
A-6	Building Section	1960191B6_05_A06BS.DWG

12 PRE-CONSTRUCTION CONFERENCE

- 12.1 After notification that the Contract has been executed, the Architect shall arrange and conduct with the Owner and Contractor a pre-construction conference to be held at the project site. The Contractor shall be responsible for ensuring that their subcontractors are in attendance and shall furnish to the Architect and Owner (1) the Schedule of Values, (2) list of subcontractors, including low voltage subcontractor, and material suppliers, (3) the Construction Schedule. (4) Submittal Schedule, and (5) the following per Article 7 for the Supplementary Conditions
 - 12.1.1 Fixed job site overhead cost itemized with documentation to support daily rates.
 - 12.1.2 Bond Premium Rate with supporting information from the General Contractor's carrier.
 - 12.1.3 Labor Burden by trade for both Subcontractors and General Contractor.
 - 12.1.4 Internal Rate Charges for all significant company owned equipment

13 PUNCH LIST ITEMS

- 13.1 At the time of the final inspection, a punch list with assigned monetary values will be compiled by the design professional in charge. If these items are not completed within the 45 day lien period, the monetary value of the item will be withheld and the item will be completed by the University.

14 TEMPORARY UTILITIES

- 14.1 Utilities during construction of new facilities or major modifications are the responsibility of the contractor. They may be purchased from the University, if available. Contractor is responsible for connection, metering and payment.
- 14.2 Contractor is to contact LSU Office of Bursar Operations to establish a construction account for billing purposes (MOT Account) prior to commencement of construction. Contact information: Laurie Meyer at (225) 578-3847 or email at lzalfe1@lsu.edu.
- 14.3 Contractor is responsible for providing temporary meter information to LSU for billing purposes.

15 ACCEPTANCE AND FINAL INSPECTION

- 15.1 No project will be accepted for occupancy and no final inspection will be scheduled until the HVAC system is completely commissioned, including being fully integrated into the Campus Building Automation System, and balanced.
- 15.2 A Technical Air Balance report (TAB) must be prepared and delivered to the University. The TAB is to be reviewed and approved by the designer and their consultant prior to final inspection. The TAB will be utilized by Facility Services at the time of final inspection to determine if the HVAC system is operating properly and the project can be accepted and occupied. A Registered Professional Engineer, employed by Facility Services, will be the determinant of the acceptability of the HVAC system.

16 INTERIOR RENOVATIONS

- 16.1 At job completion, strip tile floors to remove dirt, marks and previous finishes and apply three (3) coats of Johnson's Vectra Finish, or equal, as approved by the Office of Facility Services-Building Services Department. For masonry/stone floors, strip floors and apply three (3) coats of Johnson's Plaza Finish, or equal.

17 NEW BUILDINGS NAMED AFTER AN INDIVIDUAL

- 17.1 New buildings named after an individual: A bronze plaque with bibliographical information, including the Individual's relationship with LSU, may be displayed.
- 17.2 The History Commission can be contacted for assistance on wording of the plaque and this requirement is in addition to any required by the State.

18 SUSTAINABLE DESIGN REQUIREMENTS

- 18.1 Recycling Construction & Demolition Waste
 - 18.1.1 Recycle at least 50% or more of all construction and demolition waste (e.g. concrete, wood, asphalt, scrap metal). Records must be kept of total weights (in tons) recycled, and reported to LSU staff periodically/as available.
- 18.2 Plumbing
 - 18.2.1 Install the most efficient appliances/fixtures possible
 - 18.2.2 Install WaterSense-labeled appliances and equipment
 - 18.2.3 If not WaterSense-labeled, appliances and equipment must meet these requirements
 - 18.2.3.1 Low-flow faucets (1.5 gallons per minute, or lower)
 - 18.2.3.2 Sensor-operated faucets (recommended: 0.5 gpm faucets and 15-second shut-off time).
 - 18.2.3.3 Low-flow toilets (1.28 gallons per flush, or lower)
 - 18.2.3.4 Low-flow urinals (0.5 gallons per flush, or lower)
 - 18.2.3.5 Low-flow showerheads (2.0 gallons per minute, or less)
- 18.3 Lighting
 - 18.3.1 Install the most energy-efficient lighting available for the lighting task
 - 18.3.1.1 Install LED lighting wherever possible

- 18.3.1.2 Install occupancy sensors, timer controls, manual dimming, bi-level switching or automatic daylight dimming for more efficient indoor lighting controls
 - 18.3.1.3 Outdoor lighting - consider motion / photo sensor lighting, dimming controls, or timed lighting that turns off for places like electrical yards
- 18.4 Appliances & Equipment
 - 18.4.1 Use the following types of appliances
 - 18.4.1.1 Residential clothes washers – ENERGY STAR labeled
 - 18.4.1.2 Residential dish washers – ENERGY STAR labeled
 - 18.4.1.3 Pre-rinse spray valves - < 1.3gpm
 - 18.4.1.4 Ice machines – ENERGY STAR labeled
- 18.5 Refrigerant Management
 - 18.5.1 Meet the following (small units of 0.5 pounds or less refrigerant are exempt)
 - 18.5.1.1 No CFC-based refrigerants used in new HVAC&R systems
 - 18.5.1.2 If reusing equipment, complete a CFC phase-out plan
- 18.6 HVAC / Air Filtration
 - 18.6.1 For new construction, consider conducting a comprehensive commissioning process for mechanical, electrical, plumbing and renewable energy systems in accordance with ASHRAE 0-2005 and 1.1-2007
 - 18.6.2 Consider demand-response program (system for capability with real-time, fully-automated DR)
 - 18.6.3 Consider installation of renewable energy systems (solar PV, solar thermal)
 - 18.6.4 Consider green power, carbon offsets, or renewable energy certificates (RECs) for project
 - 18.6.5 Systems for filtering outdoor air to occupied spaces must have particle filters or air-cleaning devices that meet one of the following
 - 18.6.5.1 Minimum Efficiency Reporting Value (MERV) of 13 or higher
 - 18.6.5.2 Class F7 or higher (CEN standard EN 779-2002)
- 18.7 Paints, Sealers & Adhesives – Consider using the following for all projects
 - 18.7.1 Interior paints & coatings – Meet Green Seal Standard GS-11 (for 90% by volume for VOC emissions, and 100% for VOC content)
 - 18.7.2 Adhesives, sealants and sealant primers - comply with SCAQMD Rule 1168
 - 18.7.3 Aerosol adhesives – comply with Green Seal Standard GS-36
 - 18.7.4 Anti-corrosive and anti-rust paints – comply with Green Seal Standard C-03
 - 18.7.5 Clear wood finishes, floor coatings, stains, primers, sealers applied to interior elements – SCAQMD Rule 1113
- 18.8 Furniture & Materials
 - 18.8.1 Generally furniture comes from state-contracted materials. In the event that we are procuring furniture outside of the state contract, consider the following specifications
 - 18.8.1.1 Composite Wood - Must be documented to have low formaldehyde emissions that meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEE) resins or no added formaldehyde resins.
 - 18.8.1.2 Furniture - Must comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1 and 7.6.2, using either the concentration modeling approach or the emissions factor approach
 - 18.8.1.3 Carpet Systems - Must meet testing and requirements of Green Label Plus program (VOC limit of 50 g/L)
- 18.9 Roofing Materials
 - 18.9.1 For roofs that will not use the standard terracotta tiles, use materials having a Solar Reflectance Index (SRI) equal to or greater than 78 for low-sloped roofs or 29 for steep sloped roofs for a minimum of 75% of the roof surface

18.9.2 Consider green or vegetated roofing

18.10 Parking Lots / Paving Materials

18.10.1 Consider using porous or semi-pervious pavement (e.g. porous asphalt, pervious concrete, interlocking concrete blocks, and gravel/grass pavers, brick pavers) to help manage stormwater

18.10.2 Consider pervious pavement for either entire parking surface, or parking stalls, crosswalks and overflow lots

18.10.3 Consider using paving materials with Solar Reflectance Index of at least 29

18.10.4 Consider installation of swales, retention basins, vegetated buffer strips, infiltration systems, constructed wetlands and/or rain gardens (bioretention areas) to help manage stormwater

18.10.5 Materials - Consider use of recycled asphalt, recycled rubberized asphalt

18.11 Site Selection / Landscape

18.11.1 Minimize runoff and erosion on steep slopes (maximum slope of 3:1 for grassy slopes, or 2:1 slopes without turf or ground cover)

18.11.2 As much as possible, avoid removing any mature live oaks or other trees

18.11.3 Reuse trees and shrubs where possible

18.11.4 Recycle/compost all cleared vegetation

18.11.5 Retain as much of the existing native landscaping as possible

18.11.6 Use native plant species

18.11.7 Use irrigation techniques that are water-efficient: consider low-flow sprinkler systems, soaker hose, drip or subsurface irrigation

18.11.8 Incorporate large trees into the landscape plan

18.11.9 Incorporate clusters of trees into the landscape plan

18.11.10 Incorporate undergrowth into the landscape plan

18.11.11 Install root protection to protect tree roots from compaction during construction

18.11.12 Provide sediment control barriers where fill or excavate will be temporarily located

19 SINGLE USE RESTROOMS AND LACTATION ROOMS

19.1 All major new buildings and major renovations, generally those renovating entire buildings or large portions of buildings, are to include at least one single use restroom and at least one lactation room, possible more than one in larger buildings. Review requirements with LSU/PDC

20 SPECIAL PROCEDURES

20.1 Parking and Staging

20.1.1 Parking on the LSU Campus is strictly limited. Parking permits are required by anyone parking on campus, regardless of the amount of time on campus or the location.

20.1.2 If the Work requires contractors or subcontractors to stage and/or park on the LSU campus, the Contractor is subject to the following

20.1.2.1 Staging Areas

20.1.2.1.1 As defined by the plans. Any variation from the proposed staging area must be submitted to PDC for review. Contractor is responsible for final approval of staging area from LSU Parking and Transportation Services.

20.1.2.1.2 A cost will be applied for staging areas' impact to existing parking. The Contractor is responsible for this cost. Refer to the LSU Parking and Transportation Service's website at www.lsu.edu/parking for Contractor Parking and Staging Rates.

20.1.2.1.3 Contractor Parking & Staging Request form must be completed online and can be found on LSU Parking and Transportation Service's website at www.lsu.edu/parking

20.1.2.2 Parking

20.1.2.2.1 Contractor parking is as determined by LSU Parking and Transportation Services, on a project-by-project basis.

20.1.2.2.2 The Contractor is responsible to obtain a permit for each vehicle parking on campus.

20.1.2.2.3 Contractor Parking & Staging Request form must be completed online and can be found on LSU Parking and Transportation Service's website at www.lsu.edu/parking

20.1.2.3 Contractor to review LSU Parking and Transportation Services Contractor Parking & Permit Policy which can be found on LSU Parking and Transportation Service's website at www.lsu.edu/parking

20.2 Keys

20.2.1 The Contractor is responsible for obtaining keys via LSU Lock Shop.

20.2.2 The Contractor Key Request form can be found at www.lsu.edu/fs. This form is to be completed by the Contractor, signed and returned to LSU Project Manager.

20.3 Security and Protection

20.3.1 Site Security - Maintain security of site and building at all times. Coordinate with the Owner. Contractors shall erect and maintain appropriate access restricting barriers and warning signs to prohibit entry into construction work sites by unauthorized personnel. All pedestrian areas must be protected from activity that might result in debris, tools, or other materials falling onto pedestrian-trafficked areas, by means of well-constructed temporary protective barriers or restrictions, warning signs and reasonable detours.

20.3.2 All work is to be done in compliance with OSHA regulations. Hard hats, proper work clothes and shoes are required. Safety glasses must be worn during any operation where flying particles may occur. T-shirts and tennis or running type shoes are not allowed.

20.3.3 The Contractor shall be permitted access to the site at the Owner's convenience. The Contractor shall be responsible for any repair and/or replacement of existing lawns, ditches, concrete sidewalks or gutters, fencing or any other materials or structures existing in the area which is damaged during construction operations. The Contractor shall conduct a preconstruction site survey with the Owner to verify any such elements that need repair or which is already damaged in any manner and properly identify, describe, and record with the Owner. If no such damage is recorded (photographs), then any materials or structures over which the Contractor has crossed during construction and/or are later found to be damaged shall be considered to have been damaged by him and shall be repaired and/or replaced by the Contractor as necessary to return them to the original condition to the satisfaction of the Owner at no cost to the Owner. The Owner shall designate areas for material storage and parking within 200 feet of the site. The construction operations of the Contractor may not cause any obstruction to the free flow of traffic on the site without the prior authority of the Owner.

20.3.4 Owner intends to continue to occupy adjacent portions of the existing building site during the entire construction period. Cooperate with Owner to minimize conflict and to facilitate Owner's operations. Schedule the Work to accommodate owner occupancy of adjacent structures. All Work must be conducted so as to cause absolute minimum of interference with and inconvenience to Owner's continuing operations.

20.3.5 Provide adequate safeguards for control of dust and moisture during construction. Close coordination with Owner for these environmental controls is mandatory.

20.3.6 All construction operations must be conducted as required to insure complete safety to all persons (Owner's personnel, Contractor's personnel and others) who may be on site or adjacent to work.

20.4 LSU is a Tobacco-free campus

20.4.1 General Policy - Smoking and the use of all tobacco products on the LSU Campus is prohibited. This prohibition applies to all individuals while on the LSU Campus, including faculty, staff, students, administrators, contractors, and visitors. The use of tobacco products is harmful to health and

imposes costs on LSU and all members of the LSU community. State law RS 40:1300.263 requires LSU to adopt a smoke-free policy and authorizes LSU to adopt a smoke-free policy.

20.4.2 Definitions

20.4.2.1 LSU Campus - all land, property, buildings, and other facilities owned, leased, occupied, or otherwise controlled by LSU. This includes any land, property, buildings, and other facilities that may be leased by LSU third parties, such as fraternities, sororities, affiliated foundations, or others.

20.4.2.2 Smoking - inhaling, exhaling, burning, carrying, or possessing any lighted tobacco product, including cigarettes, cigars, pipe tobacco, and any other lighted combustible plant material; it also means the use of electronic cigarettes and any other product that is used to deliver nicotine by means of smoke or vapor.

20.4.2.3 Tobacco Products - any and all forms of tobacco, including but not limited to cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, smokeless tobacco, snuff, and chewing tobacco, as well as electronic cigarettes and any other product which is used to deliver nicotine by means of smoke or vapor. This does not include any FDA approved product or device intended to assist the user to stop smoking or using tobacco products.

20.5 Isolation of Work Areas in occupied facilities

20.5.1 Prevent dust, fumes, and odors from entering occupied areas.

20.5.1.1 Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.

20.5.1.2 Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.

20.5.1.3 Maintain dust partitions during the Work. Use vacuum collection attachments on dust producing equipment. Isolate limited work within occupied areas using portable dust containment devices.

20.5.2 Ventilation and Humidity Control

20.5.2.1 Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

20.5.2.2 Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.

20.6 Responsibility for Work Force

20.6.1 Contractor will ensure and maintain a working environment free of harassment, intimidation and coercion and shall specifically ensure that all foremen, superintendents and other supervisory personnel are aware of and carry out our commitment to maintain such a working environment.

20.6.2 B. Contractor shall enforce strict discipline and good order among the Contractor's employees, Subcontractor's and others carrying out the work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

20.6.3 C. Contractor shall require workmen to be sensibly attired, courteous, and professional in mannerisms while on the University premises. The Contractor is cautioned that workers are considered to be under the direct control of the Contractor. Inappropriate or socially unacceptable behavior on the part of any worker may affect the ability of the Contractor to bid on any future University projects. The University reserves the right to order the dismissal of any individual worker if that person displays poor behavior. Interaction with students, faculty and staff is discouraged.

20.7 Sexual Harassment Policy

20.7.1 LSU does not tolerate sexual harassment.

20.7.2 LSU Planning, Design and Construction has zero tolerance for sexual harassment and foul language on the LSU campus. Verbal or physical actions or motions either directed at passersby or between

contractors that may be perceived as harassment are not allowed. Even whistling at other contractors to direct them is recommended against, as it may be perceived as harassment.

- 20.7.3 Any notifications or complaints received will result in individuals identified being immediately removed from the project.
- 20.7.4 In the event of a complaint, the PDC Project Manager and any other PDC employees made aware will report the incident to the Title IX office and ensure the offender(s) are removed from the campus immediately by the General Contractor.

20.8 Specific LSU Safety Requirements

- 20.8.1 LSU students, faculty and staff shall not be exposed to any harmful construction debris or hazardous materials. (i.e., lead-based paint, asbestos, dust, noise, vapors, etc.). Where contaminants generated by construction may enter adjacent occupied building space; the contractor shall erect a containment system sufficient to protect LSU faculty, staff, and students from exposure. The containment system shall also be subject to approval by LSU Planning, Design and Construction and the Office of Environmental Health & Safety (EHS).
- 20.8.2 Prior to any demolition, renovation or construction; building materials shall be inspected for the presence of Asbestos Containing Materials (ACM). Questions regarding ACM or any other hazardous building materials shall be directed to EHS.
- 20.8.3 The contractor shall comply with all OSHA regulations on job site.
- 20.8.4 Contractors must send a copy of the site safety plan (Written documentation of a working and active employee safety program as defined by the OSHA Construction Standard), along with the site safety supervisors name and a 24 hour phone number, to the Office of Environmental Health & Safety (EHS).
- 20.8.5 The construction site must be restricted to authorized personnel only. High hazard areas involving machinery, hot work, roofing kettles, overhead work, excavations, etc. shall be barricaded and the barricade must be enforced at all times.
- 20.8.6 The contractor shall make available the Material Safety Data Sheet for any hazardous material used or stored on the campus. A copy of the MSDS shall be sent to EHS for review prior to the project start date.
- 20.8.7 Any injury requiring medical attention which occurs on site must be reported to EHS, and the contractor shall conduct an investigation and develop action plan for prevention. This action plan may be reviewed by EHS upon request and/or EHS may be an observer in this investigation.
- 20.8.8 Activities involving electrical utility shall be closely coordinated with Energy Services to avoid outages and accidents. Extreme caution must be taken to assure proper lockout/tagout of circuits to prevent injury and electrical flash/explosion.
- 20.8.9 Contractors shall be responsible for the proper disposal of waste materials. (Solid Waste, Hazardous Waste, etc.) Any Regulated Hazardous Waste shipped off campus by a contractor shall be manifested to that contractor. Any Waste manifested to LSU shall be authorized by EHS only.
- 20.8.10 Contractors shall be responsible for compliance with Water and Air Quality Standards as they relate to unauthorized releases or emissions of regulated substances into the environment. (Storm drains, bayous, etc.).
- 20.8.11 Contaminated water and solvents used for daily equipment cleanup will be stored outside of the building in large containers for off-site disposal. Disposal in any campus drainage system is strictly forbidden. Any violation of this requirement will result in a \$200.00 deduction in the contract amount per occurrence.
- 20.8.12 The Contractor shall be responsible for debris removal from the campus. At no time shall debris be placed outside the building units unless contained in a dumpster, trailer, or a truck.

21 ROOM NUMBERING

- 21.1 Refer to Room Numbering Guidelines

Louisiana State University Design Standards

DIVISION 02 – EXISTING CONDITIONS

1 SITE DESIGN REQUIREMENTS

- 1.1 The Exterior Environment conceptual design is to be developed concurrent with the overall project plan, and the project team shall include a landscape architect and a civil engineer for all projects which affect the design.
- 1.2 Projected cost estimates submitted at each phase of the design process shall clearly identify and include all exterior site elements.
- 1.3 A presentation package shall consist of an illustrative landscape/hardscape plan consistent with the project design theme and Owner's objectives for the project. The plan shall address and delineate a general concept for all site amenities and improvements.
- 1.4 Plans shall be of sufficient construction detail and labeling to clearly communicate landscape/hardscape intent and accuracy of scale in order to provide credible pricing for owner's approval prior to commencement of construction documents.
- 1.5 Plans listed below shall be provided beginning at the design development phase for preliminary pricing
 - 1.5.1 Construction and Staking Plans
 - 1.5.2 Grading Plans
 - 1.5.3 Lighting Plans
 - 1.5.4 Planting Plans
 - 1.5.5 General Landscape Plans
 - 1.5.6 Irrigation, Electrical and Sleeving Plans
 - 1.5.7 Drainage Plans (if applicable, Surface and Subsurface, tie into Civil)
 - 1.5.8 Erosion Control Plans (if applicable)
 - 1.5.9 Waterscape/Pottery/Exterior Furniture Plans
 - 1.5.10 Tree Protection Plan
 - 1.5.11 Details
 - 1.5.12 Wayfinding (building, parking, regulatory)
 - 1.5.13 Donor signage (If applicable)
- 1.6 Submittals of samples, cut sheets or on-site product selection and approval at supplier warehouse or nursery shall be necessary to obtain designer's approval. Approval of samples will be necessary for all materials, including concrete finishes, natural stone paving, finish surface for walls, caps, pilasters, fence, drainage materials and devices, light fixtures, turf, pottery and fixtures, etc.
- 1.7 Typical Designer requirements
 - 1.7.1 Designer to identify projects impact on parking for normal use and game day use.
 - 1.7.2 Designer to identify dumpster locations.
 - 1.7.3 Designer to consult Campus Landscape Standards to verify all site furnishings and materials match LSU campus standard.
 - 1.7.4 Designer to consult Campus Landscape Standards to verify all Plant material selected adheres to campus standards.
 - 1.7.5 Designer should consult LSU Masterplan to determine project's overall theme and layout fit within guidelines adopted for future campus planning.
 - 1.7.6 Designer has specified proper LSU standard wayfinding signage including regulatory signs (i.e. ADA Parking).

2 GENERAL CONSTRUCTION REQUIREMENTS COORDINATED BY THE DESIGNER

- 2.1 The General Contractor shall provide a detailed Landscape, Hardscape, Irrigation and Lighting Schedule for review and approval by the designer that will assure adequate coordination of the installation of all landscape and other construction tasks prior to the planting of turf grass.
- 2.2 Turf grass establishment prior to building opening shall be a contract requisite. Therefore, all other construction tasks must be properly scheduled to accommodate the time required for turf grass establishment. All disturbed areas during construction shall be properly sodded with a LSU PDC approved solid sod. Fine grading and debris removal for turf establishment are the contractor's responsibility.
- 2.3 Construction staging should be planned in the Design Development phase of the project and included in the Design Development submittal. LSU PDC shall provide approval after consultation with the Office of Parking and Transportation Services and LSU Landscape services.
- 2.4 Measures should be incorporated to ensure safe travel of pedestrians and vehicles during construction. If construction staging is located on an existing parking lot, the project shall be required pay for the temporary use of these spaces and restoration after construction. Staging areas will not be allowed so as to create potential conflicts with fire lanes. The Contractor shall coordinate with the Facility Services- Landscape Services department regarding maintaining trash/recycling services to ALL buildings in or around the construction area throughout the construction process and in conjunction with the University Landscape Architect regarding tree protection.

3 EXTERIOR ENVIRONMENT

- 3.1 Site Survey, Civil, Grading, Drainage, Green Infrastructure
 - 3.1.1 Site Survey - The design team shall define for the owner (if required) the specific requirements for a current certified land survey operator. This survey shall include: topographic contours, spot grades, lines of streets, alleys, pavements, and adjoining property; deed restrictions, boundaries, easements and contours of the Project site, locations, dimensions and complete data pertaining to existing buildings, other improvements and existing trees, and information concerning available services and utility lines both public and private, above and below grade, including inverts and depths.
 - 3.1.2 Civil - The Landscape Architect and Civil Engineer shall produce final construction documents on the same base sheets to assure coordination of plans.

4 VEHICLE ACCESS AND PARKING

- 4.1 Streets and Driveways
 - 4.1.1 All streets and driveways must meet highway standards for construction and maintain an optimum width of 24' for two- way traffic and 12' for one way traffic. If site conditions do not allow the optimum layout, an absolute minimum width of 22' for two-way traffic and 11' for one-way traffic may be allowed.
 - 4.1.2 Consideration shall be given to providing minimum 5' bike lanes. If existing conditions do not allow bike lanes, consideration shall be given to providing wider sidewalks to provide multi-use paths.
 - 4.1.3 Islands and any other physical barriers should not be employed to channel traffic. Signage and other traffic control devices should conform to the most current Manual on Uniform Traffic Control Devices.
- 4.2 Parking Lots
 - 4.2.1 The general design to maximize use of parking areas on the LSU campus is to employ a 90 degree parking space 9' feet wide and 18 feet long with an optimum bay width of 57 feet to a maximum of 60 feet for a double and 41 feet to a maximum of 43 feet respectively for a single bay.
 - 4.2.2 If the site conditions do not allow for the optimum layout, a minimum bay width of 55 feet for a double bay and 39 feet for single bay is acceptable. Parking quantities shall be designed at a rate of 1:1 for residential areas, .7:1 for commuter lots, and 1:200sf of office space and shall meet all federal requirements for the Americans with Disabilities Act.

- 4.2.3 The second method to maximize parking is 70 degree parking. The space width is 9 feet by 16 feet. Double loaded bay widths are 49' minimum, 51' optimum, and 53' maximum. Single bays are 19' minimum, 21' optimum, 23' maximum.
- 4.2.4 Parallel parking standards are 21' long by 8' wide. However parallel parking will be allowed only as directed by LSU PDC.
- 4.2.5 Handicapped spaces must comply with current ADA standards.
- 4.2.6 Layout of all parking areas must be approved by the Office of Parking & Transportation Services before implementation. Where existing parking capacity is displaced by the construction of a new facility, those displaced parking spaces must be mitigated on a one-for-one basis. Designers should submit for review a traffic study for vehicular circulation to and around the new facility, including service, delivery and public transportation vehicles. Show turning radii for garbage trucks and delivery trucks into and out of parking lots if necessary.
- 4.2.7 The University has numerous card access gated parking lots. Any additional card access controllers must be compatible with the existing system. Further information can be obtained from the Office of Parking & Transportation Services.
- 4.2.8 Lighting is to be included as part of parking lot projects. Light standard locations should be considered relative to tree planting in order to avoid dark areas in parking lots and should be coordinated with the landscape consultant.
- 4.2.9 Provided two 4" (minimum) sleeves under new paving to all green areas. Identify sleeve locations on As-Built drawings and provide 3/8" X 3" brass stove bolt in pavement at the location of each sleeve.
- 4.2.10 In addition to all other landscaping requirements, all new off-street parking lots with fifty (50) or more spaces shall provide and maintain landscaped planting areas within the interior of, and adjacent to, the parking lot.
- 4.2.11 Perimeter landscaping shall be provided a rate of one (1) tree for every seventy-five (75) linear feet of paving frontage. Trees shall be spaced so that there is a minimum of one (1) tree for every one hundred twenty-five (125) linear feet of paving frontage.
- 4.2.12 Interior tree planting shall be provided at a rate of one (1) tree for every forty (40) parking spaces located in islands at the end of parking bays, island located between parallel rows of cars, driveway medians, intermediate islands or a combination of locations. In addition to the required trees, interior planting areas shall be grassed, landscaped or covered with mulch.

5 SITE FURNISHINGS

- 5.1 Reference Campus Landscape Standards for all furnishings.
- 5.2 Bicycle Racks
 - 5.2.1 Bicycle riding is encouraged on campus and bicycle racks should be included in the project when appropriate. Bicycle parking sites shall be considered at the schematic design phase and final site locations indicated in the final construction documents. Consider bicycle parking and parking surface as part of the construction costs.
 - 5.2.2 The number and location of bicycle racks is determined in joint consultation with the LSU Office of Parking & Transportation Services and LSU Campus Planning.
 - 5.2.3 Follow the guidelines below when determining bicycle parking quantity and location
 - 5.2.3.1 Residential Facilities - Provide bike parking spots within 300 feet of a building entrance for at least 15% of the building occupants.
 - 5.2.3.2 Non-Residential Facilities - Provide bike parking spots within 300 feet of a building entrance for at least 5% of the building's peak users. Estimate peak building users by applying an efficiency factor of 75% to the building's occupancy.
 - 5.2.3.3 Bike racks shall be: Dero-Campus Rack, galvanized finish, surface mounted or equal manufacturer.

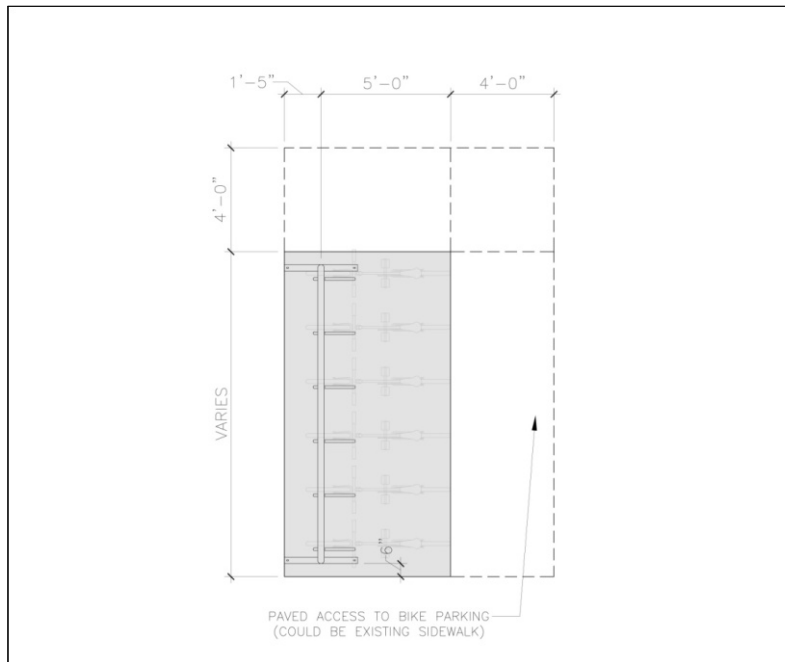


Figure 1 Double Sided Bicycle Rack

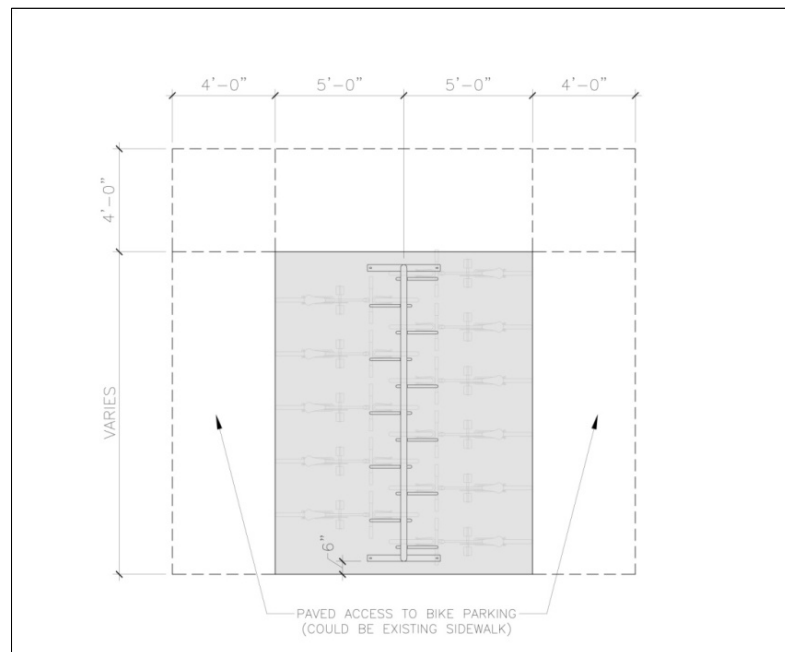


Figure 2 Single Sided Bicycle Rack

5.2.4 When locating bicycle racks, choose locations that are accessible by bicycle. Bicycle parking racks should be installed on a paved surface. The dimensional requirements of the paved surface are described in the sketches below. Designer should consider future expansion opportunities.

5.3 Benches - Benches are the primary seating component on campus. Many styles and designs of benches have been used on campus throughout its history. The campus standard bench with a back is a simple metal-strap bench that is durable and provides a comfortable seating experience. The character of the bench is complementary to other standard site components. See campus landscape standards for acceptable manufacturers.

5.4 Litter Receptacles - A metal strap-style receptacle is the campus standard. It is similar to the standard bench and other site components. A domed top prevents rain and leaves from falling into the receptacle, and a side

door allows easier access for staff. When receptacles are located adjacent to garden or groundcover planting, provide sufficient space around the unit for emptying and cleaning. LSU is a smoke-free campus and trash receptacles should not include ash trays. See campus landscape standards for acceptable manufacturers.

6 EXTERIOR LIGHTING

6.1 General Requirements

- 6.1.1 Landscape lighting design shall be conceptually designed by the Landscape Architect, with particular attention paid to creating a soft, serene and safe nighttime atmosphere. The ambiance afforded by landscape lighting is especially important in transforming the landscaped areas into pleasant, special experience for the students. Walkway lighting shall be very subtle and discreet, utilizing surrounding landscape illumination to serve the purpose of walkway lighting to the extent possible. See campus landscape standards for requirements.
- 6.1.2 Lighting of special feature items or special seasonal displays and points of interest will be accomplished through landscape lighting. Provide additional circuit capacity at the building entry Porte Cochere and plazas.
- 6.1.3 Landscape lighting design will be determined by light quality to create the desired atmosphere. Fixture style and specifications are outlined in the Campus Landscape Standards.
- 6.1.4 The Landscape Architect shall employ a qualified Lighting Consultant to ensure the proper execution of the lighting concept. This design is to be carefully coordinated with the exterior building lighting.
- 6.1.5 Landscape lighting shall be furnished and installed by the Contractor per the plans and specifications. Electrical service and circuiting shall be provided by the General Contractor as part of the Project's electrical contract. Information for electrical service requirements shall be obtained from the landscape lighting plans and specifications.
- 6.1.6 All site lighting shall be controlled on separate circuits from Landscape Lighting through either time clocks and/or photocells.
- 6.1.7 It is the designer's responsibility to layout the conduit and trenching to avoid significant tree cut cutting to install new electric lines. LSU landscape architect must approved any work done under any live oak tree root zone.

6.2 Landscape Installation

- 6.2.1 Exact physical locations of all landscape lighting fixtures shall be determined in the field by lighting consultant in coordination with Landscape Architect after tree pits are dug.
- 6.2.2 All exterior transformers and junction boxes shall be located in areas concealed from the public, as identified by the Landscape Architect and Owner.
 - 6.2.2.1 All exterior weather proof J-boxes shall be rated for NEMA 4X. Any above grade boxes shall be painted to match adjacent surface as specified by the Landscape Architect.
 - 6.2.2.2 Each ballast and junction box shall be specifically located by the Landscape Architect.
 - 6.2.2.3 All exposed conduit shall be painted out to match the adjacent surface as specified by the Landscape Architect.
 - 6.2.2.4 Final adjustments of all landscape lighting fixtures shall be approved by the Owner. Adjustments or proper focus of lighting shall be conducted as part of the contract.

7 EARTHWORK

- 7.1 The grades for all exterior areas shall be set to adequately accommodate surface site drainage.
- 7.2 Earthwork shall be accomplished in accordance with the project's Soil Report (if required) that has been accepted by the Owner.
- 7.3 Earthwork shall be consistent with the design requirements of the Structural and Civil Engineer's design.

8 GRADING

- 8.1 The final site grading plan shall assure there will be no standing water on any surface of the Exterior Environment, including but not limited to all landscape/softscape areas, hardscape surface areas, etc. The

maximum approved slope grade shall not exceed 3:1 unless approved. Additionally, the Landscape Architect shall coordinate with the Architect to assure there are no areas of conflict concerning surface runoff water.

- 8.2 Finish grades and land contours shall be incorporated in to the Civil Engineering plans. The contractor shall be held responsible for providing earth surfaces finished to give positive gravity drainage away from the buildings and walks in areas of new construction.
- 8.3 Finished slopes shall be free from irregularities, hollows, or depressions. Soil shall be fine graded and free from construction debris. Provide sod to all areas damaged by construction.
- 8.4 Require Contractor to obtain LSU excavation permits & utility shut off requests for the intended project.
- 8.5 Require Contractor to Identify/mark drainage and utility structures on site and with construction stakes and keep track during all phases of construction.

9 EROSION CONTROL -

- 9.1 Erosion control is the responsibility of the contractor. An Erosion control plan shall be provide in the design documents for LSU PDC approval.

10 RAINWATER DRAINAGE

- 10.1 Ground floor slab elevations shall be above adjacent streets, parking lots and one foot above the base 100 year flood plain. Confirm final finish floor elevation with University personnel prior to completion of Construction Document phase.
- 10.2 Site drainage shall provide satisfactory runoff of storm water during normal rainfall conditions and prevent any pockets of standing casual water creating detriment of nuisance to horizontal paved surfaces and planted landscape and lawn areas. The inlet structures should be designed with consideration for seasonal heavy leaf accumulation and catch basins located for ease of regular maintenance.
- 10.3 Site drainage considerations shall include subsurface drainage in areas of poor internal soil moisture percolation which results in saturated soil conditions causing detriment to plant growth in landscape areas, nuisance seepage onto horizontal paved surfaces and continuous seepage through retaining walls leaving unacceptable stains.
- 10.4 Surface drainage infill structures shall be located and grades set to accommodate surface runoff. Size of drain lines, drainage inlets and points of connection are to be established and connected to the main site storm drainage lines. Locate drainage apparatus away from entrances and under Live oak trees.
- 10.5 Subsurface drainage for over structure planters, planting beds, and tight soil areas where poor internal water percolation exists shall be designed and coordinated with Facility Services for points of connection into the site main drainage system and for inclusion of subsurface drainage lines with civil plans.
- 10.6 Drainage design shall show that existing drainage system is sufficient to accept new drainage patterns/flows/areas. If it is not, designer must notify Owner immediately so corrective actions can be considered/taken.

