

UConn

UNIVERSITY OF CONNECTICUT

DESIGN GUIDELINES & PERFORMANCE STANDARDS

Planning, Architectural and Engineering Services Department
Established Date: May 2015

Updates to the Design Guidelines and Performance Standards

March 2016

The following is a summary of updates made to the initial Design Guidelines and Performance Standards documents dated May 2015. Please take the time to review the changes with your staff and sub-consultants. These March 2016 updates to the Design Guidelines and Performance Standards documents shall be used with all new assignments from this date forward. Any assignments currently underway shall make every effort to incorporate these updates into your current design assignments.

University Guidelines and Performance Standards

- Section 2.1 Additional definitions have been added.
- Section 2.2 Clarification provided for the Energy Compliance Certificate requirement.
- Section 2.3 Clarification provided on the University's expectations on the Designer's responsibilities for managing Change Orders and Construction Change Directives.
- Section 2.5 Added reference and link to applicable University's Division of Student Affairs' accessibility checklist.
- Section 5.10 Added section, "Guiding Logistics for Construction Sites".
- Section 7.7 Updated Sidewalk requirements.
- Section 7.11 Added Site lighting shall be provided at all crosswalks.
- Section 7.12 Added requirements for labeling receptacles.
- Section 7.15 Clarified soil requirements.
- Section 7.16 Added requirement for requiring identification tags for all trees and shrubs. Added process for "request for tree removal". All trees and shrubs be flagged and reviewed prior to removal. Clarified process for removal of trees.
- Section 7.19 Changes in Landscape watering requirements.
- Section 7.21 Clarified that the use of banners will be on a project-by-project basis. Added weblink reference for specifics on the Construction Project sign.
- Section 8.1 Added information on Framework Consultant. Clarified roles between those of the Framework Consultant and those of the Engineer of Record for the project. Changed the preference on where utility piping and their surface components to be under paved areas. Added requirement that the utility specification include the Contractor's responsibility for electronically documenting digitally the complete installation of any utility.
- Section 8.4 Added requirement the Designer add into the utility specification, the Contractor's responsibility for dryness testing.
- Section 8.5 Provided more in depth design standards and requirements for potable water systems.
- Section 8.6 Provided more standards and requirements for steam and condensate systems.
- Section 8.7 Provided more in depth standards and requirements for chilled water systems.
- Section 8.13 Added Electrical Distribution requirements.
- Section 8.15 Change manhole cover specifications.
- Section 8.17 Added the requirement for oil separators to be installed in all elevator pits.
- Section 11.12 Changes to the doors and frames gauge minimums and requirements. Added acceptable manufacturers.
- Section 11.13 Changes to the doors and frames gauge minimums.
- Section 11.16 Changes to door hardware and added security and access controls.
- Section 12.1- 12.5 Public Safety Systems Guidelines have been expanded.

- Section 13.2 Changed performance requirements of plumbing fixtures.
- Section 13.11 Clarified isolation valves for booster pumps.
- Section 14.1 Clarified desired location of VFDs in support of mechanical rooms. Eliminated reuse of existing equipment.
- Section 14.3 Clarified the centralized chilled water system as preferred method for cooling. Clarified condensate drains shall have a trap. Exterior ductwork to be adequately pitched.
- Section 14.4 Added requirements to design air intake to avoid snow buildup and water infiltration.
- Section 14.8 Clarified performance of centrifugal pumps.
- Section 14.9 Clarified performance of isolation valves.
- Section 14.11 Clarified fume hoods to kitchen exhaust hoods.
- Section 14.12 Clarified requirements of hydronic piping.
- Section 14.14 Added requirements for cooling towers.
- Section 14.16 Added requirement that any gas pipes being removed shall be capped on both ends.
- Section 14.19 Added testing and commissioning requirements.
- Section 15.1 Additional clarifications in guiding principles. Added levels of resiliency requirements.
- Section 15.3 Additional clarifications on labeling requirements.
- Section 15.12 Clarified transfer switches.
- Section 17 Section has been wholly revised.
- Section 25.13 Added all bathrooms shall have a waterproof membrane under the entire pitched finished floor. Clarified shower valves to have integral stops.
- Section 26.1 Added specific pipe drain material requirements for disposal drains that receive soda beverage waste.

Appendix II Electronic Document Plan Submission Requirements

- Section 1.4 Added requirements on details and table of contents.
- Section 1.5 Added independent cost estimate to submission CD. Added where to find documents template referenced.
- Section 1.6 Added submission review of project specific Division One.
Added Closeout Phase with clarifications on Record Set Documents and responsibilities with as-builts and the operations and maintenance manual.

Appendix III Space Guidelines - No significant changes

Appendix IV Telecommunications Design Standards

- Section 2.5 Added clarification on Code Blue telephones.

Appendix V Building Automation Systems Standards - No significant changes

Appendix VI Classroom Guidelines

- Section 6.3 Changes to window treatment.
- Section 6.6.3 Removed.
- Section 12 Changes to high tech classroom technology.
- Appendix 1 Documents changed.

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1 Introduction

1.1 Mission Statement

As an internationally recognized institution of higher education, the University of Connecticut's **Department of Planning, Architectural and Engineering Services'** (PAES) mission is dedicated to excellence in support of the University's overall vision. In recognition of the University's mission, PAES is dedicated to achieving the enhancement of the University campuses and environments and provide superior client service to the campus communities including faculty, students, staff, neighbors and visitors.

1.2 Foreword

The **Design Guidelines and Performance Standards (University Design Standards)** has been created by PAES in conjunction with other key departments within the University from past experiences with materials and recommendations from consultants. It is intended to be a single source Guide of the University's criteria for Design and Construction or execution of a capital project to our consultants. The Guide reflects the planning, construction, operation and maintenance experiences of those persons responsible for the University's buildings and grounds throughout all campuses, with the exception of the Health Center. The information contained is not intended to be used as specifications, but merely to assist the design team when considering location(s), element(s), presentation, products or systems in the design that have or have not performed well for the University in recent past projects.

This is a living document and will be modified to incorporate lessons learned, changes in policy, and/or changes to industry practices. Feedback is part of the continuous improvement process and therefore strongly encouraged. Should there be conflicts that are noticed within various sections, it is the responsibility of the Designer and their sub-consultants to bring such inconsistency to the University's attention.

1.3 University Master Plan

The February 2015 University Master Plan and its referenced documents was approved by the University's Board of Directors and is located on the PAES website. It provides a general frame work and vision to be used with all new initiatives. The Designer and their Consultants shall familiarize themselves with the contents within the University Master Plan 2015 and take into account in any facet of the project designs in bringing the Campus closer to achieving the goals set forth in the Master Plan.

1.4 Capital Delivery Process

The University's process for capital projects is being updated and will be available within Appendix I: Capital Project's Delivery Process in the next Standards update.

2 Effectively, design documents must be accepted by the University at the end of the concept, schematic, design development and construction document phases. Estimates of the construction cost must also be prepared at the end of each of these phases to confirm that the project is within the budget expectations established by the University. The University Representative will utilize the construction cost estimates to finalize the overall project budget. The project budget is reviewed with the University’s Board on three occasions: at the end of the concept design (Planning Phase Budget), at the end of construction documents phase (Design Phase Budget) and upon construction bidding (Final Budget).-General Requirements

2.1 Definitions

To establish a common understanding of definitions within this document including all its appendixes, the following definitions of terms shall be known:

Approval	An authorization. The Designer shall formally request and obtain in writing approval from the University Representative any authorization.
Contract Documents	Consisting of Plans, Specifications, Addendas and AIA 101 and 201 as amended or AIA 133 and 201 as amended and any clarification document issued by the Designer to the Contractor.
Design Documents	Consisting of the Plans, Specifications, addendas, bulletins, and architectural supplements.
Designer	Architect, Engineer or their Consultants, responsible for following the University’s Design Guidelines and Performance Standards. The Designer is the entity to which the University has contracted with for the project and whom is responsible for all communication, decision making and coordination from their sub-consultants relating to the project University Representative.
Division One	University’s Division One consisting of all related instructions and requirements for performance of the work. The Designer is responsible for utilizing the University’s most current standard Division One template and modifying as needed based on the demands of the project.
EHS	Division of Environmental Health and Safety provides comprehensive environmental health and safety services for the University community by developing and administering effective policies, programs and procedures that prevent personal injuries and maintain regulatory compliance in the areas if biological, chemical, and occupational and radiation safety.
Facilities Operations	Facilities Operations, is a department within the University who is responsible for all general upgrades, minor repairs and maintenance to existing Buildings and Utilities Infrastructure for any Campus. The Facilities Operations has designated staff people assigned as point persons for specific utilities for new or changes to existing utilities within a project scope.

	The University Representative is responsible in identifying and communicating with the appropriate Facilities Operations Representative for any information needed and any reviews to be performed. The Designer working with the University Representative is responsible for ensuring feedback has been received from any and all appropriate Facilities Operations staff impacted by the project.
IESNA	Illuminating Engineering Society of North America
OEP	Office of Environmental Policy, a department within the University responsible for focusing on and pursuing excellence in environmental performance, emphasizing sustainability initiatives ranging from climate change to water conservation and green building, and regulatory compliance oversight function.
OFMBI	Office of the Fire Marshall and Building Inspector; The University of Connecticut's Office of the Fire Marshal and Building Inspector was established in 2005 within the Division of Public Safety (DPS) as the office responsible for code enforcement for buildings and construction projects which are not otherwise under the jurisdiction or responsibility of other Connecticut agencies.
PAES	Planning Architectural and Engineering Services, a department within the University responsible for all Capital Improvements to the University Campuses and responsible for maintaining the integrity of the guidelines and standards.
Shall	To denote requirement(s) set forth by the University that are not negotiable or arbitrary.
Should	Used where the University strongly recommends certain products or practices.
Telecommunications	To describe voice, data, and TV services and the infrastructure to deliver them.
Division of Public Safety	Division of Public Safety is a department within the University that includes the Office of the Fire Marshall and Building Inspector, Police Department, Fire Department and Locksmith Department. The Division of Public Safety provides regular inspection, incident investigation, construction permitting, and consultation on matters relevant to design, construction, renovation, maintenance, and use of structures, systems, and related assets.
University	The University of Connecticut or University; the owner of all property and completed projects, unless otherwise specified in the project documents. As the owner, the University has the right to enforce or modify all applicable codes, standards, and University specific requirements.
University Representative	A University assigned person responsible for the overall oversight and management of the Project. The University Representative may or may not be an employee of the University and will be the assigned point person for all communication and coordination of information from the Designer to various stakeholders within the University's departments. All decision making and communication shall be directed to the University Representative for direction.
University Design Standards	This Design Guidelines and Performance Standards Manual

UTIS	University Information Technology Services; the University's department that is responsible for maintaining all of the University's telecommunications systems. As such, UITS shall have final approval of the design, parts, and equipment proposed or installed for the University's telecommunications infrastructure and systems.
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2.2 Guiding Principles

All buildings and other projects for the University shall be designed as high quality institutional facilities with components specified to provide maximum life-cycle usefulness. Life cycle costing shall be an integral part of the design process. Most campus buildings are intended to last an indeterminate amount of time, but not less than 50 years, so adaptable facilities and planned maintenance are the norm, rather than short-term solutions.

This document is a supplement to all laws, manufacturer requirements and industry best practices. The document shall not be construed as overriding, replacing or amending any code or manufacturer's requirements unless it is more stringent and/or higher quality, and in such cases, the more stringent and/or higher quality shall be followed and administered. If conditions or inconsistencies are discovered while performing the duties under these Design Standards create an inability to meet the law or manufacture requirements, the Designer shall provide such written inconsistency to the University Representative who will provide direction on the matter.

The Designer shall design the project in compliance with all applicable Federal, State and Local Codes, ordinances, laws and other regulations which have jurisdiction over the nature of the construction, including the Americans with Disabilities Act (ADA). When specifying, adhere to all manufacturer requirements and industry standards.

Energy Compliance Certificates are required as proof of compliance in support of the Department of Energy, utilizing the Department of Energy's most current Comcheck program. The certificate must be signed by the design professional when the design is finished (prior to bid) and again after the construction is complete (before final payment).

These Design Standards shall not be deviated from without explicit review and approval from the University Representative in conjunction with the University Planner and Chief Architect. However, should the Designer believe deviating from any single Design Standards would provide a better quality and performance product, such suggested deviation shall be identified specifically in writing and presented to the University Representative who will provide direction.

2.3 Administration of the Contract Documents

The Designer should familiarize themselves with response times outlined in the University's Division One for review of Request for Information, Submittals and Progress Payments coming from the Contractor. Time is based on a calendar day and in most cases require a seven (7) day initial review.

The Designer is responsible for the drafting of all Construction Change Directives and Change Order documents needed for any given project for execution with the parties. Designer shall obtain all supporting backup to the change management document to ensure that all pertinent documentation has been provided and that the costs represented are fair and reasonable. Designer shall follow the

requirements identified in Division One Section 01 3100 Project Management and Coordination relating to these change management documents. Construction Change Directives shall only be issued in the events where there is a dispute on an interpreted change in the work or when timely release of the work is required to proceed while the costs are formalized.

Exploratory investigation services of existing conditions are expected to be provided from the Designer when a renovation assignment is awarded. Designer shall investigate and determine the effects of the renovation on all surrounding infrastructure and finish conditions that are being relied upon to support the renovation assignment. Do not solely rely on any drawings that the University provides the Designer relating to the building, its space, its infrastructure or the utility infrastructure. Do not assume the use of University personnel or equipment to assist in the exploratory investigation other than providing access to the space or property. Include the costs associated with the exploratory investigation within your summary of services. Proper investigation of existing conditions includes but not limited to; building envelop systems such as façade repairs, roof replacements, roof drains and gutter systems, parapet condition, window replacements and their existing openings, lighting upgrades relating to existing locations and illumination levels, fire life safety upgrades relating to illumination levels and existing locations, etc.

2.4 Product Specifications

When specifying product, it is preferred that the specifications identify a minimum of three (3) (where practical) manufacturers product models that have been pre-determined by the Designer and accepted by the University as equal or comparable in quality, measure, function and value. Where the design standards refer to following a local utility standard, equipment and/or materials may be sole sourced within the utility standard. The Designer shall identify (where feasible) additional manufacturer's equipment and/or material that is "equal to or better than" in workmanship, compatibility and performance than what is being identified as sole sourced.

"Single Source" – Sole Source

Single sourcing denotes there is only one product make/model or company that can provide the function and/or performance required for the application and no other product make/model or company.

Should the Designer choose to specify a single source manufacturer's product model, the Designer must quantify the function and/or performance uniqueness of the product as sole source justification in a format the University's Procurement Department requires. The sole source justification must be submitted to the University Representative for review. Pre-approval must be obtained from the University Representative in conjunction with Procurement Services on all sole source products is a requirement before including such within the project specifications.

There are a few unique circumstances within the University Design Standards, where there is only one manufacturer product model or service that is identified by the University. These single sources have been determined to be the only product make/model that can provide the function and/or performance that the University requires. The Designer shall provide supporting detail of the quality level performance, functionality and value that the single source provides that no other manufacturer's product can meet in a format the University's Procurement Department requires.

Should however, the Designer know or believe there is other manufacturer's product(s) that can provide the functionality, compatibility and/or performance required without adding customization costs or changes to other areas of the design to accommodate, the Designer shall provide the product information to the University Representative's attention, who in conjunction with the University Department impacted provide direction on the matter. Such direction shall be confirmed.

"Or Approved Equal"

Where the University or the Designer has chosen to denote a single source manufacturer's product as the "basis of design" for the level of quality, warranty/guaranty, size or installation restrictions (if any) and performance required and includes an "or approved equal" after the product being named, it is the Designer's responsibility to outline in detail the quality level, functionality and performance criteria that must be met or exceeded to be added to the specifications. Such "basis of design" or performance specifications shall be reviewed and approved by the University Representative in conjunction with the appropriate University Department prior to including them into the project specifications for bidding.

During bidding or in the submittal process (whichever is outlined in the specifications to be submitted for consideration), a submission is received as contending to be an "equal" product, the Designer shall be responsible for reviewing the product information provided and determining if the product meets or exceeds all the performance criteria requirements set forth and does not impact the Construction Schedule or require customization costs or changes to other areas of the design. Refer to the University's Division One for further details under "Comparable Product" and "Substitution" requirements of the Contractor and the Designer. Such review and acceptance or rejection shall be substantiated and submitted to the University Representative for review and acceptance or rejection.

Where the University has reference to "or equal" after a single source manufacturer product model or service, it implies that the University will consider other manufacturer's product. The Designer shall review the reference single source and outline in detail the quality level, functionality and performance that must be met or exceeded as the benchmark comparison criteria. The University would prefer that the Designer propose other equal manufacturer's product that can meet or exceed the quality level and functionality components and propose them to the University Representative who in conjunction with the appropriate University Department shall provide direction.

The Designer shall not deviate from designing, specifying product or performance criteria by incorporating an "Allowance" to cover such element of the design requirements.

2.5 Accessibility

The University is committed to achieving equal working and educational opportunities and full participation for persons with disabilities. It is the policy that no qualified person be excluded from participating in any University program or activity or otherwise be subjected to discrimination with regard to any University program or activity. This is a University policy which derives from the commitment to non-discrimination for all persons in employment, access to facilities, student programs, activities and services. To this end, the consultant is expected to demonstrate within the services that they provide equitable accessibility achievement within the design.

Refer to the University's Division of Student Affairs' accessibility checklist for additional requirements on renovations and new construction project designs, as well as food service areas. Reference documents can be found at the following weblinks: <http://paes.uconn.edu/Contractors.html>

2.6 High Performance Building Construction Standards – Compliance

By statute, all design and construction activities shall comply with the State of Connecticut High Performance Building Standards. The Architect and Engineer shall review the requirements of the High Performance Building Standards and shall provide a design that meets all of the requirements of same. In addition to the High Performance Standards, the University has also adopted green building design objectives, establishing a basis for incorporating the principles of environmental stewardship, energy efficiency and resource conservation into the design of new campus buildings and major renovation projects.

2.7 Environmental and Sustainability Framework

The University's goal is to pursue holistic, integrative and collaborative design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants. The University's current Sustainability policies are posted on the University's OEP website. The Designer shall review same and provide designs that are consistent with the policies. All projects shall attempt to meet a requirement of Leadership in Energy and Efficient Design (LEED) of Gold, but shall meet a LEED minimum standard no less than Silver.

Designer shall be responsible for investigating and recommending energy incentives with any product specified.

2.8 Renewable Energy Sources

The University is dedicated to the research and development of renewable energy sources on projects and providing an energy-efficient design. The Design Team shall investigate the use of renewable energy sources for each project, to include, but not be limited to, the use of solar panels, solar hot water heaters, wind turbines and fuel cells. The Designer is responsible for submitting their analysis and recommendations to the University Representative for review with appropriate University departments.

2.9 Health and Safety

The health and safety of all students, faculty, staff, and visitors shall be a principal consideration in the planning and conduct of all University activities and programs, and in the design, construction, modification, or renovation of all University buildings and facilities.

2.10 Art in Public Spaces

The Public Arts committee at the University of Connecticut works in an advisory capacity to the President and offers guidance on a wide range of architectural and design elements. The committee works to ensure that art work on all campuses reflect a commitment to quality and portray a cohesive image for the university to promote arts awareness.

The committee works with Vice Presidents, Deans, Community and University administrators to enhance the culture within the community by selecting art work that is inspiring, engaging and aesthetically pleasing. The committee, which meets about 5 times each year, is comprised of faculty members, alumni, current students, and members of the wider community with connections to arts organizations.

2.11 Electronic Document and Plan Submission Requirements

The University maintains REVIT, CAD, PDF and TIFF files for many buildings on campus and shares available files with consultants upon request. All files provided by the University are the "best available data" at the time of transfer and are intended for informational use only. The University does not

warranty the accuracy of existing files. Prior to the commencement of any work, consultants shall be responsible for field verifying data to ensure accuracy. Should it be discovered that the file data provided is not accurate, it is the Designer's responsibility to bring it to the University Representative's attention at the end of formulating the Schematic Design Phase documents. Should the Designer fail to field verify any files that the University has provide and the discrepancy is discovered during construction, any costs to adjust the work will be the responsibility of the Designer.

See Appendix II - Electronic Document and Plan Submission Requirements for specific information concerning documents and electronic file formats.

2.12 FM Global Review

The University requires the review of all projects by FM Global in order to be in compliance with its property insurance policies. Therefore, the Designer shall schedule sufficient review time by the University and FM Global at each phase of the design process. Any comments/suggestions received from Factory Mutual shall be reviewed with the University Representative in collaboration with the University Fire Department Representative to determine if they are to be incorporated into the final design. Any wood component(s) that are shown or specified must be pressure treated or preservation treated. All roofing systems shall have a Class A rating as listed by Underwriters Laboratories for fire resistance.

2.13 University Branding

The University Sign Committee is the approving authority for any and all use of the University Branding and signage. There shall be no use of any University branding, imbedded, etched, or incorporated into the building materials or campuses infrastructure without specific approval by the Sign Committee.

2.14 University Building Identification

All buildings under the ownership and/or occupancy by the University shall have a University-assigned identification number. Such numbering of a building is conducted and controlled within PAES. When the Designer is given an assignment for a new building, the name of the project may not be the name that is eventually given to the building. The University Representative shall provide the building number to the Designer to utilize on all correspondence and documents.

3 Environmental Compliance and Permitting

3.1 Guiding Principles

Many University projects involve at least one permit, certificate, or approval (Permits). The permitting process can have a significant impact on a project's schedule and cost, and therefore requires constant attention by the Designer throughout the design and contract document phases. Some permits are required prior to construction while others are required for operation or occupancy of the facility/equipment and therefore, have different lead times. For those permits requiring approval prior to construction, obtaining the necessary permits before a project goes to bid helps prevent change orders that may arise from unforeseen permit conditions.

For many of the larger capital improvement projects, this process can become the critical path on a project's schedule. For this reason, the Designer should include a separate permit/approval section and track the status of such approvals through their project schedule.

Typical approvals and permits that are required for larger capital improvement projects are described herein. The Designer shall adhere to the following general procedures and policies regarding permitting:

- All Federal Army Corp of Engineer Permitting and State Department of Energy and Environmental Protection (DEEP) correspondences and applications shall be coordinated with OEP. All Connecticut DOT Office of State Traffic Administration (OSTA) correspondences and applications shall be coordinated with the University Representative in conjunction with the University's Office of Logistics Administration-Transportation.
- The Designer shall ensure all the required permits, certificates, and/or approvals are obtained for the project and that the design meets applicable state and federal laws, regulations and permit conditions.
- Permits required prior to construction should be obtained during Design Development but no later than the early part of the Contract Documents phase. This requires that the Designer's team read permit guidance documents, coordinate with the University and the regulatory agencies, and prepare permit applications during the schematic design phase and have completed such permit applications at fifty percent (50%) design development phase and be ready for submittal to the appropriate agency¹.
- The Designer shall review all prior environmental documents for the project to determine required permits or other related issues. The Designer shall be responsible for reviewing any Connecticut Environmental Policy Act (CEPA) documents, particularly if the CEPA process occurred prior to design, to ensure information relevant to design and construction are accurate, and that agreed upon mitigation measures in the documents are incorporated into the design.
- The Designer shall not submit the project for review or approval to any municipal land use commission or board, unless the designated University Representative approves such submittal. Such review is only a courtesy, since State actions are generally exempt from local approvals.
- The Designer is responsible for all application fees, except for the "General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities," which shall be submitted and paid for by the Construction Contractor.

3.2 Connecticut Environmental Policy Act

As a State agency, the University is required to identify and evaluate the impacts of proposed actions that may significantly affect the State's land, water, air or other environmental resources under the Connecticut Environmental Policy Act (CEPA). A CEPA review does not apply to (1) emergency measures undertaken in response to an immediate threat to public health or safety, (2) activities in which The University's participation is administrative in nature, and involves no exercise of discretion, or (3) a project which involves the conversion of an existing structure for educational rather than office or commercial use. A CEPA review is required for all other University actions.

The *Generic Environmental Classification Document for State Agencies* must be consulted to determine whether a CEPA study of a proposed action may be required. If the potential for significant impact exists but is indeterminate, comments must be solicited from the public and other state agencies during a 30-day "scoping process." If, after the scoping process, it is determined that the potential for significant

¹ The exception to this may be the registration under the DEEP *General Permit for Stormwater and Dewatering Wastewaters from Construction Activities*, since it is preferred to have the Construction Contractor at least named in, if not also certify submit, the application.

environmental impact does exist, an Environmental Impact Evaluation (EIE) must be prepared, circulated to certain State agencies and commissions, and publically noticed as available for at least 45 days for review and comment by any interested party.

At the close of the EIE comment period, all comments must be reviewed and a Record of Decision is prepared with response to the substantive issues raised. The Record is submitted to OPM for it make a determination as to whether the EIE and the process that was followed were adequate. Construction of the proposed activity is not permitted to begin until at least the OPM determination of adequacy has been issued. Further, approvals and permits required from other State agencies (e.g., DEEP, DOT Office of State Traffic Administration) are not typically issued until after OPM has completed its determination of adequacy.

The Designer shall review the requirements for CEPA and shall provide CEPA documents, as needed, which meet all of the requirements of same.

3.3 National Environmental Policy Act

University actions receiving funding, all or in part, from a federal agency must be reviewed to determine what, if anything, must be done to satisfy requirements of the National Environmental Policy Act (NEPA). Should it be determined that an Environmental Impact Statement (EIS) under NEPA must be prepared, the EIS may be submitted in lieu of an EIE required under CEPA.

3.4 University OEP Design & Construction Policy

The University has adopted a green building design policy, establishing a basis for incorporating the principles of environmental stewardship, energy efficiency and resource conservation into the design of new campus buildings and major renovation projects. The University's current Sustainable Design and Construction Policy is posted on the OEP website and the Designer shall review same and provide designs that are consistent with the policy.

All new construction and renovations that have an estimated total project that exceeds \$5 million (excluding equipment other than building systems) shall attempt to meet the highest achievable Leadership in Energy and Efficient Design (LEED) rating but shall meet a LEED minimum standard no less than Silver.

The University wants to promote in all projects sustainable design features and be as environmentally sensitive as possible. Beyond meeting the LEED criteria, the project should strive to achieve carbon neutrality when possible.

3.5 American College and University Presidents' Climate Commitment

Through its Climate Action Plan and by reaffirming its commitment to the American College and University Presidents' Climate Commitment (ACUPCC), the University has pledged to achieve carbon neutrality at The University's Main Campus by 2050. The University prepared a Climate Action Plan in August 2009 as the strategy towards meeting the ACUPCC commitment, and amended the Plan in March 2012 to include an adaptation strategy.