11 GREEN INFRASTRUCTURE

- 11.1 Designer shall identify green infrastructure/low impact development practices that could help avoid water quality degradation. See www.epagov/npdes/greeninfrastructure.
- 11.2 In accordance with Louisiana Department of Environmental Quality's Storm Water Management Program requirements for East Baton Rouge under rule LAS000101/AI 90427/PER 20090001, the plan must describe measures implemented to accomplish the following objectives.
 - 11.2.1 Keep rain out of the sanitary sewer system.
 - 11.2.2 Allow storm water to be absorbed and cleansed by soil and vegetation and either re-used or allowed to flow back into groundwater or surface water resources.
 - 11.2.2.1 Measures can include, but are not limited to, alternative surfaces (vegetated roofs, sediment filters, pervious pavement or grid pavers) and nonstructural techniques (rain gardens, trees and tree boxes, vegetated swales, disconnection of imperviousness, rainwater recycling and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation) to reduce imperviousness and promote infiltration, thereby reducing pollutant loadings.

- 11.2.2.2 All measures and monitoring shall be documented in the project's Waste Water Management Plan and shall be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on monitoring reports.

12 TREE PRESERVATION & TRIMMING

- 12.1 A tree protection and pruning plan is required for all projects. The plan shall be developed in consultation with LSU's Landscape Architect (LA) and the University's Project Manager during the schematic or design development phase, and it becomes part of the design and construction documents.
- 12.2 Placement of tree and landscape protection measures, such as fences, protective mulch, protective fabric, and logging mats, should be indicated, as detailed below. The plan is a separate drawing, at an appropriate scale, labeled "Tree Protection Plan," and it should.
- 12.2.1 Identify size, drip line, species and location of all trees affected by the project.
- 12.2.2 Indicate which trees and shrubs are to be removed from the site.
- 12.3 When trees and shrubs are removed, care must be taken to protect trees and other landscape elements that are to remain. (Indicate which trees and shrubs are to remain).
- 12.4 All trees determined to be preserved by the LSU Landscape Architect shall be fenced at the drip line of the branches. There shall be no break in the continuity of the fencing. If the lawn has to be maintained within this area, then an adequate lockable gate shall be provided. Coordinate maintenance within the fence areas with LSU Landscape services.
- 12.5 Unless waived by LSU Landscape Architect the tree protection fencing shall be temporary 6' chain link. The area inside the fence shall not be used for any construction activity such as storage, lay down, etc. This includes protection from construction contamination from paint tool washing, diesel, and silt etc. The fenced area must be maintained in good physical and visual condition throughout the project.
- 12.6 Soil mitigation work shall be completed in the root zones of all live oak trees affected by the construction project. This work shall consist of injecting, according to manufacturer's recommendations, Plant Health Care, Inc. MycorTree, Pt Injectable (Ectomycorrhizal Inoculants) and PHC BioPak, or approved equal, into the soil under the drip line of all affected live oak trees.
- 12.7 Mulch shall be placed under the drip lines of the live oak trees affected by the project as determined by the LSU Landscape Architect. Mulch shall be a minimum of 4 inches of fresh or aged hardwood chips or grindings. Mulch shall not be placed on the root flares of the trees.
- 12.8 Any deadwood and/or limited crown reduction pruning of trees affected by the construction project shall be included as part of the project. The work shall conform to ANSI standards A300 and be performed by an arborist licensed by the ISA (International Society of Arboriculture) and/or LAA (Louisiana Arborist Association). All work shall proceed under the direction and observation of the LSU Arborist or the LSU LA.
- 12.9 If the trees affected by the construction project are infected with Ball Moss, the Contractor shall treat with a solution of 5% sodium bicarbonate in water by spraying until drenching on all visible ball moss.
- 12.10 Plans must indicate all trees to be pruned and treated prior to the start of the project.

13 TERMITE CONTROL

- 13.1 Termite treatment shall be provided on sub-grade fill under concrete slab. Provide 2 year bonded guarantee for material and installation with an optional renewal warranty.

14 CONTRACTOR TURNOVER

- 14.1 The Design Team is to develop a sequence of how the site is to be developed, nursery organized and secured, and final landscaping developed. The General Contractor is to incorporate this plan and sequence into his scheduling for turnover of the area of the site to be landscaped. The sequence of landscape installation and site inspection prior to commencement of landscaping shall be approved by the Owner.
- 14.2 Accessibility to the main water supply for the building shall be made available to the Landscape Contractor for irrigation system main tie-in at the time of commencement of landscape activity in any given area. The Contractor is to make provisions for watering of trees that are installed early or existing landscaped areas that are to be maintained through construction.
- 14.3 Landscape maintenance shall be included in the one year warranty after final acceptance.

15 RIGID PAVING / CONCRETE

- 15.1 Color and sample of each material and finished surface shall be approved by Owner. Minimum 6' X 6' field samples shall be provided by the General Contractor for site review and approval of the Owner, as deemed necessary.
- 15.2 Minimum acceptable standards for hardscape surfaces are as listed below.
 - 15.2.1 Minimum width of concrete walks shall be 8' unless specifically approved by Planning, Design & Construction Site Review Team.
 - 15.2.2 All concrete walks shall have a minimum depth of 5" and have a non-slip surface finish.
 - 15.2.3 Provide 4" PVC sleeves under all sidewalks at 100' maximum intervals.
 - 15.2.4 Drill and pin, in both directions, 24" O.C. with #4 steel re- bar all existing concrete that abuts new concrete walks or drives. #4 steel re-bar shall be installed 24" O.C. at all construction joints for new concrete walks.
 - 15.2.5 Porous paving shall be utilized under sensitive areas under live oak trees. Review these areas with Campus Landscape Architect.
- 15.3 Entry Drives are to have a barrier curb along both outside edges. The finish of the curb shall match that of the Entry Drive.
- 15.4 An expansion joint shall be placed between the exterior entry and the Entry Drive and adjacent walkways. Expansion joints are to be kept away from the building entry. Any expansion joints are to be caulked with on approved material and color.

16 TACTILE WARNING SURFACES

- 16.1 Provide truncated domes in sidewalk ramps which abut vehicular areas. The truncated domes shall be installed within the final 2' of paved surface prior to the vehicular use area, and shall be installed across the entire width of the walk. Individual truncated dome paver units shall be used and shall be terra cotta color.

17 BOLLARDS

- 17.1 Bollards are used throughout campus to control and regulate vehicular circulation. Bollards can provide different levels of deterrent and protection depending on the context and application. Bollards can be fixed or removable.
- 17.2 Vehicular Bollards - These bollards function as a warning and physical barrier to prevent most drivers from entering spaces not intended for vehicles, however they are not designed to prevent or stop significant vehicle impacts.
 - 17.2.1 Where occasional vehicular access is required for service or fire lanes, these bollards may feature an embedded sleeve and lock assembly that allows them to be removed temporarily. They may feature simple ornamentation to provide consistency with the character and style of other site elements and architecture.
- 17.3 Pedestrian Bollards - Pedestrian bollards provide a visual separation for both pedestrians and vehicles. Typically made of plastic and including a flexible rubber boot base, these bollards do not offer any kind of physical deterrent to vehicle or bicycle impacts.
- 17.4 Utility Bollards - When physical prevention from impacts is required, utility-style bollards are to be used. Utility bollards are typically steel columns with reinforced concrete cores engineered to withstand the force of a vehicle.
- 17.5 For additional information on bollards see the Campus Landscape Standards for design specifics.

18 FENCES, WALLS & BARRIERS

- 18.1 The purpose of this section is to provide a design standard in regards to fences, walls, and barriers on campus that is consistent with the overall goals and intent of the Campus Landscape Standards and Campus Masterplan which seeks to create a people-friendly environment while at the same time promotes the public health, safety, and the general welfare of the user. A fence if approved by LSU PDC will only be allowed to separate a land use but not to define a property boundary.

- 18.2 To further this goal, the use of fences, walls, and barriers is strongly discouraged and shall only be considered in the following circumstances.
 - 18.2.1 To contain livestock, maintain animal habitats, and/or to maintain other agricultural needs.
 - 18.2.2 To provide a visual buffer of dumpsters, mechanical, and other unsightly structures or equipment.
 - 18.2.3 To prevent unauthorized access to high voltage and/or other dangerous areas.
 - 18.2.4 For security purposes as required by federal, state, or university safety officials.
 - 18.2.5 To enhance the quality of a pedestrian oriented courtyard or space in public and residential areas.
 - 18.2.6 To secure athletic and academic functions.
- 18.3 Design of proposed fences, walls, and barriers is encouraged to reflect the existing heritage and gracious quality exemplified in the historical part of campus through the use of similar materials, color, proportion, and scale. If the use of arches and/or arcades is proposed, then consideration should be given to the character of the arcades surrounding the main quadrangle.
- 18.4 The color palette of materials to be used should be within the range of warm earth tones as seen in the historical part of campus which are generally light in color (i.e., colors found in the sandstone, buff, and terracotta families).
- 18.5 Any fence, wall, or barrier shall be constructed in a durable fashion with a finished surface of brick, stone, decorative masonry material, cast stone, painted metal, approved synthetic material, landscape material, and/or a combination of said materials.
- 18.6 The use of wood and/or chain link fence shall not be acceptable.
- 18.7 Fencing materials shall match surrounding architecture and site character as closely as possible to maintain visual harmony on campus. All designs shall be reviewed by the Planning, Design & Construction department for design integrity and follow the Campus Landscape Standards.
 - 18.7.1 The finished side of all walls or fences shall face the common property line boundary. Approved location of the fence shall be determined by the LSU PDC.
 - 18.7.2 Fences, walls, and barriers shall be designed to be climb resistant, and shall be reviewed by campus security officials.
 - 18.7.3 All fences, walls, and barriers shall allow access by university maintenance and security officials.
 - 18.7.4 When gates are required, they shall be lockable only from the outside and shall conform to all fire and safety codes. Fences, walls, and barriers shall not restrict egress from a confined pedestrian area and Campus Police and Facility Services personnel shall be allowed access at all times.
 - 18.7.5 All designs which utilize landscape materials shall be reviewed and approved by the Campus Landscape Architect.
 - 18.7.6 Temporary construction fencing shall be 6' ht galvanized chain link panels, hardware with foot pads weighted with sand bags. This can be waived by the campus Landscape Architect if the project is a short duration project. Also it must comply with the Campus Landscape Standards.

19 FENCE WRAP AND CONSTRUCTION SIGNS

- 19.1 All building renovations and new construction projects having a contract duration exceeding 60 days and overlap time when school is in session are required to have an LSU standard fence wrap.
- 19.2 All projects over \$125k construction cost with necessary construction fencing.
- 19.3 All projects deemed by the LSU Landscape Architect as a sensitive area shall have a fence wrap.
- 19.4 Exempt projects include
 - 19.4.1 Projects without construction fencing
 - 19.4.2 Site only projects that do not require building material staging.
 - 19.4.3 Service area projects that are not seen from public corridors.
 - 19.4.4 LSU landscape Architect can waive fence wrap requirements.
- 19.5 Fence Wrap Specifications
 - 19.5.1 The Fence Wrap panels are designed in 40 x 6 foot panel sections (optional 20 foot section).

- 19.5.2 Full print coverage. Designed for wide format, 4 color process printing.
- 19.5.3 Designs created in Adobe Illustrator at 400% scale (120 x 18 in.).
- 19.5.4 PMS colors (PMS 512 and PMS 124).
- 19.6 Background Scene
 - 19.6.1 LSU PDC can provide artwork upon request. It is on file at Letterman's printing Baton Rouge.
 - 19.6.2 Adobe Photoshop files for the images to be provided separately.
 - 19.6.3 No logos, images or word printing will be allowed except in this specification.
- 19.7 Company logos and Construction Signs
 - 19.7.1 No logo, images or word printing shall be allowed to be printed on the Fence Wrap.
 - 19.7.2 Contractor's printed logo ONE (1) 6-foot x 12-foot (or smaller) printed mesh Logo sign can be attached over the LSU Fence Wrap at each primary entry to the construction site.
 - 19.7.3 Sign background can be in contrast to the Fence Wrap
 - 19.7.4 Project Signs are limited to the same information above.
 - 19.7.5 Option: Logo and Project Signs can be built out of MDO plywood. Logo limited to one 4' x 8' sheet. Project Sign preferably one (1) 4' x 8', maximum two (2) set as one 8' x 8' sign.
 - 19.7.6 Any requests outside of these parameters, contact the LSU PDC project manager for PDC Director Approval.
- 19.8 Material Specifications (per Letterman's custom printed fence wrap information- attached).
 - 19.8.1 Media Properties- Media: Ultraflex StripMesh Pro LTX, Airflow: 25%, Tensile Strength: 218.94x182.22 lbs/in, Tear Strength: 81.13x61.51 lbs/in, Flame Resistance: NFPA701, Low Temperature: -4 F, High Temperature: 176 F, Air Permeability: 1736 m2/sec, Ink: CMYK Eco-Solvent Inks; Finishing Properties: 1" High-Strength Seam on all sides, 3/8" Brass Grommets applied in 24" increments attach to fence with 7" heavy-duty ties, Finished Size for 6' Fence Wrap: 5' 8".
 - 19.8.2 Graphic companies such as Letterman's can print graphics; however, contractor is not required to use Letterman's. Alternative vendor specifications must be submitted for prior LSU PDC approval
 - 19.8.3 Production Proof from vendor needs to be pre-approved by LSU before printing.

20 IRRIGATION

- 20.1 Landscape Irrigation shall be designed by a licensed landscape irrigator. Comply with LSU Campus Landscape Standards.
- 20.2 The Irrigation System shall be fully automated and controlled by an electrical controller and shall provide 100% coverage of landscaped areas with heads triangularly-spaced with overlapping head-to-head trajectory.
- 20.3 Remote control valves shall be electrically activated.
- 20.4 Turf and planting beds are to be valved separately due to different water requirements.
- 20.5 Turf heads shall be a minimum 6" pop-up spray heads in small cut-up areas of turf and rotary gear-driven heads in large expanse areas of turf.
- 20.6 Shrub and groundcover areas are to receive 12" pop-up spray heads along turf borders, sidewalks and other areas along exterior perimeters where there is no interference from vegetative growth. All interior areas of the bed shall receive shrub sprays on stationary risers with a flex pipe connection to the lateral line. The nozzles on the risers shall be brass.
- 20.7 The automatic controller is to be electromechanical repeat cycle with a master control valve to prevent errant operation. Place in a concealed location (approved by Owner) and all boxes are to be lockable, either by use of a padlock or with an integral lock. Battery operated controllers shall be acceptable on an individual case by case basis.
- 20.8 Irrigation System design is to assure consideration is provided to accommodate prevailing winds and static pressure reading to keep spray off of walks, street and parking areas.
- 20.9 The Irrigation System shall be designed with sufficient quick coupler valves in all areas of the site to be reached with 100' of water hose.
- 20.10 The Irrigation system is to be separated from the domestic water system by a backflow presenter device.

- 20.11 Design shall specify a rain sensor on all campus irrigation systems.
- 20.12 Contractor shall submit a schematic diagram of the completed irrigation system to owner showing all operable zones and the corresponding descriptor on the control box. Review operating procedures with a representative of LSU Landscape Services.

21 PLANTING

- 21.1 Soils & Plant Bed Preparation - The Landscape Architect shall approve soils and plant bed soil preparation and installation for compliance with plans and specifications. Soils and associated amendments have a direct bearing on the performance and ultimate success of plant materials used in the landscape. Selection of soils, amendments and soil preparation mixing ratios shall follow the recommendation of the Agronomic Soil Test and shall be clearly outlined in the construction documents by the Landscape Architect.
- 21.2 Planting Details - Planting beds, pit excavation and backfill for trees, shrubs, groundcover and annuals: Planting plan details and specifications shall clearly address this issue with specific consideration for location conditions regarding diameter of planting pits, depths of planting beds, usability of natural site soil and recommended soil amendments.
- 21.3 Site Landscape Grading & Drainage
 - 21.3.1 Site Grading in preparation for landscape installation shall be in accordance with the site plans. All soils, subgrade or topsoil, native to the site or imported are to be guaranteed free of noxious weeds.
 - 21.3.1.1 All clods, rocks, roots, and other trash, foreign to good friable soil conditions, greater than 1" diameter size are to be raked and removed from the site.
 - 21.3.1.2 The final finish grade for all landscaped areas shall include a 2" layer of topsoil for all turf areas unless otherwise specified.
 - 21.3.1.3 The General Contractor shall assure that all areas or phases of the Project that are ready for landscape installation are graded to specifications, but also clear of all obstacles, equipment and material, etc. that will impair complete and open access to the designated area and ultimately risk quality control of the landscape end- product.
 - 21.3.2 To protect the quality of the landscape, the General Contractor shall control ingress and egress of all subcontractors and trades not directly associated with the landscape installation into all areas designated ready for landscape.
 - 21.3.3 Subsurface drainage using perforated pipe with filter fabric embedded in gravel aggregate shall be installed per plans and specifications in all areas of underground seepage, wet seepage conditions involving paved surfaces, areas slow to percolate due to impervious or tight soil conditions and other site conditions warranting subsurface drainage.
 - 21.3.3.1 All over-structure planter beds and large stationary plant pots shall have subsurface drainage connected directly into the building or site drainage system or a means of dewatering through siphon tubes (saucers with pots are not acceptable).
 - 21.3.4 Plant Material Standards and specifications (all sizes stated are minimum sizes).
 - 21.3.4.1 The Landscape Architect shall approve all plant material used on the Project, prior to shipment from the nursery. Plant materials that do not meet the standards of the specifications and landscape planting plans as described by the Landscape Architect shall be rejected. Landscape Architect shall confirm all plant material is acceptable by LSU as outlined in LSU Campus Landscape Standards.
 - 21.3.4.2 The American Association of Nurserymen Standards shall serve as the standard of quality in developing guideline standards for specification of plant material regarding size for height, spread, caliper, rootball, etc., for container-grown and B&B trees, shrubs, groundcover and annual flowers.
 - 21.3.4.3 Shrub plants shall be planted triangularly and spaced to achieve 100% coverage within a 3-year grow-in period, unless otherwise specifically approved by the Owner.
 - 21.3.4.4 Groundcover: Plant material shall be triangularly-spaced to achieve 100% coverage within a 3-year grow-in period, unless otherwise approved by the Owner.

- 21.3.4.5 Annual flowers: Plants shall be 4" pots minimum, bud and bloomed, spaced 6" o.c. at initial planting. Some species of annual color may be 6" pot size in which case the plant spacing will be adjusted accordingly as approved by the Owner.
- 21.3.4.6 Trees: Size and specification will vary based on species and plant availability. Selection shall necessitate a degree of flexibility and reasonableness based on availability and quality. (Trees must be individually hand-selected and approved by the Campus Landscape Architect.) Specifications shall be in accordance with the applicable selection standards and the Landscape Architect shall specify plants by height, spread, caliper size, rootball and box/container size. All trees shall be tagged with pre-numbered, interlocking tags.
- 21.3.4.7 All plant material delivered to the site shall have tight, firm rootballs. The plant shall not be loose in the rootball at the root crown and the burlap shall be tightly affixed with wire on any rootball greater than 20" diameter. Plants grown in containers shall be fully and deeply rooted and not recently transplanted in such a manner that the roots have not had sufficient time to develop.
- 21.3.4.8 Contract Growing, Special Procurement and On-Site Nursery: Due to plant availability shortages, contract growing of shrubs, groundcover and annual flowers, early procurement of tree plant materials and on-site nursery arrangements may be necessary to have plant materials available for the project of acceptable quality, size and species to comply with the schedule of installation. In this case, the Landscape Architect shall approve procedures associated with such an arrangement and the schedule outlines to accomplish the task. Arrangements for this procedure must begin very early in the Project construction process to allow sufficient time for growing plants.

22 TURF AND GRASSES

- 22.1 Grading of site prior to planting grass must alleviate all pockets of standing or puddling casual water.
- 22.2 Selection of Species: The Zoysia medium turf grass species shall be conducive to the Louisiana region and pre-approved by Campus Landscape Architect, capable of vigorous growth and development of a thick turf cover.
- 22.3 The turf species shall be fine to medium-textured, capable of being developed into manicured turf of refined finish.
- 22.4 The turf quality shall be free of noxious weeds and diseases, true to species as approved by the Owner.
- 22.5 Turf installation shall be by means of solid sod, laid on the finished graded surface, rolled for smoothness and compaction. Plans shall clearly indicate all areas to receive sod.
- 22.6 Turf planting methods other than sod, such as hydro-sprigging or hydro-seeding, shall only be considered on an individual project basis in large areas greater than 100' from outer face of the building as approved by the Campus Landscape Architect.
- 22.7 The General Contractor shall be responsible for providing a 100% fully established turf a minimum of 30 days prior to the opening of the building.
- 22.8 Established turf is defined as 100% ground coverage, matted together sufficiently to support pedestrian foot traffic and growing in a vigorous manner. The turf must be free of erosion, standing water, wet-slow to drain areas, noxious weeds and disease. Newly planted grass must have been mowed on a weekly basis with the proper type mower for at least 30 days prior to final acceptance to be considered established.

23 UTILITIES

- 23.1 The Design Team shall exercise sensitivity to site aesthetics in selecting the location of all infrastructure surface devices such as drain inlets, electric load centers and transformers, backflow devices, utility vaults cleanouts, water meters, etc., with the approval of the Owner.
- 23.2 Water meter and backflow prevention devices will be located in vaults concealed from public view with finish surfaces compatible with surrounding hardscape. Provide freeze protection as required.
- 23.3 Sleeving

- 23.3.1 All horizontal paving shall be sleeved at designated locations per sleeving plans for site lighting, irrigation, and other utilities not installed prior to paving.
- 23.3.2 Sleeves shall be buried below paving a minimum of 4" and a maximum of 15" and be Schedule 40 PVC, 100mm (4") diameter. Provide 3/8" X 3" brass stove bolt in paving at sleeve locations.
- 23.3.3 The General Contractor is responsible to provide an ongoing as-built sleeve plan designating accurate locations and depth.
- 23.4 Street and Roadway Utility Repairs and Replacements: All utility repairs or replacements requiring cuts into roadways, driveways, or parking lots shall be coordinated with the Office of Parking & Transportation Services in advance of the start of work.
- 23.5 In repairing required cuts to complete utility repairs, contractors shall provide a sub base compaction rate standard of 95%. Testing shall be conducted to ensure that the appropriate compaction rate is met. Paving at the completion of the repair shall match adjacent surfaces.

24 QUALITY CONTROL

- 24.1 Quality control is the essence for achievement of the finished product for the exterior environment. The Landscape Architect is to recommend standards for landscape material selection and installation to provide the Owner with a final product that is consistent with other LSU facilities. The Owner shall be involved in the decisions that impact the end-product, including but not limited to, a review and approval of the following.
 - 24.1.1 All aspects of the technical landscape design and installation.
 - 24.1.2 Design/build shop drawings and mechanical function.
 - 24.1.3 Material selection including plants, stone, aggregate, concrete, furniture, fixtures, lighting, signage, railing, fences, etc.
 - 24.1.4 Finish grading.
 - 24.1.5 Surface drainage and details and techniques of subsurface drainage.
 - 24.1.6 Irrigation design and equipment.
 - 24.1.7 Soils and plant bed preparation specifications including chemical and physical properties.
 - 24.1.8 Hardscape design pattern and installation details and materials selection.
 - 24.1.9 Water feature design and mechanical engineering.
 - 24.1.10 Interior-scape plans, specifications, and materials selections.

Louisiana State University Design Standards

DIVISION 03 – CONCRETE

1 CONCRETE MATERIALS AND METHODS

- 1.1 All streets and driveways must meet state highway standards for design and construction, with a minimum width of 24 feet for two way traffic and 12 feet for one way traffic. Islands and any other physical barriers should not be employed to channelize traffic. Signage and other traffic control devices should conform to the most current Manual on Uniform Traffic Control Devices.
- 1.2 Plain and reinforced concrete work to comply with the current edition of the American Concrete Institute (ACI) publications, to the extent applicable in each reference.
- 1.3 Comply with current editions of the applicable American Society for Testing and Materials (ASTM) specifications, to the extent applicable in each reference.
- 1.4 Comply with current edition of the Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practices.

2 CONCRETE REINFORCEMENT

- 2.1 Reinforcing steel shall be ASTM-A615 deformed, billet-steel of grade 60 or better, and shall be installed in accordance with CRSI "Manual of Standard Practice for Reinforced Concrete Construction."

3 CAST-IN PLACE CONCRETE

- 3.1 All concrete shall be a minimum of 3,000 p.s.i. in 28 days. Higher strength concrete and possible admixtures should be considered in special situations.
- 3.2 Aggregates
 - 3.2.1 Aggregates shall conform to provisions of ASTM C33
 - 3.2.2 Use coarse aggregate from only one source and fine aggregate from only one source for exposed concrete in a single structure.
 - 3.2.3 Select proportions of ingredients to produce a concrete having proper workability, durability, strength, and appearance. Proportion ingredients to produce a mixture that will work readily into corners and angles of forms and around reinforcement by methods of placing and consolidation employed on the project.
- 3.3 Field Quality Control
 - 3.3.1 Environmental Controls - Rinsing out of the transit mix trucks, washing or wetting of concrete, site cleanup, or other activity related to water at the site shall be in strict conformance with all EPA requirements for the prevention of water runoff to storm water sewers or ditches.
 - 3.3.2 Testing and Controls
 - 3.3.2.1 The Contractor shall be required to employ, at their expense, a commercial testing laboratory, acceptable to the Owner, to prepare and test the initial mix design for each class of concrete specified.
 - 3.3.2.2 Field Test Cylinders During Construction
 - 3.3.2.2.1 Mold four cylinders for each set of tests specified
 - 3.3.2.2.2 Test one specimen at 7 days and two at 28 days according to ASTM C39. If one or both of the 28-day tests indicate a compressive strength below the strength required, the fourth specimen shall be tested at 56 days. If all tests indicate a compressive strength below the strength required, the Architect/Engineer may, at their discretion, direct the Contractor to perform testing of in-place concrete at no additional cost to the Owner, regardless of the outcome of the tests.
 - 3.3.2.3 Testing of Deficient In-Place Concrete

- 3.3.2.3.1 Concrete strength will be considered potentially deficient if the averages of two consecutive sets of strength test results fail to equal or exceed the specified strength or if any individual strength test result falls below the specified strength or if any individual strength test result falls below the specified strength. Testing may be required as directed by the Architect/Engineer
- 3.3.2.3.2 Concrete work not having the required strength, as determined by the Architect/Engineer, shall be replaced at the Contractor's expense.
- 3.3.2.3.3 All costs incurred in providing the additional testing and/or analyses required as a result of deficient concrete shall be at the Contractor's expense. All costs as a result of delays due to additional testing and/or analyses will be at the Contractor's expense, with no extension of contract length, regardless of the outcome of the testing

3.4 Acceptance of Concrete Work

- 3.4.1 Formed surfaces resulting in a configuration of members smaller than permitted under the tolerances specified shall be considered deficient and repaired or replaced as directed by the Architect/Engineer
 - 3.4.2 Concrete members cast in the wrong location shall be rejected if the strength, appearance, or function of the structure is, in the Architect/Engineer's opinion, adversely affected or if misplaced members interfere with other construction. If rejected, remove members cast in the wrong location and repair or replace the Contractor's expense as directed by the Architect/Engineer
- 3.5 All work required under this section shall be at the Contractor's expense, with no extension of contract time.

Louisiana State University Design Standards

DIVISION 04 – MASONRY

1 GENERAL

- 1.1 Standards - All new brick work including, but not limited to, expansion joints, ties and fasteners and accessories shall conform to standards of the Brick Institute of America.
- 1.2 A sample brick panel of 100 face brick selected for the project shall be laid up with specified jointing for approval by the Designer and University prior to starting exterior face brick installation.
 - 1.2.1 Install 4 foot high by 6 foot wide panel illustrating pattern, bond, and blend of colors for Architect's approval of masonry materials prior to ordering all materials. Mock-up should accurately portray the color, blend, and size of brick that will be sent to the jobsite.
 - 1.2.2 After all brick has been sent to the jobsite, construct a second mock-up wall size as necessary to incorporate examples of ALL conditions pertinent to the project; include bonding patterns, colored mortars, finished joint tooling, back-up construction, expansion joints & control joints (with sealant & backer rod), corners, headers, sills, horizontal reinforcing, anchorage to back-up construction, thru-wall flashing, cavity insulation, weeps, and any other special conditions for the project into masonry panel. The purpose of the sample panel is for the Contractor to show his understanding of all aesthetic and technical criteria related to masonry work for the Architect's approval prior to initiating actual work on the project. Masonry Work should not commence until the Architect and Owner have issued approval of the mock-up. Mock-up may remain as part of work if accepted.
- 1.3 Should the initial sample panel be unsatisfactory, the Contractor will be required to erect additional samples until the brick work and jointing are approved by both the Designer and University.

2 UNIT MASONRY

- 2.1 The predominant and preferred brick on campus is Bengal Blend Modular manufactured by Cherokee Brick and Tile Company, Jackson, MS. Any other brick selection must be approved by the Planning, Design & Construction department. Additions shall match existing brick in color and texture.
- 2.2 The University has also approved St. Joe Light Tan or Rose Blend brick where appropriate to match existing.
- 2.3 Coursing - New brickwork, which is adjacent to or an addition to existing brickwork, shall be coursed to match the existing brickwork.
- 2.4 Cavity Walls - Cavity walls shall be detailed and specified to keep cavities free of mortar and the Designer's field representative shall enforce this requirement. There are several strategies available to keep mortar out of the cavity that does not require extraordinary masonry skills. Brick ties shall be specified with built-in drips to avoid water bridging the cavity.
- 2.5 Flashings - Flashings shall be carefully thought out and positioned. Extend beyond openings and specify dams. Coordinate and detail the interface between below grade waterproofing and through-wall flashing, as well as base flashing and weeps.
- 2.6 Weep holes - Weeps are preferred to be an open head joint rather than cords or tubes. Locate them far enough above adjacent roofs to allow reproofing without interfering with their operation. Weep holes on exterior walls shall extend the full height of the brick head joint and be a minimum of 24" on center.
- 2.7 Expansion and Control Joints - Expansion joints and expansion joint spacing shall strictly conform to the Brick Institute of America.
- 2.8 Mortar Joints - Mortar joints shall be tooled slightly concave. Struck or raked joints shall not be used in exterior walls. Exception: Joints in historic buildings shall match the existing ones.
- 2.9 Reinforcement, Ties and Anchors: Reinforcement, ties and anchors shall strictly conform to the American Concrete Institute, the American Society of Civil Engineers and the Masonry Society.
- 2.10 All new exterior brick or exposed aggregate finishes shall be sealed with a clear silane or silicone waterproofing solution. Windows, doors, and shrubbery shall be covered during the application. Provide a minimum 10 year manufacturer's warranty.
- 2.11 Due to potential rusting, brick veneer wall shall have CMU back up interior wall and not metal studs.

- 2.12 Air space between brick and wall shall be a minimum of 1 ½".
- 2.13 Glazed brick or ceramic tile on restroom walls: A minimum of five feet high is preferred.
- 2.14 Copper wall flashing: A minimum of 5 oz. shall extend below the entire width of the brick.
- 2.15 Bricks used for paving shall be of a grade designated as suitable for ground contact.
- 2.16 Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting and ensure that they are securely tied. If units become wet, do not install until they are dry.

3 COPING STONES

- 3.1 Thru-wall flashing shall be installed beneath all coping stone installations.

4 MASONRY & STONE RESTORATION

- 4.1 Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on masonry units as follows.
 - 4.1.1 Existing Brick and Cast Stone: Test each type of existing masonry unit indicated for replacement, according to testing methods in ASTM C 67 for compressive strength, 24- hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.
 - 4.1.2 Existing Mortar: Test according to ASTM C 295, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength. Use X-ray diffraction, infrared spectroscopy, and differential thermal analysis as necessary to supplement microscopical methods. Carefully remove existing mortar from within joints at five locations designated by testing service.
 - 4.1.3 Temporary Patch: As directed by Architect, provide temporary materials at locations from which existing samples were taken.
 - 4.1.4 Replacement Brick and Cast Stone: Test each proposed type of replacement unit, according to sampling to sampling and testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).
- 4.2 Restoration Specialist Qualifications: Engage an experienced, preapproved masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.

Louisiana State University Design Standards

DIVISION 05 – METALS

1 STRUCTURAL STEEL

- 1.1 Structural steel work is defined in the American Institute of Steel Construction (AISC) “Code of Standard Practice.” Structural steel shall comply with the following
 - 1.1.1 AISC “Code of Standard Practice for Steel Buildings and Bridges”
 - 1.1.2 AISC “Specifications for Structural Steel Buildings,” including “Commentary”
 - 1.1.3 “Specifications for Structural Joints” using ASTM A325 or A490 “Bolts” approved by the Research Council on Structural Connections
 - 1.1.4 American Welding Society (AWS) D1.1 “Structural Welding Code – Steel”
 - 1.1.5 ASTM A6, “General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use”
 - 1.1.6 ASTM A36 “Structural Steel Shapes, Plates, and Bars”
 - 1.1.7 ASTM A500 “Grade B Cold-Formed Steel Tubing”
 - 1.1.8 ASTM A501 “Hot-Formed Steel Tubing”
 - 1.1.9 ASTM A307 “Anchor Bolts”
 - 1.1.10 ASTM C150 “Type I or Type III, Cement Grout”

2 FIREPROOFING

- 2.1 The Contractor shall coordinate the type of fireproofing to be used with structural steel primers. Some fireproofing materials cannot be easily or economically applied to painted surfaces and some Underwriter’s Laboratories, Inc. (UL) fireproofing designs do not permit primed steel.

3 STEEL JOISTS & GIRDERS

- 3.1 Steel joist and joist girders shall comply with the following requirements
 - 3.1.1 Steel Joist Institute (SJI) for steel cord and web sections
 - 3.1.2 ASTM A36, for steel bearing plates
 - 3.1.3 ASTM A307, Grade A, for unfinished threaded fasteners, low carbon steel
 - 3.1.4 UL, for fire resistance rating

4 METAL DECKING

- 4.1 Metal Decking shall comply with the following
 - 4.1.1 Steel Deck Institute (SDI) “Design Manual”
 - 4.1.2 American Iron and Steel Institute (AISI) “Specification for Cold-Formed Steel Structural Members”
 - 4.1.3 American Welding Society (AWS) D1.1, “Structural Welding Code – Steel” and AWS D1.3, “Structural Welding Code – Sheet Steel”
 - 4.1.4 UL “Fire Resistance Directory”
- 4.2 All floor decking shall be galvanized in accordance with ASTM A 525 (ASTM A 525M). The Contractor shall provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work

5 MISCELLANEOUS METALS

- 5.1 Miscellaneous metals typically include items of steel, and sometimes aluminum that are not specified as part of the building structure or part of ornamental metal sections. To avoid change orders, the scope of miscellaneous metals shall be carefully reviewed and itemized prior to issuing the Contract Documents.
- 5.2 Miscellaneous metal work shall be carefully reviewed to identify all items that should be galvanized and all items that should be shop-primed and shop finished. In general, all exterior ferrous metal items should be galvanized.

- 5.3 All exterior steel ladders, stairways, landings, supports, etc. shall be hot-dipped zinc coated (Galvanized). Where the architectural appearance is of great significance, alternate finishes may be considered. Ladders shall be lockable and meet all OSHA Standards.

Louisiana State University Design Standards

DIVISION 06 – WOOD, PLASTICS & COMPOSITES

1 TREATED LUMBER

- 1.1 Exterior wood shall be pressure treated where in contact with the ground and exposed to weathering. Lumber indicated to be preservative-treated shall comply with the applicable requirements of the American Wood Preservers Association, AWPA C2 (lumber) and AWPA C9 (plywood).
- 1.2 Preservatives for treated-wood blocking and nailers in contact with membrane roofing systems must be approved by the roof system manufacturer. Creosote, pentachlorophenol, copper naphthenate, and copper 8-quin-olate are typically not approved by roofing system manufacturers.

2 WOOD BLOCKING

- 2.1 Wood Blocking to support other work is a major portion of rough carpentry work for University projects. To avoid change orders, the scope of blocking required shall be clearly indicated. The following list includes some of the common items that may need concealed wood blocking.
 - 2.1.1 Miscellaneous metals, such as handrails
 - 2.1.2 Finish carpentry and millwork, including office shelves and casework
 - 2.1.3 Roof and flashing
 - 2.1.4 Roof accessories and skylights
 - 2.1.5 Windows
 - 2.1.6 Chalkboards and tack boards
 - 2.1.7 Toilet partitions
 - 2.1.8 Signage and graphics
 - 2.1.9 Fire extinguishers and cabinets
 - 2.1.10 Toilet accessories
 - 2.1.11 Projection screens
 - 2.1.12 Casework and attached furnishings, including laboratory bench casework
 - 2.1.13 Window treatment such as blinds, shades, and drapes
 - 2.1.14 Electrical framing such as mounting boards for telephone, fire alarm, and electrical panels

3 FINISHED CARPENTRY

- 3.1 Finish carpentry refers to carpentry work that is exposed to view and is non- structural.
- 3.2 The Architectural Woodwork Institute (AWI) publication “Architectural Woodwork Quality Standards, Guide Specifications, and Quality Certification Program” shall be used when designing, detailing, and specifying finish carpentry and millwork.