The University Master Plan and Sustainability Framework Plan add definition to this goal by recommending that all new construction target LEED Gold and that LEED Platinum and the Living Building Challenge can serve as stretch goals. The Living Building Challenge's emphasis on net-zero

energy and net-zero water can help to propel the campus forward toward its climate neutrality goals. STEM labs and residence halls with higher energy use intensity (EUI), may also benefit from ground source or air source heat pump hybrid systems. Less energy intensive buildings may benefit from variable refrigerant flow technology.

See Sections on Energy Conservation and Renewable Energy Sources for additional information.

3.6 Eagleville Brook TMDL and MOU

The University is subject to a Total Maximum Daily Load (TMDL) related to the impervious surfaces on the portion of the Storrs campus that drains to Eagleville Brook. The TMDL prescribes reductions in impervious area via disconnection from traditional storm drainage systems and area reductions.

The Eagleville Brook TMDL published by the Connecticut Department of Environmental Protection provides a detailed description of the impairments to Eagleville Brook, using percent impervious cover as a surrogate for the mix of pollutants in stormwater and specifically addresses the need to reduce impervious cover which will in turn, reduce the pollutant loading on downstream waterways. The University's Center for Land Use Education and Research has developed a Watershed Management Plan in response to the TMDL. The University's Water Quality Management Plan includes a conceptual framework and site- specific recommendations for the mitigation of stormwater impacts on Eagleville Brook using low impact development techniques.

The University is also subject to a Memorandum of Understanding with the DEEP obligating a specific reduction of volume and/or impervious area by 2021, but these thresholds do not consider NextGen CT and other additional development projects on the campus. It will be necessary for the University to implement other Low Impact Development (LID) and green infrastructure strategies throughout the watershed to mitigate the water impacts of future growth.

3.7 Flood Management

As a State agency, any University actions affecting floodplains or natural or man-made storm drainage facilities require approval from the DEEP in the form of a Flood Management Certification (FMC). Generally, any changes in drainage, including but not limited to, increasing the amount of impervious cover, rerouting drainage to another watershed, sub-watershed or collection system, new or extended stormwater collection and conveyance systems, or alterations to existing collection and conveyance systems are activities that require FMC approval. Activities consisting solely of installation of Low Impact Development stormwater management features that are not done as mitigation for other proposed increases in drainage do not require FMC approval.

For activities requiring FMC approval and that are located in the Eagleville Brook watershed, design consideration must also be given to the prevailing TMDL for the total amount of effective impervious cover in the watershed.

The Designer shall review the requirements for FMC and shall provide a design and FMC permit application, including supporting documentation and PE certifications, which meet all of the requirements of same.

3.8 Construction Stormwater and Dewatering Wastewater

Discharges of stormwater and dewatering wastewater from construction activities which result from the disturbance of *one or more* total acres of land area on a site regardless of project phasing are subject to the CT DEEP *General Permit for Stormwater and Dewatering Wastewaters from Construction Activities* (Construction Stormwater General Permit).

As a State agency, University projects are generally locally exempt (e.g., not subject to review or approval of the local municipal authority). Therefore, University construction projects disturbing over one acre must submit a registration form and Stormwater Pollution Control Plan (SWPCP) to the CT DEEP. This registration shall include a certification by a Qualified Professional who designed the project and deemed it consistent with the requirements of the general permit.

If directed by the University Representative, the Designer shall review the requirements for the Construction Stormwater General Permit and shall provide a design and permit application, including supporting documentation and PE certifications, which meet all of the requirements of same, including post-construction site design requirements.

3.9 Wetlands and Water Resources

As a State agency, wetlands regulated activities undertaken by the University in or affecting inland wetlands or watercourses are administered under the CT DEEP Inland Wetlands and Water Resources program. University activities exclusively within upland areas and that do not impact downstream wetlands are not subject to wetlands permitting.

Any proposed activity within or use of a wetland or watercourse involving the removal or deposition of material, or any obstruction, construction, alteration or pollution of such wetlands or watercourses must be subject to DEEP review. Regulated activities include, but are not limited to, filling, dredging, clearing, grubbing, grading, piping, culverting, channelizing, diverting, damming, dewatering or otherwise temporarily or permanently altering wetlands and watercourses.

Whether an activity must be authorized under an individual DEEP permit or under the CT DEEP General Permit for Water Resources Construction Activities, and whether the activity requires authorization under an individual or general permit of the Army Corps of Engineers, is dependent on the nature of the activity and amount of regulated area that is affected.

The Designer shall review the requirements of the applicable state and federal statutes, regulations, and general permits' conditions and shall provide a design and permit application(s), including supporting documentation and certifications, which meet all of the requirements of same.

The portion of the Storrs campus that is within the watershed for the Fenton River is also within the drinking water supply watershed for the Willimantic Reservoir, the source water for Windham Waterworks. Windham Waterworks is the public water supply company for Willimantic and its surrounding area. When the University files a DEEP application for a regulated activity involving a wetland or watercourse in this portion of campus, notice of the application must be provided to Windham Waterworks and the CT Department of Public Health not later than seven days after the date of the application (CGS 22a-42f).

3.10 Air Emissions

In general, the installation of new or modification of existing fuel burning equipment with a potential to emit 15 tons or more per year may be required to obtain an individual permit to construct and operate under the CT DEEP New Source Review (NSR) program. For certain fuel burning equipment (such as emergency engines), CT DEEP provides alternatives to obtaining an individual permit provided operational restrictions are implemented.

Further, potential emissions for new equipment proposed for the Storrs campus which cause the campus's aggregated NO_x emissions, as calculated by OEP using DEEP guidance, to reach or exceed 25 tons per year shall be required to obtain an individual permit to construct and operate under the CT DEEP NSR program and may be required to include emission controls as a permit condition. Subsequent equipment installations at the Storrs campus would also be subject to the same NSR permitting and emission control requirements until such time that the University can demonstrate that its aggregated NO_x emissions are less than 25 tpy.

The Designer shall provide manufacturer specification and performance data sheets for any fuel burning equipment specified by the Designer for approval by OEP prior to moving forward with a particular manufacturer as a basis of design.

For engines, the submission shall include emission rate data representing operations at maximum (100%) operating load conditions. The emissions data at maximum operating load should include emissions data for NO_x, CO, volatile organic compounds (VOC), and particulate matter (PM₁₀ and/or PM_{2.5}, if available). If emissions data are available for partial load operation (e.g., 75% and 50% load), such data should also be provided. Provide a copy of the EPA emissions certificate, showing that the engine complies with EPA's non-road emission standards or with 40 CFR Part 60, Subparts IIII or JJJJ, as applicable. Emissions information representing average emission levels over a pre-defined duty cycle, such as required for EPA certification, is not sufficient.

For all other fuel burning equipment (other than engines), the submission shall include manufacturer specification data sheets with information on the type of fuel burned as well as the heat input rating of the unit. If the proposed fuel burning equipment is an oil-fired boiler, indicate if the unit is a steam boiler or hot water boiler.

3.11 Wastewater Discharges

Discharges to waters of the State, including all surface waters, ground waters and sewage treatment plants are administered by the CT DEEP wastewater discharge program.

No discharges to surface water or the storm sewer, other than rain water and snow melt, is permissible without a permit. No process wastewater, including wash water and utility pit pump-outs, can be discharged to surface water or the storm sewer without a permit. Process wastewaters that can be discharged to surface waters under General Permits include non-contact cooling water and water treatment wastewater, provided all applicable conditions of the General Permit(s) are adhered to including any (pre)approvals, pretreatment, monitoring, and record keeping.

The University Storrs and Depot campuses are served by the University's Water Pollution Control Facility. The University Storrs Water Pollution Control Facility (WPCF) operates under a National Pollutant Discharge Elimination System permit and maintains its own Sewer Rules and Regulations

applicable to premises that discharge to the University sanitary sewer system. Wastewaters from regional campuses, other than the Torrington campus, discharge to a local Publically Owned Treatment Works (POTW).

New sources of process wastewater (e.g., non-domestic wastewater) directed to the University WPCF or local POTW must be evaluated for permissibility under available DEEP General Permits, which include but are not limited to permits for food preparation or production wastewater, swimming pool wastewater, boiler blowdown, cooling tower blowdown (and other non-contact cooling water), vehicle maintenance wastewater, building maintenance wastewater, air compressor condensate, and water treatment wastewater.

Discharges to sanitary sewer that cannot be covered under a General Permit shall be required to obtain an individual permit to construct and operate under the CT DEEP State Pollutant Discharge Elimination System (SPDES) program and may be required to include pretreatment as a condition prior to discharge. New sources of wastewater and any new service connections may be subject to approval of the appropriate local water pollution control authority.

The Torrington Campus and some of the University extension centers that are located in areas without sewers maintain their own septic systems. New sources of wastewater shall be evaluated for compliance and permissibility as discharges to groundwater.

The Designer shall review the requirements of the applicable CT wastewater statutes, regulations, general permits' conditions, and local WPCA requirements and shall provide a design and prepare permit application(s), including supporting documentation and certifications, which meet all of the requirements of same.

3.12 Parking and Traffic

Major traffic generators (MTG) are regulated as to their traffic impact on the state highway system in Connecticut by the Office of the State Traffic Administration (OSTA). A MTG is defined as any development of 100,000 square feet or more of gross floor area or 200 or more parking spaces. The Storrs Campus, as a whole, is consider a MTG.

The OSTA authority under these statutes applies to new MTGs as well as expansions or land use changes to those already in existence. However, entirely residential developments of 100 units or less are exempt from OSTA regulation under these statutes. The regulation of MTGs by the OSTA is accomplished via either an Administrative Decision (AD) or certification process (Certificate).

The Designer shall review the requirements of the applicable OSTA MTG statutes, regulations, and AD and Certificate requirements and shall provide a design and prepare permit application(s), including supporting documentation and certifications, which meet all of the requirements of same.

4 Environmental Sustainability

4.1 Guiding Principles

The University is committed to a resource and energy conservation program based on continual improvement in the design and construction of new buildings and major renovations. Design to

minimize life cycle costs, including the use of materials that will maximize durability and longevity. Use resources efficiently by designing buildings that minimize energy and water use and maximize use of natural daylight where appropriate and feasible. Specify environmentally preferable products, including (but not limited to) those without toxic ingredients and those which contain recycled content and/or are recyclable, energy efficient, organic, biodegradable or plant-based, and products that are durable and easily repairable.

4.2 Site Selection

Campus growth should be planned on the most suitable sites possible, avoiding unnecessary environmental impacts to the existing campus open space and natural resources. Sites should be reviewed for consistency with the campus Master Plan and State Plan for Conservation and Development. Lands that meet the regulatory definitions of “direct recharge areas” and “aquifer protection areas” should be protected from development. Wetland areas should be preserved and protected. Vegetated buffers should be preserved, to the extent possible, when disturbance is anticipated in proximity to wetlands. Development on lands within flood plains as defined by the Federal Emergency Management Agency (FEMA) should be prevented. Development in areas that serve as habitats of species of special concern (threatened and endangered species) should be avoided.

4.3 Energy Conservation

Through its Climate Action Plan and by reaffirming its commitment the American College and University Presidents’ Climate Commitment (ACUPCC), the University has pledged to achieve carbon neutrality at University’s Main Campus by 2050.

The Designer should provide energy modeling to optimize energy performance by way of assessing the interactions of simultaneous strategies and to determine the optimal R-values for the building envelope. Energy efficiency should be the maximum possible and a priority for the design. Most projects that must meet the High Performance Building Requirements are required to show that the design meets at least a 21% reduction below the ASTM 90 model criteria. The University receives rebates commencing at reductions of 21% below the ASTM criteria and projects should investigate whether reaching higher levels of energy efficiency is achievable and economical.

Reduce Conditioning Loads

To reduce a buildings dependence on mechanical heating and cooling, the Designer should design exterior wall assemblies to be a minimum of R-19 and roof assemblies to a minimum of R-30. All glazing should incorporate double-glazed insulated glass units with a low-E coating, argon-filled with a U-factor of ≤ 0.27 . Seasonal shading (e.g., deciduous trees, porches, horizontal sun shades and roof overhangs) should be provided to south facing glazing. Thermal mass should be incorporated within a building, since high mass buildings can stabilize temperature swings by storing heat during the day and releasing it during the evening, thus reducing the building’s peak cooling loads.

Increase Operational Efficiency

To increase a building’s operational efficiency, the Designer should design systems that make use of the campus’ Central Utility Plant (CUP) for steam or hot water and chilled water needs within buildings whenever feasible. For construction projects involving building systems that are not connected to the CUP, the Designer should consider distributed generation for the cleanest and most efficient method for heating and cooling, or combined heat and power, including renewable energy technologies. All projects shall comply at a minimum with the energy efficiency prescribed by the prevailing ASHRAE Standard.

ENERGY STAR[®] products should be specified by the Designer where applicable, including all new equipment, transformers, and kitchen appliances. A demand-controlled ventilation strategy that incorporates indoor air CO₂ monitoring to reduce ventilation rates should be used in the design of classroom spaces and other spaces with large occupancy swings. Operable windows and micro-switches that control the room ventilation/cooling when the window is open should be incorporated into building design.

All new buildings shall be fully commissioned by an independent third party commissioning agent. Commissioning agent should be involved early in the design process as part of the design team so that they can review and comment on the systems' designs. Commissioning agent should produce a manual that describes the procedures for re-commissioning the building in the future. The systems to be commissioned include but not limited to HVAC systems, building control systems, duct work and piping insulation, renewable energy and alternative energy technologies, emergency lighting, lighting controls, electrical systems, heat recovery, and automatic sensors.

4.4 Renewable Energy Sources

The University is dedicated to the research and development of clean and renewable energy sources on projects and providing an energy-efficient design. The Designer shall investigate the use of clean and renewable energy sources for each project, to include, but not be limited to, the use of solar panels, solar hot water heaters, wind turbines and fuel cells.

To meet the goals of the University's commitments and policies, on-site renewable energy systems will be required for large projects. Particularly viable technologies for the region are photovoltaics and solar hot water systems (useful for residence halls with significant domestic hot water demands). For wind to be cost-effective, it must be installed at a larger scale and located optimally. Geothermal and ground source heat pumps are also potentially viable but require further evaluation on a building-specific basis.

Examine passive solar design strategies when determining site concepts for new buildings such as orienting the building to the south, providing windows to collect winter sun, and providing thermally massive materials inside the building to store collected heat. Minimize glazing on the east, west, and north elevations, while maximizing glazing on the south elevation.

Evaluate the economic feasibility of providing photovoltaics or wind turbines as part of new projects. Examine the implications of incorporating photovoltaics when planning and siting a new project, such as proper solar orientation, solar angle, and the size of the photovoltaic array.

If there is not a feasible means of incorporating enough building-specific energy features, then the Designer can present green power purchasing scenarios for the University's consideration. For example, the University could purchase energy generated at larger scale, off-campus installations of solar or wind plants, most likely on land owned or leased by a renewable energy developer, under a long-term purchase power agreement, and use these clean energy credits, through virtual net metering, to offset emissions from new or renovated buildings powered by the University's natural gas-fired cogeneration facility.

4.5 Water Conservation

Water conservation is a key part of the University's sustainability program and usage minimization, reclamation, and reuse will need to continue and be utilized in capital projects. With new connections to

a water main extension, the University's water supply is expected to meet or exceed demand through the next 20 years, but potable water use reductions are still necessary to meet sustainability goals. The University targets a potable water use reduction of 40% below standard designs. This typically requires aerators, ultra-low flow fixtures, and process water reductions in the design of buildings.

Plumbing Fixtures and Process Water

The Designer shall specify low flow urinals (≤ 0.5 gallon per flush) in lieu of conventional urinals, and should evaluate waterless urinals provided that the maintenance requirements can be met by University operations. Dual-flushing toilets should be specified for women's and unisex facilities and in other areas specify low-flow, power-assisted toilets that use ≤ 1.6 gallons per flush. Use infrared sensors on faucets and include sensors as part of the building commissioning. Specify clothes washing machines in residence halls to comply with the EPA's Energy STAR program.

New buildings that will front or that will be in close proximity to the reclaimed water distribution system on the north side of the Storrs campus should be designed to use reclaimed water for toilet flushing (e.g., separate dedicated supply plumbing system) and, if the building is not centrally cooled, for environmental cooling (e.g., cooling tower make-up supply).

New buildings that are too distant to reasonably connect to the reclaimed water distribution system should be designed with a separate toilet flushing supply system such that, should reclaimed be available in the future, the building can connect and use reclaimed water for flushing without renovating its plumbing system.

New buildings that will potentially house water-cooled equipment should include a dedicated closed loop cooling water supply system that exchanges its heat to the University's chilled water distribution system.

Irrigation

To reduce the amount of potable water consumption associated with landscape irrigation, the Designer should utilize drought tolerant planting and include drought tolerant turf mixes where turf grass is a landscape requirement. The Designer should consider the use of native vegetation beds and meadows that require little to no irrigation, pesticides use, or fossil fuel expenditure for mowing. When irrigation is required, high-efficiency irrigation systems should be used in lieu of conventional irrigation systems and, for landscaped areas fronting or in close proximity to the reclaimed water distribution system, reclaimed water should be used as the irrigation supply.

Buildings located in the University's Technology Park are prohibited from using potable water for irrigation by virtue of the condition included by DEEP in the North Hillside Road Extension environmental permit. Use of reclaimed water may be an option for irrigation, confirm with University Representative prior to any design work.

4.6 Stormwater Management

Low Impact Development (LID) and green infrastructure should be incorporated into all projects, regardless of location, and may be needed to comply with other requirements, such as the University's Sustainable Construction Policy or the post-construction conditions of the Construction Stormwater General Permit.

At a minimum, the approach to stormwater management design should address three main goals: a) reduce peak rate of stormwater runoff to pre-developed hydrological conditions, b) limit total volume of runoff to pre-developed hydrological conditions, and c) provide treatment of water quality to meet or exceed the latest regulations.

Reduction of impervious surfaces

The Designer should develop site designs that reduce the amount of impervious surfaces that contribute most significantly to water quality degradation. These surfaces include roadways, parking lots, roofs, and to some extent pedestrian walkways and plazas. The reduction of these surfaces will reduce the volume and peak rate of runoff while limiting pollutants from tires, oils and gasses, and deicing activities.

The Designer should design site drainage to manage runoff from roof drains, parking lots, and other impervious surfaces as sheet flow directed across vegetated filters, such as areas of turf grass or woodlands, to remove suspended solids and reduce runoff velocity. The length and slope of the vegetated filter area are critical to the overall performance of this strategy.

Groundwater Recharge

The Designer should design systems that promote infiltration through the use of infiltration basins, french drains, and porous paving. These practices will reduce both the volume and peak rate of stormwater runoff, capture suspended solids and pollutants, and recharge the ground- water supply. The use of these systems or features should not occur where high groundwater or shallow bedrock exists, or in service and loading areas where spillage or leaking of petroleum products or other pollutants is likely.

Water Quality Improvements

The Designer should incorporate properly designed rain gardens or bioswale as part of an active, ecologically functioning landscape. Such features can remove up to 90% of the Total Suspended Solids from the water quality design storm, recharge groundwater, and be an aesthetic amenity on the campus. Trees, shrubs, groundcover and lawns have the ability to return a significant portion of the rainwater they take up into the atmosphere through evapotranspiration. Metals, nutrients, and hydrocarbons can be removed from runoff through chemical and biological processes within the soils and plants of a rain garden or bioswale. Systems with small footprints distributed throughout the landscape and designed to capture the first flush of a rain event function more effectively than a single large treatment area.

Maintenance Plans

A maintenance plan must be established by the Designer in tandem with the design. Without regular cleaning, clogging can occur in any infiltration feature. This leads to ponding and increased surface runoff, while limiting the water quality benefits of infiltration. Therefore, to remain effective, maintenance of an infiltration system is crucial. Maintenance of the existing landscape and storm drainage systems can play a significant factor in the quality of the stormwater runoff leaving a site.

4.7 Refrigerants

Chillers, air conditioning units and other cooling equipment within new buildings shall use refrigerants that contain no CFCs. HCFCs or alternative refrigerants used shall have the lowest possible Global Warming Potential and Ozone Depleting Potential, and the Designer shall specify chillers and other

cooling equipment with the lowest feasible operating pressure in order to prevent or minimize leaking of refrigerants, which are often potent greenhouse gases, to the atmosphere. Halons should not be used in fire suppression systems in new buildings.

5 Site Planning Guidelines

5.1 Guiding Principles

The University views all infrastructure components visible at-grade as design opportunities and encourages the Designer to engage in creative, timeless solutions for these opportunities.

5.2 Stormwater Management

All permanent and temporary stormwater design features, including collection systems, low impact development, and construction-related sediment and erosion controls, shall comply with the 2002 Connecticut Guidelines for Erosion and Sedimentation Control, as amended, and the 2004 Connecticut Stormwater Manual, as amended.

Regarding the aesthetics of stormwater management on campus, efforts should be made to visually integrate whichever stormwater best management practice is chosen for a site into the overarching design concept for that landscape space and surrounding areas. For example, the shape, size and edge definition of rain gardens or bio-retention areas should be thoughtfully designed in relationship to the adjacent buildings and landscape. The same principles that guide material choices and planting design of other types of spaces on campus should be employed and coordinated with any new designs.

5.3 Soils Analysis

The Designer shall perform soils testing in the areas of all proposed disturbance, and may include testing for contamination of soils for the purpose of worker safety and for proper soil management and/or disposal. Soil testing may also include geotechnical for structural and infiltration capacity considerations.

Soil testing results with respect to pipe and duct bank installations, in particular, shall be provided to the University Representative for review with all appropriate University departments and shall include an analysis of the cathodic influence and potential reaction to all materials to be installed subsurface. The Designer shall be responsible for ensuring that there is no negative reaction with any subsurface materials specified and the soil conditions.

5.4 Connection between Inside and Outside

It is important to the University that buildings are sited such that they take advantage of the natural contours and characteristics of the site. The Designer should survey the site and trees and attempt to minimize the reduction in trees. The University's Arboretum Committee shall be consulted to limit the disruption of trees and vegetation according to the University's tree protection guidelines. The University encourages windows that create a connection between the inside and outside of the buildings and promotes views of both natural settings and green roofs where possible.

5.5 Building Orientation

Buildings should be oriented such that they are in relation to other buildings, structures and streets in the area. They should not be orthogonal or unusually shaped, but should respect the adjacencies. It is desirable that the buildings be oriented to take advantage of any sun and natural light exposure.

5.6 Spaces Between & Behind Buildings

The University promotes open space between and behind buildings. It is important to create open congregational spaces with each building that will promote both formal use and social gatherings. Additionally, exterior space should be included and programmed for athletic use. Loading docks should be approached from the rear of the building if possible, with ample screening from main thoroughfares, and circulation paths should be included on all sides of the building.

5.7 Open Space & Recreation

For all buildings, provide outdoor congregational spaces and seating spaces to allow students, staff and faculty to experience both active and quiet areas. Outdoor recreational spaces are required near buildings that house large populations and residence halls.

5.8 Roads, Paths and Accesses

The goal of site design is to promote pedestrian and bike movements to the building and through the site. Roads through the center of campus are discouraged, so transportation of materials and services to the building needs careful consideration and design. Paths should be identifiable as either main thoroughfares (minimum 16' wide), primary paths (minimum 12' wide) or secondary paths (6' wide).

5.9 Environmental Site Studies

All new buildings or additions need to conduct environmental studies of the site. This includes soil sampling and testing for any contaminants throughout the project limits. All investigations should follow the prevailing standards required of Phase 1 Environmental Site Assessment and Phase 2 Environmental Site Investigation requirements. In addition, the site should be surveyed for potential wetland areas, and where possible, any wetland areas that are identified should be avoided.

Should soil and/or groundwater remediation be needed, the Designer shall design remediation to conform to the CT Remediation Standard Regulations, regardless of whether or not the remediation must be entered into a state program that would require such conformance. All remediation and investigation derived waste must be removed from campus and reused or disposed in accordance with all applicable laws, regulations and permit conditions.

5.10 Guiding Logistics for Construction Sites

Mitigating the impacts of construction activity to campus access, appearance, and safety, and communicating any disruption to the daily routines of our students, faculty, staff and guests, is very important to the University.

The Design Team, with direction from the University's Representative, shall develop a "Site Logistics Guidance Plan" concurrently with the Design review process.

Typical Workflow for Site Logistics Guidance Plan workflow:

Design Development Kick-Off

The Designer shall meet with the University Representative and key stake holders to establish relevant topics for developing a preliminary Site Logistics Guidance Plan.

50% Design Development submission review

The Designer shall submit for review the proposed preliminary Site Logistics Guidance Plan and identified conflicts with Division One Specifications against what is proposed in the Plan. Initiate discussions on design of informational banners or graphical scrim for shall be initiated by the Designer with the University's Representative (at least 60 days prior to completion of bid documents).

100% Design Development through 50% Construction Documents

The Designer shall submit interim design reviews of the Plan as construction documents are progressing to ensure the Plan and Specifications are updated and stakeholders are informed.

90% Construction Documents

The Designer shall submit final review of Site Logistics Guidance Plan and Division One Specifications. Final stakeholder comments shall be incorporated into bid documents with confirmation by the University Representative.

Pre-Construction

The Designer shall ensure that review of the Site Logistics Guidance Plan has been performed with the Contractor. Any changes to initial Plan against those identified by the Contractor's Site Logistics Plan for staging and performance of the work, shall be submitted to the University stakeholders for approval prior to mobilization.

Construction

The University Representative in conjunction with the Designer shall monitor the Contractor's performance and compliance with the Site Logistics Plan. Contractor submits request(s) for changes to the Plan to the Designer.

A sampling of topics that should be discussed when establishing the Site Logistics Guidance Plan include:

- Subterranean spaces
- Other construction activity
- Restricted roads to campus
- Event disruptions or shutdowns
- Phasing of work
- Pedestrian circulation and detours
- Vehicular circulation and detours
- Temporary lighting
- Maintaining building access
- Construction entrance
- Perimeter fencing location
- Project information sign location
- Restricted areas for staging & office
- Tree protection fence
- Webcam locations

A sampling of site management issues that may require annotation on the Site Logistics Guidance Plan includes:

- Maintenance of temporary facilities and controls
- Maintenance of grounds within the construction site

Fence specifications (if not included in site details)
Snow/ice removal
Transit disruptions

A note that states: “A separate plan shall be prepared and submitted to the University by the Contractor two weeks in advance for each sequence of construction that will modify the initial logistics plan.”

6 Building Planning Guidelines

6.1 Guiding Principles

The Designer should work with the University Representative to clearly define the program and vision for the project. It is critically important that the Designer be familiar with the University’s Master Plan and understand the University’s goals and objectives in locating new buildings on the campus.

6.2 Space Planning Guidelines

The Designer shall review and comply with the University Space Planning Guidelines in Appendix III when designing new or renovated space at the University.

6.3 Heights of Structures

The tallest building on the campus is the Wilbur Cross Building, with its tower at a height of approximately 110 feet. New buildings should not exceed this height without prior approval by the University. Most buildings on the campus are in the range of three to five stories, and the height of new buildings should generally be in the same range as other buildings in the area and district. When proposing a tall building, the Designer shall review limitations of the University’s existing fire safety equipment and abilities.