4 ARCHITECTURAL WOOD CASEWORK

- 4.1 Reference Standards
 - 4.1.1 AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
 - 4.1.2 AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).
 - 4.1.3 BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.
 - 4.1.4 NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
 - 4.1.5 ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
 - 4.1.6 ANSI A208.1 - American National Standard for Particleboard; 2009.
 - 4.1.7 ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
 - 4.1.8 AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
 - 4.1.9 HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009 (ANSI/HPVA HP-1).

- 4.1.10 NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- 4.1.11 NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; National Hardwood Lumber Association; 2011.
- 4.1.12 PS 1 - Structural Plywood; 2009.
- 4.1.13 PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2010.
- 4.1.14 WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com/services.
- 4.1.15 WI (MCP) - Monitored Compliance Program (MCP); current edition at www.woodworkinstitute.com/services.
- 4.2 Quality Assurance
 - 4.2.1 Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
- 4.3 Cabinets
 - 4.3.1 Quality Grade - Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Premium Grade.

Louisiana State University Design Standards

DIVISION 07—THERMAL & MOISTURE PROTECTION

1 ROOF DETAILS

- 1.1 All roofing details shall conform to the NRCA (National Roofing Contractors Association) Roofing and Waterproofing Manual.

2 SHEET METAL DETAILS

- 2.1 All sheet metal details shall conform to the SMACNA (Sheet Metal and Air Conditioning Contractors National Association) Architectural Sheet Metal Manual.

3 ROOF SCHEDULE

- 3.1 Provide for all roofing to be installed such that any area started shall be completed through installation of aggregate the same day. Water-stops conforming to the NRCA Roofing Manual shall be installed at the end of each day's work to ensure maintenance of the waterproof integrity of the roof membrane.

4 ROOF SERVICE AGREEMENT

- 4.1 Roof work shall be covered by the Membrane Roofing Service Guarantee described in these standards.

5 INSULATION

- 5.1 Batt insulation is preferred to blown insulation. Where insulation is installed in roof areas, chicken wire will be used to support the batts within the roof rafters.
- 5.2 Exterior wall insulation shall be a minimum R-19 and ceiling/roof insulation R-30.

6 CLAY TILE ROOFS

- 6.1 New roofs shall be sloped Ludowici - 'S' Tile – 13 1/4" tile (9 3/4" x 13 1/4"). Larger size Ludowici 18 3/8" tile (9 3/4" x 18 3/8") may be substituted and approved upon review depending on the mass and scale of the structure.
- 6.2 Color pattern to match existing roofs (65% Summer Rose, 15% Impressionist Fireflash, and 10% Desert Sand, 10% Clay Red).
 - 6.2.1 Color pattern mix to be approved via mockup by LSU Planning, Design & Construction.
 - 6.2.2 Coordinate with LSU Facility Services to incorporate attic stock tile materials prior to mockup and installation
- 6.3 Hurricane clips, copper or stainless steel shall be used on all perimeter tiles. Fasten each tile with 2 or 3 nails. Fasten tiles overlapping sheet metal with copper wire and plastic cement.
- 6.4 Stainless steel hurricane clips shall be used on all tile within 36" of all perimeters. Cut valley tiles shall be notched and wired using 16 gauge solid copper wire without insulation and wired to a fastener driven into the deck beyond the flashing and adhered to adjacent tiles using a polyurethane sealant that is suitable for bonding with clay tiles.
- 6.5 Nails for tile and cleats shall be copper, 11 gauge, ring shanked, 3/8" headed and proper length to allow minimum 3/4" penetration. No penetration is allowed on exposed eaves. Screws for tile shall be stainless steel or brass #8 or #9 and proper length to allow minimum 3/4" penetration. Fasten each tile with fastener in each provided hole.
- 6.6 Hip and ridge tile to have a clear silicone sealant (Dow 790) applied over the nail heads so that the adjacent tile is well adhered to minimize wind uplift. Accessory pieces to include end bands, beveled eaves, flat tops, detached gable rakes, rolled rakes, #102 hip rolls, #206 ridge, #152 LSU hip starter, #206 High Bump Closed Ridge End, #102/#206 High Bump Terminals.
- 6.7 Flat Interlocking LudoSlate -This tile may be used as an alternative to the Spanish tile above, upon written approval by the University, for reroofing projects and new sloped roof projects whereby design justifies its use. The size shall be 10.

- 6.8 ¾" x 16" with the exception that the Desert Sand shall be 7" wide. Color pattern shall be same as per above requirements with noted exception for 7" wide tile. Fastening shall be per above requirements. Accessory hip and ridge pieces shall be same as per above requirements.
- 6.9 Both tile above shall be per ASTM 1167, have a durability of Grade 1, a warranty of 75 years, have a moisture absorption rate of less than 3%, and supplied by a factory that references ISO 9000 certification standards.
- 6.10 Equal products of other manufacturers submitted shall match Ludowici tile in colors, shapes, textures, sizes and include all accessory pieces as Ludowici products listed. Failure to meet these exact requirements shall be reason for rejection.

7 ROOF SLOPE

- 7.1 Minimum slope on flat roof re-roofing shall be 1/8" for coal tar pitch and 1/4" for asphalt pitch.
- 7.2 Underlayment for sloped roofs shall be a Modified Bituminous Self-Adhering Sheet not less than 60 mils thick equal to W.R. Grace and Co, Ice and Water Shield, W.R. Meadows SealTight Mel-Rol, or Pecora Duramem 700-SM.
- 7.3 Install a 30# asphalt saturated organic felt, un-perforated, over the self-adhering sheet. Underlayment for use under copper and other metals shall be Grace Ultra or equal which is used for high temperatures.

8 METAL ROOFING

- 8.1 All roof metal work shall be minimum 16 oz. copper, unless otherwise noted. Standing seam metal roofing and accessories shall be installed in accordance with the manufacturer's specifications and shall be 16" wide by 2" high, 24 gauge baked enamel galvalume steel with a double lock seam capable of withstanding 100 MPH sustained winds.

9 LEAK REPAIRS

- 9.1 Roofing contractor shall respond within 24 hours to leak repair requests by the University.

10 UNDERGROUND EQUIPMENT PITS

- 10.1 Underground equipment pits shall have bentonite waterproofing applied to the exterior of the walls.

11 ROOF FEATURES

- 11.1 The University discourages the use of skylights, sloped glazing and glass atriums.

12 EXTERIOR MASONRY

- 12.1 Exterior masonry (stucco) shall be finished to conform to STO 10610, Sea Shell, Fine Sand Finish and all caulking shall be a high performance gun-grade polyurethane sealant successfully tested for joint movement of ± 50%. It is to match existing color of masonry being caulked.

13 ROOF HATCHES

- 13.1 Roof hatches shall be a minimum 3'0" X 3'0", aluminum metal with 1" rigid insulation. Provide hold open arm and one point spring latch with pad locking provisions.

14 ASBESTOS

- 14.1 All materials, including fireproofing, shall be asbestos-free.

15 ROOF ACCESS

- 15.1 Buildings with multiple roof levels shall have roof access provided via 1) operable windows, 2) roof hatch, 3) door from attic or stair, or 4) wall mounted hot dipped galvanized steel ladder.

Louisiana State University Design Standards

DIVISION 08 - OPENINGS

1 STANDARD STEEL FRAMES

- 1.1 Manufacturers
 - 1.1.1 Ceco Door Products
 - 1.1.2 Republic Builders Products
 - 1.1.3 Steelcraft
 - 1.1.4 The MPI Group
 - 1.1.5 Mesker
- 1.2 Accessories
 - 1.2.1 Removable Stops - Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws
 - 1.2.2 Bituminous Coating - Non-asbestos fibered asphalt emulsion
 - 1.2.3 Primer - Zinc chromate type
 - 1.2.4 Silencers - Resilient rubber fitted into drilled hole at interior door locations only
 - 1.2.5 Weather-stripping - for all exterior door locations only
 - 1.2.5.1 Glazed Lights - Non-removable stops on non-secure side; sizes and configurations as indicated on drawings; Style - Manufacturers standard
- 1.3 Fabrication
 - 1.3.1 Fabricate frames as welded unit

2 STANDARD STEEL DOORS

- 2.1 Manufacturers
 - 2.1.1 Ceco Door Products
 - 2.1.2 Republic Builders Products
 - 2.1.3 Steelcraft
 - 2.1.4 The MPI Group
 - 2.1.5 Mesker
- 2.2 Accessories
 - 2.2.1 Removable Stops - Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws
 - 2.2.2 Primer - Zinc chromate type
 - 2.2.3 Provide edge clearances in accordance with ANSI A250, but no less than 1/8" clear
- 2.3 Fabrication
 - 2.3.1 Fabricate doors with hardware reinforcement welded in place

3 FLUSH WOOD DOORS

- 3.1 Manufacturers
 - 3.1.1 Algoma Hardwoods Inc. Model Commercial Wood Doors
 - 3.1.2 Eggers Industries Model Commercial Wood Doors
 - 3.1.3 Haley Bros. Wood Doors
 - 3.1.4 Oshkosh Door Company
- 3.2 Flush Interior Doors: 1 3/4" thick; solid core, five ply construction
- 3.3 Solid Core, Non-Rated, Type SCL Structural Composite Lumber

4 FIBERGLASS DOORS

- 4.1 Manufacturers

- 4.1.1 Molded Fiberglass Doors
 - 4.1.1.1 ChemPruf Door Company, Ltd.
 - 4.1.1.2 Tiger Door, LLC
- 4.1.2 Product
 - 4.1.2.1 Fiberglass construction with reinforced core 1 3/4" nominal
 - 4.1.2.2 Core Material - Manufacturer's standard core material for application indicated
 - 4.1.2.3 Construction - Fiberglass faces laminated to core with an applied gel coating, or molded in one piece including gel coating on each side
 - 4.1.2.4 Face Sheet Texture - Smooth
 - 4.1.2.5 Subframe and Reinforcements - Fiberglass pultrusions, polymer foam, stainless steel, or aluminum; no wood
 - 4.1.2.6 Waterproof Integrity
 - 4.1.2.6.1 Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP).
 - 4.1.2.6.2 Provide cut- outs with joints sealed independently of glazing, louver inserts, or trim.
 - 4.1.2.7 Hardware Preparations
 - 4.1.2.7.1 Factory reinforce, machine, and prepare for door hardware including field installed items.
 - 4.1.2.7.2 Provide solid blocking for each item.
 - 4.1.2.7.3 Field cutting, drilling or tapping is not permitted.
 - 4.1.2.7.4 Obtain manufacturer's hardware templates for preparation as necessary.
- 4.1.3 Accessories
 - 4.1.3.1 Stops for Glazing and Louver
 - 4.1.3.1.1 Fiberglass, unless otherwise indicated or required by fire rating
 - 4.1.3.1.2 Provided by door manufacturer to fit factory made openings, with color and texture to match door
 - 4.1.3.1.3 Fasteners shall maintain waterproof integrity
 - 4.1.3.1.4 Exterior Doors - Provide non-removable stops on exterior side with continuous compression gasket weather seal
 - 4.1.3.1.5 Glazed Openings - Provide removable stops on interior side
 - 4.1.3.1.6 Fire-Rated Doors - Provide stop kit listed by labeling authority
 - 4.1.3.1.7 Opening Sizes and Shapes - As indicated on drawings
 - 4.1.3.2 Louvers for Non-Fire-Rated Doors
 - 4.1.3.2.1 Same materials, construction, finish, and color as door
 - 4.1.3.2.2 Fixed vanes
 - 4.1.3.2.3 45° sloped vanes
 - 4.1.3.3 Louvers for Fire-Rated Doors - UL (DIR) listed and labeled self-closing fire damper louvers

5 SLIDING AUTOMATIC ENTRANCES

- 5.1 Includes exterior and interior, bi-parting, sliding automatic entrances with integral transoms
- 5.2 References
 - 5.2.1 Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated.
 - 5.2.2 Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority.

- 5.2.3 Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- 5.2.4 Underwriters Laboratories (UL)
 - 5.2.4.1 UL 325 Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems
 - 5.2.4.2 UL/cUL 325 Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems (CAN/CSA-C22.2 No. 247)
- 5.2.5 American National Standards Institute (ANSI) / Builders' Hardware Manufacturers Association (BHMA)
 - 5.2.5.1 ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors
 - 5.2.5.2 ANSI/BHMA A156.5: Standard for Auxiliary Locks and Associated Products
- 5.2.6 American Society for Testing and Materials (ASTM)
 - 5.2.6.1 ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - 5.2.6.2 ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- 5.2.7 American Association of Automatic Door Manufacturers (AAADM)
- 5.2.8 National Fire Protection Association (NFPA)
 - 5.2.8.1 NFPA 101 Life Safety Code
 - 5.2.8.2 NFPA 70 National Electric Code
- 5.2.9 International Code Council (ICC)
- 5.2.10 Building Officials and Code Administrators International (BOCA)
- 5.2.11 International Organization for Standardization (ISO)
 - 5.2.11.1 ISO 9001 Quality Management Systems
 - 5.2.11.2 ISO 14025 Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures
 - 5.2.11.3 ISO14040 Environmental Management - Life Cycle Assessment - Principles and Framework
 - 5.2.11.4 ISO 14044 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
 - 5.2.11.5 ISO 21930 Sustainability in Buildings and Civil Engineering Works - Core Rules For Environmental Product Declarations Of Construction Products And Services
- 5.2.12 National Association of Architectural Metal Manufacturers (NAAMM) - Metal Finishes Manual for Architectural and Metal Products
- 5.2.13 American Architectural Manufacturers Association (AAMA)
 - 5.2.13.1 AAMA 606.1 Integral Color Anodic Finishes for Architectural Aluminum
 - 5.2.13.2 AAMA 611 Voluntary Specification for Anodized Architectural Aluminum
 - 5.2.13.3 AAMA 701 Voluntary Specification for Pile Weatherstripping and Replaceable
- 5.2.14 United Nations Central Product Classification (UNCPC)
 - 5.2.14.1 UNCPC 4212 Product Category Rules for Preparing an Environmental Product Declaration for Power-Operated Pedestrian Doors and Revolving Doors
- 5.3 Performance Requirements
 - 5.3.1 Provide automatic entrance door assemblies capable of withstanding loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project
 - 5.3.2 Operating Range - Minus 30°F (Minus 34°C) to 130° F (54°C)
 - 5.3.3 Opening - Force Requirements for Egress Doors: Force shall be adjustable; but, not more than 50 lbf (222 N) required to manually set swinging egress door panel(s) in motion
 - 5.3.4 Closing-Force Requirements - Not more than 30 lbf (133 N) required to prevent door from closing
- 5.4 Submittals

- 5.4.1 Shop Drawings - Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work
- 5.4.2 Color Samples for selection of factory-applied color finishes
- 5.4.3 Closeout Submittals
 - 5.4.3.1 Owner's Manual
 - 5.4.3.2 Warranties
- 5.4.4 Reports - Based on evaluation performed by a qualified agency, for automatic entrance door assemblies
 - 5.4.4.1 Environmental Product Declaration
 - 5.4.4.2 Evaluation Report for compliance with IBC
- 5.5 Quality Assurance
 - 5.5.1 Installer Qualifications - Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project
 - 5.5.2 Manufacturer Qualifications - A qualified manufacturer with a manufacturing facility certified under ISO 9001
 - 5.5.3 Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service
 - 5.5.4 Certifications - Automatic sliding door systems shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards
 - 5.5.4.1 ANSI/BHMA A156.10
 - 5.5.4.2 NFPA 101
 - 5.5.4.3 UL 325 listed
 - 5.5.4.4 IBC
 - 5.5.4.5 BOCA
 - 5.5.5 Environmental Product Declaration (EPD)
 - 5.5.6 Shall be certified by the manufacturer to comply with the following
 - 5.5.6.1 Prepared under Product Category Rule (PCR) UNCPC 4212
 - 5.5.6.2 Conform to ISO standards 14025, 14040, 14044, 21930
 - 5.5.6.3 Life Cycle Assessment Basis: Cradle to Gate, minimum
 - 5.5.7 Source Limitations - Obtain automatic entrance door assemblies through one source from a single manufacturer
 - 5.5.8 Product Options - Drawings shall indicate sizes, profiles, and dimensional requirements of automatic entrance door assemblies and are based on the specific system indicated
 - 5.5.9 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
 - 5.5.10 Emergency-Exit Door Requirements - Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress
- 5.6 Automatic Entrances Products
 - 5.6.1 Manufacturer - Stanley Access Technologies; Dura-Glide™ 3000 Series sliding automatic entrances or prior approved equal product
- 5.7 Automatic Entrance Door Assemblies
 - 5.7.1 Provide manufacturer's standard automatic entrance door assemblies including doors, sidelights, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.
 - 5.7.2 Sliding Automatic Bi-Parting Entrances
 - 5.7.2.1 Configuration - Two sliding leaves and two full sidelight; bi- parting
 - 5.7.2.2 Traffic Pattern - Two-way
 - 5.7.2.3 Emergency Breakaway Capability - Sliding leaves and sidelights

5.7.2.4 Mounting - Between jambs

5.8 Door Operators

5.8.1 Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, operation under normal traffic load for type of occupancy indicated

5.8.2 Electromechanical Operators - Self-contained overhead unit powered by a minimum of 1/4 horsepower, permanent-magnet DC motor with gear reduction drive, microprocessor controller and encoder

5.8.2.1 Operation - Power opening and power closing

5.8.2.2 Features

5.8.2.2.1 Adjustable opening and closing speeds

5.8.2.2.2 Adjustable open check and close check speeds

5.8.2.2.3 Adjustable hold-open time between 0 and 30 seconds

5.8.2.2.4 Obstruction recycle: On/Off switch to control electric power to operator

5.8.2.2.5 Energy conservation switch that reduces door-opening width

5.8.2.2.6 Closed loop speed control with active braking and acceleration

5.8.2.2.7 Adjustable obstruction recycle time delay

5.8.2.2.8 Self-adjusting stop position

5.8.2.2.9 Self-adjusting closing compression force

5.8.2.2.10 Onboard sensor power supply

5.8.2.2.11 Onboard sensor monitoring

5.8.2.2.12 Optional Switch to open/Switch to close operation

5.8.2.2.13 Fire alarm interface, configurable to safely open or close the entrance on signal from fire alarm system

5.8.2.3 Mounting - Concealed

5.8.2.4 Drive System - Synchronous belt type

5.9 Electrical Controls

5.9.1 Electrical Control System shall include a microprocessor controller and a high-resolution position encoder

5.9.1.1 Encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed

5.9.1.2 The high-resolution encoder shall have a resolution of not less than 1024 counts per revolution

5.9.1.3 Systems utilizing external magnets and magnetic switches are not acceptable

5.9.1.4 Shall include a 24 VDC auxiliary output rated at 1 amp

5.9.2 Performance Data - The microprocessor shall collect, and store performance data as follows

5.9.2.1 Counter - A non-resettable counter to track operating cycles.

5.9.2.2 Event Reporting - Unit shall include non-volatile event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors

5.9.2.3 LED Display - Display presenting the current operating state of the controller

5.9.3 Controller Protection - The microprocessor controller shall incorporate the following features to ensure trouble free operation

5.9.3.1 Automatic Reset Upon Power Up

5.9.3.2 Main Fuse Protection

5.9.3.3 Electronic Surge Protection

5.9.3.4 Internal Power Supply Protection

- 5.9.3.5 Resettable sensor supply fuse protection
- 5.9.3.6 Motor Protection, over-current protection
- 5.9.4 Soft Start/Stop - A "soft-start", "soft-stop" motor driving circuit shall be provided for smooth normal opening and recycling
- 5.9.5 Obstruction Recycle
 - 5.9.5.1 Provide system to recycle the sliding panels when an obstruction is encountered during the closing cycle
 - 5.9.5.2 If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed
 - 5.9.5.3 If obstruction is encountered again, the door will come to a full stop
 - 5.9.5.4 The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation
- 5.9.6 Programmable Controller - Microprocessor controller shall be field programmable.
 - 5.9.6.1 The following parameters may be adjusted
 - 5.9.6.1.1 Operating speeds and forces as required to meet specified ANSI/BHMA standard
 - 5.9.6.1.2 Adjustable and variable features specified
 - 5.9.6.1.3 Reduced opening position
 - 5.9.6.1.4 Fail Safe/Secure control
 - 5.9.6.2 Manual programming shall be available through local interface which has a two-digit display with a selection control including three push buttons

5.10 Aluminum Finishes

- 5.10.1 Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes
- 5.10.2 Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes
- 5.10.3 Class I, Color Anodic Finish - AA-M12C22A42/A44 Mechanical Finish - as fabricated; Chemical Finish - etched, medium matte; Anodic Coating - Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum complying with AAMA 611-98, and the following
 - 5.10.3.1 Color - Dark Bronze
 - 5.10.3.2 AAMA 606.1
 - 5.10.3.3 Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge
- 5.10.4 Installation
 - 5.10.4.1 General
 - 5.10.4.1.1 Do not install damaged components
 - 5.10.4.1.2 Fit frame joints to produce joints free of burrs and distortion
 - 5.10.4.1.3 Rigidly secure non-movement joints
 - 5.10.4.2 Entrances
 - 5.10.4.2.1 Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place
 - 5.10.4.2.2 Install surface-mounted hardware using concealed fasteners to greatest extent possible
 - 5.10.4.2.3 Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support
 - 5.10.4.3 Door Operators

- 5.10.4.3.1 Connect door operators to electrical power distribution system
- 5.10.4.4 Glazing
 - 5.10.4.4.1 Performed in accordance with sliding automatic entrance manufacturer's instructions

5.11 Field Quality Control

- 5.11.1 Testing Services - Factory Trained Installer shall test and inspect each automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

5.12 Cleaning and Protection

- 5.13 Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish. Comply with requirements in Division 8 Section "Glazing", for cleaning and maintaining glass.

5.14 Warranty

- 5.14.1 Automatic Entrances shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion
- 5.14.2 During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs
- 5.14.3 A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner
- 5.14.4 During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hour

6 DOOR HARDWARE

6.1 General

- 6.1.1 It is the intent of this document to provide guidelines for the Architect's specifications section 08710, finish hardware
- 6.1.2 Products detailed herein are the standard of quality to be used on new projects and renovations or additions to existing buildings
- 6.1.3 Coordinate all products to meet the requirements of life safety codes, ADA requirements, and applicable building codes
- 6.1.4 All hardware for aluminum doors shall be specified and provided in this section

6.2 Quality Assurance

6.2.1 Supplier

- 6.2.1.1 The supplier must be a factory authorized distributor of all materials to be furnished
- 6.2.1.2 The supplier must have an office and warehouse within a one hundred fifty-mile radius of the project to properly service the projects

6.2.2 Installer

- 6.2.2.1 Firm with three (3) years' experience in the installation of commercial or institutional grade hardware
- 6.2.2.2 Hardware must be installed accurately, applied securely, and adjusted properly
- 6.2.2.3 Install the hardware only with fasteners furnished by the manufacturer. Warranties and/or labels will be void on material installed with unauthorized fasteners
- 6.2.2.4 The installer will clean and make final adjustments of each item of hardware to insure proper operation and function. Adjust door control devices for final operation after air handling equipment is operational

6.3 Field Quality Control

- 6.3.1 The finish hardware distributor shall provide the field quality control services as listed
- 6.3.2 Furnish a complete report to the Architect and General Contractor after each field visit
- 6.3.3 Prior to installation

- 6.3.3.1 Visit the project site with the General Contractor and installer and check the hardware for any shortages or shipment damage
 - 6.3.3.2 Instruct the installer on any special conditions and the adjustments required for the proper installation of the finish hardware
- 6.3.4 After Installation
 - 6.3.4.1 Check the project for the proper application of the finish hardware according to the approved hardware schedule
 - 6.3.4.2 Check that all items, including door control devices, have been properly adjusted and are operating properly
 - 6.3.4.3 Notify the Architect of any hardware not installed in accordance with the approved hardware schedule or properly adjusted
 - 6.3.4.4 If hardware is found that is not installed correctly or properly adjusted, the General Contractor must adjust, repair, or replace, as directed by the Architect
 - 6.3.4.5 Instruct the owner personnel in the proper operation, adjustments, and maintenance of the finish hardware
- 6.3.5 One Year Review - If requested by the Architect, the hardware distributor and hardware installer shall visit the project and make any final adjustments to the hardware as required
- 6.4 Finish Hardware Schedule
 - 6.4.1 Prior to approval of the finish hardware schedule, the Architect shall provide a copy to the University's Office of Planning, Design and Construction (PDC) for review - Attention: PDC Project Manager
 - 6.4.2 Finish hardware schedule shall include the following
 - 6.4.2.1 A complete list of all manufacturers used
 - 6.4.2.2 A complete list of all abbreviations used
 - 6.4.2.3 A complete list and description of all finishes used, including base metals
 - 6.4.2.4 A complete set of cut sheets illustrating all products proposed
 - 6.4.2.5 Hardware heading are to be arranged to correspond with specification hardware sets
 - 6.4.2.6 Hardware heading shall include
 - 6.4.2.6.1 A complete description of the opening, including "LSU" room numbers, to be provided by Facility Services and Architect's room numbers
 - 6.4.2.6.2 Key set numbers (See keying requirements)
 - 6.4.2.6.3 A complete description of the products, including finishes
- 6.5 Key Cylinders and Keying Requirements
 - 6.5.1 All key cylinders shall be provided from one of the following manufacturers who have established proprietary Great Grand Master Key Systems for the Baton Rouge campus.
 - 6.5.1.1 All new buildings shall be keyed to a new Building Grand Master
 - 6.5.1.2 All existing buildings shall be keyed to that building's existing Grand Master Key
 - 6.5.1.3 Acceptable manufacturers for key cylinders. No exceptions will be considered.
 - 6.5.1.3.1 Medeco - All New facilities or complete rekey projects
 - 6.5.1.3.2 Best Lock Co. - All New facilities or complete rekey projects
 - 6.5.1.3.3 Corbin Russwin - Only use when matching existing facility master key systems
 - 6.5.1.3.4 Sargent - Only use when matching existing facility master key systems
 - 6.5.1.3.5 Yale Security - Only use when matching existing facility master key systems
 - 6.5.2 All key cylinders shall be provided with removable cores
 - 6.5.2.1 Cores shall be removable by a control key without removing cylinder from locking device
 - 6.5.3 Construction cores shall be provided to the contractor by the supplier for use during construction

- 6.5.4 At completion of the project, the General Contractor shall remove the construction cores and install the permanent cores
- 6.5.5 All permanent keys shall be delivered to LSU's Lock Shop. The Lock Shop will then transmit master control keys to contractor for use on project
 - 6.5.5.1 Two copies of the manufacturer's bitting list shall be included
 - 6.5.5.2 The bitting list shall include the following
 - 6.5.5.2.1 LSU room number (This information will be provided by LSU PDC)
 - 6.5.5.2.2 Key set number
- 6.5.6 All permanent keys shall be delivered in individual envelopes and tagged as follows
 - 6.5.6.1 Hardware heading number
 - 6.5.6.2 LSU room number and location description
 - 6.5.6.3 Architects room numbers
 - 6.5.6.4 Key change number
 - 6.5.6.5 Number of keys enclosed
- 6.5.7 All keys and permanent cores shall be stamped as follows
 - 6.5.7.1 Key bows; manufacturers name and key set number only
 - 6.5.7.2 Removable cores; stamp key set number on back of core
- 6.5.8 Key Quantities
 - 6.5.8.1 Construction Masters (10)
 - 6.5.8.2 Control Keys (3)
 - 6.5.8.3 Change keys per cylinder (2 each)
 - 6.5.8.4 Master and grand master keys (12 each)
 - 6.5.8.5 Key blanks for each cylinder (4 each)
- 6.5.9 Exception to the above keying requirements
 - 6.5.9.1 When 50 percent or more of a building's hardware is being replaced, provisions must be made to provide new key cylinders for the existing locking devices that are not being replaced
- 6.5.10 All questions regarding keying shall be directed to
 - 6.5.10.1 LSU's Security Manager, LSU Office of Facility Services, Lock Shop 225-578-7474
 - 6.5.10.1.1 Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware
- 6.5.11 Provide five extra cylinders and cores of each key way used for LSU inventory
- 6.5.12 Keying Requirements Meeting
 - 6.5.12.1 This meeting shall be set up by the Architect and coordinated with LSU a minimum of 3 months prior to scheduled completion date
 - 6.5.12.2 Attendance Required
 - 6.5.12.2.1 Contractor
 - 6.5.12.2.2 Owner
 - 6.5.12.2.3 Architect
 - 6.5.12.2.4 Installer's Architectural Hardware Consultant (AHC)
 - 6.5.12.2.5 Hardware Installer
 - 6.5.12.2.6 User Agency
 - 6.5.12.3 Agenda
 - 6.5.12.3.1 Establish keying requirements
 - 6.5.12.3.2 Verify locksets and locking hardware are functionally correct for project requirements
 - 6.5.12.3.3 Verify that keying and programming complies with project requirements

6.5.12.3.4 Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following

6.5.12.4 Access control requirements

6.5.12.5 Key control system requirements

6.5.12.6 Schematic diagram of preliminary key system

6.5.12.7 Flow of traffic and extent of security required

6.5.12.7.1 Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made

6.5.12.7.2 Deliver established keying requirements to manufacturers

6.6 Acceptable Manufacturers and Products

6.6.1 Continuous Geared Hinges

6.6.1.1 Acceptable manufacturers, models and applications

6.6.1.1.1 Bommer; FS--HD1

6.6.1.1.2 Hager; 780-210HD1

6.6.1.1.3 McKinney; MCK22HD1

6.6.1.1.4 Pemko; FS-HD1

6.6.1.1.5 Stanley; 655HD

6.6.1.2 Provide for all exterior high frequency doors and all exterior doors equipped with exit devices

6.6.1.3 Provide for retrofit work where new doors are being installed into existing frames

6.6.1.4 Provide heavy duty full surface types

6.6.1.5 Finish - Satin aluminum or Dark Bronze for all Storefront or Brown/Bronze Painted Doors

6.6.1.6 Finish to match door, not Hardware

6.6.2 Butt Hinges

6.6.2.1 Acceptable manufacturers, models and applications

6.6.2.1.1 Bommer; BB5005, BB5004, BB5001, & BB5000

6.6.2.1.2 Hager; BB1199, BB1168, BB1191, & BB1279

6.6.2.1.3 McKinney; T4A3386, T4A3786, TA2314, & TA2714

6.6.2.1.4 Stanley; FBB199, FBB168, FBB191 & FBB179

6.6.2.2 Provide anti-friction types for all butt hinges

6.6.2.3 Provide non removable pins for all out swing exterior doors

6.6.2.4 Provide stainless steel types for all restroom doors, toilet doors, and all other areas which may require non-ferrous material

6.6.2.5 Provide heavy weight types for all interior doors equipped with exit devices and all other high frequency doors, such as entrance doors to classrooms, labs, libraries, cafeterias, auditoriums, restrooms, and all doors over 36" wide

6.6.2.6 Size - 4.5" x 4.5" for doors up to 36" wide; 5.0" x 4.5" for all doors over 36" wide

6.6.2.7 Finish

6.6.2.7.1 Satin stainless steel for non-ferrous types

6.6.2.7.2 Satin chrome plated for steel base types

6.6.3 Exterior Security Exit Devices

6.6.3.1 Acceptable manufacturers, models and applications

6.6.3.1.1 Corbin Russwin; ED5200S x M52 series (SecureBolt)

6.6.3.1.2 Yale Security; 7155 series (SquareBolt)

- 6.6.3.1.3 Precision; Apex 2100
- 6.6.3.1.4 Von Duprin; CD-xp98 Series
- 6.6.3.1.5 Provide heavy duty ANSI grade 1, type 28 types
- 6.6.3.1.6 Provide for all exterior doors requiring exit devices
- 6.6.3.1.7 Provide devices with direct throw latch bolts; Pullman latches are not acceptable
- 6.6.3.1.8 Concealed or surface vertical rod devices are not acceptable
- 6.6.3.1.9 Provide key cylinder dogging, no tool
- 6.6.3.1.10 Provide offset pull exterior trim
- 6.6.3.1.11 Finish - Satin stainless steel
- 6.6.4 Interior Standard and Fire Exit Devices
 - 6.6.4.1 Acceptable manufacturers, models and applications
 - 6.6.4.1.1 Corbin Russwin; ED5200 series
 - 6.6.4.1.2 Sargent; 8800 series
 - 6.6.4.1.3 Von Duprin; 98 series
 - 6.6.4.1.4 Yale Security; 7100 series
 - 6.6.4.1.5 Precision; Apex 2100 series
 - 6.6.4.2 Provide heavy duty, ANSI grade 1 devices
 - 6.6.4.3 Provide all non-rated devices with inside key cylinder dogging feature
 - 6.6.4.4 Provide offset pulls for all high frequency non-rated doors
 - 6.6.4.5 Provide lever trim for all fire rated doors
 - 6.6.4.6 Mount all devices with thru-bolts at all mounting points
 - 6.6.4.7 Concealed vertical rod types are not acceptable
 - 6.6.4.8 Surface applied vertical rod types less bottom rods are acceptable only for use on double egress doors, as required by codes
 - 6.6.4.9 Finish - Satin stainless steel
- 6.6.5 Removable Mullions
 - 6.6.5.1 Acceptable manufacturers, models and applications
 - 6.6.5.1.1 Precision KR822, KR822F
 - 6.6.5.1.2 Corbin Russwin; 710KM, 707AKM, or 808
 - 6.6.5.1.3 Sargent; L980, 12-L980, or 650A
 - 6.6.5.1.4 Von Duprin; KR4954, KR9954, or 656
 - 6.6.5.1.5 Yale Security; KRM100, KRM100F, or M300
 - 6.6.5.2 Provide key removable types
 - 6.6.5.3 Provide wall mounting brackets to store mullion when out of the opening
 - 6.6.5.4 Provide removable mullions with stabilizers
 - 6.6.5.5 Finish
 - 6.6.5.6 Primed for painting, steel mullions
 - 6.6.5.7 Satin aluminum, for aluminum mullions
- 6.6.6 Lock Sets
 - 6.6.6.1 No Cylindrical Locks unless given consent by Facility Services Acceptable manufacturers, products and applications
 - 6.6.6.2 Acceptable manufacturers, models and applications
 - 6.6.6.2.1 Best; 45H series x 3J lever trim
 - 6.6.6.2.2 Corbin Russwin; ML2000 series x LSM lever trim

- 6.6.6.2.3 Sargent; 8200 series x LS1J lever trim
- 6.6.6.2.4 Yale Security; 8800FL series x CRxCN lever trim
- 6.6.6.2.5 Schlage; L9000 Series x 03N lever trim
- 6.6.6.2.6 Provide heavy duty ANSI grade 1 mortise types
- 6.6.6.2.7 Provide key cylinders, as required. See keying requirements.
- 6.6.6.2.8 Provide lever trim that meets ADA requirement
- 6.6.6.2.9 Provide cast levers x wrought escutcheon trim, thru-bolted to door
- 6.6.6.2.10 Provide wrought box strikes for all locks
- 6.6.6.2.11 All locks shall be free for egress from inside room at all times
- 6.6.6.2.12 Finish - Satin chrome plated
- 6.6.7 Door Closers
 - 6.6.7.1 Acceptable manufacturers, models and applications
 - 6.6.7.1.1 Corbin Russwin; DC6000 series
 - 6.6.7.1.2 LCN; 4040 series
 - 6.6.7.1.3 Sargent; 351 series
 - 6.6.7.1.4 Yale Security; 4400 series
 - 6.6.7.1.5 Stanley QDC111
 - 6.6.7.1.6 Provide top jamb mounted closers for exterior swing out doors
 - 6.6.7.1.7 Provide top jamb mounted closers for interior swing out corridor doors
 - 6.6.7.1.8 Provide regular arm mounted closers for all other doors
 - 6.6.7.1.9 Parallel arm closers are allowed in situations where limit arms are needed as well as situations where door swings into a hallway
 - 6.6.7.1.10 Provide heavy duty barrier free & field adjustable types
 - 6.6.7.1.11 Provide closers UL listed for fire rated doors.
 - 6.6.7.1.12 Provide mounting brackets or plates, as required by opening and mounting conditions
 - 6.6.7.1.13 All closers shall be equipped with adjustable back check
 - 6.6.7.1.14 Hold open closers shall be held to a minimum
 - 6.6.7.1.15 Fusible link closers are not acceptable
 - 6.6.7.1.16 All closers shall comply with ADA requirements
 - 6.6.7.1.17 Provide sex nut & bolt mounting to doors
 - 6.6.7.1.18 Finish - Satin aluminum painted
- 6.6.8 Overhead Holders and Stops
 - 6.6.8.1 Acceptable manufacturers, models and applications
 - 6.6.8.1.1 ABH 9000 Series
 - 6.6.8.1.2 Glynn Johnson; 900 series
 - 6.6.8.1.3 Rixson; 9 series
 - 6.6.8.1.4 Sargent; 590 series
 - 6.6.8.1.5 Provide heavy duty, surface applied types
 - 6.6.8.1.6 Provide thru bolted to doors
 - 6.6.8.1.7 Provide size as required by opening conditions
 - 6.6.8.1.8 Finish - Satin stainless steel, for exterior doors; Satin chrome plated, for interior doors
- 6.6.9 Door Trim and Auxiliary Items