6.4 Exterior Cladding Materials

Buildings should be designed with a 50-year horizon and utilize only durable materials. It is important to consider long-term maintenance in the selection of materials.

Brick is a prominent exterior material on the campus however it should not be assumed that all buildings are to be solely brick. Any suggested exterior cladding should be selected in consultation with the University Representative. The building setting should be considered and be in harmony with other buildings in the area and district of the project.

6.5 Exterior Building Lighting

Most buildings are not lit on campus. Feature elements, like towers, may be lit, but the prominent exterior of the building should not be lit. The University conforms to “dark skies” provisions and all lighting (whether building or site) shall be down lighting only.

Lighting is required at all entrances and exits to the building. Lighting shall also be required at all crosswalks, on both sides of any streets.

6.6 Entrances and Lobbies

MEP piping and ductwork should be run within the corridor ceilings, if possible, and not run in the ceilings of programmed space. MEP rooms should be directly accessible from corridors and not through secondary rooms.

Power clusters should be provided at spacing no greater than every 50' in the corridors. This power is for both building service and student charging use, so it should be visible and within the general congregating areas around benches. Academic corridors should have Wi-Fi service in all areas.

Corridor finishes should be durable and maintenance should be emphasized. Generally, corridor walls should have a chair rail, base and 4' high of protection board. Ceilings should be accessible and have easily removal panels or tiles.

6.7 Stairs and Ramps

Stairs should be located such that they are intuitive and easy to find. The University promotes walking-upstairs and use of stairwells, so all stairs (even fire enclosed stairs) should be finished as communicating stairs. Security, both on the interior and from the exterior, should be considered in the design.

The preferred material for exterior stairs on primary paths shall be granite on a concrete foundation. A latex bonding agent shall be used in the mortar to increase its salt resistance. Granite shall be from a New England source, light gray in color and exposed faces shall be thermal finished. The University has determined the following Manufacturer(s) to be of acceptable quality and color granite material shall be similar to products provided by Fletcher Granite Company or approved equal.

Concrete exit stairs are preferred over metal at exterior applications. All flat areas or stairs that are exposed to water or weather shall utilize epoxy rebar reinforcing and all epoxy coated components shall be used.

The proportion of treads to risers shall be determined on the basis of specific site conditions, however a generally acceptable proportion shall be 15" treads and 7" risers. However existing conditions may warrant varying the proportions, so review proposed configurations with the University Representative prior to finalizing.

Where stairs occur in lawns, cheek walls shall be established parallel and equal to the surrounding grades for ease of lawn mowing and to visually minimize the steps and enhance the continuity of the lawn. Where stairs occur at plant beds, cheek walls shall not be used. This will allow snow to be easily swept into plant beds off of the ends of the stair treads.

Ramps

Where conditions necessitate, design for ramps to always slope away from the building. Ensure that any landings pitch away from the building to the ramp as well.

6.8 Handrails

Handrails shall be stainless steel tube 304 or 316 welded with a rectangular, square or circular cross section and shall comply with load rating conditions. Ensure that stainless steel fittings 304 or 316 are specified in all applications. Finishes for pipe and tubing shall be #6 polished and for fittings #8 polished. Intermediate posts and rails, where required, shall meet structural requirements and applicable standards, but should be kept to a minimum to create a simple profile. Custom bronze handrails, may also be used if more aesthetically compatible with the design of adjacent buildings. Simple rails are preferred over ornamental guardrails. Should conditions dictate the need for painted rails, the University requires that the railings be powder coated.

Hand rails shall be installed into the body cast of the stairs, where the rail is set into a cylindrical mortar set. Cores, sleeves or cups should not be made of ferrous metal, and shall be over filled with a slight taper at the base of the rail with non-shrink hydraulic cement. The Designer is responsible to ensure during the punch list phase, that the rails cylindrical setting is completely filled leaving a slight crown to shed water away from the post. The University consistently finds that this finish process is overlooked and has become a regular maintenance issue.

6.9 Restrooms

The location of restrooms in public, academic and operationally occupied buildings should be intuitive and easy to find with a minimum of one set of restrooms per floor. Men's restrooms, women's restrooms, transgender and special needs restrooms are required in each grouping and should be located contiguous to each other. In public buildings, at least one set of restrooms should be provided for each large congregational space or room.

Floor drains should be provided in all restrooms. Floors in restrooms should generally be recessed so that a water membrane can be provided below the floor tile and all floors shall have positive slope to drain. A separate hose bib, with a special key for the valve, should be provided in all restrooms for the janitorial staff.

6.10 Custodial Closets and General Trash Storage Room

At least one wet custodial closet should be provided on each floor of a building, and should generally be provided adjacent to the restrooms, but with access from the corridor, not through the restroom. Custodial closets are considered part of the building infrastructure, not part of the programmable space of the building. Access to these facilities should be separately keyed and reserved to the appropriate staff from Facilities Operations.

Wet custodial closets should be a minimum of 30 square feet. In addition to the one wet closet per floor minimum, the building should have one additional wet custodial closet for every 25,000 square feet of gross building area. All custodial closets should contain a raised floor sink with laminate walls 4' high minimum and a raised spigot to allow buckets to be filled in same. The space should also contain adequate storage shelving to hold a supply of paper products, cleaning supplies, chemicals and equipment. Exhaust and ventilation should be provided for all custodial closets.

A trash storage room shall be located nearest the loading dock or service entrance of each building. This room shall include sufficient space for janitorial supplies and equipment, paper goods and floor wet sink for large and small container cleaning and central trash holding for the entire building. Shelving for a back stock of paper products, chemicals, supplies and equipment should be included. The storage room should be dedicated strictly for janitorial usage so that the space can be secured and is not shared with any electrical, mechanical or communications functions.

6.11 Facilities Building Storage Room

Include in the design a lockable storage room for building supplies. It is preferred that the storage room be adjacent to the electrical and mechanical rooms, however the building materials storage shall not be incorporated or assumed into the mechanical or electrical rooms or attic space.

6.12 Electrical Room

It is preferred that electrical rooms are accessed directly off corridors, and not through other rooms. Electrical rooms shall be dedicated to electrical services only and shall not also serve as a telecommunications rooms. No plumbing shall pass through electrical rooms. The minimum size of an electric room shall be a minimum of 90 square feet. In addition to the electrical panels in the room, the room layout must accommodate a minimum of one 36" x 84" x 20" storage cabinet located up against a clear unobstructed wall. Refer to the Electrical Section for additional requirements when medium voltage (> 1000 Volts) is present.

Similar to transformer requirements, the main switchgear room shall have available filtered outside air and should be heated, but not air conditioned. A dry fire protection should be installed with high temperature heads.

6.13 Telecommunications Room

Telecommunication rooms are preferred to be adjacent (but separate) to the Electrical rooms. Typical room size shall be between 130 – 150 square feet however a telecommunication room shall be no less than 80 square feet. Final size shall be reviewed and approved by the University Representative in conjunction with UITS. It is the Designers responsibility to adhere to the industry and manufacturer standards for distance limitations when locating rooms.

See Appendix IV - Telecommunications Design Guidelines and Performance Standards for additional details and requirements.

6.14 Mechanical Room

The Designer shall verify the requirements of this space with the University Representative in conjunction with Facilities Operations and follow ASHRAE Standards 15 and 34. Appropriate sound separation, lighting, heating and ventilation air must be incorporated into the design of these spaces. General lighting for space may be derive from a common lighting panel outside the mechanical room. The air movement of the space shall sweep the entire space. Open louver ventilation is not acceptable due to freezing conditions, and all louvers shall be operated by a power open, spring close operator. Make the main mechanical room large enough to accommodate a standup plan table, stool and at least one 36" x 84" x 20" storage cabinet located up against a clear unobstructed wall. Access to the mechanical rooms should be directly off a corridor and the door and corridor widths should be adequate to allow replacement of the largest-sized piece of equipment through the opening (one double door minimum). Access hatches with ladders to mechanical rooms are not acceptable. Concrete slab floors shall be pitched away from all equipment and shall include a floor drain with a trap primer or a trap guard that can be serviceable. Walls and floors shall be painted epoxy and shall have circulation guide lines incorporated to establish clear paths for egress.

6.15 Loading Docks and Service Areas

Buildings that are being programmed to have full kitchen and/or serveries, warehouse stock requirements, intense research, and regular deliveries shall have a loading dock as part of the program. Loading docks shall be designed to require at least one hydraulic lift plate.

Service Areas and Loading Dock landings shall be designed to pitch away from the building. All concrete used for the complete loading dock or Service Area shall be treated with salt-guard and shall have a drain with an oil and grease interceptor for run off from vehicles.

Service areas are for vehicle access to a building for load/unload and shall be a designated area distinct from a drive or parking space. Buildings that are being programmed for residential, general office and classroom use shall have a designated service area to accept deliveries and general receiving areas, as opposed to a loading dock.

Designer should attempt to make loading docks and service areas pedestrian friendly and multi-functional if possible.

6.16 Trash and Recycling Requirements

The University has a trash and recycling program where the goal is to minimize the amount of dumpsters and eliminate barrel bins on the various campuses. On the Storrs campus, within and just outside any general academic or office occupancy building, trash and recycling is collected by the cleaners nightly. The cleaners are responsible at the end of their cleaning to transport the trash and recycling collected and maintained separately to a remote central trash and/or recycling location on campus. For buildings where there is regular food service being performed, the design shall incorporate sufficient space for several dumpsters, trash compactor and a loading dock with unobstructive access. Such an area shall be screened as much as possible from view by the general public.

Designated trash room(s) shall be incorporated into any new building or major renovation. Such trash rooms shall be located near the back of the building where delivery and building services access. The room shall have proper ventilation, epoxy concrete floor, masonry block or cement board walls with water protective material, appropriate lighting, and that the room be large enough to accommodate bulk general cleaning and paper good products and temporary storage of trash. Within the space, there shall be space allocated for a floor slop sink to clean trash containers and a nearby floor drain for any water over spray or flow.

Design shall incorporate ergonomics to reduce workplace injuries. Located the dumpsters and compactors nearest the loading dock for ease in disposing of trash into the containers.

The Designer should also consider the efficacy of designing separate built-in recycling stations in public areas with separate collection portals for both mixed recycling and trash, utilizing the University's standard design for labels, or lid openings, and other methods used to prevent commingling of trash and recyclables, to the extent practicable. In such cases, the receptacle space for recycling shall be coupled with trash, and recycling receptacle space shall be at least a 2:1 ratio over space allocated for trash receptacles.

All new construction and major renovation designs shall incorporate trash rooms. The design shall be reviewed and approved by the University Representative in conjunction with Facilities Operations prior to the completion of the design development phase. Any proposed changes to the original approval of the trash room shall be resubmitted for consideration to Facilities Operations prior to being implemented into the final construction documents.

7 Landscape Design Guidelines

7.1 Guiding Principles

The Designer shall follow the intent of sustainable design principles outlined in the Sustainable Sites Initiative™ (SITES™) for Water, Soil and Vegetation. The University has also adopted the Crime Prevention through Environmental Design (CPTED) philosophy and requires the Designer to take into account such philosophy in the landscape design.

Wherever possible, sustainable material choices shall be made by the Designer such as the use of pervious pavement, concrete and/ or brick pavers. The Designer shall have sufficient knowledge when evaluating, recommending and designing all aspects associated with the maintenance of these outside elements listed hereto as they relate to the climate zone that the University is located in.

For all road and parking additions or replacement projects, an evaluation of alternative methods of reducing stormwater sediments and pollutants shall be undertaken. The evaluation shall determine preferred water quality improvement techniques for the specific project in its larger watershed context. Pervious pavement should be considered as one alternative technique, along with other methods such as vortex catch basins, vegetated swales, and sheet flow into vegetated and bio-retention areas. Factors to be weighed in the selection of pervious pavement should include subsurface soil conditions, maintenance implications and cost effectiveness versus other available stormwater improvement methods. In service yards and loading docks in particular, it is preferable to direct storm-water into landscape areas rather than to infiltrate storm water directly through the pavement because of the likelihood of oil and other pollutants from vehicles in these areas. When pervious pavements are selected for such a location, catch basins with a sump and oil separator hood should be used.

7.2 Roadways and Driveways

The University owns and/or is responsible for maintaining the majority of roads throughout the Storrs and Regional Campuses. Major roadways are defined as the primary vehicular routes around and through the campuses. The University believes in incorporating more traffic calming methods within its designs and encourage more bike lanes and other alternative transportation methods within the road shoulders or immediate adjacent to the road.

When designing paving overlays, ensure that existing catch basins, manholes and control valves are reset or extension rings added to meet the finish grade of the pavement overlay. The Designer should follow the Department of Transportation guidelines for roadway or sidewalk impact repairs.

7.3 Transit Routes and Shelters

The University has a robust transit system at the Storrs Campus. The Designer shall ensure that the University Representative in conjunction with the University's Logistic Administration review any and all aspects associated with vehicular circulation on any of the campuses.

Campus buildings located on any of the campus roadways shall have a transit stop within 150 feet of the building's main entrance or parking area. Bus pull-offs shall be designed to include ample room for two buses, shelter(s) for waiting rider's protection from weather, and adequate lighting.

Currently the University is installing CEMUSA manufactured shelters, however the University's desire is to include more solar voltaic opportunities and will consider other alternatives.

7.4 Parking Areas

The University limits the amount of parking spaces within the Storrs core campus on project sites to service and handicap parking. There are a limited number of metered spaces provided for short term parking and several parking garages and parking lots located on the periphery of the campus. There is no on-street parking allowed with given exceptions. The University charges and monitors all of these parking areas.

Whenever possible, design parking lots to maximize efficient circulation, ease in the maintenance and its snow removal, be appropriately lit to increase safety and provide easy pedestrian access to and from the parking area. Snow accumulation areas with pervious materials for optimal draining are required in all new parking area designs.

Mopeds are becoming more prevalent on campus. If a parking area is included in the project, moped parking spaces should be designated and have an ability for the moped to be secured to a rack. If there is no parking area included in the project, an area must be designed to accommodate the securing of the moped outside of sidewalks and exterior building perimeters. Preferably adjacent to bike racks.

The University is looking to add limited green infrastructure to its parking lots by incorporating trestles for shaded coverage. Careful planning and coordination is required as to the placement of the trestles based on their anticipated adult size in relation to the placement of lighting.

Careful planning of parking area layouts must demonstrate clear accessibility for emergency vehicles, fire trucks and snow plows in relations to a fully occupied parking area. Designer must obtain prior approval from the University's Representative in conjunction with the Division of Public Safety, Facility Operations and Logistics Administration on the layout prior to completion of the design development phase.

As part of the design for any parking area, an electric vehicle charging station shall be determined on a project by project basis. Refer to the Section on Electrical for details.

Any development of 200 or more parking spaces is considered a Major Traffic Generator which is regulated as to its traffic impact on the state highway system in Connecticut by the Office of the State Traffic Administration (OSTA).

7.5 Pavement Markings

The University prefers the use of regular paint over epoxy paint for pavement markings. The University has approved templates for the pavement marking, and the Designer should request same from the University Representative if required.

7.6 Curbs

All curbing shall match existing granite curbing throughout the campus, being hard and durable, fundamentally of light color, of general uniform texture, of smooth splitting appearance, free from seams or imperfections that would impair its structural reliability and containing only such color variations as in the opinion of the Engineer would reasonably be characteristic of the material source.

All curbs shall be New England quarried granite, 18" in height installed 2/3rds in ground. Granite curbs shall have a split face and sawn top.

In low visibility areas where budget constraints exist, precast concrete curbs may be used. Use of cast in place concrete and bituminous curbs shall be avoided.

Where emergency access vehicles are expected to jump curbs in an emergency to get to a building, consider mountable curbs in those areas.

7.7 Curb Cuts, Crosswalks and Sidewalks

All exterior concrete walks, curb cuts, and exterior stairs made from concrete shall be salt guard treated.

Curb Cuts

Curb cuts and curb ramps shall be provided along all barrier free routes as required and shall conform to ADA and ABA standards. Where feasible, curb ramps shall have a wide gradual apron; ramp width shall be determined on a case by case basis considering factors such as pedestrian safety, width of connecting sidewalks, ease of snow removal, and utility pole locations. Curb ramps shall use cast iron detectable warning plates with truncated domes manufactured by East Jordan Ironworks or approved equal in a black asphalt dip finish. These plates are low maintenance, very durable, and made from recycled materials.

Crosswalks

In general, crosswalks shall be demarcated with white painted stripes (not epoxy). Crosswalk widths shall match the widths of connecting sidewalks and adhere to all requirements in accordance with the Uniform Traffic Guidance Manual. Where specific design conditions and pedestrian volumes warrant, crosswalks may be raised to the curb level to create a speed "table." The table approach ramps should be made visible by white paint or a material change (such as white concrete to contrast with the bituminous concrete road). The table tops may utilize brick pavers. Tables should only be used in areas of very high pedestrian cross traffic and where a combination of traffic calming techniques can successfully be employed to alert drivers in advance of the table.

Campus standard pole mounted pedestrian or street light fixtures should be located in the tree lawn or sidewalk close enough to the crosswalk to make crossing pedestrians visible to drivers at night. Light fixtures adjacent to crosswalks should be part of a regular spacing of lighting along the length of the street.

Sidewalks

The preferred material for campus sidewalks is cast-in-place concrete. Sidewalk intersections shall be designed with corner radii that reasonably accommodates the turning movements of snow removal equipment, service vehicles, and the natural flow of pedestrian traffic. Minimum corner radius shall be five (5) feet. Sidewalks placed at building entrances shall not only be doweled into the foundation of the building but should be designed to accommodate a haunch that extends to frost to protect the door from becoming jammed during winter months. The extent of sidewalk to be replaced shall be coordinated with the University Representative in conjunction with the University Landscape Architect during the SD phase of the project. Dependent on the overall project, if 50% of an existing sidewalk is being impacted by the proposed work consideration shall be given in the replacement of additional length of sidewalk to the nearest sidewalk intersection. The color of adjacent sidewalks shall also be evaluated to see if the new walks can match in color and finish. This shall be reviewed with the

University Representative in conjunction with the University Landscape Architect during the SD Phase of the project

Cast in place concrete shall be 4,500 psi, class F with a maximum water cement ratio of 0.45, slump limit of 4 inches and an air content of 6 percent +/- 1.5 percent. Concrete retarding materials shall be utilized when weather has an adverse effect on placement, all sidewalk placement shall take place between April 15th and October 15th unless previously requested and approved by the University. Contraction joints shall be placed parallel to length of walk. Joint spacing shall be included in design drawings and not left up to the Contractor. Jointing pattern shall not allow for joints at radius that create a "zero" edge. Expansion joints shall utilize a full depth asphalt saturated cellulosic fiber strip. Steel diamond shape load plates shall be utilized at all expansion joints in lieu of round dowels with the exception of areas where sidewalk ties into existing walks. Load plates, dowels and expansion joints shall be utilized at all locations where concrete is poured up against stationary objects. Contraction Joints shall be ¼ of the overall depth of the concrete pour to ensure contraction of the material takes place at these locations. Concrete shall utilize 6-inch square wire mesh, wire mesh shall have a minimum twelve-inch overlap. Wire mesh shall be placed on chairs spaced no more than eighteen inches on center.

Ensure within the specifications to the Contractor that a slump test be performed by an independent testing lab and testing results provided to the Designer for review and acceptance of the installation. All projects requiring more than 10 cubic yards of concrete shall receive onsite testing. Require in the specifications that the concrete installer hold a current ACI flatwork certification. Concrete sidewalk shall be placed utilizing a mechanically vibratory screed to ensure proper densification of the concrete. Concrete sidewalk shall be hard troweled prior to receiving a medium broom finish with ¼ inch tooled joints and edging. Tooling shall be completed after the surface finish. No additional water shall be added to the surface to aid in finishing. If finishing aid is required, it shall be similar to Eucobar.

Concrete sidewalk wet cure shall commence immediately after finishing and continue uninterrupted for a period of 7 days, 5 days minimum. Wet cure shall utilize a non-marking curing paper or other curing cover similar to Hydra Cure Cover S16. Upon approval the contractor shall utilize a dissipating curing compound only if moisture curing is not feasible. Upon proper curing concrete sidewalks shall have joints filled with self-leveling sealer that matches the color of the concrete. Sidewalks shall be treated with salt guard sealer in accordance with manufactures instructions. Placement shall be witnessed by construction engineer, owner or architect.

Asphalt paving may only be used for temporary (30 days) walkways on campus. The intersections of sidewalks should be designed with corner radii that reasonably accommodate the turning movements of snow removal equipment, service vehicles, and the natural flow lines of pedestrian traffic. Minimum corner radius shall be five (5) feet.

Handicap access ramps shall be constructed in cast in place concrete or adjacent materials and shall conform to ADA and ABA standards. For all cast in place ramps and landings near building entries, radiant heat shall be specified.

Sidewalk width shall vary with the volume of pedestrian traffic, with six (6) feet being the minimum and used only in very low volume areas yet service vehicles may go over them; eight (8) feet being the preferred standard where occasional service vehicle use is anticipated; ten (10) to twelve (12) feet width shall be used for most service collector pathways, and sixteen (16) feet shall be used for major corridors, such as Fairfield Mall and the Academic Way. Pavement thickness on all walks eight (8) feet wide and

larger shall be designed to carry vehicles including a fire truck. Minimum concrete pavement thickness shall be six (6) inches with a minimum six (6) inch gravel base, all expansion joints shall receive a 10-inch-thick by 12-inch-wide minimum haunch. There shall be no vertical impediments such as signs located within the sidewalks. At the end of any sidewalk greater than eight (8) feet wide, the Designer shall include controlled structures, such as removable bollards to restrict non-service vehicles.

Special Walkways

At major pedestrian walkways, such as the Academic Way and Fairfield Mall, special pavement shall be designed. Other appropriate applications should be considered for service areas that double as pedestrian routes, streetscape margins such as former tree lawns converted to pavement, campus gathering spaces and plazas, areas associated with building terraces and entrances, and street crosswalks at raised tables such as those existing along Gilbert Road. In service and loading areas that double as pedestrian routes, vehicular concrete unit pavers shall be used.

Special pavements shall consist of high quality material such as brick, stone, or concrete pavers. Stone that is subject to damage from deicing salts or freeze-thaw damage, such as bluestone, shall not be used. Pavers shall be selected to be compatible with adjacent landscape and architectural materials and setting methods. The preferred brick for campus wide use shall match the brick used in the Fairfield Mall. The preferred setting method for special pavements shall be in a bituminous setting bed on a concrete slab, as shown in the detail below. The slab thickness and base course depth shall vary according to the pavement load requirements and subsurface conditions.

Pervious special pavers should be considered as a means of infiltrating stormwater. Factors to be weighed in the decision to use pervious pavers should include subsurface soil conditions, maintenance implications and cost effectiveness versus other available stormwater management methods. Special pervious pavers shall be of high quality material and shall be selected to be compatible with adjacent landscape and architectural materials. The preferred pervious clay brick paver special paver shall be 4" x 8" x 2.25" in size in a random standard color mix. The University has determined the following Manufacturer(s) to be of acceptable quality and color for pervious clay brick; Whiteacre Greer's antique, dark antique and red sunset colors, Pine Hall or approved equal.

7.8 Service and Emergency Access

Service Access

Service access routes allow campus vehicles and outside vendors to access campus buildings for deliveries and service, as well as temporary short term (15 minute) parking spaces. Service access should be typically one location per building or two for large buildings.

At service streets and service yards that double as pedestrian routes, unit pavers shall be used to create a more pedestrian-friendly scale and quality. Selection of unit paver size, pattern, color and finish shall be coordinated with PAES Landscape Architect Representative.

Emergency Access

Emergency access must be planned for the complete perimeter of the building, where ever possible. Pervious brick pavers that allow for a hard surface for emergency vehicle access not limited to a fire truck, while allowing for water filtration and grass growth.

7.9 Site Walls

In general, any wall shall be constructed of durable high quality masonry materials. All walls 30" or more shall be designed by a structural engineer and shall have footings and proper drainage for the application that the wall is performing. The materials and workmanship of site walls built in association with buildings should closely match the quality and finishes of the building walls. The use of rustic or inferior site wall materials, such as concrete masonry units, in close association with the architecturally finished walls of campus buildings should be avoided.

Design for the growth of flowering vines to cover bare concrete walls in cases where soil is available for planting and solar exposure is favorable. The example of a most effective hardy vine for covering site walls is Boston Ivy, but other possible solutions should be explored.

Seat Walls

Seat walls are encouraged as a way to create informal meeting and gathering places at locations that naturally attract people, such as building entrances and intersections of major walks. Seat walls should be generously sized to allow for comfortable, informal use. Design with minimum joints. The minimum depth for seat walls shall be eighteen (18) inches. Copings shall be designed in proportion to each wall and shall be counter flashed to withstand weather impacts over time. Coping material shall be a natural stone material.

Retaining Walls

The preferred material for retaining walls is a natural stone veneer with fully raked or dry stacked joint grout lines with air space and weep holes both top and bottom, counter flashing under the coping cap, and a drainage system behind the fascia.

If cheek walls are necessary leading into exterior steps, the cheek walls should be treated the same as the retaining wall.

Screenings

Architecturally compatible site walls rather than fences should be used to visually screen utility, trash and service areas. Walls that screen must integrate itself with the building. Similarly, compatible walls should be used for screening service and utility areas throughout the campus. Such screening walls shall be engineered, conform to the surrounding building types and shall be lattice design in nature. Decorative effects should be avoided.

7.10 Bollards, Post and Chain, Fencing and Guardrails

Bollards

The use of simple granite bollards and blocks may be considered for use in applications where permanent bollards are required. In situations where unauthorized vehicular traffic on campus walkways and service drives requires control, card gates or removable bollards should be employed.

Install protective bollards around outdoor fuel tanks and fill pipes in locations where damage from normal vehicular traffic and snowplows can occur. These bollards shall typically be no greater than 6" in diameter, filled with concrete, secured to withstand a vehicle impact and have a polymer weather proof coated sleeve.

Post and Chain

The University utilizes post and chain in areas where accommodation of all desire lines would result in excessive expanses of paving and fragmentation of the landscape. Lawns and tree root zones that currently show signs of pedestrian and vehicular impacts should be protected with post-and-chain. When street trees occur in tree lawns, the campus standard post and chain detail shall be used on the sidewalk side of the tree lawn to protect the lawn and trees from cut across pedestrian traffic where necessary.

The campus standard for post and chain barriers is the PSU aluminum Fence Post and 1/4" grade 30 proof coil chain in black powder coated finish. The posts shall be 3" diameter cylindrical cast aluminum posts, with cast aluminum ball-top cap, and cast aluminum D-ring. Posts shall be set plumb in PVC sleeves cast inside of concrete foundations. Concrete post foundations shall be held 6" below grade, but the PVC sleeve shall come up to finished grade. Posts shall be 60" tall, with 36" exposed above finished grade, spaced 9' on center. Low points of each chain between posts shall be set at 22" above grade.