- 6.6.9.1 Acceptable manufacturers, models and applications
 - 6.6.9.1.1 Hager; 30S, 33G, 190S, 269F, 259F
 - 6.6.9.1.2 Ives; 8200, 8302, 8500, FS18S
 - 6.6.9.1.3 Rockwood; 70, 107x70, K1050, 466, 480
 - 6.6.9.1.4 Trimco; 1001, 1017B, K0050, 1209, 1214
 - 6.6.9.1.5 All plates .050 thick
 - 6.6.9.1.6 Push plates; 6" x 16", door stile permitting
 - 6.6.9.1.7 Door pulls; 8" pull mounted on 4" x 16" plate
 - 6.6.9.1.8 Thru bolt mounting for all pulls
 - 6.6.9.1.9 Kick plates; 12" high
 - 6.6.9.1.10 Mop plates; 4" high
 - 6.6.9.1.11 Armor plates; 34"
 - 6.6.9.1.12 Provide heavy duty door stops
 - 6.6.9.1.13 Finishes - Satin stainless steel / push, pulls, & protection plates
 - 6.6.9.1.14 Black rubber / heavy duty floor stops
 - 6.6.9.1.15 Grey rubber / door silencers
 - 6.6.9.1.16 Primed for paint / coordinators
 - 6.6.9.1.17 Satin chrome plated / all other items
- 6.6.10 Door Seals and Thresholds
 - 6.6.10.1 Acceptable manufacturers, models and applications
 - 6.6.10.1.1 Hager; 896SS, 891SV, 627S, 421S, 520SV
 - 6.6.10.1.2 McKinney; MCK316AS, MCK303AV, MCK1715A, MCK171A, MCK2005AV
 - 6.6.10.1.3 National Guard; 137NA, 135NA, 425E, 896N
 - 6.6.10.1.4 Pemko; 316AS, 303AV, 1715A, 171A, 2005AV
 - 6.6.10.1.5 Fire & smoke seals to meet positive pressure requirements
 - 6.6.10.1.6 All seals to be screw in types. Adhesive mounted types are not acceptable.
 - 6.6.10.1.7 Heavy duty thresholds for all corridor entrance doors and all other heavy traffic doors
 - 6.6.10.1.8 Thresholds must meet handicap requirements
 - 6.6.10.1.9 Finishes - Slip resistant finish, similar to Pemko's "PemKote" or Hager's "Sure Step" for thresholds; Satin aluminum for all other items
- 6.6.11 Electric Hardware
 - 6.6.11.1 General requirements for electric hardware
 - 6.6.11.2 All electric hardware shall be pre-wired at the factory with standardized connector
 - 6.6.11.3 Devices used for Card Access - These Devices should use low in rush voltage to open and hold open (under 1.2 amps)
 - 6.6.11.4 Coordinate with door and frame manufacturers for wiring harness
 - 6.6.11.5 Wiring Elevations - Provide, as part of the hardware schedule, a door and frame elevation that shows location of each item of electric hardware, including a written description of operation
 - 6.6.11.6 Wiring Diagrams - Provide point-to-point wiring instructions with all electric hardware
 - 6.6.11.7 Coordinate all electrical hardware with access control supplier (Johnson Controls) specified in other section
- 6.6.12 Single Use Restroom Hardware
 - 6.6.12.1 Hardware - Assa Abloy Yale 8800 Series Grade 1; Mortise Lock Catalog

- 6.6.12.2 Finish - 626
- 6.6.12.3 Lockset - CR CN 8822FL
- 6.6.12.4 Trim Retrofit - CN 88-260
- 6.6.12.5 Cylinder - Best Small Format
- 6.6.12.6 Lock Core - Medeco 7 Pin 33N70000006-26-BDU
- 6.7 Facility Management System (Access Control Controllers)
 - 6.7.1 The Access Control capabilities shall include, but are not be limited to
 - 6.7.1.1 Access controllers terminal interfaces, card readers, conduit, wire and accessories required to provide a complete operational system
 - 6.7.2 The equipment and installation shall comply with the current applicable provisions of the following standards
 - 6.7.2.1 National Electric Code
 - 6.7.2.2 Local and state building codes
 - 6.7.2.3 All requirements of the local authority having jurisdiction
 - 6.7.2.4 Underwriters Laboratories, Inc.
 - 6.7.2.5 The system and all components shall be listed by Underwriters Laboratories, Inc., for use in Access Control Systems under the following standards as applicable. UL 294 Access Control System Unit
 - 6.7.3 All access controller panels shall be housed in a cabinet designed for mounting directly to a wall or vertical surface
 - 6.7.4 Its doors shall contain a key lock
 - 6.7.5 The integrated intelligent access controller shall provide or be capable of expansion to the following capacities
 - 6.7.5.1 Card Readers - 16
 - 6.7.5.2 Card Capacity - 16,000
 - 6.7.5.3 Alarm Points - 128
 - 6.7.5.4 Access Levels - Unlimited
 - 6.7.5.5 Time Zones - 8
 - 6.7.5.6 Password Levels - 2
 - 6.7.5.7 Card Issue Levels - 8
 - 6.7.5.8 Reports - 5
 - 6.7.6 The system shall be capable of storing 16,000 cards per intelligent access control panel
 - 6.7.7 The system shall be capable of storing a maximum of 640,000 card transactions on a single operator workstation file
 - 6.7.8 A user definable limit shall cause the operator interface to warn the operator when the number of transactions in the file has exceeded that limit
 - 6.7.9 The intelligent central access controller shall be able to interface directly into the same Operator Workstation used for the HVAC and fire functions. Please refer to the Operator Interface section of this specification for more detail
 - 6.7.10 The entire database of the intelligent central access controller shall be definable at the Operator Workstation
 - 6.7.11 The operator interface shall allow the operator to perform commands including, but not limited to, the following
 - 6.7.11.1 Override All Doors to the Access Mode of Operation
 - 6.7.11.2 Release Overrides
 - 6.7.11.3 Command Door to Access Mode
 - 6.7.11.4 Command Door to Secure Mode
 - 6.7.11.5 Command Door to Temporarily Open

- 6.7.11.6 Silence Local Alarms
- 6.7.12 System operators shall, from the operator interface, be able to manually unlock controlled doors for a variable time period, or program an event to automatically unlock and lock doors during a particular time period
- 6.7.13 Reports
 - 6.7.13.1 Shall be generated automatically or manually, and directed to either OWS displays, printers, or disk files
 - 6.7.13.2 At minimum, the system shall allow the user to easily obtain the following
 - 6.7.13.2.1 List of all cardholders
 - 6.7.13.2.2 List of all transactions currently available
- 6.7.14 The system shall provide on-line query generation which can be used to obtain specific information from the above logs based on user defined parameters. These queries, once defined, may be stored and used again when needed
- 6.7.15 The system shall be provided complete with all equipment and documentation necessary to allow an operator to independently perform the following additional functions
 - 6.7.15.1 Add/Delete/Modify Access Control Panels
 - 6.7.15.2 Add/Delete/Modify Smart Terminal Interfaces/Readers
 - 6.7.15.3 Add/Delete/Modify Cardholder User Data
- 6.7.16 Graphical programming shall be used to define processes whereby other FMS functions may be controlled by a valid card transaction
- 6.7.17 Up to 64 cardholder groups shall be definable per intelligent access control panel connected
- 6.7.18 The Access Controller shall communicate with the Smart Terminal Units of the system
- 6.7.19 Failure of a Smart Terminal Unit shall be detected and reported to the printer connected to the OWS
- 6.7.20 When a card is read at a reader, the card number and issue level are sent to the controller. If the reader is equipped with a keypad, a 4 or 5 digit PIN number may be entered and verified at the reader. The controller, which shall be programmed to control access by both location and time periods, shall verify all information and immediately grant or deny access and record the transaction including date, time and location. The option of having the transactions printed as they occur shall also be provided. If access is granted, the controller shall send a signal to the appropriate reader to activate the door lock. If access is denied, the transaction will be recorded and/or printed identifying the reason.
- 6.7.21 The system shall be capable of supporting Magnetic Stripe card to be the existing LSU ID Card. The system shall be designed to maintain access control through two levels of degradation. The intelligent terminal controller shall continue to provide, using its local data base, a full level of access control upon loss of communications with the Facilities Management System. Upon loss of communications with the intelligent terminal controller, the readers shall continue to control access using verification of the facility code in the card and, if used, a PIN entry.
- 6.7.22 The system shall be able to designate certain readers to control only entry or exit, and shall require a cardholder using a card at an entry reader to subsequently use it at an exit reader before again entering the secured area. This shall prevent "passing back" a card to an unauthorized second user
- 6.7.23 Individual cards may be programmed for special privileges to override access level and time zone parameters
- 6.7.24 The controller shall provide an interface which permits data to be stored on a tape cartridge.
- 6.7.25 In the event of a power loss, a backup battery shall provide full controller operation for up to eight hours, and memory retention up to 24 hours
- 6.7.26 Cards shall be programmed into the controller individually; additions, deletions, and changes shall be completed rapidly
- 6.7.27 Alarms may be programmed by the user for suppression during specific time periods. The intelligent terminal controller shall provide an output for annunciation of alarms

- 6.7.28 The intelligent terminal controller shall provide a buffer to store 1000 historical transactions if communication is lost with the Facilities Management System
- 6.7.29 The card readers shall consist of an intelligent terminal interface and magnetic stripe readers.
- 6.7.30 The intelligent terminal interface shall control the electric door lock, visual access indicators, access and shunt timers, and an auxiliary access input
- 6.7.31 The intelligent terminal interface shall monitor door status via a door or lock contact. An alarm shall be reported when the door is not closed and locked, and when the door is forced open
- 6.7.32 All readers (except proximity) shall provide a red and green visual indicator for granted and denied access, and tamper detection capability
- 6.7.33 Readers shall be surface or flush mounted. Outdoor readers shall be supplied with special weather-resistant housings. Where required, readers shall be configured with integral 16-position keypads.
- 6.7.34 Readers with 16-position keypads shall be able to verify PIN codes even during loss of communications with the intelligent terminal controller. If the readers lose communications with intelligent terminal controller, they shall be able to determine authorized access based on the facility code and PIN, if used, which shall be verified at the reader
- 6.7.35 Proximity readers that are capable of proper operation without the need of standoffs when mounted to walls containing substantial amounts of metal construction shall be available.
- 6.7.36 Magnetic Stripe Cards for this security system shall be constructed of top quality, durable, and resilient PVC laminated with a magnetic stripe of low coercivity material designed for use with magnetic stripe readers
- 6.7.37 Each shall be encoded with a facility code unique to the security system, an individual card number, and one of eight issue level numbers. At the system owner's request, the manufacturer shall provide the equipment necessary for the system owner to encode magnetic stripe cards for use only in the owner's system
- 6.7.38 Standard cards shall be available with minimal printing and permanently marked with respective card number and reference code. The standard LSU ID card is to be used
- 6.7.39 The manufacturer shall provide custom print cards, in accordance to the manufacturer's guidelines, to meet the needs specified by the system owner
- 6.7.40 All Card Access Control parts shall comply with the following
 - 6.7.40.1 Normally Secure Electronic Strikes are the preferred hardware method for card access doors and must be compatible with access system and wiring harness
 - 6.7.40.2 Magnetic Lock: No magnetic locks are to be used unless authorized by LSU and State Fire Marshal Office
 - 6.7.40.3 Crash Bar and Cable: Provide double pole, double throw with release button
 - 6.7.40.4 Door contacts - Provide door status contacts that mount to surface of door and frame.
 - 6.7.40.5 Provide 2" x 2" button for egress where called for
 - 6.7.40.6 Power Supply - Provide 12/24-volt power supplies with independent load switches and battery backup

6.8 Warranties

- 6.8.1 Manufacturers' standard warranties to cover defects in materials and workmanship
 - 6.8.1.1 Warranty period to begin at date of substantial completion
 - 6.8.1.2 Copies of all warranties shall be provided to the University at completion of the project
- 6.8.2 Minimum ten years
 - 6.8.2.1 Heavy duty surface mounted door closers
- 6.8.3 Minimum five years
 - 6.8.3.1 Heavy duty grade one mortise locks
 - 6.8.3.2 Heavy duty grade one exit devices
- 6.8.4 Minimum one year
 - 6.8.4.1 Electrical products

7 AUTOMATIC DOOR OPERATORS

7.1 General

- 7.1.1 Products detailed herein are the standard of quality to be used on new projects and renovations or additions to existing buildings
- 7.1.2 Coordinate all products to meet the requirements of life safety codes, ADA requirements, and applicable building codes
- 7.1.3 All hardware for automatic door operators shall be specified and provided in this section.

7.2 Quality Assurance

7.2.1 Installer Qualifications

- 7.2.1.1 Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for the project
- 7.2.1.2 Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service
- 7.2.1.3 Certifications; Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards: ANSI/BHMA A156.19, NFPA 101, UL 3225 Listed, UL 10C Listed, IBC and BOCA
- 7.2.1.4 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

7.2.2 Field Quality Control

- 7.2.2.1 Field Measurements: Verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings
- 7.2.2.2 Verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material

7.3 Warranties

7.3.1 Manufacturers' standard warranties to cover defects in materials and workmanship

- 7.3.1.1 Warranty period to begin at date of substantial completion
- 7.3.1.2 Copies of all warranties shall be provided to the University at completion of the project
- 7.3.1.3 Automatic door operators shall be free of defects in material and workmanship for a period of one (1) year
- 7.3.1.4 During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner

7.4 Manufacturer

- 7.4.1 Stanley Access Technologies; M-Force Series automatic door operator or prior approved equal product

7.5 Components

- 7.5.1 Header Case; Header case shall not exceed 6" (152 mm) square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access
 - 7.5.1.1 Door Arms - A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors
 - 7.5.1.2 Fasteners and Accessories - Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials

7.5.1.3 Signage - Provide signage in accordance with ANSI/BHMA A156.19

7.6 Swinging Door Operators

7.6.1 General

7.6.1.1 Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated

7.6.2 Electromechanical Operators - Self-contained unit powered by a minimum 3/16 horsepower, permanent-magnet DC motor; through a high torque reduction gear system

7.6.2.1 Operation - Power opening and spring closing

7.6.2.2 Operator Type - Low energy; readily convertible to full energy; no tools required to change type

7.6.2.3 Handing - Non-handed; no tools required to change handing

7.6.2.4 Capacity - Rated for door panels weighing up to 700 lb (318 kg)

7.6.2.5 Mounting - Visible

7.6.2.6 Features

7.6.2.6.1 Adjustable opening and closing speeds

7.6.2.6.2 Adjustable opening and closing force

7.6.2.6.3 Adjustable back-check

7.6.2.6.4 Adjustable hold-open time between 0 and 30 seconds

7.6.2.6.5 Reverse on obstruction

7.6.2.6.6 Time delay for electric lock integration

7.6.2.6.7 Force compensation and closed loop speed control with active braking and acceleration

7.6.2.6.8 Power Close

7.6.2.6.9 Slam Protection

7.6.2.6.10 Power Assist

7.6.2.6.11 Lock Release

7.6.2.6.12 Stall Sensor Ignore

7.6.2.6.13 Electronic Coordination

7.6.2.6.14 Optional Switch to open/Switch to close operation

7.6.2.6.15 Optional push to activate operation

7.6.2.6.16 Fire alarm interface, configurable to safely open or close doors on signal from fire alarm system

7.6.2.7 Field Adjustable Spring Closing Operation - The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be a helical compression spring adjustable for positive closing action. The spring shall be adjustable, without removing the operator from the header, to accommodate a wide range of field conditions

7.6.2.8 Independent Adjustable Closing and Latching Speed Control: The operator shall employ a rheostat module to allow for independent field adjustment of closing and latching speeds using the motor as a dynamic brake

7.6.2.9 Field Adjustable Open Stop: The operator shall provide a field adjustable open stop to accommodate opening angles from 80° to 135° without the need for additional components

7.6.2.10 Consistent Cycle - The operator shall deliver an even, consistent open manual push force across the entire transition from door fully closed to door fully open. Additionally, the force shall be field adjustable to accommodate a wide range of on-site conditions

- 7.6.2.11 Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba
- 7.6.2.12 Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open
- 7.6.2.13 Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 5 amps

7.7 Electrical Controls

- 7.7.1 Electrical Control System - Electrical control system shall include a microprocessor controller and a high-resolution position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed
 - 7.7.1.1 The high-resolution encoder shall have a resolution of not less than 1024 counts per revolution. Systems utilizing external magnets and magnetic switches are not acceptable.
 - 7.7.1.2 Electrical control system shall include a 24 VDC auxiliary output rated at 1 amp.
- 7.7.2 Performance Data - The microprocessor shall collect, and store performance data as follows
 - 7.7.2.1 Counter - A non-resettable counter to track operating cycles
 - 7.7.2.2 Event Reporting: Unit shall include non-volatile event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors
 - 7.7.2.3 LED Display - Display presenting the current operating state of the controller
- 7.7.3 Controller Protection - The microprocessor controller shall incorporate the following features to ensure trouble free operation
 - 7.7.3.1 Automatic Reset Upon Power Up
 - 7.7.3.2 Main Fuse Protection
 - 7.7.3.3 Electronic Surge Protection
 - 7.7.3.4 Internal Power Supply Protection
 - 7.7.3.5 Resettable sensor supply fuse protection
 - 7.7.3.6 Motor Protection, over-current protection
- 7.7.4 Power Close - When enabled, engages the operator to close a door that does not close completely at the end of a cycle
- 7.7.5 Force Compensation - Utilizing the closed loop speed control, the operator shall maintain constant opening and closing speeds when subjected to excessive outside forces, such as positive or negative stack pressures
- 7.7.6 Slam Protection - The operators speed control system prevents door from slamming at the full open or full closed position
- 7.7.7 Power Assist - Operator mode that lowers opening forces when the door is used manually. Power assist is active only while pushing or pulling the door. The door will close when an opening force is no longer applied
- 7.7.8 Lock Release - On doors with electric locking, operator shall include a closing function to release tension on a latch mechanism prior to opening the door
- 7.7.9 Stall Sensor Ignore: Adjustable setting to disable swing side safety sensors at a specific angle
- 7.7.10 Electronic Coordination: On pairs of doors, allows independent timing of opening and closing of each leaf as required for astragal coordination
- 7.7.11 Soft Start/Stop - A "soft-start" "soft-stop" motor driving circuit shall be provided for smooth normal opening and recycling
- 7.7.12 Obstruction Recycle - Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle
- 7.7.13 Programmable Controller: Microprocessor controller shall be field programmable.
 - 7.7.13.1 The following parameters may be adjusted
 - 7.7.13.1.1 Operating speeds and forces as required to meet specified ANSI/BHMA standard

- 7.7.13.1.2 Adjustable and variable features specified
 - 7.7.13.2 Manual programming shall be available through local interface which has a two-digit display with a selection control including three push buttons
- 7.7.14 Emergency Breakout Switch - A cam actuated emergency breakout switch shall be provided to disconnect power to the motor when an in-swinging door is manually pushed in the emergency out direction. The operator will then automatically reset, and power will be resumed
- 7.7.15 Control Switch
 - 7.7.15.1 Shall be equipped with a three-position function switch to control the operation of the door
 - 7.7.15.2 Shall provide three modes of operation - Automatic, Off and Hold-Open
- 7.7.16 Power Switch
- 7.7.17 Shall be equipped with a two position On/Off switch to control power to the door
- 7.8 Activation Devices
 - 7.8.1 Push Plates
 - 7.8.1.1 Provide 4 3/4" (121 mm) square push plates with UL recognized SPDT switch
 - 7.8.1.2 Face plates and mounting studs shall be stainless steel
 - 7.8.1.3 Face plates shall be engraved with the international symbol for accessibility and "Push To Open"
 - 7.8.1.4 Shall be wall mounted in single or double gang electrical boxes and hardwired to door operator controls
 - 7.8.1.5 Shall be similar or better than PBS Series 10PBS1 as manufactured by BEA
- 7.9 Aluminum Finishes
 - 7.9.1 Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes
 - 7.9.2 Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes
 - 7.9.3 Class I, Color Anodic Finish - AA-M12C22A42/A44
 - 7.9.4 Mechanical Finish - as fabricated
 - 7.9.5 Chemical Finish - etched, medium matte
 - 7.9.6 Anodic Coating - Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum complying with AAMA 611-98
 - 7.9.7 Color - Dark Bronze
 - 7.9.8 AAMA 606.1
 - 7.9.9 Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge
- 7.10 Installation
 - 7.10.1 Do not install damaged components
 - 7.10.2 Fit joints to produce hairline joints free of burrs and distortion
 - 7.10.3 Rigidly secure non-movement joints
 - 7.10.4 Mounting - Install automatic door operators/headers plumb and true in alignment with established lines and grades; Anchor securely in place
 - 7.10.4.1 Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 - 7.10.4.2 Set headers, arms and linkages level and true to location with anchorage for permanent support
 - 7.10.5 Door Operators - Connect door operators to electrical power distribution system as specified in Division 26 Sections
- 7.11 Field Quality Control

- 7.11.1 Testing Services - Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards
- 7.11.2 Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in specified ANSI/BHMA operating standard by AAADM Certified Technician
- 7.11.3 Clean surfaces promptly after installation
- 7.11.4 Remove excess sealant compounds, dirt, and other substances
- 7.11.5 Repair damaged finish to match original finish

Louisiana State University Design Standards

DIVISION 09 – FINISHES

1 PORTLAND CEMENT PLASTERING (STUCCO)

- 1.1 Stucco is a generic term used to describe Portland cement plaster applied to exterior surfaces. It is often used interchangeably with the term Portland cement plaster.
 - 1.1.1 ACI 524R, "Guide to Portland Cement Plastering," contains useful guidelines to be used for preparing project specifications.
 - 1.1.2 ASTM C926 and ASTM C1063, "Specification for Application of Portland Cement-Based Plaster and Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster, respectively, are standards that are to be used in preparing specifications.
- 1.2 Stucco exterior wall finishes are used on many existing buildings at LSU. New stucco finishes should match or be compatible with existing wall finishes. The most predominate stucco finish on campus is STO Sea Shell, #10610, fine sand finish. Any other finishes must be submitted to Planning, Design & Construction for prior approval. Mockup sample stucco finishes are to be submitted for approval prior to construction.
- 1.3 All metal lath and accessories to be pure zinc. No zinc coated or "galvanized" will be accepted. Lath and accessories to be attached using zinc plated self- drilling pan head screws such as Hilti 3.6.2 self-drilling screws (sized as per manufacturer's recommendation). Material to meet ASTM A510 Grade 1018- 1022.
- 1.4 Standard stucco exterior color shall match Sherwin Williams SW6107 "Nomadic Desert."

2 TILING

- 2.1 The slip resistance requirements for floor tile installation are those recommended by the Americans with Disabilities Act, "Accessibility Guidelines for Buildings" (ADAAG).

3 ACOUSTICAL CEILINGS

- 3.1 Acoustical Units
 - 3.1.1 Acceptable manufacturers: Armstrong World Industries, Inc. or USG
 - 3.1.2 Size 24 x24 inches (300 x 300 mm)
 - 3.1.3 Thickness 5/8" inches
 - 3.1.4 Standard angled; regular edge

4 RESILIENT FLOORING

- 4.1 Resilient Tile Flooring
 - 4.1.1 Vinyl Composition Tile
 - 4.1.1.1 Use commercial rated tiles only
 - 4.1.1.2 Tiles must be 1/8" thick and asbestos free.
 - 4.1.1.3 Approved manufacturers are: Armstrong, Mannington, Tarkett or equal (prior approval by Planning, Design & Construction required for "equal").
 - 4.1.1.4 Pattern and color must be through tile-no surface applied patterns accepted.
 - 4.1.1.5 Standard grade shall be manufacturer's "premium" grade
 - 4.1.1.6 Tile Adhesive
 - 4.1.1.6.1 Glue down with premium clear adhesive
 - 4.1.1.6.2 Adhesive must be asbestos- free
 - 4.1.1.6.3 No "cut back" adhesive allowed
 - 4.1.1.6.4 New tile and terrazzo floors are to be stripped to remove dirt, marks and manufacturer's mill finish
 - 4.1.1.7 Floor Finish

- 4.1.1.7.1 Floors that require a wax finish shall use an ultra-high solids pure acrylic polymer type product; NCL 24/7 Extended Performance Floor Finish as approved by Facility Services-Building Services Department. This product will be furnished by the Owner and applied by the contractor. Burnish to high gloss finish.
- 4.1.1.7.2 Preparation and application shall be in accordance with the manufacturer's written instructions.
- 4.1.1.7.3 A minimum of three (3) coats of wax are to be applied.
- 4.1.2 Resilient Base
 - 4.1.2.1 Rubber cove base recommended.
 - 4.1.2.2 Restricted to standard sizes of 4" and 6".
 - 4.1.2.3 Use continuous base scored at corners; no pre-molded corners.
 - 4.1.2.4 Approved manufacturers are: Mercer, Flexco, Roppe or equal (prior approval by Planning, Design & Construction required for "equal").

5 CARPETING

- 5.1 New finishes shall match existing as closely as possible where an addition or alteration is made to an existing building.
- 5.2 Carpeting should be free of visual blemishes, streaks or other physical or manufacturing defects.
- 5.3 Carpet materials and treatments shall be non-allergenic and free from other recognized health hazards.
- 5.4 All level loop type carpets shall be a minimum of 24 oz.
- 5.5 All cut pile carpeting shall be a minimum of 30 oz.
- 5.6 Only branded nylons shall be used
- 5.7 Power stretchers must be used when installing carpeting over pad.
- 5.8 T-seaming as a method of installation requires prior approval and seaming diagram.
 - 5.8.1 Vacuum carpet using commercial machine with face bearer element. Remove spots and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors.
- 5.9 Carpet Adhesives
 - 5.9.1 Provide a premium adhesive recommended by the carpeting manufacturer which will allow removal of carpet at any time without damage to the carpeting
 - 5.9.2 Adhesives must comply with flame spread rating required for the carpet installation
 - 5.9.3 Adhesives must be asbestos free

6 PAINTING AND COATING

- 6.1 Paint
 - 6.1.1 New finishes shall match existing as closely as possible where an addition or alteration is made to an existing building.
 - 6.1.2 Coatings to be manufactured by PPG, Benjamin Moore, ICI Dulux, Sherwin Williams, Farrell Calhoun and Devoe. The Architect shall specify the top grade of each approved manufacturer.
 - 6.1.3 All public spaces (such as lobbies, hallways, classrooms, etc.) shall receive semi-gloss finish. All offices shall receive semi-gloss finish.
 - 6.1.4 Flat paint is not to be allowed, except on ceilings and on unusual areas as approved by the University. Interior wood doors shall receive a natural or stained finish. Variations will be permitted in most unusual cases.
 - 6.1.5 All colors must be selected from the LSU Standard Paint Colors or approved by Planning, Design & Construction prior to submission to the Contractor.
 - 6.1.6 When applicable, industrial coatings are to be used in corrosive environments.
 - 6.1.7 Conventional spray painting is not allowed, although airless spray painting may be considered by special approval of Planning, Design & Construction.

- 6.1.8 Coatings for each project shall be of the same manufacturer for compatibility and warranty purposes.
- 6.1.9 Paints containing lead are not permitted.
- 6.1.10 Acrylic latex paint is acceptable on walls and ceilings; however, alkyd paint shall be used on doors and door frames where painting is an approved finish.

Louisiana State University Design Standards

DIVISION 10 – SPECIALTIES

1 VISUAL DISPLAY SURFACES

- 1.1 Glass marker boards must be provided by a single manufacturer.
- 1.2 1/4" Tempered safety writing glass, polished with eased corners
- 1.3 Size of white marker board shall be 48 inches in height at all locations.
 - 1.3.1 Repair and preparation of existing wall surfaces to which these boards are to be attached and to make ready for the installation of this work is a requirement of this project.
- 1.4 All boards to be mechanically fastened to sound substrates.
- 1.5 The University prefers metal trim bulletin, chalk boards and erasable marker boards.
- 1.6 Standard heights for boards will be 37" above the floor to the tray.

2 BOARDS

- 2.1 The University prefers metal trim bulletin, chalk boards and erasable marker boards.
- 2.2 Standard heights for boards will be 37" above the floor to the tray.

3 RESTROOMS

- 3.1 The University prefers floor supported head rail braced toilet partitions.
 - 3.1.1 Do not use a ceiling hung partition unless enclosed on each side with a wall. Partitions and doors shall be solid phenolic resin core, solid plastic or solid color reinforced composite.
- 3.2 Partitions layout shall comply with ADA requirements. All hardware shall be type 304 stainless steel and door hinges shall be field adjustable to be self-closing or partially open when unoccupied.
- 3.3 Dispensers—Jumbo Bath Tissue Dispensers, Paper Towel Dispensers and Soap Dispensers will be furnished by The University and installed by the contractor as per ADA guidelines.
- 3.4 Jumbo (12") Bath Tissue Dispensers furnished by The University will be Georgia- Pacific 59012.
- 3.5 Paper Towel Dispensers furnished by the University will be Kimberly Clark 09990.
- 3.6 Soap Dispensers furnished by the University will be GOJO Industries 5271-06.
- 3.7 Mirrors shall be provided with a theft-proof locking device.

4 FIRE EXTINGUISHERS

- 4.1 Unless codes provide otherwise, the University prefers fire extinguishers rather than fire hoses. Fire extinguisher cabinets shall be provided in corridors only.
- 4.2 Fire extinguishers for general purpose shall be ABC multi-purpose, dry chemical.
- 4.3 Fire extinguishers for equipment rooms shall be CO2.
- 4.4 Cabinets shall be semi- recessed, lockable with break-glass doors.

5 FIXED SEATING FOR LECTURE WITH MULTIPLE SEATING

- 5.1 The Director of LSU's Office of Procurement Services has approved a proprietary specification for the purchase and installation of fixed, lecture seating in academic buildings.
 - 5.1.1 Acceptable Manufacturer - American Seating Company
 - 5.1.2 Product - Stellar - Model 3522 w/LSU custom tablet arm
 - 5.1.3 Color - To be approved by the University

6 INTERIOR / EXTERIOR ROOM SIGNAGE GUIDELINES

- 6.1 Refer to LSU Interior / Exterior Room and Building Signage Guidelines

7 SITE & LANDSCAPE IMPROVEMENTS

- 7.1 Refer to Campus Site & Landscape Standards & Guidelines

8 WAYFINDING IMPROVEMENTS

- 8.1 Refer to Wayfinding Guidelines with Addendum

Louisiana State University Design Standards

DIVISION 11 – EQUIPMENT

1 EQUIPMENT REQUIREMENTS

- 1.1 The Design Professional is responsible for reviewing all equipment requirements with the LSU Project Manager.
- 1.2 The Design Professional is responsible for reviewing the “base bid” and “or equals” to insure they meet the intent and requirements of the Project Manual.
- 1.3 The Design Professional is required to review all proposed equipment and receive written approval from the LSU Project Manager for all equipment including mechanical electric, steam, refrigerants and or other equipment.

2 RADIOISOTOPE HOODS

- 2.1 In order to avoid considerable difficulties incurred by the University, it is requested that the Architect submit shop drawings for radioisotope hoods to the University for approval prior to the beginning of fabrication of hoods.
- 2.2 Plans and specifications of Radiation Shielding for all X-Ray areas must be submitted to the University for approval

Louisiana State University Design Standards

DIVISION 12 - FURNISHINGS

1 WINDOW TREATMENTS

1.1 Blinds

1.1.1 All blinds shall have a lifetime warranty on working mechanisms.

1.1.2 Slat Requirements

1.1.2.1 No smaller than .006 gauge will be accepted

1.1.2.2 Only 25 millimeter or larger slat width will be accepted. Aluminum slats only - no vinyl slats accepted.

1.1.2.3 Spacing between slats shall be no greater than 21.5 millimeters

1.1.3 Head rail metal thickness must be .025 gauge or greater

1.1.4 Approved manufacturers are: Hunter Douglas-Dacor, Levalor-Riviera or equal (Prior approval by Planning, Design & Construction required for "equal").

1.2 Roller Shades

1.2.1 All shades shall have a lifetime warranty on working mechanisms.

1.2.2 Manually operated sunscreen roller shades with drive chain.

1.2.2.1 Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

1.2.3 Visually transparent single-fabric vinyl shade cloth.

1.2.3.1 Maximum 5 percent open

1.2.4 Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.

1.2.5 Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

1.2.6 Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.

1.2.7 Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.

2 FURNITURE

2.1 Tablet Arm Chairs

2.1.1 Approximately ten percent (10%) of all fixed table arm auditorium or classroom seats in each room shall be left handed.

Louisiana State University Design Standards

DIVISION 13 – SPECIAL CONSTRUCTION

1 PRE-ENGINEERED BUILDINGS

- 1.1 Pre-engineered steel building wall and roof panels shall have a 20 year non- prorated warranty on the finish coating.

Louisiana State University Design Standards

DIVISION 14 -CONVEYING EQUIPMENT

1 GENERAL TO ALL ELEVATORS AND EQUIPMENT

- 1.1 ALL elevator equipment, without exception, installed on this campus shall be non-proprietary.
 - 1.1.1 Any elevator company shall be allowed to purchase, install and maintain this equipment.
 - 1.1.2 Spare parts shall be available for sale for replacement stock to be maintained on site or anywhere the owner chooses in order to properly maintain the elevator equipment. A published readily available price list is required and the parts shall be sold free of additional requirements.
 - 1.1.3 Should a diagnostic tool of any kind be needed to perform any kind of adjustment or troubleshooting, the tool shall be provided with the equipment or the tool may be placed on-board and shall operate all functions. This tool shall have unrestricted access to all parameters, adjustments, and flags or notifications for the full maintenance of the equipment. No expiring software, partial operation or keyed access is allowed. Price to replace any tool shall be supplied during bid phase, it shall remain the price for a period of 50 years with cost of living allowances calculated when requested.
 - 1.1.4 Factory and or on-site training shall be available from the original manufacturer and shall be open for enrollment of anyone wishing to learn about the adjustment, maintenance and troubleshooting of the equipment. Training fees shall be reasonable, appropriate, and in line with other types of equipment maintenance training.
 - 1.1.5 A technical support line shall be provided by the original manufacturers during normal working hours and shall be provided to anyone as designated by the owner. Technical support shall be free of charge for the life of the equipment.
 - 1.1.6 Engineering support shall be provided by the original manufacturer to any contractor or mechanic as designated by the equipment owner.
 - 1.1.7 Manuals, parts catalogs, technical guides, troubleshooting guides, engineering drawings, fault codes and parameters, circuit diagrams, wiring diagrams and prints, all in triplicate shall be provided for the equipment prior to initialization of work. In addition provide one a copy of elevator job specific controller software. All documents shall be the property of the owner and all documentation shall be available for replacement purchase at a reasonable cost to any contractor designated by the owner.
 - 1.1.8 Full maintenance control plan specific to the elevator shall be included and is the property of the owner. At a minimum shall have full maintenance instructions, with detailed information and illustrations to prevent misinterpretations. Shall include enough detail to completely maintain, trouble shoot and test the equipment installed. Each manual shall instructions and programs required to install, set-up, and adjust the elevator system or any part of the system including the passwords for all levels of interaction. This document shall be neatly bound and provided in triplicate.
- 1.2 Approved elevator control manufactures shall be
 - 1.2.1 Motion Control Engineering (Rancho Cordova, CA),
 - 1.2.2 Elevator Controls (Sacramento, CA),
 - 1.2.3 Galaxy (Bronx, NY),
 - 1.2.4 Smartrise (Sacramento, CA).
- 1.3 Circulation patterns and anticipated usage of the building shall determine the appropriate types and number of elevators required to ensure a fully functional building. A traffic analysis of vertical transportation equipment will be compiled and presented for review.
- 1.4 At least one ADA 3500 lb. capacity elevator that will accommodate a full size stretcher in the flat position per the IBC building code is required to serve each floor of the building.
- 1.5 State of the art microprocessor based control systems shall include as a minimum remote monitoring, independent service, firefighter service, inspection, hoistway access, and two way leveling.

- 1.6 Control system shall have comprehensive means to access computer memory and shall have permanent indicators for important elevator statuses as an integral part of the system. Programming shall be stored in ROM or flash memory.
- 1.7 All elevator systems must have remote monitoring. Monitoring shall be through the existing campus wide monitoring system or a stand-alone compatible system completely provided and installed to location designated by the owner. The remote monitoring system shall be capable of monitoring multiple elevators and/or groups of elevators simultaneously, and each elevator or group of elevators shall be simultaneously monitored from at least two remote locations outside the building on campus. In addition, the remote monitoring shall include a dial in modem and software so that the system may be monitored from an off-campus site.
- 1.8 Provide state of the art microprocessor based AC drive control systems.
- 1.9 All motors used in the elevator system shall be guaranteed to be a minimum of 90% efficient at full load operation.
- 1.10 All equipment shall not be rated at more than 90% of the capacity of the product both electrically and mechanically. Electrically shall not exceed 90% of nameplate rating and mechanically sheave shaft loads, pumps and motors shall not exceed 90% of their maximum ratings.
- 1.11 The Firefighter Service key-switch shall be operated by the EPCO MFD-1 key and all other key-switches and locks shall be Best 7-pin cylinder key-switches and locks per LSU's priority keying.
- 1.12 Insulation applied to walls or structural members in any elevator related space shall be encapsulated.
- 1.13 Elevator shall be powered through a shunt trip circuit breaker. Heat detector initiating devices to be located within 18 inch of any sprinkler head in elevator related spaces.
- 1.14 Sprinkler piping shall be installed per code requirements. A sprinkler shutoff valve shall be provided immediately outside the elevator related sprinkled space and its location shall be marked or a sign shall be provide at the sprinkler head denoting the valve's location.
- 1.15 Paint elevator machine rooms and elevator pit walls and floors to LSU's paint standards.
- 1.16 All elevator shafts and pits that are below grade shall be sealed and waterproofed with a barrier system on the exterior walls and below the pit floors.
- 1.17 Elevators shall have telephones with hands-free operation containing an integral automatic tone dialer, be field programmable without special tools or programmers and comply with ADA guidelines. These communication devices shall be made "Vandal-Proof" construction such as Janus' VPP Emergency Communication Devices. Owner will determine dial tone location.
- 1.18 The elevator car lighting disconnect shall be fed from the emergency lighting panel.
- 1.19 All elevators and counterweights to have standard T-rails.
- 1.20 All elevators shall have roller guides. Minimum three (3) rollers per shoe on cars 4000 lb. capacity or below and six (6) rollers per shoe on cars above 4000 lbs capacity.
- 1.21 All car and hoistway sills to be nickel silver.
- 1.22 Passenger cab lighting shall be GE Lumination ET LED Luminaires (Size: 2ft x 2ft).
- 1.23 The lighting/ceiling system shall consist of 1-1/2" SS #4 tees and ells welded into a solid framework grid.
- 1.24 Clear ceiling height shall be no less than 90 inches.
- 1.25 Provide one light on smaller passenger cars and two lights on larger passenger cars and service/freight elevators.
- 1.26 Elevator door reopening devices shall be full length infrared curtain types with illuminated indicators such as Janus' Panachrome 3D Light Curtains.
- 1.27 Position indicators required on all elevators. Minimum 2" high red LED 16 segments on a black background with up and down arrows integral to unit. Located in car panel and on fire egress floor and alternate fire egress floor lobbies.
- 1.28 All elevator signal fixtures, hall and car, shall be vandal resistant, flush mounted and have engraved signage.
- 1.29 All governors to be located in the elevator machine room.
- 1.30 All elevator and counterweight safeties to be type B flexible clamp safeties.

- 1.31 Provide hoistway access escutcheons in all elevator hoistway doors.
- 1.32 All door operators shall be sized and rated for heavy duty operation.
- 1.33 All wiring installed from hatch to controller and from car to the controller shall have 10% spare wiring included.
- 1.34 Travel cable shall consist of minimum 10% spare conductors and an additional pair of shielded conductors and shall have an additional coax cable included in the cable for future needs.
- 1.35 Full size machine rooms required.
- 1.36 Perform maintenance, including emergency callback service 24 hours 7 days a week. Provide LSU with a monthly maintenance inspection report.
- 1.37 At a minimum ALL state local and federal codes for elevator installation, elevator product, elevator design, electrical requirements, fire and safety requirements, building code requirements and ADA requirements are to be followed.
- 1.38 Any proprietary equipment installed shall be replaced by the contractor at no extra cost to the State of Louisiana.
- 1.39 Testing and permits are the responsibility of the elevator contractor.
- 1.40 Submittals and shop drawings are required on all work. Generic elevator submittals will not be acceptable. Submit actual equipment being installed. Submittals shall be approved by architect and LSU.
- 1.41 All equipment and components of equipment shall be delivered in factory packaging for protection and shall be sheltered from the elements and protected from damage until installed.
- 1.42 All machine rooms are required to be conditioned to maintain the operating temperatures of the control equipment.
- 1.43 Elevator contractor is responsible for coordinating with all other trades and crafts to accomplish the acceptable finished product.
- 1.44 All equipment must be painted with rust blocking paint at the time of acceptance (either factory or field painted).
- 1.45 All elevator equipment shall be marked as required by elevator code and electrical code. Disconnects shall be marked with panel #, circuit # and room # or location of the circuit breaker from which it is fed.
- 1.46 All contracts shall hold a 10% retainage until all tools, codes, software and training have been received by LSU.

2 SPECIFIC TO TRACTION ELEVATOR SYSTEMS

- 2.1 ALL elevator machines shall be full size machines with a minimum 30 year useable lifespan and located in a full size machine room.
- 2.2 All suspension means shall be a minimum ½" steel elevator rope.
- 2.3 All machines shall be 1:1 roped.
- 2.4 No Machineromless (MRL) equipment is allowed on campus.

3 SPECIFIC TO HYDRAULIC ELEVATOR SYSTEMS

- 3.1 Pit sump pump required and shall be the oil separator type.
- 3.2 In ground jack installation is the standard.
- 3.3 No roped hydraulic installations allowed.
- 3.4 Twin post application allowed but telescopic twinpost application is not allowed.
- 3.5 Install back draft dampers in all elevator shaft vents with access to the dampers.
- 3.6 Hydraulic elevators may be provided for three (3) floors and less. All buildings above three floors shall require traction equipment.
- 3.7 All pump motors shall be rated 120 starts per hour or have a motor sized 20% greater in horsepower than capacity and speed require.
- 3.8 Provide sound isolation pads under pumping unit.

- 3.9 Hydraulic silencers with pulsation absorbing material in a blowout-proof housing required for each pump unit.
- 3.10 Oil coolers required on all campus elevator units.
- 3.11 Oil heaters required on all parking garage units.
- 3.12 Solid State starters required.
- 3.13 Shut-off valves required in machine room and pit.
- 3.14 Rupture valves required. Test and tag.
- 3.15 Elevator pumps, controllers and tanks shall be in an elevator machine room.
- 3.16 No Machineromless (MRL) equipment is allowed on campus.
- 3.17 Underground piping machine room to piston shall be avoided. If unavoidable the underground piping shall be coated, double wrapped with protective jack tape and installed in schedule watertight 40 PVC piping the full underground run.
- 3.18 In ground jack hole preparation
 - 3.18.1 Plumb oversized protective steel casing to accommodate the PVC casing required.
 - 3.18.2 Plumb PVC oversized sealed/watertight casing with means of testing and removal of water or oil between casing and cylinder is required.
 - 3.18.3 Jack to be installed plumb and centered on the car pick up point.

4 SPECIFIC TO FREIGHT ELEVATORS

- 4.1 Elevator cab interior lighting shall be a minimum of two LED lamps..... The fixture shall be guarded from contact with cover that will withstand the same force as required for the elevator car top.
- 4.2 Doors shall be power operated hatch and car with reopening protection.

5 REFERENCE MATERIAL

- 5.1 AISCS335 Specification for structural steel buildings – Allowable stress design, plastic design, American Institute of Steel Corporation, Inc: 1989
- 5.2 AISC S350L Load and resistance factor design specification for structural steel building: American Institute of Steel Construction, Inc: 1999, with supplement No. 1 in 2001.
- 5.3 ASME A17.1 Safety Code for Elevators and Escalators: The American Society of Mechanical Engineers; Latest adopted code by the State of Alabama
- 5.4 ASME A17.2 Guide for Inspection of Elevators, Escalators, and Moving Walks: The American Society of Mechanical Engineers; Latest adopted code by the State of Alabama
- 5.5 ASME A17.3 Safety Code for Existing Elevators and Escalators: The American Society of Mechanical Engineers; Latest adopted code by the State of Alabama
- 5.6 AWS D1.1 Structural Welding Code – Steel; American Welding Society
- 5.7 ITS (DIR) Directory of Listed Products: Intertek Testing Services NA, Inc; current edition
- 5.8 NFPA 70 National Electric Code; National Fire Protection Association; Most current adopted code
- 5.9 NFPA 72 National Fire Alarm Code; National Fire Protection Association; Most current adopted code
- 5.10 NFPA 80 Standard for Fire Doors and Fire Windows; National Fire Protection Association; Most current adopted code
- 5.11 UL (BMD) Building Materials Directory; Underwriters Laboratories Inc.; current edition
- 5.12 U (ECMD) Electrical Construction Materials Directory: Underwriters Laboratories Inc., current edition
- 5.13 ADA – Building Transportation; latest adopted addition
- 5.14 IBC - International Building Code; International Code Council; latest adopted addition

DIVISION 22 – PLUMBING

1 REFERENCES

- 1.1 ANSI B31.1 Power Piping
- 1.2 ANSI B31.2 Fuel Gas Piping
- 1.3 ANSI B31.4 Liquid Petroleum Transportation Piping Systems
- 1.4 ANSI B31.9 Building Service Piping
- 1.5 ASME Boiler and Pressure Vessel Code
- 1.6 ASME Sec. 9 Welding and Brazing Qualifications
- 1.7 ASME B16.1 Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800
- 1.8 ASME B16.3 Malleable Iron Threaded Fittings
- 1.9 ASME B16.4 Cast Iron Threaded Fittings Class 125 and 250
- 1.10 ASME B16.18 Cast Bronze Solder-Joint Pressure Fittings
- 1.11 ASME B16.22 Wrought Copper and Bronze Solder-Joint Pressure Fittings
- 1.12 ASME B16.23 Cast Copper Alloy Solder-Joint Drainage Fittings – DWV
- 1.13 ASME B16.26 Cast Bronze Fittings for Flared Copper Tubes
- 1.14 ASME B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings – DWV
- 1.15 ASME B16.32 Cast Copper Alloy Solder-Joint Fittings for Solvent Drainage Systems
- 1.16 ASTM A47 Ferritic Malleable Iron Castings
- 1.17 ASTM A53 Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless
- 1.18 ASTM A74 Cast Iron Soil Pipe and Fittings
- 1.19 ASTM A120 Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses
- 1.20 ASTM A234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- 1.21 ASTM B32 Solder Metal
- 1.22 ASTM B42 Seamless Copper Pipe
- 1.23 ASTM B43 Seamless Red Brass Pipe
- 1.24 ASTM B75 Seamless Copper Tube
- 1.25 ASTM B88 -Seamless Copper Water Tube
- 1.26 ASTM B251 Wrought Seamless Copper and Copper-Alloy Tube
- 1.27 ASTM B302 Threadless Copper Pipe (TP)
- 1.28 ASTM B306 Copper Drainage Tube (DWV)
- 1.29 ASTM C14 Concrete Sewer, Storm Drain, and Culvert Pipe
- 1.30 ASTM C425 Compression Joints for Vitrified Clay Pipe and Fittings
- 1.31 ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
- 1.32 ASTM C564 Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- 1.33 ASTM C700 Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
- 1.34 ASTM D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- 1.35 ASTM D2235 Solvent Cement for Acrylonitrile - Butadiene - Styrene (ABS) Plastic Pipe and Fittings
- 1.36 ASTM D2241 Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
- 1.37 ASTM D2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- 1.38 ASTM D2513 Thermoplastic Gas Pressure Pipe, Tubing and Fittings
- 1.39 ASTM D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- 1.40 ASTM D2680 Acrylonitrile-Butadiene-Styrene (ABS) Composite-Sewer Piping

- 1.41 ASTM D2683 - Socket-Type Polyethylene Fillings for Outside Diameter-Controlled Polyethylene Pipe
- 1.42 ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- 1.43 ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
- 1.44 ASTM D2846 - Chlorinated Polyvinyl Chloride (CPVC) Pipe, Fittings, Solvent Cements and Adhesives for Potable Hot Water Systems
- 1.45 ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
- 1.46 ASTM D3033 - Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- 1.47 ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- 1.48 ASTM D3309 - Polybutylene (PB) Plastic Hot Water Distribution System
- 1.49 ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- 1.50 ASTM F493 - Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- 1.51 ASTM F845 - Plastic Insert Fittings for Polybutylene (PB) Pipe
- 1.52 AWS A5.8 - Brazing Filler Metal
- 1.53 AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
- 1.54 AWWA C110 - Ductile - Iron and Gray - Iron Fittings 3 in. through 48 in., for Water and Other Liquids
- 1.55 AWWA C111- Rubber-Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings
- 1.56 AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
- 1.57 AWWA C651 - Disinfecting Water Mains
- 1.58 CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems
- 1.59 CISPI 310 - Joints for Hub-less Cast Iron Sanitary Systems
- 1.60 CAN-3 B281 - Aluminum Drain, Waste, and Vent Pipe and Components
- 1.61 NCPWB - Procedure Specifications for Pipe Welding
- 1.62 NFPA 54 - National Fuel Gas Code
- 1.63 NFPA 58 - Storage and Handling of Liquefied Petroleum Gases

2 SUBMITTALS

- 2.1 Provide data on pipe materials, pipe fittings, valves, and accessories.
- 2.2 Provide manufacturers catalog information. Indicate valve data and ratings.

3 PROJECT RECORD DOCUMENTS

- 3.1 Record actual locations of valves and concealed terminal units.

4 MAINTENANCE DATA

- 4.1 Include installation instructions, spare parts lists, exploded assembly views.

5 QUALITY ASSURANCE

- 5.1 Valves - Manufacturer's name and pressure rating marked on valve body.
- 5.2 Welding Materials and Procedures - Conform to ASME Code.
- 5.3 Welders Certification - In accordance with ASME Sec 9.
- 5.4 Maintain one copy of each document on site.

6 REGULATORY REQUIREMENTS

- 6.1 Perform Work in accordance with State plumbing code.
- 6.2 Conform to applicable code for installation of backflow prevention devices.
- 6.3 Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

7 DELIVERY, STORAGE, AND HANDLING

- 7.1 Deliver, store, protect and handle products to site.
- 7.2 Accept valves on site in shipping containers with labelling in place and inspect for damage.

- 7.3 Provide temporary protective coating on cast iron and steel valves.
- 7.4 Provide temporary end caps and closures on piping and fittings and maintain in place until installation.
- 7.5 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

8 ENVIRONMENTAL REQUIREMENTS

- 8.1 Do not install underground piping when bedding are wet or frozen.

9 EXTRA MATERIALS

- 9.1 Provide two repacking kits for each size valve.

10 PRODUCTS

- 10.1 Sanitary Sewer Piping
 - 10.1.1 Buried beyond 5' of building
 - 10.1.1.1 Cast Iron Pipe: ASTM A74, service weight
 - 10.1.1.1.1 Fittings: Cast iron
 - 10.1.1.1.2 Joints: ASTM C564, neoprene gasket system or lead and oakum
 - 10.1.1.2 ABS Pipe: ASTM D2680 or D2751
 - 10.1.1.2.1 Fittings: ABS
 - 10.1.1.2.2 Joints: ASTM D2235, solvent weld
 - 10.1.1.3 PVC Pipe: ASTM D3033 or D3034, SDR 35
 - 10.1.1.3.1 Fittings: PVC
 - 10.1.1.3.2 Joints: ASTM F477, elastomeric gaskets
 - 10.1.2 Buried within 5' of building
 - 10.1.2.1 Cast Iron Pipe: ASTM A74 service weight
 - 10.1.2.1.1 Fittings: Cast iron
 - 10.1.2.1.2 Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum
 - 10.1.2.2 Cast Iron Pipe: CISPI 301, hub-less, service weight
 - 10.1.2.2.1 Fittings: Cast iron
 - 10.1.2.2.2 Joints: ASTM C564, neoprene gasket system or lead and oakum
 - 10.1.2.3 Copper Tubing: ASTM B306, DWV
 - 10.1.2.3.1 Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper
 - 10.1.2.3.2 Joints: ASTM B32, solder, Grade 50B
 - 10.1.2.4 ABS Pipe: ASTM D2680 or D2751
 - 10.1.2.4.1 Fittings: ABS
 - 10.1.2.4.2 Joints: ASTM D2235, solvent weld
 - 10.1.2.5 PVC Pipe: ASTM D2729
 - 10.1.2.5.1 Fittings: PVC
 - 10.1.2.5.2 Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement
 - 10.1.3 Above Grade (Use cast iron in acoustically sensitive applications)
 - 10.1.3.1 Cast Iron Pipe: ASTM A74, service weight
 - 10.1.3.1.1 Fittings: Cast iron
 - 10.1.3.1.2 Joints: ASTM C564, neoprene gasket system or lead and oakum
 - 10.1.3.2 Cast Iron Pipe: CISPI 301, hub-less, service weight
 - 10.1.3.2.1 Fittings: Cast iron
 - 10.1.3.2.2 Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies
 - 10.1.3.3 Copper Tube: ASTM B306, DWV Type L

- 10.1.3.3.1 Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper
- 10.1.3.3.2 Joints: ASTM B32, solder, Grade 50B
- 10.1.3.4 Copper Pipe: ASTM B42
 - 10.1.3.4.1 Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper
 - 10.1.3.4.2 Joints: ASTM B32, solder, Grade 50B
- 10.1.3.5 Brass Pipe: ASTM B43, chrome plated
 - 10.1.3.5.1 Fittings: ASME B16.23, cast bronze, chrome plated.
- 10.1.3.6 Steel Pipe: ASTM A53 Schedule 40, galvanized
 - 10.1.3.6.1 Cast Iron Fittings: ASME B16.4, screwed fittings
 - 10.1.3.6.2 Malleable Iron Fittings: ASME B16.3, screwed type
 - 10.1.3.6.3 Mechanical Grooved Couplings: Malleable iron, galvanized
- 10.1.3.7 ABS Pipe: ASTM D2680 or D2751
 - 10.1.3.7.1 Fittings: ABS
 - 10.1.3.7.2 Joints: ASTM D2235, solvent weld
- 10.1.3.8 PVC Pipe: ASTM D2729
 - 10.1.3.8.1 Fittings: PVC
 - 10.1.3.8.2 Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement

10.2 Water Piping

- 10.2.1 Buried beyond 5' of building
 - 10.2.1.1 Cast Iron Pipe: AWWA C151
 - 10.2.1.1.1 Fittings: Ductile or gray iron, standard thickness
 - 10.2.1.1.2 Joints: AWWA C111, rubber gasket with 3/4 inch diameter rods
 - 10.2.1.2 Copper Tubing: ASTM B88, Type L, hard drawn
 - 10.2.1.2.1 Fittings: ASME B16.18, cast bronze or ASTM B16.22 wrought copper and bronze
 - 10.2.1.2.2 Joints: ASTM B32, solder, Grade 95TA
- 10.2.2 Buried within 5' of building
 - 10.2.2.1 Copper Tubing: ASTM B88, Type L, hard drawn
 - 10.2.2.1.1 Fittings: ASME B16.18, cast bronze or ASTM B16.22 wrought copper and bronze
 - 10.2.2.1.2 Joints: ASTM B32, solder, Grade 95TA
 - 10.2.2.2 Copper Tubing: ASTM B88, Type L, annealed
 - 10.2.2.2.1 Fittings: ASME B16.26, cast bronze
 - 10.2.2.2.2 Joints: Flared
 - 10.2.2.3 Cast Iron Pipe: AWWA C151
 - 10.2.2.3.1 Fittings: Ductile iron, standard thickness
 - 10.2.2.3.2 Joints: AWWA C111, rubber basket with 3/4 inch diameter rods
- 10.2.3 Above Grade
 - 10.2.3.1 Copper Tubing: ASTM B88, Type L, hard drawn
 - 10.2.3.1.1 Fittings: ASME B16.18, cast bronze, or ASME B16.22, wrought copper and bronze
 - 10.2.3.1.2 Joints: ASTM B32, solder, Grade 95TA
 - 10.2.3.2 CPVC Pipe: ASTM D2846
 - 10.2.3.2.1 Fittings: ASTM D2846, CPVC
 - 10.2.3.2.2 Joints: ASTM D2846, solvent weld with ASTM F493 solvent cement
 - 10.2.3.3 PB Pipe: ASTM D3309
 - 10.2.3.3.1 Fittings: ASTM F845 PB, or copper
 - 10.2.3.3.2 Joints: Mechanical with copper compression rings

10.3 Storm Water Piping

10.3.1 Buried beyond 5' of building

10.3.1.1 Cast Iron Pipe: ASTM A74 service weight

10.3.1.1.1 Fittings: Cast iron

10.3.1.1.2 Joints: ASTM C564, neoprene gasket system or lead and oakum

10.3.1.2 Copper Tube: ASTM B306, DWV

10.3.1.2.1 Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper

10.3.1.2.2 Joints: ASTM B32, solder, Grade 50B

10.3.1.3 Concrete Pipe: ASTM C14

10.3.1.3.1 Fittings: Concrete

10.3.1.3.2 Joints: ASTM C443, rubber gaskets

10.3.1.4 PVC Pipe: ASTM D3033 or D3034, SDR 35. Fittings: PVC. Joints: ASTM F477, elastomeric gaskets

10.3.2 Buried within 5' of building

10.3.2.1 Cast Iron Pipe: ASTM A74 service weight

10.3.2.1.1 Fittings: Cast iron

10.3.2.1.2 Joints: ASTM C564, neoprene gasket system or lead and oakum

10.3.2.2 Cast Iron Pipe: CISPI 301, hub-less, service weight

10.3.2.2.1 Fittings: Cast iron

10.3.2.2.2 Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies

10.3.2.3 Copper Tube: ASTM B306, DWV

10.3.2.3.1 Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper

10.3.2.3.2 Joints: ASTM B32, solder, Grade 50B

10.3.2.4 ABS Pipe: ASTM D2680 or D2751

10.3.2.4.1 Fittings: ABS

10.3.2.4.2 Joints: ASTM D2235, solvent weld

10.3.2.5 PVC Pipe: ASTM D2729

10.3.2.5.1 Fittings: PVC

10.3.2.5.2 Joints: ASTM D2855, solvent weld

10.3.3 Above Grade (use cast iron in acoustically sensitive applications)

10.3.3.1 Cast Iron Pipe: ASTM A74 service weight

10.3.3.1.1 Fittings: Cast iron

10.3.3.1.2 Joints: ASTM C564, neoprene gasket system or lead and oakum

10.3.3.2 Cast Iron Pipe: CISPI 301, hub-less, service weight

10.3.3.2.1 Fittings: Cast iron

10.3.3.2.2 Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies

10.3.3.3 Copper Tube: ASTM B306, DWV

10.3.3.3.1 Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper

10.3.3.3.2 Joints: ASTM B32, solder, Grade 50B

10.3.3.4 ABS Pipe: ASTM D2680 or D2751

10.3.3.4.1 Fittings: ABS

10.3.3.4.2 Joints: ASTM D2235, solvent weld

10.3.3.5 PVC Pipe: ASTM D2729

10.3.3.5.1 Fittings: PVC

10.3.3.5.2 Joints: ASTM D2855, solvent weld

10.4 Natural Gas Piping

- 10.4.1 Buried beyond 5' of building
 - 10.4.1.1 Polyethylene Pipe: ASTM D2513, SDR 11.5
 - 10.4.1.1.1 Fittings: ASTM D2683 or ASTM D2513 socket type
 - 10.4.1.1.2 Joints: Fusion weld
- 10.4.2 Buried within 5' of building
 - 10.4.2.1 Steel Pipe: ASTM A53 or A120, Schedule 40 black
 - 10.4.2.2 Fittings: ASTM A234, forged steel welding type, with AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape
 - 10.4.2.3 Joints: ANSI B31.1, welded
- 10.4.3 Above Grade
 - 10.4.3.1 Steel Pipe: ASTM A53 or A120, Schedule 40 black
 - 10.4.3.1.1 Fittings: ASME B16.3, malleable iron, or ASTM A234, forged steel welding type
 - 10.4.3.1.2 Joints: NFPA 54, threaded or welded to ANSI B31.1, ASME Sec 1
- 10.5 Flanges, Unions & Couplings
 - 10.5.1 Pipe Size 2 Inches and Under
 - 10.5.1.1 Ferrous pipe - 150 psig malleable iron threaded unions
 - 10.5.1.2 Copper tube and pipe - 150 psig bronze unions with soldered joints
 - 10.5.2 Pipe Size Over 2 Inches
 - 10.5.2.1 Ferrous pipe: 150 psig forged steel slip-on flanges; 1/16 inch thick preformed neoprene gaskets
 - 10.5.2.2 Copper tube and pipe: 150 psig slip-on bronze flanges; 1/16 inch thick preformed neoprene gaskets
 - 10.5.3 Grooved and Shouldered Pipe End Couplings
 - 10.5.3.1 Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe
 - 10.5.3.2 Sealing gasket: "C" shape composition sealing gasket
 - 10.5.4 Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier, bronze or brass fittings or valves are preferred over dielectric fittings between dissimilar metals
- 10.6 Gate Valves
 - 10.6.1 Up to and including 2" - Bronze body, bronze trim, rising stem, handwheel, inside screw, single wedge or disc threaded ends
 - 10.6.2 Over 2" - Iron body, bronze trim, rising stem, handwheel, OS&Y, single wedge, flanged or grooved ends
- 10.7 Glove Valves
 - 10.7.1 Up to and including 2" - Bronze body, bronze trim, rising stem, handwheel, inside screw, renewable composition disc, screwed ends, with back seating capacity repackable under pressure
 - 10.7.2 Over 2" - Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc
- 10.8 Ball Valves
 - 10.8.1 Up to and including 2" - Bronze or Stainless steel two-piece body, stainless steel ball, Teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union
 - 10.8.2 Over 2 Inches - Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, or gear drive handwheel for sizes 10 inches and over, flanged
- 10.9 Plug Valves
 - 10.9.1 Up to and including 2" - Bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded or grooved ends

10.9.2 Over 2" - Cast iron body and plug, non-lubricated, Teflon packing, flanged or groove ends

10.10 Butterfly Valves

10.10.1 Bronze body, stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, 10 position lever handle

10.10.2 Cast or ductile iron body, chrome plated ductile iron disc, resilient replaceable EPDM seat, grooved, or lug ends, extended neck, 10 position lever handle

10.11 Flow Controls

10.11.1 Construction - Brass or bronze body with union on inlet, and outlet, temperature and pressure test plug on inlet and outlet venturi metering independent of valve position with blowdown/backflush drain

10.11.2 Calibration - Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psig

10.12 Swing Check Valves

10.12.1 Up to and including 2" - Bronze swing disc, screwed ends

10.12.2 Over 2" - Iron body, bronze trim, swing disc, renewable disc and seat, grooved or flanged ends

10.13 Spring Loaded Check Valves

10.13.1 Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, grooved, or flanged ends

10.14 Water Pressure Reducing Valves

10.14.1 Up to 2" - Bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, double union or grooved ends

10.14.2 Over 2" - Cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged or grooved ends

10.15 Relief Valves

10.15.1 Bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled

10.16 Strainers

10.16.1 Size 2" and under - Screwed or grooved brass or iron body for 175 psig working pressure, Y pattern with 1/32" stainless steel perforated screen.

10.16.2 Size 2-1/2" to 4" - Flanged or grooved iron body for 175 psig working pressure, Y pattern with 3/64" stainless steel perforated screen

10.16.3 Size 5" and larger - Flanged iron body for 175 psig working pressure, basket pattern with 1/8" stainless steel perforated screen.

11 EXAMINATION

11.1 Verify that excavations are to required grade, dry, and not over-excavated.

12 PREPARATION

12.1 Ream pipe and tube ends

12.2 Remove burrs

12.3 Bevel plain end ferrous pipe

12.4 Remove scale and dirt, on inside and outside, before assembly

12.5 Prepare piping connections to equipment with flanges or unions

13 INSTALLATION

13.1 Install in accordance with manufacturer's instructions

13.2 Provide non-conducting dielectric connections or bronze or brass fittings or valves wherever jointing dissimilar metals

13.3 Route piping in orderly manner and maintain gradient

13.4 Install piping to conserve building space and not interfere with use of space

13.5 Group piping whenever practical at common elevations

- 13.6 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment
- 13.7 Provide clearance for installation of insulation and access to valves and fittings
- 13.8 Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with general contractor and other trades
- 13.9 Establish elevations of buried piping outside the building to ensure minimum specified cover
- 13.10 Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding
- 13.11 Verify weldability of all structural members before welding
- 13.12 Provide support for utility meters in accordance with requirements of utility companies, utility contracts and university metering
- 13.13 Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting
- 13.14 Excavate in accordance with other sections of these specifications
- 13.15 Backfill in accordance with other sections of these specifications
- 13.16 Install bell and spigot pipe with bell end upstream
- 13.17 Install valves with stems upright or horizontal, not inverted
- 13.18 Provide one plug valve wrench for every ten plug valves sized 2 inches and smaller, minimum of one
- 13.19 Provide each plug valve sized 2-1/2 inches and larger with a wrench with set screw
- 13.20 Pipe vents from gas pressure reducing valves to outdoors and terminate in weather-proof hood

14 APPLICATION

- 14.1 Install unions downstream of valves and at equipment or apparatus connections
- 14.2 Install brass male adapters each side of valves in copper piped system
- 14.3 Sweat solder adapters to pipe
- 14.4 Install gate, ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers
- 14.5 Install globe, ball, or butterfly valves for throttling, bypass, or manual flow control services
- 14.6 Provide spring loaded check valves on discharge of water pumps
- 14.7 Provide plug valves in Natural gas systems for shut-off service
- 14.8 Provide flow controls in water recirculating systems where indicated

15 ERECTION TOLERANCES

- 15.1 Establish invert elevations, slopes for drainage. Maintain gradients
- 15.2 Slope water piping and arrange to drain at low points

16 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- 16.1 Prior to starting work, verify system is complete, flushed and clean
- 16.2 Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric)
- 16.3 Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual
- 16.4 Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets
- 16.5 Maintain disinfectant in system for 24 hours
- 16.6 If final disinfectant residual tests less than 25 mg/L, repeat treatment
- 16.7 Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L
- 16.8 Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651

17 SERVICE CONNECTIONS

- 17.1 Provide new sanitary and storm sewer services

- 17.2 Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing
- 17.3 Provide new water service complete with reduced pressure, double check backflow preventer and water meter with by-pass valves, pressure reducing valve and sand strainer
- 17.4 Option 1
 - 17.4.1 Provide sleeve in wall for service main and support at wall with reinforced concrete bridge
 - 17.4.2 Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall
- 17.5 Option 2
 - 17.5.1 Provide 18 gage (1.20 mm) galvanized sheet metal sleeve around service main to 6 inch (150 mm) above floor and 6 feet (1800 mm) minimum below grade. Size for minimum of 2 inches (50 mm) of loose batt insulation stuffing
 - 17.5.2 Provide new gas service [complete with gas meter and regulators]. Gas service distribution piping to have initial minimum pressure as determined through consultation with LSU Facility Services. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.

Louisiana State University Design Standards

DIVISION 23 – HEATING, VENTILATING & AIR CONDITIONING (HVAC)

1 GENERAL DESIGN CONDITIONS

- 1.1 Design occupied spaces to maintain 72°F and a space dew point temperature not to exceed 55°F.
- 1.2 Design classroom and office space buildings with Variable Air Volume (VAV) air handlers.
- 1.3 Chilled water coils controlled by both space dry bulb and space dew point (or relative humidity) are preferred.
- 1.4 Coils for comfort heating in the re-heat position are preferred.
- 1.5 Where practical, provide return and outside air ducts and dampers capable of economizer operation.
- 1.6 VAV boxes shall be selected with hydronic re-heat coils.
- 1.7 Utilize campus steam (where available) to heat hydronic heating water.

2 AIR HANDLING UNITS

- 2.1 All new air handling units shall be Variable Air Volume (VAV) with terminal re-heat utilizing hot water coils.
- 2.2 All new air handling unit cooling coils shall be chilled water cooling coils as follows.
 - 2.2.1 Casing – minimum 16 gauge stainless steel
 - 2.2.2 Tubing – minimum 0.020 inch thick wall thickness copper
 - 2.2.3 Fins – minimum thickness 0/007 inches- continuous sheet, solid fin fabrication-copper of aluminum
 - 2.2.4 Fin density – no more than 10 fins per inch
- 2.3 Coil selections shall utilize 48°F chilled water supply. Coils shall be of counter flow configuration. All new air handler unit casings shall be double wall construction. Wall panels shall have a minimum R-Value of 13.0 BTU/°F-ft² and shall be capable of withstanding 5 inches of water gauge of differential static pressure without permanent deflection.
- 2.4 Access panels shall be removable, bolt on hinge and with a gasket.
- 2.5 All new air handling units shall have pleated high efficiency media in angle filter racks or shall be bag type. Filter Face Velocity shall not exceed 300 feet per minute.
- 2.6 All new air handling units shall have stainless steel secondary safety pans. Pans shall allow 3" clearance on all sides of the unit footprint. Pans shall be a minimum of 3" deep all welded seam construction.
- 2.7 Pipe secondary drain pans to most convenient sanitary sewer storm drain. Allow a minimum ½" air gap to drain overflow rim.
- 2.8 Secondary drain pans shall lay flat on concrete house-keeping pads, minimum 3½" high. Pads shall have 1" chamfer on all sides and shall completely contact entire drain pan bottom. Provide block outs in pads and bottom drain connections on secondary drain pans. (Detail sketches of Unit/Pan/Pad configurations are available for review).
- 2.9 AHU fans shall be selected to provide no greater than 2 inches water gauge external static pressure.
- 2.10 AHU fans shall be modulated using variable frequency drives (VFDs). Use of inlet valves or discharge dampers is unacceptable.
- 2.11 Balance contractor shall set up system to operate at minimum required external static pressure on prime moving fans.
- 2.12 Air handling equipment may not be placed on rooftops.

3 AIR HANDLING UNIT PIPING

- 3.1 All coils 10 Total Tons and lower shall be piped with Type L hard drawn copper.
- 3.2 All cooling coils shall be trapped according to manufacturer's recommendation and piped to the most convenient sanitary waste or storm drain with adequate means.
- 3.3 All water coils shall have union or flanged connections to expedite future coil replacement.
- 3.4 All water coils shall have shut-off service valves in supply and return run outs. Service valves shall be for isolation purposes only.

- 3.5 All water coils shall have a strainer with a valve blow down piped to the most convenient sanitary sewer.
- 3.6 All water coils shall have thermometers in thermometer wells and pressure gauges with gauge cocks in both the supply and return run outs. Return run out pressure gauges shall be down stream of all control and balancing devices. An additional gauge cock and plug shall be installed between the discharge of the coil and any control or balancing device.
- 3.7 All air unit control valves shall be three way and shall be located in the return piping.

4 TERMINAL HEATING PIPING

- 4.1 All terminal reheat coils on both constant and variable air volume systems shall have isolation valves in the supply and return run out.
- 4.2 Shut off valves shall be for isolation purposes only.
- 4.3 Pipe re-heat coils with union of flanged joints to expedite coil change out.
- 4.4 Provide an independent strainer for each coil run out. Strainer shall have a valve blow-down with a capped hose-bibb connection.
- 4.5 Provide capped and P&T plugs upstream and downstream of the strainer, the coil, the flow control valve, and the flow balancing valve.
- 4.6 In variable volume pumping systems provide two-way control valves at each coil and three way valves for the most remote locations suitable to handle 20% of the total re-heat system volumetric flow rate.
- 4.7 Re-heat systems should be designed for 180°F supply and 160°F return temperatures.

5 DUCTWORK

- 5.1 All ductwork shall be constructed to SMACNA and ASHRAE standards.
- 5.2 All ductwork shall be galvanized sheet steel construction, except for special ducts carrying corrosive or dangerous fumes.
 - 5.2.1 Special duct systems shall be specifically called out in construction documents.
 - 5.2.2 Designer shall consult with the Planning, Design & Construction department concerning all special duct system.
- 5.3 All ductwork shall be flange connected or lock seam connected with mastic sealed joints.
- 5.4 All ductwork carrying air below ambient temperature shall be wrapped with 2" minimum thickness, 1½ pound density duct wrap with reinforced, foil vapor barrier.
 - 5.4.1 Ductwork serving acoustically sensitive areas may be lined.
 - 5.4.2 All lined duct shall be specifically called out in construction document.
 - 5.4.3 Designer shall consult with the Office of Facility Development concerning all acoustically lined ductwork.
- 5.5 Ductwork shall not be run over electrical panels, electrical switch boards or the working clearances of such items.
- 5.6 All rectangular duct take-offs shall be SMACNA standard angle take-offs.
- 5.7 Provide manual balancing dampers with locking quadrants at each duct take off. Splitter dampers are not acceptable.
- 5.8 All dampers shall be high efficiency, low leakage type.
- 5.9 All supply air diffusers shall be insulated with minimum 1" thick duct wrap
 - 5.9.1 Duct wrap on supply air diffusers shall have vapor barrier on ambient air side
 - 5.9.2 Seal duct wrap vapor barrier to supply air diffuser edge

6 COOLING TOWERS

- 6.1 All Cooling Towers shall be induced flow design.
- 6.2 Distribution (hot) basins and collection (cold) basins shall be of stainless steel construction.
- 6.3 Sleeve bearings are unacceptable.
- 6.4 Drives shall be gear type only.

7 PIPE IDENTIFICATION

PIPE	COLOR
Chilled Water Supply	Dark Blue
Condenser Water Supply (From cooling tower collection basin to chiller condensing barrel)	Dark Green
Condenser Water Return (From chiller condensing barrel to cooling tower distribution basin)	Light Green
Steam	Dark Grey
Steam Condensate	Light Grey
Natural Gas	Yellow (ANSI Standard)
Chemical Feed	Purple
Heating Water Supply	Brown
Heating Water Return	Tan
Fire Suppression Systems	Red
Fire Suppression Systems Distribution	Red (or to match architectural features)

7.1 Provide ANSI standard labels at wall, floor and ceiling/roof penetrations and every 15 feet in machine rooms.

7.2 Provide direction arrows at all changes in direction and at label.

8 PUMPS

8.1 Hydronic Pumps

- 8.1.1 Hydronic pumps shall be close coupled base mounted or horizontal split case type. Vertical split case pumps will be considered if foot print is limited in order to provide for sufficient access.
- 8.1.2 All hydronic pumps of five (5) horsepower and above shall have adjustable frequency drives sufficiently sized to accommodate operation at 125% design flow and 156% of design head.
- 8.1.3 All hydronic pumps of five (5) horsepower and above shall have impellers sized to accommodate operation at 125% design flow and 156% of design head.
- 8.1.4 Select all pumps to operate within 10% to the right of maximum efficiency point (MEP) and 15% to the left of MEP.