The University has determined the following Manufacturer(s) to be of acceptable quality for a post and chain style and system is Quality Machining, Inc. Model # 14424 or approved equal.

Fencing

The University does not have many application needs for permanent fencing since it prefers site walls. However, where there would be a need, the fence shall be high quality ornamental metal picket three rail with a black powder coated finish. There are applications for chain link fencing for athletic fields, where all components of the fence shall be vinyl coated black. Simple fencing is preferred over ornamental fencing. Where budget does not allow for site walls, simple fencing, designed to match the scale, color and directionality of adjacent architectural materials may be considered and shall be presented to the University Representative for review and acceptance prior to detailing the fencing requirements. Decorative effects should be avoided. In the Agricultural Area, extruded cellular PVC pasture fencing is recommended. All agricultural fencing along public roads should be visually consistent to create a unified campus image.

Guiderails

The University would prefer to have guiderails that are unobtrusive with a maintenance free finish. Vehicular guard rails shall be corten steel box beam guide rails attached to corten steel posts. Typical post spacing shall be six feet. Wood posts and rails shall not be used.

Although the desire is to have unobtrusive guiderails, the Designer must take into account that there are state roads that run through some of our campuses that require specific DOT requirements.

7.11 Roadway & Site Lighting

Site Lighting

Currently the Storrs campus standard for a post-top style pedestrian light fixture for use along campus walks and certain campus streets is the Parklane, Model No. F9AL-GX935-PG932 in black finish, with a 649 Washington Post 12' pole in black, both manufactured by Pennsylvania Globe Gaslight Company or approved equal. This fixture employs a partial cut-off shield that directs light downward to reduce nighttime light pollution and all exterior light fixtures shall comply with "dark sky" provisions. Lamps shall be LED.

Lighting that is provided for sidewalks should be no shorter than ten (10) feet and no taller than 20 feet, with a spacing of no greater than fifty (50) feet apart. Height and spacing shall ultimately be driven by a photometric study. Although a minimum of 1.0 ft.-candles is required on all sidewalks in all locations, this lighting criteria shall also apply to five (5) feet to either side of the sidewalk.

Lighting shall be provided at all exterior cross walks. Any alternative site lighting should meet the light levels and uniformity ratios recommended by the Illuminating Engineering Society of North America (IESNA) Recommended Practice Manual: Lighting for Exterior Environments and should be designed exterior with shielding to prevent light spillage to the night sky per the following standards: exterior fixtures with output greater than 3500 lumens shall be full cutoff; exterior fixtures with output less than 3500 lumens shall be Cutoff or Full Cutoff; and locate, aim, and shield all exterior light fixtures to minimize light trespass across campus boundaries.

Roadway Lighting

Currently the Storrs campus vehicular light fixture is the Sterner-Executive Series shoebox light on a metal pole with black finish or approved equal. Pole height, light spacing, and lamp watt- age shall be determined by the specific application. Lamps shall be LED rather than metal halide or high pressure sodium.

7.12 Site Furnishings and Accessories

Benches

Simple architectural benches or seat walls may be used in association with buildings if they are part of a unified architectural ensemble of entry walls, stairs, paving etc. The Scarborough bench (horizontal strap seat) manufactured by Landscape Forms or approved equal shall be used as the standard campus bench. Teak benches may be used in park and garden settings, Landscape Forms Wellspring bench, seventy-two (72) inch length, nineteen (19) inch height, without intermediate arms in sustainably farmed teak or approved equivalent shall be used. Simple stone benches are integrated with the architecture. Benches shall always be mounted on level concrete or other paving with sufficient space provided for convenient lawn mowing and snow plowing. When replacing in kind, replace with like bench.

Bike Racks

All buildings must have exterior bike storage in a designated area. The bike racks shall be simple, two point of contact, stainless steel or powder coated black and set in concrete. For residential projects, the exterior bike racks should be covered and an interior area should be designated for bike storage.

If a bicycle rack layout includes two or more aisles, the design should assume a bike length of 72 inches, and allow a minimum of 48 inches for aisle space. Aisle width should be increased to 72 inches in high traffic bicycle parking areas where many racks might be located, such as the Student Union and Library. These large parking areas should also have at least two entrances to ease congestion during times of high turnover.

Bike racks on campus shall be the Bike Rib Series II by Function First, Inc. or approved equal in black finish or equivalent. These racks allow for equal access at each point of attachment along the rack, so that the entire rack may be used at one time, with access required only from one side. This rack also allows for easy lock-up of both bike frame and wheels. The number of racks at each location will depend on the projected amount of use for each building. All bicycle racks shall be mounted on concrete paving with adequate space allowed for bicycle access. Bike racks should be placed a minimum of 30" from

walls or other objects. Bike parking areas shall be contiguous to walkways or plazas rather than floating in lawn areas. In order to promote bicycle use on campus, bicycle parking areas should be located as close to bike routes as possible, as well as adjacent to building entrances.

Trash and Recycling Receptacles

Wherever practical, the University prefers trash receptacles indoors. Currently the Storrs campus standard is a vertical strap receptacle powder coated black for trash or ivy for recycle. The receptacle has a covered top, which prevents the receptacle bag within from filling with water during storms, and a side opening, which allows for easy removal of trash bags.

Each trash receptacle is to be accompanied by an equivalent recycling receptacle that follows the same design standard as the trash receptacle except that it shall be green color. Each receptacle shall be labeled with white lettering, "Trash" for the black receptacles and "Recycle" for green receptacles.

Tables and Chairs

In areas where tables will be left outdoors all year round, anchor type table with integrated chairs anchored powder coated black shall be used or equivalent. In areas where tables and chairs can be movable and stored indoors, café style armless metal grid chairs and 30" round tables in various finishes shall be used or equivalent.

7.13 Site Grading Considerations

Site grading should take the existing topography and adjacent buildings into account. Creating flat terraced areas alongside buildings and structures are desirable, however the site should be sculptural and have smooth transitions between spaces.

7.14 Landscape Adjacent to Buildings

Within thirty feet of a particular building, site furnishings and lighting may take of the style of the building, but further afield from the building, the furnishings and lighting should be consistent with the campus-wide standards. Plantings should not be installed within four feet of a building so that maintenance has access between the landscaped areas and the building.

7.15 Soils

Planting Soils

When specifying new soils, the composition of the soil must be compatible with the plant type needs. Therefore, soils testing on existing soils is the responsibility of the Designer to ensure that the proper specification for treatment of the soil is compatible with the plant type being specified. Underdrainage shall be provided to avoid any ponding of water at the surface. The Designer should specify that the contractor shall submit copies of the soil characteristics for approval prior to installing same.

Any top soil that is brought onto any campus shall be free of high contents of contaminants and free from weed and invasive seed material. Specify that any new soils being brought onto any campus (whether specified or not) must be tested not only for the organics but also for contaminants and the results be submitted for review and acceptance prior to bringing soils on to University property. Treating the material on site may be an acceptable solution, however the specifications must state that any pre-emergent treatment must be submitted for review and acceptance prior to placement. Use of existing top soil is preferred should the organics be of a quality suitable for the plant type. Minor treatment of the soil on site is acceptable.

Placement of top soil shall be no less than six (6) inches and existing subgrade shall be scarified to a depth of six (6) inches for lawn applications. Planting beds shall be continuous top soil material no less than eighteen (18) inches.

Fill

Use of existing fill is preferred, however include within the specifications that should the Contractor determine on their own that they would rather replace with new fill from offsite verses working with existing fill, the Contractor must have independent tests performed (within the past 20 days from pickup) on the new soil and submit test results for acceptance by the Designer and the University prior to proceeding with replacement.

7.16 Trees, Shrubs and Plantings

Plants such as trees, shrubs and groundcover can dramatically improve the appearance of a facility and help control erosion while reducing the regular maintenance required of lawn areas. Plant material that is long-lived, non-invasive, indigenous to southern New England and well-adapted to the specific exposures, moisture conditions, climate and soils of the campus shall be used. The University's Landscape Architect, Tree Warden and Arboretum Committee will assist the Designer with creating a plant palette for each Project.

The Designer shall identify potential conflicts between proposed plantings and utilities including future impact to those services from its growing habit or rooting structure. As a general rule, no trees or large shrubs shall be proposed within fifteen (15) feet of any existing or planned utility including pad-mounted transformers and switchgears. Such planting constraints shall be presented to the University Representative in conjunction with Facilities Operations and the University's Landscape Architect prior to finalizing the planting design.

The University has a responsibility to protect, promote, catalogue and manage its trees as physical assets that create economic, educational and social benefits for the campus community. Any Project that proposes the removal or relocation of trees or shrubs shall be reviewed by the University Representative in conjunction with the University Landscape Architect and Tree Warden. Prior to the completion of the Design Development phase, the University's Arboretum Committee shall also review the proposal for comment and acceptance.

All plant material shall conform to the American Standard for Nursery Stock, published by the American Association of Nurserymen, Inc., current edition. Prior to delivery, the Designer shall inspect and select (tag) all plant material at their respective nurseries. Upon delivery to campus and prior to installation, the Designer, in conjunction with the University Representative and Landscape Architect, shall also provide final approval and confirmation that all plant material is in conformance with the Project's specifications. Designer shall require the Contractor to install University supplied identification tags for all new or relocated trees and shrubs installed as part of the contract, ensure that this is incorporated into the bid documents.

The University supports natural surveillance, access control and territorial reinforcement in the built environment as outlined by Crime Prevention through Environmental Design (CPTED) strategies. The Designer shall select and locate plant material to promote campus safety.

Trees

Trees shall be native species and shall be located based on what their mature growth size will be. Trees are to be preselected and purchased at a nursery, specify tree size to be selected on the planting schedule that is required at the time of digging and installation. The Designer and University Representative shall both be responsible for the selection of plantings. The Designer shall be responsible to ensure that the tree's root flares are flush with grade so that there is no crowning prior to mulch installation.

When design calls for trees along a street or walkway, the campus standard post and chain detail shall be used on the sidewalk side of the tree lawn to protect the lawn and trees from cut across pedestrian traffic where necessary.

Areas where site grades, soils, and subsurface utilities allow, tree lawns may be depressed below the level of the sidewalk to create simple bio-retention areas of lawn and trees. In such cases, trees should be chosen that can accommodate intermittent flooding, such as Red Maple.

In new street tree planting conditions, the preferred tree sizes are three and half (3 ½) inch caliper to four and half (4 ½) inch caliper. This size will insure that the tree will have reasonable visual effect at planting, be large enough to overcome the vulnerability to damage that smaller trees would experience, and be small enough not to require extensive excavation and shipping cost that larger caliper sizes would cause.

For general landscape tree plantings, the installation sizes may typically vary from one and half (1 ½) inch caliper trees to six (6) inch caliper trees depending upon the location, project budget, and species of tree being planted. For high use areas such as Sundial Plaza and the Pharmacy Quad, where the landscape is being created from scratch, the largest size trees that budgets will allow should be planned. Specify proper measures to insure that large trees will be appropriately cared for during a two to three-year acclimation period after planting. For tree plantings in other areas, where new trees are being used to supplement or renew existing plantings, smaller size trees should be used with preference given to one and half (1 ½) inch caliper sizes where adequate protection can be afforded by location and buffering from mechanical damage and pedestrian impacts. The advantages of planting small trees are lower material and planting costs, better plant acclimation, and lower initial maintenance requirements.

For street tree planting conditions, the preferred tree sizes are three and half (3 ½) inch caliper to four and half (4 ½) inch caliper. The intent is the size will insure that the tree will have reasonable visual effect at planting, be large enough to overcome the vulnerability to damage that smaller trees would experience, and be small enough not to require extensive excavation and shipping cost that larger caliper sizes would cause.

At a minimum, specify an eighteen months' warranty period (after substantial completion of the plant material) where the plant material must remain in good health as the condition to accept.

When design calls for removal of trees, the Designer shall obtain approval prior to designating the removal of the tree(s). Designer shall submit a request for tree removal in the format required by the University Representative in conjunction with the University Landscape Architecture department.

When under construction, should conditions arise that may require consideration for removal of a tree(s), the Designer must submit for review the request for tree removal to the University Representative. Designer shall not direct any tree removal without prior written approval from the University. Ensure that all trees and shrubs or hedges shall be flagged by the Contractor for final field review with the University Representative in conjunction with University Landscape Architecture department.

Designer shall take into consideration when designing/specifying the removal of any tree, the University prefers that the tree(s) be taken down sectionally and directionally dropped to minimize damage to adjacent tree canopies or root systems. Consider root protection matting to prevent rutting and compaction within the tree canopy zone. It is preferred that all work be specified to be done by hand, bucket truck or crane operated equipment. The use of equipment should operate on existing pavement where practical. Ensure that any wood debris is to be removed each day. Only trees with stumps within deep excavation shall allow for excavator removal. All others, stumps are to be ground to 8" below grade and grindings raked and removed from site; with the holes backfilled with pre-approved topsoil and mulch or seed per project. The removal must be performed by a qualified Contract Arborist.

7.17 Turfgrass

The University accepts different materials and methods of turf grass dependent on site conditions, including but not limited to hydro-seed. However, the preference is to place seed on soil and allowing the seed to establish. Sod shall only be specified with prior approval from the University Representative in conjunction with the Landscape Architect.

Specify a minimum of 30-60 days at the discretion of the University Representative for maintenance and establishment of the turf grass for performance.

7.18 Mulched Areas

The type, color, texture, and depth of mulched areas should be reviewed with the University Representative prior to completing the design. Trees planted in lawn areas shall be planted with mulch rings.