9 INSULATION

9.1 Above Grade Piping Insulation (all thicknesses and installation procedures as recommended by material manufacturer)

- 9.1.1 Chilled Water Piping
 - 9.1.1.1 Steel piping shall be insulated with foam-glass insulation.
- 9.1.2 Copper piping shall be insulated with elastomeric foam insulation.
- 9.1.3 Heating Water Piping shall be insulated with preformed fiberglass pipe insulation.
- 9.1.4 Domestic Cold, Hot and Hot Return Water Piping shall be insulated with preformed fiberglass pipe insulation.

- 9.1.5 Team and Steam Condensate Piping shall be insulated with preformed fiberglass pipe insulation.
- 9.1.6 Condensate lines from Air Handling Units and Ice Making Machinery shall be insulated with elastomeric foam insulation.
- 9.1.7 Direct Expansion Cooling Piping shall be insulated with elastomeric foam insulation.
- 9.2 Below Grade Piping Insulation (all thicknesses and installation procedures as recommended by material manufacturer)
 - 9.2.1 Chilled Water Piping shall be pre-insulated piping with aluminum exterior PVC lagging.
 - 9.2.2 Steam and Condensate Piping shall be pre-insulated piping with aluminum exterior PVC lagging.

Louisiana State University Design Standards

DIVISION 26 - ELECTRICAL

1 ELECTRICAL REQUIREMENTS

- 1.1 Consultants shall explicitly follow all applicable criteria listed. Any variation from these criteria must be approved by the Office of Planning, Design and Construction (PDC).
- 1.2 For each project, provide electronic versions, pdf file format, of Operation and Maintenance manuals. Include submittal data on panel boards, switchboards, starters, transformers, meters, light fixtures, lighting controls, fire alarm system, sound systems, telecommunications equipment, etc.
- 1.3 All requests for power outages shall be coordinated with the Office of Facility Services, and shall be requested in writing at least two weeks prior to the outage. For each outage, the Contractor shall complete and submit a Facility Services Utility Shutdown Request form. The Contractor shall attend any pre- shutdown meetings required by the University to coordinate such outages. All work requiring a shutdown shall be scheduled after working hours or on weekends unless specifically allowed otherwise by LSU.
- 1.4 Verify with Mechanical that sufficient air conditioning is provided to all rooms with transformers, UPS's, Power Conditioners or other major heat generating electrical equipment.
- 1.5 All penetrations made in walls, floors or other building partitions for raceways, cables, equipment, etc. including penetrations in concealed areas (ceilings, chases, etc.) shall be either bore drilled or core drilled as required. Bust/poke-throughs with hand tools shall not be used to penetrate and will not be accepted. Any bust/poke through penetrations will be patched and redone with a drilled penetration by the contractor. All penetration work shall be neat and debris cleaned up after completion. Any walls or ceilings damaged due to penetration work shall be repaired. Any penetrations through walls or ceilings in visible finished areas shall be patched and painted, as required, to restore the finish around the penetration to its original condition. Where paint color/texture cannot be matched for an invisible transition from new to existing finish, the entire wall shall be repainted. The Contractor is to verify before starting any penetration work that the item to be penetrated has been checked by LSU and is free of asbestos. Roof penetrations shall be sealed by a licensed roofing contractor which maintains the existing roof warranty.
- 1.6 All wiring shall be run in conduit or other type raceways unless specifically noted or allowed otherwise by LSU. Horizontal runs of low voltage fire alarm, telephone, data, & controls may be run without a raceway in accessible ceiling spaces where allowed by code. Surveillance camera wiring shall be considered data wiring. Where run without raceways, cables shall be routed & grouped together utilizing UL approved J hooks by Caddy, Raco or approved equal attached to the building structure & spaced 4' - 0' maximum in a neat orderly arrangement. Ceilings considered accessible shall only be those with lay in panels on T-bar grids. Other types of ceilings may be considered accessible if specifically approved as such by LSU. Hangers used to support wiring run without raceways shall be Caddy CAT series or B-Line BCH series J- hooks or other hangers approved by LSU with mounting as appropriate to the location. Hangers shall be submitted for approval. Do not use wire wraps or tie straps to support cable. Provide attachment accessory suitable for the substrate the hanger is being attached to. Wiring run without raceways shall be bundled together with reusable Velcro wraps (not nylon tie wraps) at least once between each 4'-0' support. Wiring must be routed on the supports as high as possible, free and clear of mechanical equipment, lighting fixtures, piping, conduits, ductwork, building structural members and any other building equipment or items. Cables shall not rest on the ceiling support grid system or other building items. Each wiring system (fire alarm, telecom, etc.) shall be run separate with separate hangers. Do not support from ceiling system supports, HVAC ductwork, conduit, piping, etc. Where wiring run without raceways penetrates walls or ceilings a metal conduit sleeve with bushings at each end shall be provided for the penetration. Cables shall not be run through holes in walls or ceilings. Each cable shall be continuous, without splices or connections from the source to the connected device. Routing shall be parallel or perpendicular to building lines. Support arrangement and tension on cables shall be minimized to prevent exceeding the maximum cable bending radius. Where cables transition from sections run without a raceway into sections run with a raceway, a bushing shall be installed on the entrance to the raceway (conduit, wiremold, etc.). All fire alarm wiring shall have a red colored jacket.

- 1.7 All penetrations through floors, ceilings or other partitions shall be sealed using the design and materials of an Underwriters Laboratory (UL) listed method to maintain the fire resistance rating of the system. The contractor shall submit manufacturer's cut sheets of the product(s) to be used and the UL assembly method it will be used in before making the penetrations. This information shall also be provided at the end of the project at the time of the Fire Marshal inspection. For renovation projects, all existing walls and ceilings shall be considered to have a minimum 2 hour assembly rating.
- 1.8 Wiring run without raceways through ceilings or other spaces used for environmental air handling (ceiling spaces used for return air, etc.) shall be listed for the use (plenum rated) & comply with NEC Section 300-22.
- 1.9 For each new panelboard, provide a load schedule on the project drawings listing the load for each branch circuit and a breakdown of the connected load on the panel. Provide an electrical load summary for each project, as part of the final review set.
- 1.10 The fault rating of all new electrical distribution equipment shall be sufficient for the maximum available fault current. The fault rating for all new equipment shall be listed in the specifications or on the drawings. New circuit breakers added to existing panels are to meet or exceed the fault rating of the existing breakers in the panel.
- 1.11 Provide concrete housekeeping slabs under all floor mounted electrical equipment.
- 1.12 The exact location of starters, disconnect switches, control panels and similar type items shall be coordinated in the field with all other items being installed in the project and with any existing items, and adjusted as required to maintain all code required clearances.
- 1.13 Permanently label all electrical distribution and control equipment (panels, safety switches, starters, transformers, etc.) with etched laminated plastic nameplates, black letters on white background, 1/4" minimum size lettering.
- 1.14 Meter all electrical services for both energy usage and power demand.
- 1.15 For any existing systems (fire alarm, emergency lighting, access control, etc.) for which work is performed in a project, before starting work, the contractor is to document in writing to LSU any existing problems with the system (control panels in alarm condition, lights not operating, etc.). Any non-documented problems in these systems noted after the contractor starts work will be the responsibility of the contractor to correct at no increase in cost to LSU.
- 1.16 The contractor is responsible for providing temporary construction power to all construction sites from a source to be determined by LSU. All temporary construction power is to be provided with metering and charges for the power are to be paid for by the contractor.
- 1.17 Electrical equipment shall be contained in a dedicated electrical room with a minimum of one room on each floor.
- 1.18 For elevators, provide telephone service to the controller and generator emergency power circuit for elevator car lighting when the building has an emergency generator.
- 1.19 All mechanical piping and ductwork shall be routed such that they do not cross over electrical panels and switchboards or the working clearances of these items as per NEC.
- 1.20 Raceways shall be concealed in all finished areas unless required to be surface by existing conditions. Where raceways must be surface type in finished areas, they shall be decorative surface raceway, not exposed conduit. Surface raceways with only power conductors (not tel/data or combined power/tel/data raceways) shall be metal type, not non-metallic type. Surface raceways for telephone, data or combination of tel/data/power shall be non-metallic type per LSU Information Technology Services standards. Surface power raceways shall consist of a system of U.L. approved, factory painted finish, surface metal raceway consisting of base and cover sections, wire retainers, corners, bends, junction boxes and all accessories required for a neat and complete installation. Boxes shall be sized to accommodate the wiring devices to be installed. Size of raceway shall be approved for number of conductors to be installed. Surface metal raceway shall be by Wiremold or approved equal with manufacturer's standard accessories (couplers, corners, right angles, entrance end fittings, tees, end caps, etc.) as required for a neat and complete installation. A factory supplied bushing shall be provided at the entrance to all surface metal raceways. Surface non-metallic raceway shall be surface mount constructed of high-impact, fire-resistant, UL Listed, PVC type compounds.

All sizes and types of fittings including flat, inside and outside elbows shall be EIA/TIA compliant with respect to Cat-6 bend radius requirements. Non-metallic raceway shall be provided complete with manufacturer's standard accessories (couplers, corners, right angles, entrance end fittings, tees, end caps, etc.) as required for a neat and complete installation. The color of all surface raceways and associated boxes, fittings, etc., shall be selected from the manufacturer's standard color selection to best match the finish color of the particular wall the box is to be installed on.

- 1.21 Wiring for transformers and bussing for panelboards, switchboards and bus ducts shall be copper.
- 1.22 Outdoor equipment (panelboards, safety switches, contactors, etc.) shall be stainless steel with external mounting tabs.
- 1.23 Conduit connections to outdoor enclosures shall be watertight with listed weatherproof hubs, not with only locknuts and shall be made on the bottom or sides of the enclosure (no top penetrations).
- 1.24 Do not run exposed conduit on exterior walls unless specifically allowed otherwise.
- 1.25 Under demolition, add the requirement that the contractor re-feed any items to remain presently fed through items to be removed in the project. Remove all accessible unused and abandoned wiring and conduit back to the source. This includes the conduit and abandoned wiring in accessible ceiling spaces. Electrical demolition is to include removal of all unused electrical items (conduit, boxes, wire, light fixtures, cables, supports, etc.) in the area being renovated. This includes any existing already un-energized abandoned electrical items as well items disconnected as part of this work.
- 1.26 For renovations, electrical work is to include re-supporting existing conduit, boxes, cables, etc. in ceiling not properly supported in accordance with requirements for new work in project.
- 1.27 The University has the right of salvage to any demolished equipment. For equipment to be removed, the Contractor is to confirm with the University whether or not the University desires to keep the respective piece of equipment. Equipment desired by the University shall be moved by the Contractor to a designated site on campus. Any equipment not desired by the University shall become the property of the Contractor and removed/disposed of by the Contractor.
- 1.28 For existing buildings being renovated, re-feed all exterior lighting circuits fed from the building which feed lights which are to remain (building mounted lights, street lights, etc.). Existing exterior lights shall be temporarily fed and controlled during construction to maintain security lighting around the building. Note the demolition of the existing exterior light fixtures and verify there is sufficient exterior security lighting to replace the coverage of the removed fixtures.
- 1.29 For maintenance considerations, unless specifically allowed otherwise by LSU PDC, ceilings shall be easily accessible with a simple method of tile removal so that electrical equipment may be more easily maintained and circuits may be added in the future. Hard ceilings shall only be used in areas where LSU specifically grants the designer permission to use non-accessible ceilings (plaster, gyp board, etc. or ceilings without a simple easy method of tile removal) generally restrooms or other high humidity areas. Where accessible ceilings are allowed by LSU, recessed light fixtures shall be capable of having the driver replaced from below the ceiling through the fixture opening and access panels shall be provided for items requiring access by code.
- 1.30 The electrical contractor is to submit a Facility Services Utility Locate Request form and have it approved before performing any digging or driving any object below grade.
- 1.31 For excavating in areas congested with existing underground utilities, the contractor is to use water excavation or hand dig in the vicinity of existing lines. Exact routing of all new underground ductbanks is to be adjusted in the field to avoid existing obstructions.
- 1.32 For any work requiring building electrical outages, develop and list in the bid documents a recommended sequence of work to accomplish the electrical work and verify all necessary outages are addressed and any special work or materials required to maintain power to critical loads is provided for as part of the project. Coordinate with the building users and if they cannot accommodate an outage of sufficient length to accomplish the work, then include the cost in the project to provide and connect a temporary generator to power any necessary building loads. The sequence of work associated with the electrical outage utility work is to be outlined and the allowable duration of the associated outages is to be clearly stipulated in bid documents. The sequence developed is to be approved by LSU before the project bids.

- 1.33 Include as part of the project for the contractor to provide an arc flash analysis and labeling service based on compliance with NFPA 70E, OSHA 1910 and IEEE 1584. All switchgear, switchboards, transformers and panelboards are to have arc flash labeling complying with the above standards including arc flash boundaries outlined, and required levels of personal protective equipment posted. Provide specifications for this work.

2 CONDUIT & BOXES

- 2.1 All wiring shall be run in conduit or other type raceway except where specifically allowed otherwise.
- 2.2 Galvanized rigid steel conduit w/ threaded fittings shall be used for all exterior conduit, conduit in damp locations, and conduit embedded in or run through concrete slabs.
- 2.3 Underground conduit runs shall be grey colored schedule 40 PVC type. Conduits for all underground medium voltage feeders shall be encased in 3" minimum of red concrete unless directionally bored. Conduit for directional bores shall be continuous Schedule 80 HDPE coiled in reels for direct burial service. There shall be no splices in directionally bored conduit.
- 2.4 Interior conduit in dry locations shall be EMT type with compression type fittings. Set screw fittings shall not be used.
- 2.5 Provide an insulated bushing on the ends of all conduits 1" size and larger.
- 2.6 Outlet boxes in concealed conduit systems shall be flush mounted, galvanized steel of sufficient size to accommodate the number of conductors and devices contained and be securely fastened to wall or ceiling framing for a rigid installation.
- 2.7 Outlet boxes for lighting fixtures shall be 4" octagon, galvanized steel, not less than 1-1/2" deep, with fixture stud fastened through from the back of the box.
- 2.8 Where outlet boxes are installed in a concrete slab, units designed and listed for this application shall be used.
- 2.9 Device boxes for receptacles, switches, data and communications outlets shall be deep type, not less than 4" square and 2-1/4" deep. Device boxes shall have box extension rings with the required number of gang openings and with a depth to match the wall finish material so that the face of the box extension is exactly flush with wall face.
- 2.10 Outlet boxes for switches and receptacles in exposed conduit systems shall be cast iron or aluminum, factory finished, Type FS or FD, with number of gangs as required.
- 2.11 Outlet boxes shall not be installed back to back in walls or floors.

3 POWER WIRING (600 VOLT AND BELOW)

- 3.1 All conductors shall be of soft drawn annealed copper having a conductivity of not less than 98% of that of pure copper. Conductors shall be standard code gauge in size, & shall have insulation rated for use at 600 volts.
- 3.2 All conductors shall be color-coded as follows

3Ph 480V System	3Ph 208 (or 240V) System	1Ph 240V System
Phase 1- Brown	Phase 1- Black	Line 1- Black
Phase 2- Orange	Phase 2- Red*	Line 2- Red
Phase 3- Yellow	Phase 3- Blue	Neutral-White
Neutral- Gray	Neutral-White	Ground- Green
Ground- Green	Ground- Green	(* Orange for wild leg)

- 3.3 Color coding shall be continuous the full length of wire No. 10 and smaller. On larger sizes, identification shall be by color-coded phasing tape at each box and connection. Surface printing at regular intervals on all conductors shall indicate manufacturer, size, Voltage and insulation type. White or gray colored insulation shall only be used for grounded (neutral) conductors. For multiple neutrals run in the same conduit, provide separate neutral conductors with a continuous, factory applied tracer stripe matching the color of the

respective phase conductor. Green colored insulation shall only be used for equipment grounding conductors. Insulation for isolated equipment grounding conductors shall be green with yellow tracers.

- 3.4 Except where specifically allowed, feeders shall be run their entire length without joints or splices. Splices in branch circuit wiring shall be made only at outlets or in accessible junction boxes. Splices in branch circuit wiring shall be listed for the quantity, types and sizes of the conductors connected. Splices shall be made with compression type solderless connectors or spring loaded, tapered, screw on type insulated units (wirenuts). Push-in, plastic body type connectors are not allowed. Do not use wirenuts on splices of solid wiring to stranded wiring. Terminations or splices for conductors No. 6 AWG and larger shall use compression type connecting lugs made with a hydraulic type compression tool approved by the manufacturer. All splices and terminations shall be insulated in an approved manner by an integral or separate cover or by taping to provide insulating value equal to that of the conductors being joined.
- 3.5 Branch circuit power conductors shall be a minimum No. 12 size except that conductors shall be minimum No. 10 size for 120V circuits with home runs over 75 feet long and for 277V circuits with home runs over 100 feet long.
- 3.6 Wire shall be copper, THHN/THWN insulation, #12 size minimum. Sizes #8 and larger shall be stranded. Wires #12 and #10 AWG may be stranded if terminated in devices which do not use screw type terminal connections and are UL listed for termination with stranded conductors (lug, pressure plate connectors, etc.). Wires #12 and #10 AWG shall be solid if terminated in devices which use screw type terminal connections or which are not UL listed for termination with stranded conductors.
- 3.7 For all conduit runs and raceways, provide a separate, green colored, insulated equipment grounding conductor, sized per the NEC, in addition to the conduit or raceway ground.
- 3.8 All emergency lighting shall be run in separate raceways from normal wiring, as per the NEC.
- 3.9 Each branch circuit shall have a dedicated neutral. Sharing a common neutral between multiple phases is not allowed.
- 3.10 For receptacles and switches which are not the end of the line, the equipment grounding conductor and neutral shall not route through the device per NEC 250.148(B). For such instances, splice from the incoming conductor in the box with one conductor going to the device and one continuing to the next device on the run, such that the device can be removed without losing the ground or neutral connection to the downstream devices.
- 3.11 For branch circuit wiring, there shall not be more than 8 current carrying conductors per raceway. Neutral conductors shall be considered current carrying. Apply derating factors as per NEC and increase size of conductors if necessary.
- 3.12 Each feeder shall be run in its own dedicated raceway.
- 3.13 For all 120 and 277 Volt branch circuits rated 30A or smaller serving above floor interior items requiring concealed wiring, the Electrical Contractor may use National Electrical Code (NEC) metal clad Type MC Cable in lieu of wiring in hard conduit. BX, AC, and NM type cables are not allowed. MC cable is to be run concealed except for equipment rooms where it can be exposed. All other wiring is to be in hard conduit as specified. The use of MC cable is not allowed for feeders. MC clad cable shall be a factory packaged, U.L. listed, NEC constructed assembly consisting of a flexible galvanized steel conduit system with pre-packaged insulated conductors with an integral insulated full size dedicated neutral (no multiwire branch circuits sharing a common neutral allowed) and a full size green grounding conductor. All conductors shall be rated 90°C. All circuits shown on the Drawings or called for with a separate normal and isolated grounding wire shall have a separate insulated ground wire in the cable, color coded green for the normal ground, and green with a yellow tracer stripe for the isolated ground. Color coding of the wiring shall comply with NEC and this Design Standard. Contractor MUST use different cables with different colors for each phase with the colors as noted above. The exterior of the MC cable shall be marked to indicate the color of the phase conductor(s) contained. The fittings used for MC cable shall be steel constructed and of the type specifically designed and listed for this use. Connections to boxes, panels or devices shall be made with steel straight squeeze connectors and secured with no play for a dependable ground. If required, provide oversized type fittings when attaching to a multiple size knockout to prevent the cable from opening the larger size knockout ring. Any loose connections shall be remade or replaced until acceptable to the Engineer. MC cable must be

secured and independently supported from the structure with a maximum spacing of 4-1/2 feet and with supports within 12 inches of every connection to a junction box or device. Use hangers similar to Caddy CC Series, 6M Series, WMX Series and RBMX Series. This cable must be neatly bundled together and routed to follow the building lines and not interfere with access to other equipment. Do not route diagonally. Do not lay over insulation, horizontal structural members, light fixtures, ductwork or HVAC equipment.

4 WIRING DEVICES

- 4.1 Wiring devices (receptacles and switches) shall be specification grade, 20A minimum rating, with nylon housing and metal mounting strap (devices with plastic mounting straps are not acceptable). Switches shall be silent actuating with 120V or 277V rating, as required by the circuit controlled. Receptacles may be back or side wired, but back wired receptacles shall utilize a pressure connection requiring the side screw to be tightened (wires held in with clip type mechanisms are not acceptable). Contractor shall tighten the screws on any unused receptacle terminations, to reduce the possibility of protruding screws shorting to the box.
- 4.2 Provide receptacles with integral ground fault protection for outdoor receptacles, receptacles in wet locations and receptacles where required to be ground fault type by code.
- 4.3 For any existing receptacles to remain in areas being renovated, the contractor is to check out the existing wiring and correct any problems (no power, open grounds, reversed polarity, etc.) and to repair and/or replace any inoperative or damaged receptacles.
- 4.4 For all new receptacles and light switches and for existing receptacles and existing light switches in renovated areas, and for all equipment connections made with disconnect switches, enclosed circuit breakers or a hard wired connection, provide a permanent label on the coverplate with the panel designation and circuit number of the circuit serving the device. Labeling shall use laminated, scratch resistant, 1/2" wide polyester adhesive backed tape, Panduit LS4M or Brother P-Touch labeling system or equal system approved by LSU Facility Services. Labels shall be black letters on clear background for light colored plates (ivory, white, etc.) and white letters on clear background for dark colored plates (black, brown, etc.). Lettering shall be 1/8" size.
- 4.5 Wiring devices shall mount securely to the device backboxes with no play (no gaps between mounting ears of the device and the box or trim ring).
- 4.6 Coverplates for interior wiring devices (receptacles, light switches, etc.) shall be flexible nylon type (not hard thermoplastic). Coverplates shall not be stainless steel unless specifically requested by LSU. Covers for exterior wiring devices shall be gasketed, non-metallic type with upward operating self-closing spring door. Weatherproof receptacles shall be flush mounted in exterior walls, unless required otherwise.
- 4.7 Provide red colored devices and cover plates for all receptacles and switches on emergency generator power.
- 4.8 For all receptacles securely attach the devices yoke to the back box or back box to wall structure such that there is minimal movement of the device when a plug is inserted or removed and the device is not dependent on the plate to keep it in position. For instances where the back box is loose, secure the back box to the wall structure. For instances where the mounting ears of the device do not touch the box ring due to improper extension ring depth and do not securely sit on the wall finish due incorrect wall opening size, where boxes are set back more than 1/4" from the face of the finished wall/ceiling provide an adjustable box extender ring (Bridgeport BXE series, RACO 976 series or approved equal). Where boxes are set back less than 1/4" from the face of the finished wall/ceiling provide a device leveler and retainer (Caddy RLC or approved equal). Provide any other work and accessories to provide a rigid, level installation of the device to the box.

5 SAFETY SWITCHES

- 5.1 Safety switches (disconnect switches) shall be UL listed, heavy duty type with ratings and features as required by the load served. Switches shall have visible blades, be padlock-able in the off (down) position, use positive quick made, quick break operating mechanisms, be horsepower rated for the motor served, have a NEMA 1 enclosure for dry indoor location and a NEMA 4X stainless steel enclosure for outdoor or wet locations. Safety switches shall have an isolated neutral bus for circuits with a neutral. All safety switches shall have listed ground lugs attached to the enclosure as required for terminating all equipment grounding conductors.
- 5.2 Safety switches shall be fused when required by code to provide overcurrent/short circuit protection or to comply with the nameplate data of the equipment served. Safety switches shall be non-fused when the

branch circuit protection device ahead of the switch provides the code required overcurrent/short circuit protection and the specific protection required by the equipment served as listed on the equipment nameplate.

- 5.3 For maintenance considerations, unless not possible by code or by requirements of the manufacturer of the item served, use enclosed circuit breakers instead of fused type safety switches to provide overcurrent/short circuit protection to equipment.
- 5.4 Galvanized angle, channel or other suitable supports shall be provided for switches that cannot be mounted on walls or other rigid surfaces. Switches shall not be supported by conduit alone. Switches shall not be mounted on equipment unless specifically allowed otherwise. When allowed, the location shall be coordinated with the equipment manufacturer, such that the switch does not damage any working components or block any unit access.

6 FUSES

- 6.1 Fuses protecting panelboards, switchboards and other distribution equipment shall be current limiting type RK1. All other fuses shall be current limiting type RK5. Provide one spare set of fuses (3 minimum) for each type and size fuse used on a project.

7 PANELBOARDS

- 7.1 Panel boards shall be circuit breaker type using quick-made, quick-break, trip free, bolt-on, molded case circuit breakers. Provide 25 % spare/spaces in each panel section (minimum of 4). Provide an additional section, if necessary, to meet this requirement. Panel board shall be dead front safety type with main breaker or main lugs, as required by code. Panel boards shall have single, feed through, or double lugs to accommodate feeder conductors. Panel boards with neutrals shall have a neutral buss and a neutral bar insulated from the enclosure for terminating feeder and branch circuit neutral conductors. Each panel board shall have an equipment grounding bar connected to the cabinet for terminating feeder and branch circuit ground conductors. All panel board bussing shall be copper. Load centers are not acceptable.
- 7.2 Doors shall be fitted with flush cylinder locks, keys to which shall all be alike: two keys shall be furnished for each lock. Provide a directory for each panel with typewritten identification of all circuits listing final approved room names, room numbers and item served.
- 7.3 Indoor panel boards shall be NEMA 1 and have door-in-door trim to allow hinged access to the interior panel wiring without removal of the panel door assembly (one lockable door over the interior and one which exposes the gutter).
- 7.4 Outdoor panel boards shall be NEMA 4X, stainless steel with external mounting tabs.
- 7.5 For recessed panel boards, provide a minimum of three 3/4" spare empty conduits from each panel section to the nearest accessible ceiling space.

8 SWITCHBOARDS

- 8.1 Switchboards shall be dead front with molded or insulated case circuit breaker mains and branches. Main circuit breaker shall have ground fault protection when required by code. Switchboards shall have an incoming solid state power meter recessed in the front of the enclosure to measure phase voltages (L-L and L-N), phase amps, KW, KVA, peak KW, peak KVA. CTs and PTs used in the metering shall provide minimum 2% accuracy.
- 8.2 Switchboard bussing shall be plated copper and be of sufficient cross sectional area to meet UL Standard #891 on temperature rise. The entire switchboard assembly (bussing, circuit breakers, etc.) shall have a fault rating as required to exceed the available fault current. All incomplete vertical sections shall have full length "space only" bussing such that it may accept future branch devices. This is to be in addition to the scheduled space or spare branches specified or scheduled. The continuous current rating of the vertical bussing shall be equal to or greater than the capacity of the available branches whether scheduled, supplied or not. Feeders shall enter and terminate in the same vertical section as per NEC 384-3 or interior wireways specifically for horizontal cable routing shall be provided. No cable is to route between or in physical contact with switchboard bussing. Horizontal bussing shall be full size, non-tapered with ampacities as required by the loads served plus minimum 25% extra for future and tapered for full size future extension.

- 8.3 The switchboard shall have a ground bus extending through all sections. All equipment grounding conductor cables shall terminate at this ground bus with suitable lugs and not the metal switchboard frame. The ground bus shall be factory bonded to the switchboard frame.
- 8.4 Switchboards in non-secure areas shall have full length and width lockable, handle operated, hinged doors.

9 DRY TYPE TRANSFORMERS

- 9.1 Dry Type Transformers shall have two 2 ½ % primary taps above and below normal. Units are to have minimum 220° C insulation system with maximum 150° C temperature rise at 40° C ambient. Floor mounted units shall be provided with rubber vibration isolating pads (minimum ½" thick).
- 9.2 Dry type transformers shall have copper windings.
- 9.3 Sound levels shall not exceed 45 db for units 75 KVA and below, or 50 db for units above 75 KVA in an ambient of 24 db.
- 9.4 Dry type transformers shall be K rated as required when serving loads with significant levels of non-linear harmonic load currents.

10 LIGHTING

- 10.1 Design to Illuminating Engineering Society (IES) recommended levels for the use of the space or area.
- 10.2 Lighting shall be energy efficient, utilizing LED light sources. Color temperature of the LEDs shall be 3500K.
- 10.3 Incandescent, fluorescent and HID lamps are not to be used. Justification and approval from LSU for specialty use is required.
- 10.4 Each fixture shall be supported independently from the building structure.
- 10.5 Lenses for interior fixtures shall be injection molded UV stabilized acrylic (minimum 0.125" thick) or glass. Polycarbonate lens shall not be used unless specifically permitted by LSU.
- 10.6 Use occupancy sensors to control lighting in classrooms, conference rooms, restrooms, offices, storage rooms and similar spaces. Occupancy sensors shall have adjustable time delay 30 sec to 30 minutes and adjustable sensitivity. Rooms shall generally have a switch at the door to override the occupancy sensor to off if a wall type occupancy sensor with this capability is not used.
- 10.7 Lighting in areas where computer terminals are used shall be designed to minimize direct and indirect glare when viewing the terminal displays.
- 10.8 At the design development phase of a project, a lighting fixture schedule shall be provided listing at a minimum a description of each type fixture to be used and the proposed lumen output. In addition a cut sheet of each proposed fixture shall be provided.
- 10.9 Where existing fixtures are replaced with new fixtures, the connection shall include a #12 green equipment ground wire from the circuit equipment ground wire, if one is present, or from the metal box if a ground wire is not present.
- 10.10 Provide an HOA switch on all lighting contactors.
- 10.11 For recessed light fixtures, provide a maximum of 4 feet of steel constructed flexible metal conduit or MC cable between the last branch circuit wiring junction box and the fixture. Wiring in flexible conduit or MC cable shall be #12 size minimum with a green equipment ground wire. Flexible conduit to each fixture shall be from a hard conduit connected junction box to the fixture. Looping from fixture to fixture with flexible conduit or MC cable is not allowed.
- 10.12 Main corridor lighting shall be controlled by relays controlled through occupancy sensors. Selected minimal corridor lights shall be unswitched, connected to generator backed emergency lighting circuits with sufficient quantity and location to provide only the necessary code required emergency lighting and to allow the main corridor lights to be switched off during times of inactivity.
- 10.13 For emergency lighting, in all areas except for corridors and stairs, where lights are on an emergency lighting circuit, connect these fixtures to an emergency lighting circuit through an emergency lighting control unit (ECU) which normally controls the emergency fixture with the other normal fixtures in the room and automatically turns on the emergency fixture upon an outage of the normal lighting branch circuit. Do not use an emergency transfer device so that the fixture is never powered by the normal lighting circuit. For switched fixtures, the ECU shall be Wattstopper ELCU-200 Emergency Lighting Control Unit or approved

equal. For dimmed fixtures, the ECU shall be Iota ETS 20-DR or approved equal. Provide a nameplate in the fixture stating "EM FIXT W/ EM LTG CONT UNIT". Emergency lights in corridors and stairs are to be circuited as unswitched night lights and will not require an emergency control unit. Stairwell lights are to be provided with integral sensors to switch the fixture to reduced light output after no motion is detected after an adjustable time delay.

- 10.14 Lighting is to be installed such that there are no locations where the maintenance of light fixtures requires the use of greater than a 26 ft vertical scissor lift (30 ft maximum ceiling height) or would require scaffolding such as over a stair (no fixtures over stair risers), or other situations where the maintenance would be difficult or require specialized lifts.
- 10.15 All light fixtures shall have a minimum 5 year manufacturer's warranty.
- 10.16 All existing ballasts in ECM and renovation projects that do not carry the words "Non-PCB" shall be removed from existing fixtures, stored in the approved DOT/EPA specification drums (Provided by the contractor). These drums shall have a log of exact contents and date each article was in each drum. The drums shall be stored on pallets in a location suitable to the Owner. Disposal shall be the responsibility of the Contractor and shall be in accordance with all state and federal requirements. All PCB tracking documents from jobsite to destruction shall be delivered to the Owner via the Architect/Engineer prior to project close-out.

11 OUTDOOR LIGHTING

- 11.1 Outdoor site lighting shall provide adequate security lighting around buildings and on the sidewalks and drives. Lighting levels shall be in accordance with the latest IES recommendations. The light source should be energy efficient for low operating cost with a long lifetime for low maintenance. Fixtures shall utilize LED light sources. Color temperature of the LEDs for outdoor fixtures shall be 4000K.
- 11.2 Glare shall be minimized as much as possible with fixtures using cutoff type reflectors wherever possible. Open face "wall pack" type fixtures generally shall not be used except for equipment type areas not generally visible from public view.
- 11.3 Exterior light fixtures shall have a glass or acrylic lens to prevent lens yellowing. Polycarbonate lens are not allowed. Exterior fixtures not exposed to the weather shall be UL damp location listed and those exposed to the weather shall be UL wet location listed
- 11.4 Bollard fixtures are not generally desired and should only be used where specifically approved for use by LSU and where there is little chance of being struck by lawnmowers or vehicles. Ground mounted fixtures (ground mounted floodlights, etc.) shall only be used where specifically allowed by LSU and provided with a secure, strong mounting arrangement. Exterior fixtures supported only by the conduit connection are not allowed. In-grade mounted fixtures are not allowed.
- 11.5 Outdoor site lighting pole mounted fixtures shall utilize the LSU campus standard "Core/Historical" pole/fixture which shall consist of a traditional lantern type fixture on a decorative pole. Fixture and pole shall have a black finish. Fixture/pole shall consist of a cast aluminum fixture with a tapered six sided cage and top finial, minimum 126W LED light source, cutoff optics generally with a symmetrical reflector concealed in roof (with other type distribution where required), frosted chimney giving the appearance of the light source, clear seeded acrylic or clear seeded glass lenses, internal fusing in fixture or in-line fusing in pole base, 12 foot tall decorative cast alum pole. Fixture shall be Sternberg 6130C series with 4200 series pole, ANP LA844 series with 4F12.188-41 series pole or equal approved fixture/pole with similar photometrics, appearance and construction.
- 11.6 All pole/fixture assemblies shall have a minimum 100 mph wind load rating with a 1.3 gust factor.
- 11.7 Outdoor lights are to be controlled on at dusk and off at dawn either through a contactor(s) controlled by a master exterior photocell, or the fixtures themselves are to have individual built in photocells. Do not use a programmable lighting control panel (when one is present) to control outdoor lights. Provide an HOA switch on all lighting contactors with the "A" position having the contactor controlled by the photocell.
- 11.8 Pole foundations shall utilize double nutting as the means of mounting and leveling. Grout shall be installed between the pole base plate and the top of the foundation around the bottom leveling nuts. All poles shall have metal base covers. All metal poles shall have a ground rod with a connection to the pole ground lug located inside the pole and accessible through the base handhole.

11.9 See LSU Campus Site & Landscape Design Guidelines & Standards for additional exterior lighting information.

12 EMERGENCY POWER

- 12.1 The preferred method for emergency power for “Exit” signs and egress illumination shall be by a building emergency power generator. The code specified transfer and duration will be met. For small buildings and for renovations where emergency lighting systems do not exist in a building, individual battery powered units may be considered on a case by case basis, but must be approved by LSU.
- 12.2 Generators shall be natural gas fueled. For each project, the Designer shall obtain permission from the State Fire Marshall to allow natural gas as the fuel in lieu of an on-premises fuel supply as allowed by the exception listed in NEC 701.11,(B),(3). The wording of the request to the Fire Marshal shall be coordinated with LSU utilizing the same as used in past successful requests.
- 12.3 Generators shall have electronic isochronous governor, critical exhaust silencer, alternator and control panel space heaters, water jacket heater, output circuit breaker, max 130 deg C temp rise, automatic exerciser clock with selector for load or no load exercising, starting batteries and charger, lockable outdoor weatherproof enclosure.
- 12.4 The ATS for the generator shall be 3P, SN unless required otherwise and have time delay neutral position or in phase monitor. Each ATS shall have built in factory supplied metering that shall display at a minimum Amps, Volts, kW demand, and kVA demand.
- 12.5 Generator and ATS shall have a 5 year/1500 hour comprehensive warranty.
- 12.6 All aspects of the natural gas supply shall be in accordance with NFPA, 37, 54 and 110. Where the gas supply is connected to the building gas supply system, it shall be connected on the supply side of the building main gas shutoff valve and marked as supplying an emergency generator. The building’s main gas shutoff valve shall be marked to indicate the existence of the separate generator shutoff valve. Gas piping shall be Schedule 80, black steel, painted ANSI “Natural Gas” Yellow and installed by a licensed plumbing contractor. The connection at the generator is to be made with a flexible piping connection provided by the generator manufacturer. Gas trains shall include an equipment isolation valve at the generator, a manual shutoff valve in a remote location, a regulator and two automatic safety shutoff valves at the generator each with manual leak test valves. The automatic safety shutoff valves shall stop the flow of fuel in the event the engine stops for any cause. All gas piping shall be tested and purged in accordance with NFPA 54:8.
- 12.7 Provide a generator remote annunciator panel with emergency stop pushbutton in the building.
- 12.8 Provide a connection from the generator common alarm contact to the campus EMS system to monitor any generator alarm.
- 12.9 Generators shall be located a minimum of 5’-0” from buildings.
- 12.10 All telecom rooms shall be provided with emergency power. Coordinate exact requirements with LSU ITS.

13 FIRE ALARM SYSTEMS

- 13.1 Fire alarm systems shall be in accordance with NFPA 72, NFPA 101, ADA, and all other requirements of the Louisiana State Fire Marshall. All fire alarm system work shall be performed by a licensed fire alarm subcontractor in accordance with all requirements of the State Fire Marshall. Fire alarm system installer shall be an authorized vendor of the fire alarm panel manufacturer. The contractor shall be responsible for all Fire Marshall submittals and shall be responsible for any fees charged by the Fire Marshall for the reviews. For additions to existing systems, new fire alarm equipment shall be listed for use with the existing equipment.
- 13.2 The fire alarm system shall be non-coded, addressable, automatic and supervised. The fire alarm system shall be a Johnson Controls Metasys IFC 3030 system or Notifier NFS 3030 system. The fire alarm system shall be connected to and communicate on a point by point basis with the campus EMS system (Johnson Controls Metasys System) without using third party translators. The translation device shall be part of the control panel and UL listed for use with the fire alarm system control panel (the model number included on the UL listing sheet of compatible devices for the fire alarm control panel). Software programming of the Campus EMS system for this communication shall be done by the University. All other work and materials to accomplish this communication will be the responsibility of the fire alarm contractor. In addition to the point by point connection to Metasys, provide addressable relays on the data loop to tie into Metasys contacts for panel general trouble and alarm. In addition to this communication, the fire alarm system is to transmit

status (normal, alarm, or trouble) to the LSU Campus police through a Keltron Model RF750L subscriber unit transceiver. It shall convert control panel data to point-specific life safety event information (not just indicate trouble and alarm). Where existing systems are being replaced with new systems, the existing radio transmitter may be reused if one is present.

- 13.3 Provide a fire alarm remote annunciator at the location the fire department/police would use to enter the building when an alarm occurs.
- 13.4 The fire alarm control panel and any power extenders shall be powered from the existing generator backed up emergency system when one is present.
- 13.5 Pull stations shall be key resettable by a key provided by the system manufacturer (not an Allen head or other type screw arrangement). Over each pull station provide a clear, alarm deterrent cover with integral battery powered local alarm. Alarm deterrent covers shall be Americorp STI Stopper 2, STI-1100 series or Signal Communications Corp ST series.
- 13.6 Smoke detectors shall be photoelectric type, not ionization type.
- 13.7 Visual alarm appliances (strobes) shall be LED type.
- 13.8 Generally audible and visual alarm indicating appliances (horns, horn/strobes, speakers, speaker/strobes) shall be ceiling mounted wherever possible versus wall mounted.
- 13.9 Generally, all corridors and electrical and telecom equipment rooms shall be provided with smoke detection coverage per NFPA 72 whether required by code or not.
- 13.10 Shutdown of any air units shall be accomplished through a fire alarm addressable relay at the starter/drive for the air unit (not through the auxiliary contacts of the duct detector).
- 13.11 Provide isolation modules in the initiating wiring with no more than 25 addressable devices for each module.
- 13.12 The passwords for access to modifying the fire alarm system programming are to be left on the factory default settings and this password given to LSU at completion of the project.
- 13.13 A reduced copy of the as built fire alarm system shop drawings shall be included in the fire alarm system operations and maintenance manuals.
- 13.14 Fire alarm system control panel power supply and battery backup shall have 25% extra capacity to allow for additions to the system. Enclosures shall have 25% unoccupied extra physical space for future expansion capability.
- 13.15 Where existing fire alarm systems are replaced, remove all existing fire alarm items not reused including all wiring and exposed raceways after the new system is installed, operating and approved by the Fire Marshal.
- 13.16 Fire alarm system wiring shall be copper, 16 gauge minimum size. Fire alarm wiring shall be run in raceways except for sections in accessible ceilings for horizontal runs in equipment rooms which can be run without raceways supported and routed in accordance with LSU design standards. All fire alarm wiring shall have a red colored jacket and shall be installed separate from other building wiring systems. Fire alarm wiring between buildings shall be fiber optic cable where possible. Provide lightning/surge protectors at each end of fire alarm wiring serving items remote from the building. Wiring run underground shall be wet location listed.
- 13.17 For fire alarm control panels which are recessed in walls, provide three minimum 3/4" spare empty conduits from the panel to the nearest accessible ceiling space.
- 13.18 For all addressable fire alarm devices (smoke detectors, heat detectors, duct detectors, pull stations, etc.), provide a permanent label on the device base listing the device's complete address. Labeling shall use laminated, scratch resistant, 1/2" wide polyester adhesive backed tape, black letters on clear background, Panduit LS4M or Brother P-Touch labeling system or equal system approved by LSU Facility Services.
- 13.19 As part of the programming of the system, the contractor shall program Zone #50 to deactivate all outputs when this zone is disabled to allow the system initiating devices to be tested.
- 13.20 Where the building must remain in operation during construction, all outages of the existing system must be in accordance with the Fire Marshal requirements. The existing system shall be operational at the end of each work day unless specifically allowed otherwise by LSU. All work to disable/reconnect the existing fire alarm system items is to be done by the fire alarm system sub-contractor (not by LSU).
- 13.21 The contractor shall provide LSU a minimum of 2 days advance notice of the scheduling the Fire Marshall checkout of the system.

- 13.22 A copy of the final software programming shall be provided to LSU on flash drive at completion of the project as part of the operations and maintenance items.

14 SOUND SYSTEMS, SPEAKERS, SPEAKER INTERCOMS AND PAGING SYSTEMS

- 14.1 Specifications for these systems shall be developed as the specific need is determined and the scope as defined by the user agency.
- 14.2 Wiring for these systems shall be in appropriately sized conduit.
- 14.3 Electronic units used shall be solid state, easily serviced units.

15 CLOCK SYSTEMS

- 15.1 Specifications for clock systems shall be developed as the specific need is determined and the scope as defined by the user. In general, clocks are not to be provided in new buildings and existing clocks in renovated sections of existing buildings are to be removed as part of the renovation.

16 MEDIUM VOLTAGE WIRING (HIGH VOLTAGE SYSTEM)

- 16.1 For each project, provide a fault study and an overcurrent protective device coordination study. The coordination study shall cover from the utility system upstream substation main breaker down to the 480V branch circuit breakers in the building. The computer software program used to perform the studies shall be the ETAP program (latest version) and LSU shall be provided with all the data files for the fault study and coordination study at the completion of the project. Permanent electrical service to the building will not be provided until the coordination study curves and recommend protective device settings are submitted to and approved by LSU. All equipment shall be rated for the available fault current as determined in the study.
- 16.2 Verify all outages to accomplish the electrical utility work are addressed and any special work or materials required to maintain power to critical loads is provided for. Address the phasing and outages associated with the replacement of the high voltage feeders and equipment. In general, LSU cannot accommodate prolonged outages to accomplish high voltage utility work. The sequence of work associated with the electrical utility work is to be outlined and the allowable duration of the associated outages is to be clearly stipulated in bid documents. As much as possible, high voltage utility work is to be scheduled during the periods of low activity at the university such as between semesters and during the week between Christmas and New Year's when the University is closed. Portable backup generators shall be provided as part of the project (provided, installed, connected and fueled by the contractor) to power for any loads deemed critical by LSU and not capable of withstanding the outages necessary for the electrical utility work.
- 16.3 Medium voltage cable shall be UL listed, single conductor, 15kV rated, for use in solidly grounded wye circuits not exceeding 15kV phase to phase at conductor temperatures of 105 degrees C for continuous normal operation, 130 degrees C for emergency overload conditions, and 250 degrees C for short circuit conditions. Cable shall have stranded, concentric, round, compressed or compact, annealed copper conductor; extruded semi-conductor shield over the conductor; 220 mil Ethylene Propylene Rubber (EPR) insulation (133% insulation level); extruded semi-conductor shield over the insulation; minimum 3 mil thick helically applied minimum 25% overlapping solid copper tape shield; and black 80 mil PVC jacket imprinted with manufacturer, size, type insulation, insulation thickness, voltage rating, and UL designation. Cable shall be for use in general purpose applications in wet or dry locations including conduit, cable tray, direct burial and aerial installations. Cable shall be constructed in accordance with all applicable IPCEA standards. Cables shall be manufactured by General Cable, Okonite, Pirelli, Southwire, Superior Essex or approved equal.
- 16.4 The new medium voltage wiring and equipment shall connect to the existing solidly grounded 13.8KV or 4.16KV grounding system. Provide a green insulated equipment ground conductor run in each conduit containing a medium voltage feeder, minimum #3/0 size for the 13.8KV system and minimum #2 size for the 4.16KV system. Ground busses or conductors in existing manholes shall be extended full size to the new equipment and wiring. Cable shields shall be grounded at each termination and splice with an individual, (one per cable) minimum #6 size conductor to the ground system. Provide a minimum #12 size green ground from the tab on the elbow to the ground system. Provide a ground rod in each new manhole with a connection to the ground system. Cable shields for straight splices in manholes (except those made with elbow connectors) are not to be brought out and grounded.
- 16.5 Duct banks for medium voltage feeders shall have 25% spare conduits (minimum of one (1) each size).

- 16.6 The contractor shall be responsible for proper phasing of the system and shall demonstrate proper phasing for items fed by feeders affected by the work in this project. Coordinate phasing with Facility Services. The contractor shall be responsible for matching the phasing between the multiple feeders at HV switches and transformers and shall demonstrate proper phasing to LSU.
- 16.7 Provide new non-metallic cable racks in existing manholes when required for proper support of cables.
- 16.8 New cables shall make one complete loop in each manhole. Where multiple feeders are present in a manhole the conductors of the different feeders are to be kept apart from each other as much as possible to minimize the possibility of a fault on one feeder affecting the other feeder.
- 16.9 For splicing to existing medium voltage cables in manholes, verify that sufficient slack in cable lengths exist in the manhole to allow existing splices to be cut out and new splices to be made. If sufficient length does not exist, pull slack from adjacent manholes when possible or replace cables from adjacent manholes if it is not possible.
- 16.10 Where multiple medium voltage feeders are present in manholes, the contractor may be required to splice one feeder while other feeders in the manhole are energized. Contractor shall provide insulating blankets for added safety from energized cables and other safety items, necessary by manhole conditions.
- 16.11 New manholes for the medium voltage distribution systems shall be minimum 8' square, 6' tall, have 42" diameter traffic rated cover, non-metallic cable racks, as required, on all four sides with minimum of two racks for each side, 24" square sump for draining, 10' long ground rod and be adjusted so top is flush with finished grade or paving. All conduits to manholes are to terminate with end bells. Provide pulling eyes on all four sides and on the bottom of the manhole directly under the opening
- 16.12 Note that in areas congested with existing underground utilities, the contractor may be required to hand dig in the vicinity of existing lines. Exact routing of all new ductbanks is to be adjusted in the field to avoid existing obstructions.
- 16.13 Verify all outages to accomplish the work are addressed and any special work or materials required to maintain power to a particular load is provided for.
- 16.14 The contractor is to submit to the Architect/Engineer for review, the name and list of experience of the cable splicer to be used (actual person who will perform the work). Should the University deem that the cable splicer is not acceptable; the Contractor must submit information for a different cable splicer and repeat this process, until one is found with acceptable experience.
- 16.15 In each manhole, transformer and high voltage switch, etc. where work is to be performed in this project, the Contractor shall install on each medium voltage cable an etched laminated plastic nameplate (tag) identifying the feeder number/designation. On loop feeders, the tag wording shall also include the destination of the cable after it leaves the manhole or equipment. Note that for loop feeders in manholes, there will be a set of tags on both locations that the cable enters/exits the manhole designating at both ends where the cable goes to. Exact wording on cable tags shall be submitted by the contractor and approved by LSU. Tags shall be etched laminated plastic, white plate with black letters, with minimum 1/2" size lettering, attached with two nylon tie wraps, one at each end of the tag. The tags are to be positioned so that they can be viewed from the manhole or equipment opening. At each tag, and on both sides of every splice, the medium voltage cable shall also be color coded with electrical tape as to the phase connection (colors shall be same as presently in use on the system).
- 16.16 Underground splices in the 13.8KV or 4.16KV distribution systems are to be avoided as much as possible. Where splices must be made they are to be located above grade in sectionalizing cabinets with 600A deadbreak separable connector (elbow) type junctions inside. Sectionalizing cabinets shall be tamperproof; constructed with stainless steel enclosure, base, backpanel, hinge & hardware; Munsell green corrosion resistant finish; hinged padlockable cover with "Warning High Voltage" label and reflective sectionalizer designation label on outside; minimum 22" depth to allow back-to-back elbow connections; contain universal mounting plates with 600A junctions and parking stands. Sectionalizer cabinets shall be mounted on a minimum 6" thick, steel reinforced concrete pad with the top of the pad, 2" above grade. Provide an 18" deep, min 12" wide, below grade conduit window with concrete sides and open bottom to allow room for HV cables to turn before connecting to the unit. Conduits are to terminate 3" above the bottom of the window with bushings. Stainless steel base extenders may be utilized in lieu of a conduit window for sectionalizers

located in non-high visibility areas when approved by LSU. Sectionalizing cabinets shall be manufactured by Cooper Power Systems, Malton, CMC/BMC, Maysteel or approved equal. Protect with concrete filled, 6" round, yellow painted pipe bollards extending min 3 feet below grade with underground section surrounded by 12 inches of concrete.

- 16.17 Where underground splices in manholes cannot be avoided and above grade sectionalizers cannot be installed, splices shall be made using 600A deadbreak, separable connector (elbow) type junctions in the manhole unless the manhole containing the splice does not have sufficient space. Junctions shall be supported with J hooks from the manhole ceiling with the location coordinated with LSU to not obstruct access into the manhole. If there is insufficient space in the manhole for elbow type junctions, splice kits shall be used.
- 16.18 Medium voltage cable in-line straight splice kits where cable does not change size significantly at the splice shall be made utilizing pre-packaged, cold shrink or heat shrink type kits for shielded cable. Kits shall include compression connector, semi-conducting and insulating tapes, cold shrink or heat shrink insulation body and shield continuity assembly. Splice kits shall be rated for 15kV, 150kV BIL. Splice kits shall be 3M QS-III 5513A thru 5516A series, or Raychem CAS-15M or HVS-1520 series or approved equal.
- 16.19 Medium voltage cable tee splice kits shall be made with pre-packaged cold shrink or heat shrink type kits for shielded cable. Kits shall include connector, semi-conducting and insulating tapes, cold shrink or heat shrink insulation body and shield continuity assembly. Tee splice kits shall be 3M QS2001B or Raychem HVSJ with appropriate cable reducing accessories as required.
- 16.20 For medium voltage cable X splices and for tee or straight in-line splices with a cable size change that cannot be accommodated by the kits specified above, and for instances where there is insufficient space to use the kits specified above, the splice shall be made with hand wrapped tape type splice kits containing the necessary compression connectors, semi-conducting and insulating tapes, and shield continuity assembly. Tape splice kits shall be rated for 15kV, 150kV BIL. Tape splice kits shall be 3M 5700 series or approved equal.
- 16.21 Medium Voltage cable terminations on equipment shall be dead front type wherever possible (SF6 switches, sectionalizing cabinets, pad mount transformers, etc.) made with separable (elbow) type connectors. Separable elbow connectors shall be minimum 15kV class suitable for 4-wire multi-grounded or 3-wire ungrounded systems. Connectors shall be 600A, deadbreak type. Connectors not located in manholes shall have a test point for the mounting of a fault indicator or for aid in testing of power available and phase sequencing. Connectors in manholes shall not have a test point. Each connector shall come with an insulated plug, cap, stud, lug, cable adapter and metallic tape shield adapter. Connectors shall be sized for the conductor installed on the project. Connectors shall be by Elastimold or Cooper Power Systems.
- 16.22 Where medium voltage cables must terminate in a live front connection (Metal Clad switchgear, live front equipment, etc.) the connection shall be made utilizing termination kits rated for IEEE Standard 48-1990 Class 1 termination. Terminations shall consist of high dielectric constant stress relief tube inside a molded silicon insulator mounted on a supported core. Terminations shall be rated 15 KV minimum and have a continuous operating temperature rating of 105 deg. C with an emergency overload rating of 130 deg. C. Terminators shall be constructed with insulators constructed of tracking resistant silicon rubber. Terminations for outdoor or inside outdoor pad-mounted gear shall be outdoor rated and shall be skirted. Terminations may be of a pre-stretched cold shrink design or heat shrink design. Termination kits shall include one piece silicone rubber termination with solderless mechanical ground assembly to accommodate tape shielded cables. The termination kits shall be utilized with listed copper compression lugs rated for 105 deg C continuous operation. Termination kits shall be properly selected for the conductor type and size involved. Field verify existing cable sizes. Termination kits shall be 3M QT-III series, Raychem TFT or HVT series or approved equal.
- 16.23 Each elbow connector at equipment connections (not in manholes) shall be provided with a single phase, test point mounted, fault indicator for mounting on the test point of the connector. Fault indicators shall have integral visual display, automatic reset upon restoration of system voltage (3 to 10 minutes), junction shield feature, and shall operate on a system voltage of 2.4 kV phase-to-ground. Nominal trip rating shall match the maximum ampacity of the cable served and shall be approved by the Engineer. Fault indicators shall be E. O. Schweitzer 1TPRI-J6 series or Hubbell Chance TJS series with junction shield feature or approved equal.

- 16.24 Each elbow connector at equipment connections (not in manholes) shall be provided with a single phase hot line indicator for mounting in place of the rubber cap on the connector. Hot line indicators shall be line powered, have flashing neon lamp, be hotstick installable and operate from 2 - 35 kV phase-to-ground. Hot line indicators shall be E. O. Schweitzer VIN600 series, Hubbell/Chance VI600F or approved equal.
- 16.25 Splicing and termination kits and elbow connectors shall be properly selected for the conductor type and size involved. The contractor is to field verify the existing cable size and insulation type/thickness before starting work.
- 16.26 For all HV terminations (switches, sectionalizers, transformers, etc.) provide an 18" deep, min 12" wide, below grade conduit window with concrete sides and open bottom to allow room for HV cables to turn before connecting to the unit. Conduits are to terminate 3" above the bottom of the window with bushings.
- 16.27 Seal all underground conduits at manholes and HV equipment to prevent water from draining from the equipment to manholes or buildings.
- 16.28 At the completion of work in power manholes and transformer vaults, the Contractor shall remove all debris, dirt and any other trash already present or created by the construction.
- 16.29 All medium voltage cables must be tested. The cable is to be tested on the reel by the manufacturer at time of construction, as per all applicable IPCEA standards. Each reel is to be tested individually. Copies of these tests shall be provided to LSU. The installing contractor shall also hire a testing contractor to test the cable after it is installed in conduits, but before connection to existing cables, equipment or transformers. Cables shall again be tested after all terminations, stress cones and splices have been completed, but prior to connections to any equipment and energization. When new cables are spliced on to existing cables, the cables shall be tested prior to making the splice. On completion of the splice, the entire run of new and existing cable, shall be tested as a unit. The maximum voltage on DC high potential tests is to be per the cable manufacturer's recommendation for new cable and not over the rating of the cable for existing cable. Each time the cable is tested, the following tests shall be made:
- 16.29.1 Shield Continuity Test
 - 16.29.2 Insulation and Dielectrics Absorption Test
 - 16.29.3 Direct Current (DC) High Potential Test
- 16.30 For each existing medium voltage oil switch removed in this project, the contractor shall take an oil sample from the switch and have the sample tested for PCB content. For switches with a separate oil reservoir for each phase, the oil from only one reservoir will need to be tested. For any switches which test above 50 PPM PCB content, the university will drain the oil from the switch, after which the switch would be classified as non-hazardous. After the testing and, if necessary, the draining of the switches, all switches will become the property of the contractor and are to be removed from the campus by him. All testing procedures shall be coordinated with and performed in accordance with the LSU Occupational and Environmental Safety Department requirements. A copy of the test report for each switch shall be provided to the university. The lab performing the testing of samples shall be EPA certified and accredited by the AIHA. (ENTEK and Gulf Coast Analytical are two of several local labs that can perform this work.) Samples shall be tested as required by EPA per TSCA Part 761 (PCBs) using one of the following testing methods:
- 16.30.1 ASTM D 923-86 (PCB specific)
 - 16.30.2 ASTM D 923-89 (PCB specific)
 - 16.30.3 EPA Method 8270 (PCB must be specified)

17 MEDIUM VOLTAGE SWITCHGEAR

- 17.1 Medium Voltage switchgear shall be SF6 type pad mounted switchgear. The switchgear shall be dead front, load break, three phase, 15KV, minimum 600A continuous current. The switchgear assembly (all switches and interrupters) shall have a minimum fault rating of 25KA symmetrical, 40kA asymmetrical. The switchgear shall generally consist of two non-interlocked, incoming feeder switches without overcurrent protection to select between two medium voltage feeders powering the switchgear. It shall also contain outgoing switches each with automatic load interrupters for each load fed by the switchgear. Provide a minimum of one spare outgoing switch/load interrupter. The quantity of outgoing switch/load interrupters shall be as required by the project. Each load interrupter shall have adjustable, electronic overcurrent trip control to automatically

protect for overcurrent and fault conditions. Incoming switches and outgoing load interrupter switches shall be 3 position type (open, closed, ground). The switches and load interrupters shall operate in an insulating medium of SF6 gas contained in a type 304 stainless steel tank. Switches and load interrupters shall operate all three phases together. Each switch and interrupter way shall be provided with a large viewing window at least 6 inches by 8 inches to allow positive verification of the switch operating condition.

- 17.2 The switchgear shall be housed in a minimum 14 ga, tamper resistant, steel enclosure with Munsell green finish, access covers and hinged doors with recessed handles containing a pentahead bolt and provisions for pad locking. The enclosure shall be independent of the switchgear, bolt to the concrete pad and be easily removable for replacement. Provide a ground rod inside the switchgear enclosure. The enclosure and switchgear, ground rod, and system grounds shall be bonded together with a minimum #3/0 ground bonding jumper. Both the switchgear and the enclosure shall have lifting provisions.
- 17.3 Feeder connections shall be made with 600A, dead-break separable elbow connectors with test points. Elbow mounted fault indicators and hot line indicators shall be provided on each elbow connector. The switch enclosure shall be extended to allow for back-to-back elbow connections taking into consideration hot line indicators installed on the back of the outer elbows. Cable connections shall be on the opposite side of the unit from the switch and interrupter operating handles. Provide a minimum 18" deep concrete lined window for the conduit entries to allow space for the cables to be routed to the termination points without exceeding the cable bending radius and putting excessive stress on the elbow connectors.
- 17.4 Each switch/interrupter shall be provided with a factory supplied Voltage indicator to indicate the energization status of each phase of the switch respective switch. The indicator shall be visible from the operating side of the switchgear.
- 17.5 Each switch/interrupter shall be provided with factory supplied low voltage phase verification pins (one pin per phase) to allow verification of phasing between switches using a low voltage multimeter between the corresponding phase pins of each switch.
- 17.6 Medium Voltage switchgear shall be S&C Vista series or G&W Padmount series.
- 17.7 Medium Voltage switchgear must be submitted to LSU PDC for approval before ordering.

18 LIQUID FILLED PAD MOUNT DISTRIBUTION TRANSFORMERS

- 18.1 Transformer shall be liquid filled pad mounted transformer with the following ratings: 3 phase, 60 HZ, 13.8KV or 4.16KV Delta connected primary, 95KV BIL, 480 WYE/277 volts or 208 WYE/120 volts secondary, 30 KV BIL. The transformer temperature rise shall not exceed 65 degree C above a 40 degree C ambient. Transformers shall be liquid filled with a 10 C insulating liquid. The transformer shall comply with the latest applicable standards of the American National Standards Institute (ANSI) and be provided with a test report as per ANSI Standards.
- 18.2 Transformers shall be compartment type, self-cooled, tamper proof and weatherproof for mounting on a pad. There shall be a transformer tank, high voltage compartment and low voltage compartment assembled as an integral unit. There shall be no exposed screws, bolts or other fastening devices which are externally removable. Transformers in the vicinity of cooling towers shall have stainless steel enclosures, bases, radiators and hardware.
- 18.3 Transformers shall be of the sealed tank construction of sufficient strength to withstand normal internal working pressures without permanent distortion. The cover shall be welded with a tamper proof bolted and gasketed handhole.
- 18.4 Cooling panels will be provided on the back and sides of the tank. Lifting eyes and jacking pads will be provided.
- 18.5 The core and coil assembly shall be wound core type with copper windings. A tap changing mechanism shall be provided for accurate voltage adjustment without opening the transformer tank and shall have two 2½% voltage taps above and below the primary voltage. The tap changing mechanism shall be externally operated and shall be for de-energized operation only. Cores shall be high quality silicon steel.
- 18.6 The high and low voltage compartments shall be located side-by-side separated by a steel barrier. Terminal compartments shall be full height, air filled with individual doors. The high voltage door fastenings shall not be accessible until the low voltage door has been opened. The low voltage door shall have a 3-point latching

mechanism with vault type handle having provisions for a single padlock. The doors shall be equipped with lift-off type stainless steel hinges and door stops to hold the doors open when working in the compartments. ANSI tank grounding provisions shall be furnished in each compartment.

- 18.7 The high voltage terminations and equipment shall be dead front and conform to ANSI C57.12.26 requirements with the number of terminators required for the connection configuration (single radial, dual radial, loop, etc.). Each bushing well shall be suitable for accepting 15KV 600A separable (elbow) connectors. Provide accessory mounting brackets for use with test/grounding bushings or parking bushings adjacent to each bushing well.
- 18.8 The primary shall have an oil immersed switch to match the connection configuration and shall contain drywell cartridge current limiting fuses (McGraw Edison Type NX) or oil immersed Bay-O-Net type current limiting fuses. Fuses shall be externally replaceable with distribution hot stick without opening the transformer tank and shall be sized in accordance with the transformer rating to protect against transformer overloads. Fuses shall contain current limiting elements to provide the transformer with a 50,000 AIC symmetrical fault rating. Provide one set of spare fuses.
- 18.9 Padmount transformers shall have a recessed, stainless steel, captive, pentahead security bolt with 0.560" sides.
- 18.10 Furnish the following accessories
 - 18.10.1 Nameplate in low voltage compartment.
 - 18.10.2 One-inch drain plug.
 - 18.10.3 One-inch upper filter press and filling plug.
 - 18.10.4 Liquid level gauge.
 - 18.10.5 Pressure relief device (self resealing with indicator).
 - 18.10.6 Pressure vacuum gauge
 - 18.10.7 Temperature gauge
- 18.11 Transformers shall be by General Electric, Van Tran, Cooper, ABB, Schneider, Eaton or approved equal.
- 18.12 Provide a permanent sign on the outside of each transformer door stating "Warning High Voltage".
- 18.13 Each transformer is to be provided with meter consisting of current and potential transformers as required mounted in the secondary compartment with a watt hour meter and meter pan mounted on the outside transformer housing. The Contractor is to provide all necessary wiring and connections to connect the meter including fusing for the power connections. The meter is record kWH and kW demand. CT's and PT's for metering shall have 1% accuracy or better. Meter shall be a Byram Labs, p/n1C6907 - Fm9S, AA, Node, A3TL, Byram LAN 069, CL20, 3P4W, 120-480 volts auto ranging, kwh demand & TOU and load profile registers, LAN ID 069, Form 9S meter. Meter shall be Form 4S for single phase applications.
- 18.14 Before shipment the actual transformer shall be factory tested in accordance with the provisions of ANSI C57.12.90 and shall include as a minimum the following tests:
 - 18.14.1 RatioPolarity
 - 18.14.2 Phase Rotation
 - 18.14.3 No-Load Loss
 - 18.14.4 Excitation Current
 - 18.14.5 Impedance Voltage
- 18.15 A copy of the completed test report indicating passing for each test shall be provided.
- 18.16 Transformers must be submitted to LSU PDC for approval before ordering.

19 TELECOMMUNICATIONS

- 19.1 Telecommunications shall be in accordance with the LSU Information Technology Services (ITS) requirements available from the LSU ITS website found at https://www.lsu.edu/it_services/uni/construction-requirements.php

- 19.2 LSU utilizes a Panduit-General Cable solution for all cabling across campus in order to standardize the network. All cabling, jacks, faceplates, patch panels, etc. shall conform to the Pan-Gen solution. These requirements are addressed in more detail on the ITS website.
- 19.3 LSU requires that any low-voltage contractor shall be PCI (Panduit Certified Installer) certified in addition to having an RCDD on staff. These requirements are addressed in more detail on the ITS website.
- 19.4 Standards for General Purpose Multimedia Classrooms are addressed on the ITS website.

20 SURVEILLANCE CAMERAS

- 20.1 For all projects, surveillance cameras on the campus surveillance camera system shall be provided. Cameras will be IP devices connected to the campus surveillance camera system through the LSU network. Cameras shall be provided and installed by LSU.
- 20.2 The exact location of cameras shall be provided to the designer by LSU. Camera locations shall be as required to view the following
 - 20.2.1 Each building entry (from inside)
 - 20.2.2 Main lobbies, gathering areas and high use areas.
 - 20.2.3 Stairs
 - 20.2.4 Exterior areas around the building particularly high traffic areas (exterior camera).
 - 20.2.5 Point of Sale areas
 - 20.2.6 High security areas
 - 20.2.7 ATM locations
 - 20.2.8 Elevator cars or elevator lobbies.
- 20.3 Additional cameras may be required due to special situations and additional cameras may potentially be required. The purpose of this standard is to set the minimum requirements.
- 20.4 Unless noted otherwise, for each camera the contractor is to provide a Cat 6A network data wiring drop from the nearest LSU network data rack to the camera location. Data wiring shall be in accordance with LSU ITS standards, terminated at each end and tested per ITS requirements. Terminate the cable at the camera end with an RJ45 female connector. Rough-in provisions for the specific types of camera locations shall be as follows.
 - 20.4.1 Cameras in Accessible Ceilings: Leave camera end of data drop coiled in ceiling space above camera location with 10' of slack and terminated with Panduit CBX1WH-A surface mount box. Provide minimum 5' long Cat 6A jumper from data drop end for connection to the camera. The jumper shall be terminated at the camera end with an RJ45 male connector. For all data cable termination points in accessible ceilings, provide a label on the ceiling with 1/8" size lettering listing the camera number.
 - 20.4.2 Cameras on Non-accessible Ceilings (Hard Ceilings) and Walls: At the camera location provide a recessed rough-in J box with single gang opening. Provide a 3/4" conduit from the J box to nearest accessible ceiling in the direction of the nearest data rack. Leave the camera end of the data drop coiled in the accessible ceiling space at the end of conduit with minimum 10 ft of slack and terminate with Panduit CBX1WH-A surface mount box. Provide and install a Cat 6A data cable jumper from the connector on the end of the data drop in the accessible ceiling through the conduit to the camera J box leaving as much slack as will fit in the box. The jumper shall be terminated at the camera end with an RJ45 male connector. Connect the jumper to the data drop connector in the accessible ceiling space. The installation of the connector on the camera end of the jumper will be by the camera installer. Provide a blank coverplate over the box for the camera in case a camera is not installed with the initial construction.
 - 20.4.3 Exterior Cameras: Provide a 1/2" sleeved conduit from the camera to the nearest accessible ceiling space. Terminate the conduit end at the camera with a sleeved and sealed exterior wall penetration as close to the camera as possible in the least visible location. Provide a grommited opening on both ends of the conduit to protect cable from snagging. Provide and install outdoor-rated section of Cat 6A data cable jumper from the connector on the end of the data drop in the accessible ceiling through the conduit to the camera leaving 10' of unterminated slack at the accessible ceiling end.

The jumper shall be terminated at the camera end with an RJ45 male connector. Connect the jumper to the data drop connector in the accessible ceiling space. Protect the exterior exposed end of the cable from the weather. Installation of the connector on the exterior end of the jumper will be by the camera installer.

20.4.4 Cameras in Elevator Cabs: The data drop for an elevator cab camera shall be provided in the elevator shaft with 10 ft of slack coiled at the top of the shaft. On top of the elevator car, the electrical contractor shall provide a quad receptacle connected to the elevator 120V power.

20.4.5 Cameras on Exterior Poles: Provide & install a 16"x14"x8" NEMA 4X non-metallic, padlockable, box with galvanized backplate at base of pole to house camera and radio equipment. Bottom of box shall be approximately 24" above grade and shall not obstruct handhole. For round poles, mount the box to the pole using a U-bolt arrangement wrapped around the pole connecting to two minimum horizontal unistrut supports on the back of the box. Paint the box and all associated mounting hardware to match the pole color. Provide an unswitched 120V power circuit to a fourplex receptacle in a separate device box within the overall box. Provide two stacked 1/2" bushed nipples through the back of the box into the pole (bottom for power, top for data). Power conductors are to go directly into the receptacle device box and are not to be exposed inside the overall box. Provide a new ground rod at the pole with a solid #6 connection from it to the receptacle equipment grounding conductor. Install 2 black exterior-rated Cat6A data cables from the box thru the pole to a 1/2" grommeted opening made near the top of the pole. Data cables will be terminated by others. Seal all openings for a watertight installation. Camera and radio equipment are to be provided by LSU.

20.5 The contractor shall coordinate the exact rough-in requirements for all cameras with LSU PDC and provide all work and materials required.

Louisiana State University Design Standards

DIVISION 32 – EXTERIOR IMPROVEMENTS

1 SITE DESIGN REQUIREMENTS

- 1.1 The Exterior Environment conceptual design is to be developed concurrent with the overall project plan, and the project team shall include a landscape architect and a civil engineer for all projects which affect the design.
- 1.2 Projected cost estimates submitted at each phase of the design process shall clearly identify and include all exterior site elements.
- 1.3 A presentation package shall consist of an illustrative landscape/hardscape plan consistent with the project design theme and Owner's objectives for the project. The plan shall address and delineate a general concept for all site amenities and improvements.
- 1.4 Plans shall be of sufficient construction detail and labeling to clearly communicate landscape/hardscape intent and accuracy of scale in order to provide credible pricing for owner's approval prior to commencement of construction documents.
- 1.5 Plans listed below shall be provided beginning at the design development phase for preliminary pricing
 - 1.5.1 Construction and Staking Plans
 - 1.5.2 Grading Plans
 - 1.5.3 Lighting Plans
 - 1.5.4 Planting Plans
 - 1.5.5 General Landscape Plans
 - 1.5.6 Irrigation, Electrical and Sleeving Plans
 - 1.5.7 Drainage Plans (if applicable, Surface and Subsurface, tie into Civil)
 - 1.5.8 Erosion Control Plans (if applicable)
 - 1.5.9 Waterscape/Pottery/Exterior Furniture Plans
 - 1.5.10 Tree Protection Plan
 - 1.5.11 Details
 - 1.5.12 Wayfinding (building, parking, regulatory)
 - 1.5.13 Donor signage (If applicable)
- 1.6 Submittals of samples, cut sheets or on-site product selection and approval at supplier warehouse or nursery shall be necessary to obtain designer's approval. Approval of samples will be necessary for all materials, including concrete finishes, natural stone paving, finish surface for walls, caps, pilasters, fence, drainage materials and devices, light fixtures, turf, pottery and fixtures, etc.
- 1.7 Typical Designer requirements
 - 1.7.1 Designer to identify projects impact on parking for normal use and game day use.
 - 1.7.2 Designer to identify dumpster locations.
 - 1.7.3 Designer to consult Campus Landscape Standards to verify all site furnishings and materials match LSU campus standard.
 - 1.7.4 Designer to consult Campus Landscape Standards to verify all Plant material selected adheres to campus standards.
 - 1.7.5 Designer should consult LSU Masterplan to determine project's overall theme and layout fit within guidelines adopted for future campus planning.
 - 1.7.6 Designer has specified proper LSU standard wayfinding signage including regulatory signs (i.e. ADA Parking).

2 GENERAL CONSTRUCTION REQUIREMENTS COORDINATED BY THE DESIGNER

- 2.1 The General Contractor shall provide a detailed Landscape, Hardscape, Irrigation and Lighting Schedule for review and approval by the designer that will assure adequate coordination of the installation of all landscape and other construction tasks prior to the planting of turf grass.
- 2.2 Turf grass establishment prior to building opening shall be a contract requisite. Therefore, all other construction tasks must be properly scheduled to accommodate the time required for turf grass establishment. All disturbed areas during construction shall be properly sodded with a LSU PDC approved solid sod. Fine grading and debris removal for turf establishment are the contractor's responsibility.
- 2.3 Construction staging should be planned in the Design Development phase of the project and included in the Design Development submittal. LSU PDC shall provide approval after consultation with the Office of Parking and Transportation Services and LSU Landscape services.
- 2.4 Measures should be incorporated to ensure safe travel of pedestrians and vehicles during construction. If construction staging is located on an existing parking lot, the project shall be required pay for the temporary use of these spaces and restoration after construction. Staging areas will not be allowed so as to create potential conflicts with fire lanes. The Contractor shall coordinate with the Facility Services- Landscape Services department regarding maintaining trash/recycling services to ALL buildings in or around the construction area throughout the construction process and in conjunction with the University Landscape Architect regarding tree protection.

3 EXTERIOR ENVIRONMENT

- 3.1 Site Survey, Civil, Grading, Drainage, Green Infrastructure
 - 3.1.1 Site Survey - The design team shall define for the owner (if required) the specific requirements for a current certified land survey operator. This survey shall include: topographic contours, spot grades, lines of streets, alleys, pavements, and adjoining property; deed restrictions, boundaries, easements and contours of the Project site, locations, dimensions and complete data pertaining to existing buildings, other improvements and existing trees, and information concerning available services and utility lines both public and private, above and below grade, including inverts and depths.
 - 3.1.2 Civil - The Landscape Architect and Civil Engineer shall produce final construction documents on the same base sheets to assure coordination of plans.

4 VEHICLE ACCESS AND PARKING

- 4.1 Streets and Driveways
 - 4.1.1 All streets and driveways must meet highway standards for construction and maintain an optimum width of 24' for two- way traffic and 12' for one way traffic. If site conditions do not allow the optimum layout, an absolute minimum width of 22' for two-way traffic and 11' for one-way traffic may be allowed.
 - 4.1.2 Consideration shall be given to providing minimum 5' bike lanes. If existing conditions do not allow bike lanes, consideration shall be given to providing wider sidewalks to provide multi-use paths.
 - 4.1.3 Islands and any other physical barriers should not be employed to channel traffic. Signage and other traffic control devices should conform to the most current Manual on Uniform Traffic Control Devices.
- 4.2 Parking Lots
 - 4.2.1 The general design to maximize use of parking areas on the LSU campus is to employ a 90 degree parking space 9' feet wide and 18 feet long with an optimum bay width of 57 feet to a maximum of 60 feet for a double and 41 feet to a maximum of 43 feet respectively for a single bay.
 - 4.2.2 If the site conditions do not allow for the optimum layout, a minimum bay width of 55 feet for a double bay and 39 feet for single bay is acceptable. Parking quantities shall be designed at a rate of 1:1 for residential areas, .7:1 for commuter lots, and 1:200sf of office space and shall meet all federal requirements for the Americans with Disabilities Act.

- 4.2.3 The second method to maximize parking is 70 degree parking. The space width is 9 feet by 16 feet. Double loaded bay widths are 49' minimum, 51' optimum, and 53' maximum. Single bays are 19' minimum, 21' optimum, 23' maximum.
- 4.2.4 Parallel parking standards are 21' long by 8' wide. However parallel parking will be allowed only as directed by LSU PDC.
- 4.2.5 Handicapped spaces must comply with current ADA standards.
- 4.2.6 Layout of all parking areas must be approved by the Office of Parking & Transportation Services before implementation. Where existing parking capacity is displaced by the construction of a new facility, those displaced parking spaces must be mitigated on a one-for-one basis. Designers should submit for review a traffic study for vehicular circulation to and around the new facility, including service, delivery and public transportation vehicles. Show turning radii for garbage trucks and delivery trucks into and out of parking lots if necessary.
- 4.2.7 The University has numerous card access gated parking lots. Any additional card access controllers must be compatible with the existing system. Further information can be obtained from the Office of Parking & Transportation Services.
- 4.2.8 Lighting is to be included as part of parking lot projects. Light standard locations should be considered relative to tree planting in order to avoid dark areas in parking lots and should be coordinated with the landscape consultant.
- 4.2.9 Provided two 4" (minimum) sleeves under new paving to all green areas. Identify sleeve locations on As-Built drawings and provide 3/8" X 3" brass stove bolt in pavement at the location of each sleeve.
- 4.2.10 In addition to all other landscaping requirements, all new off-street parking lots with fifty (50) or more spaces shall provide and maintain landscaped planting areas within the interior of, and adjacent to, the parking lot.
- 4.2.11 Perimeter landscaping shall be provided a rate of one (1) tree for every seventy-five (75) linear feet of paving frontage. Trees shall be spaced so that there is a minimum of one (1) tree for every one hundred twenty-five (125) linear feet of paving frontage.
- 4.2.12 Interior tree planting shall be provided at a rate of one (1) tree for every forty (40) parking spaces located in islands at the end of parking bays, island located between parallel rows of cars, driveway medians, intermediate islands or a combination of locations. In addition to the required trees, interior planting areas shall be grassed, landscaped or covered with mulch.

5 SITE FURNISHINGS

- 5.1 Reference Campus Landscape Standards for all furnishings.
- 5.2 Bicycle Racks
 - 5.2.1 Bicycle riding is encouraged on campus and bicycle racks should be included in the project when appropriate. Bicycle parking sites shall be considered at the schematic design phase and final site locations indicated in the final construction documents. Consider bicycle parking and parking surface as part of the construction costs.
 - 5.2.2 The number and location of bicycle racks is determined in joint consultation with the LSU Office of Parking & Transportation Services and LSU Campus Planning.
 - 5.2.3 Follow the guidelines below when determining bicycle parking quantity and location
 - 5.2.3.1 Residential Facilities - Provide bike parking spots within 300 feet of a building entrance for at least 15% of the building occupants.
 - 5.2.3.2 Non-Residential Facilities - Provide bike parking spots within 300 feet of a building entrance for at least 5% of the building's peak users. Estimate peak building users by applying an efficiency factor of 75% to the building's occupancy.
 - 5.2.3.3 Bike racks shall be: Dero-Campus Rack, galvanized finish, surface mounted or equal manufacturer.

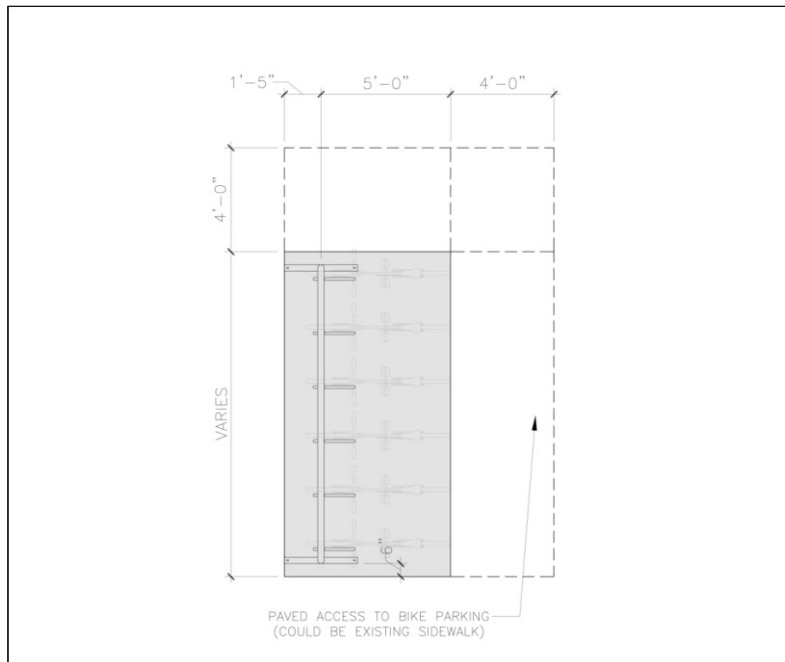


Figure 1 Double Sided Bicycle Rack

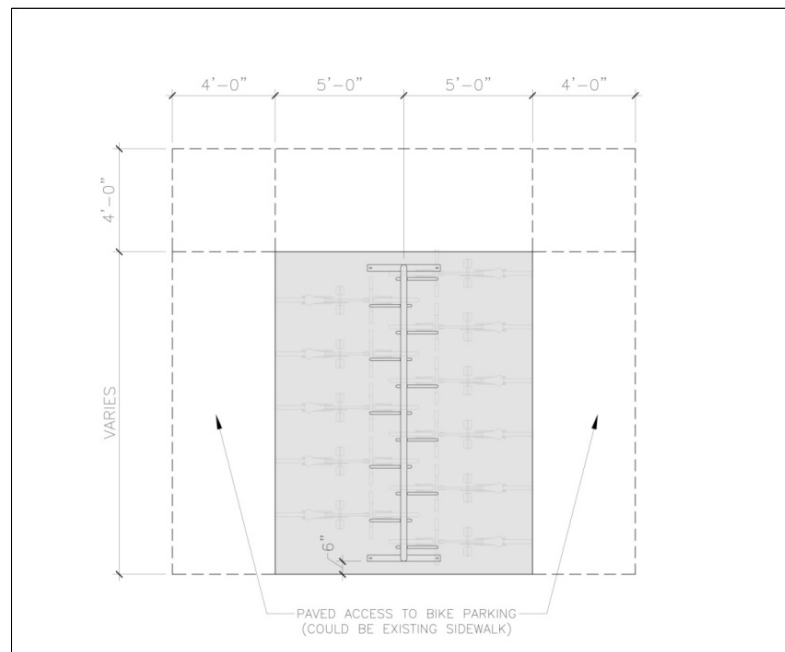


Figure 2 Single Sided Bicycle Rack

5.2.4 When locating bicycle racks, choose locations that are accessible by bicycle. Bicycle parking racks should be installed on a paved surface. The dimensional requirements of the paved surface are described in the sketches below. Designer should consider future expansion opportunities.

5.3 Benches - Benches are the primary seating component on campus. Many styles and designs of benches have been used on campus throughout its history. The campus standard bench with a back is a simple metal-strap bench that is durable and provides a comfortable seating experience. The character of the bench is complementary to other standard site components. See campus landscape standards for acceptable manufacturers.

5.4 Litter Receptacles - A metal strap-style receptacle is the campus standard. It is similar to the standard bench and other site components. A domed top prevents rain and leaves from falling into the receptacle, and a side door allows easier access for staff. When receptacles are located adjacent to garden or groundcover planting,

provide sufficient space around the unit for emptying and cleaning. LSU is a smoke-free campus and trash receptacles should not include ash trays. See campus landscape standards for acceptable manufacturers.

6 EXTERIOR LIGHTING

6.1 General Requirements

- 6.1.1 Landscape lighting design shall be conceptually designed by the Landscape Architect, with particular attention paid to creating a soft, serene and safe nighttime atmosphere. The ambiance afforded by landscape lighting is especially important in transforming the landscaped areas into pleasant, special experience for the students. Walkway lighting shall be very subtle and discreet, utilizing surrounding landscape illumination to serve the purpose of walkway lighting to the extent possible. See campus landscape standards for requirements.
- 6.1.2 Lighting of special feature items or special seasonal displays and points of interest will be accomplished through landscape lighting. Provide additional circuit capacity at the building entry Porte Cochere and plazas.
- 6.1.3 Landscape lighting design will be determined by light quality to create the desired atmosphere. Fixture style and specifications are outlined in the Campus Landscape Standards.
- 6.1.4 The Landscape Architect shall employ a qualified Lighting Consultant to ensure the proper execution of the lighting concept. This design is to be carefully coordinated with the exterior building lighting.
- 6.1.5 Landscape lighting shall be furnished and installed by the Contractor per the plans and specifications. Electrical service and circuiting shall be provided by the General Contractor as part of the Project's electrical contract. Information for electrical service requirements shall be obtained from the landscape lighting plans and specifications.
- 6.1.6 All site lighting shall be controlled on separate circuits from Landscape Lighting through either time clocks and/or photocells.
- 6.1.7 It is the designer's responsibility to layout the conduit and trenching to avoid significant tree cut cutting to install new electric lines. LSU landscape architect must approved any work done under any live oak tree root zone.

6.2 Landscape Installation

- 6.2.1 Exact physical locations of all landscape lighting fixtures shall be determined in the field by lighting consultant in coordination with Landscape Architect after tree pits are dug.
- 6.2.2 All exterior transformers and junction boxes shall be located in areas concealed from the public, as identified by the Landscape Architect and Owner.
 - 6.2.2.1 All exterior weather proof J-boxes shall be rated for NEMA 4X. Any above grade boxes shall be painted to match adjacent surface as specified by the Landscape Architect.
 - 6.2.2.2 Each ballast and junction box shall be specifically located by the Landscape Architect.
 - 6.2.2.3 All exposed conduit shall be painted out to match the adjacent surface as specified by the Landscape Architect.
 - 6.2.2.4 Final adjustments of all landscape lighting fixtures shall be approved by the Owner. Adjustments or proper focus of lighting shall be conducted as part of the contract.

7 EARTHWORK

- 7.1 The grades for all exterior areas shall be set to adequately accommodate surface site drainage.
- 7.2 Earthwork shall be accomplished in accordance with the project's Soil Report (if required) that has been accepted by the Owner.
- 7.3 Earthwork shall be consistent with the design requirements of the Structural and Civil Engineer's design.

8 GRADING

- 8.1 The final site grading plan shall assure there will be no standing water on any surface of the Exterior Environment, including but not limited to all landscape/softscape areas, hardscape surface areas, etc. The maximum approved slope grade shall not exceed 3:1 unless approved. Additionally, the Landscape Architect shall coordinate with the Architect to assure there are no areas of conflict concerning surface runoff water.

- 8.2 Finish grades and land contours shall be incorporated in to the Civil Engineering plans. The contractor shall be held responsible for providing earth surfaces finished to give positive gravity drainage away from the buildings and walks in areas of new construction.
- 8.3 Finished slopes shall be free from irregularities, hollows, or depressions. Soil shall be fine graded and free from construction debris. Provide sod to all areas damaged by construction.
- 8.4 Require Contractor to obtain LSU excavation permits & utility shut off requests for the intended project.
- 8.5 Require Contractor to Identify/mark drainage and utility structures on site and with construction stakes and keep track during all phases of construction.

9 EROSION CONTROL

- 9.1 Erosion control is the responsibility of the contractor. An Erosion control plan shall be provide in the design documents for LSU PDC approval.

10 RAINWATER DRAINAGE

- 10.1 Ground floor slab elevations shall be above adjacent streets, parking lots and one foot above the base 100 year flood plain. Confirm final finish floor elevation with University personnel prior to completion of Construction Document phase.
- 10.2 Site drainage shall provide satisfactory runoff of storm water during normal rainfall conditions and prevent any pockets of standing casual water creating detriment of nuisance to horizontal paved surfaces and planted landscape and lawn areas. The inlet structures should be designed with consideration for seasonal heavy leaf accumulation and catch basins located for ease of regular maintenance.
- 10.3 Site drainage considerations shall include subsurface drainage in areas of poor internal soil moisture percolation which results in saturated soil conditions causing detriment to plant growth in landscape areas, nuisance seepage onto horizontal paved surfaces and continuous seepage through retaining walls leaving unacceptable stains.
- 10.4 Surface drainage infill structures shall be located and grades set to accommodate surface runoff. Size of drain lines, drainage inlets and points of connection are to be established and connected to the main site storm drainage lines. Locate drainage apparatus away from entrances and under Live oak trees.
- 10.5 Subsurface drainage for over structure planters, planting beds, and tight soil areas where poor internal water percolation exists shall be designed and coordinated with Facility Services for points of connection into the site main drainage system and for inclusion of subsurface drainage lines with civil plans.
- 10.6 Drainage design shall show that existing drainage system is sufficient to accept new drainage patterns/flows/areas. If it is not, designer must notify Owner immediately so corrective actions can be considered/taken.

11 GREEN INFRASTRUCTURE

- 11.1 Designer shall identify green infrastructure/low impact development practices that could help avoid water quality degradation. See www.epagov/npdes/greeninfrastructure.
- 11.2 In accordance with Louisiana Department of Environmental Quality's Storm Water Management Program requirements for East Baton Rouge under rule LAS000101/AI 90427/PER 20090001, the plan must describe measures implemented to accomplish the following objectives.
 - 11.2.1 Keep rain out of the sanitary sewer system.
 - 11.2.2 Allow storm water to be absorbed and cleansed by soil and vegetation and either re-used or allowed to flow back into groundwater or surface water resources.
 - 11.2.2.1 Measures can include, but are not limited to, alternative surfaces (vegetated roofs, sediment filters, pervious pavement or grid pavers) and nonstructural techniques (rain gardens, trees and tree boxes, vegetated swales, disconnection of imperviousness, rainwater recycling and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation) to reduce imperviousness and promote infiltration, thereby reducing pollutant loadings.

- 11.2.2.2 All measures and monitoring shall be documented in the project's Waste Water Management Plan and shall be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on monitoring reports.

12 TREE PRESERVATION & TRIMMING

- 12.1 A tree protection and pruning plan is required for all projects. The plan shall be developed in consultation with LSU's Landscape Architect (LA) and the University's Project Manager during the schematic or design development phase, and it becomes part of the design and construction documents.
- 12.2 Placement of tree and landscape protection measures, such as fences, protective mulch, protective fabric, and logging mats, should be indicated, as detailed below. The plan is a separate drawing, at an appropriate scale, labeled "Tree Protection Plan," and it should.
- 12.2.1 Identify size, drip line, species and location of all trees affected by the project.
- 12.2.2 Indicate which trees and shrubs are to be removed from the site.
- 12.3 When trees and shrubs are removed, care must be taken to protect trees and other landscape elements that are to remain. (Indicate which trees and shrubs are to remain).
- 12.4 All trees determined to be preserved by the LSU Landscape Architect shall be fenced at the drip line of the branches. There shall be no break in the continuity of the fencing. If the lawn has to be maintained within this area, then an adequate lockable gate shall be provided. Coordinate maintenance within the fence areas with LSU Landscape services.
- 12.5 Unless waived by LSU Landscape Architect the tree protection fencing shall be temporary 6' chain link. The area inside the fence shall not be used for any construction activity such as storage, lay down, etc. This includes protection from construction contamination from paint tool washing, diesel, and silt etc. The fenced area must be maintained in good physical and visual condition throughout the project.
- 12.6 Soil mitigation work shall be completed in the root zones of all live oak trees affected by the construction project. This work shall consist of injecting, according to manufacturer's recommendations, Plant Health Care, Inc. MycorTree, Pt Injectable (Ectomycorrhizal Inoculants) and PHC BioPak, or approved equal, into the soil under the drip line of all affected live oak trees.
- 12.7 Mulch shall be placed under the drip lines of the live oak trees affected by the project as determined by the LSU Landscape Architect. Mulch shall be a minimum of 4 inches of fresh or aged hardwood chips or grindings. Mulch shall not be placed on the root flares of the trees.
- 12.8 Any deadwood and/or limited crown reduction pruning of trees affected by the construction project shall be included as part of the project. The work shall conform to ANSI standards A300 and be performed by an arborist licensed by the ISA (International Society of Arboriculture) and/or LAA (Louisiana Arborist Association). All work shall proceed under the direction and observation of the LSU Arborist or the LSU LA.
- 12.9 If the trees affected by the construction project are infected with Ball Moss, the Contractor shall treat with a solution of 5% sodium bicarbonate in water by spraying until drenching on all visible ball moss.
- 12.10 Plans must indicate all trees to be pruned and treated prior to the start of the project.

13 TERMITE CONTROL

- 13.1 Termite treatment shall be provided on sub-grade fill under concrete slab. Provide 2 year bonded guarantee for material and installation with an optional renewal warranty.

14 CONTRACTOR TURNOVER

- 14.1 The Design Team is to develop a sequence of how the site is to be developed, nursery organized and secured, and final landscaping developed. The General Contractor is to incorporate this plan and sequence into his scheduling for turnover of the area of the site to be landscaped. The sequence of landscape installation and site inspection prior to commencement of landscaping shall be approved by the Owner.
- 14.2 Accessibility to the main water supply for the building shall be made available to the Landscape Contractor for irrigation system main tie-in at the time of commencement of landscape activity in any given area. The Contractor is to make provisions for watering of trees that are installed early or existing landscaped areas that are to be maintained through construction.
- 14.3 Landscape maintenance shall be included in the one year warranty after final acceptance.

15 RIGID PAVING / CONCRETE

- 15.1 Color and sample of each material and finished surface shall be approved by Owner. Minimum 6' X 6' field samples shall be provided by the General Contractor for site review and approval of the Owner, as deemed necessary.
- 15.2 Minimum acceptable standards for hardscape surfaces are as listed below.
 - 15.2.1 Minimum width of concrete walks shall be 8' unless specifically approved by Planning, Design & Construction Site Review Team.
 - 15.2.2 All concrete walks shall have a minimum depth of 5" and have a non-slip surface finish.
 - 15.2.3 Provide 4" PVC sleeves under all sidewalks at 100' maximum intervals.
 - 15.2.4 Drill and pin, in both directions, 24" O.C. with #4 steel re- bar all existing concrete that abuts new concrete walks or drives. #4 steel re-bar shall be installed 24" O.C. at all construction joints for new concrete walks.
 - 15.2.5 Porous paving shall be utilized under sensitive areas under live oak trees. Review these areas with Campus Landscape Architect.
- 15.3 Entry Drives are to have a barrier curb along both outside edges. The finish of the curb shall match that of the Entry Drive.
- 15.4 An expansion joint shall be placed between the exterior entry and the Entry Drive and adjacent walkways. Expansion joints are to be kept away from the building entry. Any expansion joints are to be caulked with on approved material and color.

16 TACTILE WARNING SURFACES

- 16.1 Provide truncated domes in sidewalk ramps which abut vehicular areas. The truncated domes shall be installed within the final 2' of paved surface prior to the vehicular use area, and shall be installed across the entire width of the walk. Individual truncated dome paver units shall be used and shall be terra cotta color.

17 BOLLARDS

- 17.1 Bollards are used throughout campus to control and regulate vehicular circulation. Bollards can provide different levels of deterrent and protection depending on the context and application. Bollards can be fixed or removable.
- 17.2 Vehicular Bollards - These bollards function as a warning and physical barrier to prevent most drivers from entering spaces not intended for vehicles, however they are not designed to prevent or stop significant vehicle impacts.
 - 17.2.1 Where occasional vehicular access is required for service or fire lanes, these bollards may feature an embedded sleeve and lock assembly that allows them to be removed temporarily. They may feature simple ornamentation to provide consistency with the character and style of other site elements and architecture.
- 17.3 Pedestrian Bollards - Pedestrian bollards provide a visual separation for both pedestrians and vehicles. Typically made of plastic and including a flexible rubber boot base, these bollards do not offer any kind of physical deterrent to vehicle or bicycle impacts.
- 17.4 Utility Bollards - When physical prevention from impacts is required, utility-style bollards are to be used. Utility bollards are typically steel columns with reinforced concrete cores engineered to withstand the force of a vehicle.
- 17.5 For additional information on bollards see the Campus Landscape Standards for design specifics.

18 FENCES, WALLS & BARRIERS

- 18.1 The purpose of this section is to provide a design standard in regards to fences, walls, and barriers on campus that is consistent with the overall goals and intent of the Campus Landscape Standards and Campus Masterplan which seeks to create a people-friendly environment while at the same time promotes the public health, safety, and the general welfare of the user. A fence if approved by LSU PDC will only be allowed to separate a land use but not to define a property boundary.

- 18.2 To further this goal, the use of fences, walls, and barriers is strongly discouraged and shall only be considered in the following circumstances.
 - 18.2.1 To contain livestock, maintain animal habitats, and/or to maintain other agricultural needs.
 - 18.2.2 To provide a visual buffer of dumpsters, mechanical, and other unsightly structures or equipment.
 - 18.2.3 To prevent unauthorized access to high voltage and/or other dangerous areas.
 - 18.2.4 For security purposes as required by federal, state, or university safety officials.
 - 18.2.5 To enhance the quality of a pedestrian oriented courtyard or space in public and residential areas.
 - 18.2.6 To secure athletic and academic functions.
- 18.3 Design of proposed fences, walls, and barriers is encouraged to reflect the existing heritage and gracious quality exemplified in the historical part of campus through the use of similar materials, color, proportion, and scale. If the use of arches and/or arcades is proposed, then consideration should be given to the character of the arcades surrounding the main quadrangle.
- 18.4 The color palette of materials to be used should be within the range of warm earth tones as seen in the historical part of campus which are generally light in color (i.e., colors found in the sandstone, buff, and terracotta families).
- 18.5 Any fence, wall, or barrier shall be constructed in a durable fashion with a finished surface of brick, stone, decorative masonry material, cast stone, painted metal, approved synthetic material, landscape material, and/or a combination of said materials.
- 18.6 The use of wood and/or chain link fence shall not be acceptable.
- 18.7 Fencing materials shall match surrounding architecture and site character as closely as possible to maintain visual harmony on campus. All designs shall be reviewed by the Planning, Design & Construction department for design integrity and follow the Campus Landscape Standards.
 - 18.7.1 The finished side of all walls or fences shall face the common property line boundary. Approved location of the fence shall be determined by the LSU PDC.
 - 18.7.2 Fences, walls, and barriers shall be designed to be climb resistant, and shall be reviewed by campus security officials.
 - 18.7.3 All fences, walls, and barriers shall allow access by university maintenance and security officials.
 - 18.7.4 When gates are required, they shall be lockable only from the outside and shall conform to all fire and safety codes. Fences, walls, and barriers shall not restrict egress from a confined pedestrian area and Campus Police and Facility Services personnel shall be allowed access at all times.
 - 18.7.5 All designs which utilize landscape materials shall be reviewed and approved by the Campus Landscape Architect.
 - 18.7.6 Temporary construction fencing shall be 6' ht galvanized chain link panels, hardware with foot pads weighted with sand bags. This can be waived by the campus Landscape Architect if the project is a short duration project. Also it must comply with the Campus Landscape Standards.

19 FENCE WRAP AND CONSTRUCTION SIGNS

- 19.1 All building renovations and new construction projects having a contract duration exceeding 60 days and overlap time when school is in session are required to have an LSU standard fence wrap.
- 19.2 All projects over \$125k construction cost with necessary construction fencing.
- 19.3 All projects deemed by the LSU Landscape Architect as a sensitive area shall have a fence wrap.
- 19.4 Exempt projects include
 - 19.4.1 Projects without construction fencing
 - 19.4.2 Site only projects that do not require building material staging.
 - 19.4.3 Service area projects that are not seen from public corridors.
 - 19.4.4 LSU landscape Architect can waive fence wrap requirements.
- 19.5 Fence Wrap Specifications
 - 19.5.1 The Fence Wrap panels are designed in 40 x 6 foot panel sections (optional 20 foot section).

- 19.5.2 Full print coverage. Designed for wide format, 4 color process printing.
- 19.5.3 Designs created in Adobe Illustrator at 400% scale (120 x 18 in.).
- 19.5.4 PMS colors (PMS 512 and PMS 124).
- 19.6 Background Scene
 - 19.6.1 LSU PDC can provide artwork upon request. It is on file at Letterman's printing Baton Rouge.
 - 19.6.2 Adobe Photoshop files for the images to be provided separately.
 - 19.6.3 No logos, images or word printing will be allowed except in this specification.
- 19.7 Company logos and Construction Signs
 - 19.7.1 No logo, images or word printing shall be allowed to be printed on the Fence Wrap.
 - 19.7.2 Contractor's printed logo ONE (1) 6-foot x 12-foot (or smaller) printed mesh Logo sign can be attached over the LSU Fence Wrap at each primary entry to the construction site.
 - 19.7.3 Sign background can be in contrast to the Fence Wrap
 - 19.7.4 Project Signs are limited to the same information above.
 - 19.7.5 Option: Logo and Project Signs can be built out of MDO plywood. Logo limited to one 4' x 8' sheet. Project Sign preferably one (1) 4' x 8', maximum two (2) set as one 8' x 8' sign.
 - 19.7.6 Any requests outside of these parameters, contact the LSU PDC project manager for PDC Director Approval.
- 19.8 Material Specifications (per Letterman's custom printed fence wrap information- attached).
 - 19.8.1 Media Properties- Media: Ultraflex StripMesh Pro LTX, Airflow: 25%, Tensile Strength: 218.94x182.22 lbs/in, Tear Strength: 81.13x61.51 lbs/in, Flame Resistance: NFPA701, Low Temperature: -4 F, High Temperature: 176 F, Air Permeability: 1736 m2/sec, Ink: CMYK Eco-Solvent Inks; Finishing Properties: 1" High-Strength Seam on all sides, 3/8" Brass Grommets applied in 24" increments attach to fence with 7" heavy-duty ties, Finished Size for 6' Fence Wrap: 5' 8".
 - 19.8.2 Graphic companies such as Letterman's can print graphics; however, contractor is not required to use Letterman's. Alternative vendor specifications must be submitted for prior LSU PDC approval
 - 19.8.3 Production Proof from vendor needs to be pre-approved by LSU before printing.

20 IRRIGATION

- 20.1 Landscape Irrigation shall be designed by a licensed landscape irrigator. Comply with LSU Campus Landscape Standards.
- 20.2 The Irrigation System shall be fully automated and controlled by an electrical controller and shall provide 100% coverage of landscaped areas with heads triangularly-spaced with overlapping head-to-head trajectory.
- 20.3 Remote control valves shall be electrically activated.
- 20.4 Turf and planting beds are to be valved separately due to different water requirements.
- 20.5 Turf heads shall be a minimum 6" pop-up spray heads in small cut-up areas of turf and rotary gear-driven heads in large expanse areas of turf.
- 20.6 Shrub and groundcover areas are to receive 12" pop-up spray heads along turf borders, sidewalks and other areas along exterior perimeters where there is no interference from vegetative growth. All interior areas of the bed shall receive shrub sprays on stationary risers with a flex pipe connection to the lateral line. The nozzles on the risers shall be brass.
- 20.7 The automatic controller is to be electromechanical repeat cycle with a master control valve to prevent errant operation. Place in a concealed location (approved by Owner) and all boxes are to be lockable, either by use of a padlock or with an integral lock. Battery operated controllers shall be acceptable on an individual case by case basis.
- 20.8 Irrigation System design is to assure consideration is provided to accommodate prevailing winds and static pressure reading to keep spray off of walks, street and parking areas.
- 20.9 The Irrigation System shall be designed with sufficient quick coupler valves in all areas of the site to be reached with 100' of water hose.
- 20.10 The Irrigation system is to be separated from the domestic water system by a backflow presenter device.

- 20.11 Design shall specify a rain sensor on all campus irrigation systems.
- 20.12 Contractor shall submit a schematic diagram of the completed irrigation system to owner showing all operable zones and the corresponding descriptor on the control box. Review operating procedures with a representative of LSU Landscape Services.

21 PLANTING

- 21.1 Soils & Plant Bed Preparation - The Landscape Architect shall approve soils and plant bed soil preparation and installation for compliance with plans and specifications. Soils and associated amendments have a direct bearing on the performance and ultimate success of plant materials used in the landscape. Selection of soils, amendments and soil preparation mixing ratios shall follow the recommendation of the Agronomic Soil Test and shall be clearly outlined in the construction documents by the Landscape Architect.
- 21.2 Planting Details - Planting beds, pit excavation and backfill for trees, shrubs, groundcover and annuals: Planting plan details and specifications shall clearly address this issue with specific consideration for location conditions regarding diameter of planting pits, depths of planting beds, usability of natural site soil and recommended soil amendments.
- 21.3 Site Landscape Grading & Drainage
 - 21.3.1 Site Grading in preparation for landscape installation shall be in accordance with the site plans. All soils, subgrade or topsoil, native to the site or imported are to be guaranteed free of noxious weeds.
 - 21.3.1.1 All clods, rocks, roots, and other trash, foreign to good friable soil conditions, greater than 1" diameter size are to be raked and removed from the site.
 - 21.3.1.2 The final finish grade for all landscaped areas shall include a 2" layer of topsoil for all turf areas unless otherwise specified.
 - 21.3.1.3 The General Contractor shall assure that all areas or phases of the Project that are ready for landscape installation are graded to specifications, but also clear of all obstacles, equipment and material, etc. that will impair complete and open access to the designated area and ultimately risk quality control of the landscape end- product.
 - 21.3.2 To protect the quality of the landscape, the General Contractor shall control ingress and egress of all subcontractors and trades not directly associated with the landscape installation into all areas designated ready for landscape.
 - 21.3.3 Subsurface drainage using perforated pipe with filter fabric embedded in gravel aggregate shall be installed per plans and specifications in all areas of underground seepage, wet seepage conditions involving paved surfaces, areas slow to percolate due to impervious or tight soil conditions and other site conditions warranting subsurface drainage.
 - 21.3.3.1 All over-structure planter beds and large stationary plant pots shall have subsurface drainage connected directly into the building or site drainage system or a means of dewatering through siphon tubes (saucers with pots are not acceptable).
 - 21.3.4 Plant Material Standards and specifications (all sizes stated are minimum sizes).
 - 21.3.4.1 The Landscape Architect shall approve all plant material used on the Project, prior to shipment from the nursery. Plant materials that do not meet the standards of the specifications and landscape planting plans as described by the Landscape Architect shall be rejected. Landscape Architect shall confirm all plant material is acceptable by LSU as outlined in LSU Campus Landscape Standards.
 - 21.3.4.2 The American Association of Nurserymen Standards shall serve as the standard of quality in developing guideline standards for specification of plant material regarding size for height, spread, caliper, rootball, etc., for container-grown and B&B trees, shrubs, groundcover and annual flowers.
 - 21.3.4.3 Shrub plants shall be planted triangularly and spaced to achieve 100% coverage within a 3-year grow-in period, unless otherwise specifically approved by the Owner.
 - 21.3.4.4 Groundcover: Plant material shall be triangularly-spaced to achieve 100% coverage within a 3-year grow-in period, unless otherwise approved by the Owner.

- 21.3.4.5 Annual flowers: Plants shall be 4" pots minimum, bud and bloomed, spaced 6" o.c. at initial planting. Some species of annual color may be 6" pot size in which case the plant spacing will be adjusted accordingly as approved by the Owner.
- 21.3.4.6 Trees: Size and specification will vary based on species and plant availability. Selection shall necessitate a degree of flexibility and reasonableness based on availability and quality. (Trees must be individually hand-selected and approved by the Campus Landscape Architect.) Specifications shall be in accordance with the applicable selection standards and the Landscape Architect shall specify plants by height, spread, caliper size, rootball and box/container size. All trees shall be tagged with pre-numbered, interlocking tags.
- 21.3.4.7 All plant material delivered to the site shall have tight, firm rootballs. The plant shall not be loose in the rootball at the root crown and the burlap shall be tightly affixed with wire on any rootball greater than 20" diameter. Plants grown in containers shall be fully and deeply rooted and not recently transplanted in such a manner that the roots have not had sufficient time to develop.
- 21.3.4.8 Contract Growing, Special Procurement and On-Site Nursery: Due to plant availability shortages, contract growing of shrubs, groundcover and annual flowers, early procurement of tree plant materials and on-site nursery arrangements may be necessary to have plant materials available for the project of acceptable quality, size and species to comply with the schedule of installation. In this case, the Landscape Architect shall approve procedures associated with such an arrangement and the schedule outlines to accomplish the task. Arrangements for this procedure must begin very early in the Project construction process to allow sufficient time for growing plants.

22 TURF AND GRASSES

- 22.1 Grading of site prior to planting grass must alleviate all pockets of standing or puddling casual water.
- 22.2 Selection of Species: The Zoysia medium turf grass species shall be conducive to the Louisiana region and pre-approved by Campus Landscape Architect, capable of vigorous growth and development of a thick turf cover.
- 22.3 The turf species shall be fine to medium-textured, capable of being developed into manicured turf of refined finish.
- 22.4 The turf quality shall be free of noxious weeds and diseases, true to species as approved by the Owner.
- 22.5 Turf installation shall be by means of solid sod, laid on the finished graded surface, rolled for smoothness and compaction. Plans shall clearly indicate all areas to receive sod.
- 22.6 Turf planting methods other than sod, such as hydro-sprigging or hydro-seeding, shall only be considered on an individual project basis in large areas greater than 100' from outer face of the building as approved by the Campus Landscape Architect.
- 22.7 The General Contractor shall be responsible for providing a 100% fully established turf a minimum of 30 days prior to the opening of the building.
- 22.8 Established turf is defined as 100% ground coverage, matted together sufficiently to support pedestrian foot traffic and growing in a vigorous manner. The turf must be free of erosion, standing water, wet-slow to drain areas, noxious weeds and disease. Newly planted grass must have been mowed on a weekly basis with the proper type mower for at least 30 days prior to final acceptance to be considered established.

23 UTILITIES

- 23.1 The Design Team shall exercise sensitivity to site aesthetics in selecting the location of all infrastructure surface devices such as drain inlets, electric load centers and transformers, backflow devices, utility vaults cleanouts, water meters, etc., with the approval of the Owner.
- 23.2 Water meter and backflow prevention devices will be located in vaults concealed from public view with finish surfaces compatible with surrounding hardscape. Provide freeze protection as required.
- 23.3 Sleeving

- 23.3.1 All horizontal paving shall be sleeved at designated locations per sleeving plans for site lighting, irrigation, and other utilities not installed prior to paving.
- 23.3.2 Sleeves shall be buried below paving a minimum of 4" and a maximum of 15" and be Schedule 40 PVC, 100mm (4") diameter. Provide 3/8" X 3" brass stove bolt in paving at sleeve locations.
- 23.3.3 The General Contractor is responsible to provide an ongoing as-built sleeve plan designating accurate locations and depth.
- 23.4 Street and Roadway Utility Repairs and Replacements: All utility repairs or replacements requiring cuts into roadways, driveways, or parking lots shall be coordinated with the Office of Parking & Transportation Services in advance of the start of work.
- 23.5 In repairing required cuts to complete utility repairs, contractors shall provide a sub base compaction rate standard of 95%. Testing shall be conducted to ensure that the appropriate compaction rate is met. Paving at the completion of the repair shall match adjacent surfaces.

24 QUALITY CONTROL

- 24.1 Quality control is the essence for achievement of the finished product for the exterior environment. The Landscape Architect is to recommend standards for landscape material selection and installation to provide the Owner with a final product that is consistent with other LSU facilities. The Owner shall be involved in the decisions that impact the end-product, including but not limited to, a review and approval of the following.
 - 24.1.1 All aspects of the technical landscape design and installation
 - 24.1.2 Design/build shop drawings and mechanical function
 - 24.1.3 Material selection including plants, stone, aggregate, concrete, furniture, fixtures, lighting, signage, railing, fences, etc.
 - 24.1.4 Finish grading
 - 24.1.5 Surface drainage and details and techniques of subsurface drainage
 - 24.1.6 Irrigation design and equipment
 - 24.1.7 Soils and plant bed preparation specifications including chemical and physical properties
 - 24.1.8 Hardscape design pattern and installation details and materials selection
 - 24.1.9 Water feature design and mechanical engineering
 - 24.1.10 Interior-scape plans, specifications, and materials selections

25 SITE & LANDSCAPE IMPROVEMENTS

- 25.1 Refer to Campus Site & Landscape Guidelines & Standards

26 WAYFINDING IMPROVEMENTS

- 26.1 Refer to Wayfinding Guidelines with Addendum