7.19 Irrigation

Given the constraints imposed by limited local water supplies, it is preferred that all planted landscape areas be designed to succeed without supplementary irrigation after the establishment period. With an annual rain- fall amount of over 40 inches, distributed relatively evenly throughout the year, it is reasonable to design the campus landscape without supplementary irrigation. It is recommended that all lawn and planting areas be supplied with planting soils designed with adequate moisture retention capacity, and that plant selection and grass seed mixes be suitable for non-irrigated landscapes. During the establishment period of all plantings, it is preferred that a watering program be implemented as part of the landscape installation contract. Designer shall review with the University Representative to determine a period of time suitable that will help guard against serious stress injuries during the establishment period when root systems are not fully balanced with top growth.

7.20 Grounds / Roads Maintenance Affects

When specifying plantings or hardscapes, low impact design should be considered. When project demands require grass or plantings to be installed outside the planting season and/or require a higher level of care and attention for establishment; consider alternate ways for the initial care of them such as

“gator bags” for new trees or installation of an 8’ walkway to reduce snow blowing for snow plowing, or heated sidewalks at building entrances. Avoid 90-degree sidewalk intersections, choose a radius connection that assists in grass maintenance and minimizes foot traffic shortcuts. For areas where a mower is not able to access, consider other means of filling the space, design for good “mow flow”.

Design for snow clearing of all hard surface areas with a designated pervious area for snow storage.

The Designer shall provide with each project that impacts any University grounds, roads, and parking lots; a resource and cost loaded schedule for maintenance. Lineal and square footage of areas impacted shall be provided within the calculations for cost impact to the changes or additional areas. The staffing levels should be developed for various levels of attention utilizing the APPA Operational Guidelines for Educational Facilities. The levels of attention will be a 1-5 ranking with 1 being of the highest level of attention and 5 being total neglect of the property. Most of the property will be maintained at a level 1 through 3. Note that the lawns during peak times are mowed every four days. Annual gardens and pots are changed out no less than three times a year and 25% are four times a year.

7.21 Way finding, Informational and Directional Exterior Signage:

The University limits the amount of banners, lawn signs and building signs that are allowed on the campuses. Any desired banners or temporary signs must be preapproved by the Sign Committee prior to final design and fabrication. Signs and banners that are fabricated and installed that have not been preapproved by the sign committee, will be immediately removed.

The University has approved seasonable banners for light poles in certain areas of the campus. When designing a new roadway or walking paths, review if seasonable banners will be required with the lighting. The desire for additional style banners shall have prior approval by the University Sign Committee.

The University’s primary color palette is:

Navy Blue	Pantone 289C	C10	M75	Y12	K70	RO	G14	B47
White	Opaque White	CO	MO	YO	KO	R255	G255	B255
Grey	Pantone 430C	C33	M18	Y13	K40	R124	G135	B142

Construction Banners

University Communications have established the requirement of informational Project Construction Banners to be strategically placed on the perimeter construction fencing and scrim for each highly visible construction project. The background and graphics are determined by University Communications and the banners are the responsibility of the University. Contractors are to install these banners on a project by project basis, therefore the Designer during the Site Logistics review should inquire as to the use of such banners in lieu of graphical scrim.

Typical banner size is five (5) feet in height x twenty (20) feet in length or (5) feet in height x thirty (30) feet in length and fabricated with UltraMesh Plus 8oz coated polyester scrim mesh, 4/0 color process, reinforced webbing on all sides with silver nickel grommets every 20” with 8” cable zip ties per grommet or pocket sleeve for cable wire for installation. Graphics shall be supplied by the University Representative in conjunction with University Communications.

Construction Project Signs

Construction signs are required and should be specified for each highly visible construction project. Such signs shall be forty-two (42) inch in height x seventy-eight (78) inch in length single sided, premium cast vinyl lettering or image mounted to MDO board; clamps for mounting to black paint wood posts with flat cap. Depending on the length of the perimeter fence will depend on how many of the signs will be required. The Designer is responsible for ensuring within the Construction Documents the location and information for the sign is identified and included as part of the base bid. The Designer shall work through the University Representative will obtain specific information for the sign and how many shall be determined prior to 50% completion of the construction documents. Such sign(s) shall be supplied and installed by the Contractor prior to commencing construction. See web link for specifics on the construction Project Sign: <http://paes.uconn.edu/Contractors.html>

Gateway Signs

The size for this type sign shall be ten (10) inch deep x fourteen (14) feet in length x four (4) feet in height. The lettering shall be University Font and Gotham Bold, premium vinyl. The base for this sign shall eighteen (18) inch in height with natural stone façade.

Secondary Signage

All parking, handicap, etc. signs are created by the University sign shop. Locations of these type signs are to be reviewed and approved by the Sign Committee prior to the completion of the Construction Documents phase. Bicycle lane or “share the road” street signs shall be posted as needed and appropriate for pedestrian, motorist and bicyclist safety, and may be co-located on other parking and regulatory signs where feasible to avoid sign clutter and additional channel posts.

Parking and Regulatory Signs

Sign blank – ten (10) inch in height x eighteen (18) inch in length, 063 metal, reflective covering w/ black border

First line – one and half (1.5) inch colored bar, color: varies

Second line Font - Gothic condensed, one and three quarter (1.75) inch height, color Black

Third line Font - Gothic condensed, 1.18” height, color Black

Fourth line Font - Gothic condensed, one (1) inch height, color Black

Fifth line (if required) – one and half (1.5) inch Symbol, color Black

Ten (10) feet #2 Galvanized U-Channel posts for Regulatory Signs

Eight (8) feet #2 Galvanized U-Channel posts for Parking Signs

Three (3) feet #2 Galvanized U-Channel posts as the “starter-post”

Exterior Building Identification Signs

There shall be no hard case lettering, signs or neon ticker tapes designed to be mounted on any building. The University has a standard freestanding building identification sign. The size of this type sign shall be 6’ x 4’. The lettering shall be University Font and Gotham Bold premium vinyl. Mounted on two – three (2-3) inch diameter posts and installed in a concrete. The oak leaf, the building name, and the building address shall be represented on the sign. The University Sign Committee Representative shall be consulted on details of the layout.

With prior approval of the Sign Committee, Buildings shall receive white vinyl lettering applied to glass entry ways that identifies the building and which entrance you are entering.

8 Civil and Utilities Design Guidelines

8.1 Guiding Principles

The University has adopted a Master Plan for the Storrs and Depot Campuses. It is the responsibility of the Designer to review the Master Plan and consult with the appropriate University Representatives when approaching any design requirements for current and future demands on the utilities infrastructure. Designs must take into account future requirements and demands identified within the Master Plan that would impact any particular System whenever feasible.

Although these standards are generally for all campuses, the University's regional campuses have very different subsurface and environmental conditions, and therefore, an individual analysis of these conditions will be required. For example, the Avery Point campus has significant exposure to seawater and salts, and therefore all underground piping will need particular protection from corrosion. The Designer should identify and coordinate any changes to these standards with the University prior to any implementation of same.

The main campus is located in Storrs, Connecticut consisting of over 300 buildings situated on a 420-acre campus. Approximately 156 of these buildings receive heating steam and/or chilled water from underground distribution systems emanating from the central and south campus utility plants. There is a high water table in a fair amount of the Campus, therefore proper due diligence should be performed when locating and designing for underground structures and duct banks.

The University has contracted with a Frame Work consultant whose responsibilities are to investigate, map and model the University's existing utility infrastructure. Any project that requires an increase demand on the existing utility infrastructure shall submit the full load demands of the building including the increase to the Frame Work consultant, who in turn will provide direction if the existing utility infrastructure can support the added demand. Should upgrades to the existing utility infrastructure be required, the Frame Work consultant shall be responsible to design those upgrades and identify the appropriate location for which any new service connections need to be made. Such connection designs, and the design of the services from the connection points to the project, shall be the responsibility of the Designer.

Where possible, all utilities should come into one quadrant of the building. Distinction between all existing and new utility runs shall be shown on one composite drawing to make apparent any potential interferences. Such interferences and connections to existing shall be detailed on profile drawings for individual and common utilities to show elevations for construction and clearances from other utilities. The Designer shall model utility runs and connections to ensure proper coordination and clash avoidance has been performed. Assumptions must be clearly noted on the drawings to allow for further investigation prior to bidding. See Appendix II - Electronic Document and Plan Submission Requirements for additional information on document requirements.

Survey and grading/excavation plans shall indicate all underground utilities and the effects of new grading. Full coordination of existing and proposed utilities and other appurtenances with proposed grading shall maintain the required depth or cover

The preference is to run utility piping within a paved area. All surface components of the utility system shall be located entirely within paved surfaces to the greatest extent possible. If conditions do not permit such routing or locating components within paved areas, obtain approval from the University Representative in conjunction with the University's Landscape Architect to run the utilities piping under a landscape area. Follow the requirements of State of Connecticut Department of Transportation and these Design Standards for road and sidewalk repair requirements in these situations.

The University prefers not to abandon any piping or other structures underground. Should conditions identify existing piping or structures to be of an asbestos-containing material (ACM), where feasible it shall be removed before back filling upon prior inspection and approval from DEEP and University's Office of Environmental Policy. The Designer shall seek approval from the University's Representative in conjunction with the Office of Environmental Policy prior to assuming any abandonment of piping. If such removal is a hardship and the regulatory authorities approve the abandonment, the Designer shall have the pipe or structure GPS located and documented on a separate CAD layer for abandoned material as an as-built for the University to register.

It is the Designer's responsibility to coordinate all proposed underground piping locations with existing and proposed landscaping to ensure that no tree or large plantings are located within 5' of the proposed piping route or installation. Where piping is proposed to be installed near existing trees or large plantings, the Designer shall obtain a licensed arborist to investigate the condition of the plant roots and propose mitigation measures to protect the tree both during and after the piping installation or to change the route of the piping.

All connections to the campus steam, condensate, and chilled water systems shall be coordinated with the University Representative in conjunction with Facilities Operations for that campus. The Designer shall be responsible for providing within their Design Schedule and requiring that of the Contractor's Construction Schedule, the anticipated milestone of at least 14 days' advance of any tie-ins or shutdowns required to facilitate a tie-in. The University Representative in conjunction with Facilities Operations has final authority on any and all scheduling of shutdowns, outages, etc., for connections and tie-ins. In many instances, connections can only be made during a planned outage or shutdown such as the University's standard shut down for maintenance of the Steam and Condensate lines in May of every year. For this reason, connections are only typically made when weather conditions permit such work.

It is the responsibility of the Designer to ensure that specified piping and their submittals provide a Certificate of Compliance verification to ensure quality assurance and controls are being performed.

Design to ensure backfill with clean stone a minimum of twelve (12) inch below all underground piping and eighteen (18) inch minimum on either side of the piping. If piping is designed to cross wherein the amount of stone would be less than these standards, obtain direction from the University Representative for deviations to the standard.

The Designer shall include within each specification section that involves underground utility work, that the Contractor must take digital photos to capture seventy-five percent of the progress of the underground work. Contractor must take finish conditions of the work prior to back filling. Should the Contractor fail to take photos of the condition of the work, the Designer and/or Owner reserves the right to require the Contractor to uncover the work for inspection at the Contractor's expense.

The University has an Environmental Title V air permit that will need to be updated for all projects, Designer shall provide the necessary updates by working with the University Representative in conjunction with the OEP Representative.

8.2 Call before you dig (CBYD)

The University is responsible for marking all utilities prior to beginning any excavation work. The University uses a water based paint that fades more quickly than the average CBYD markings.

Include within the specifications that it is the Contractors responsibility to monitor the condition of the markings and maintain their appearance throughout the duration of the project schedule. At final closeout, the Contractor is responsible for the complete removal of all CBYD markings applied on any hard surface during the course of the work.

8.3 Marking Requirements

The University requires all new and replacement utilities piping installations to provide marking tape that follows the AWWA standard color recommendations for various utilities. Such marking tape shall be minimum 4" wide and detectable magnetic plastic tape manufactured specifically for warning and identification of underground piping. As an example, the tape could contain the words "CAUTION - steam distribution piping" or similar wording dependent on the utility being identified. This tape shall be installed no more than 12 inches below finished grade.

8.4 Utility Quality Control

As part of the submittal requirements, require that a certification is provided by the manufacturer of the piping system to include the following; 1) from the manufacturer recognizing who the Contractor or Subcontractor is who will be installing the system and that they are a certified installer for their manufactured system, and 2) that the manufacturer provides the name and contact information of a knowledgeable technically trained Manufacturer's Representative who shall be assigned to witness/oversee the project's installation of the system and that such representative is a recognized agent of the manufacturer who has the authority to provide an unconditional certification which shall ensure a warrantee/guarantee of the installation. Daily logs of the installation shall be required from the manufacturer's representative inspecting and witnessing the delivery, trench preparation/fill, installation of the piping, connectivity and any issues and/or discrepancies with the installation. Note any corrective actions, if any, given on the installer, follow-up to the corrective action given and date the correction was performed to the satisfactory of the Manufacturer's Representative or if no corrective action was taken, such information shall be immediately reported (in writing) to the University's Representative regardless if corrective action has been performed.

Include testing of all pre-insulated conduits by a pneumatic pressure test at 10psig for a minimum of one hour. Note that if the Contractor fails to provide sufficient notice for testing to be arranged and performed, all cost associated with obtaining confirmation testing shall be borne by the Contractor. Additionally, incorporate that the Contractor must take sufficient steps to prevent pre-insulated pipe from getting wet. If pre-insulated pipe does get wet, remove affected sections shall be removed and disposed of at the Contractors expense. Contractor shall provide a final dryness acceptance test acceptable to the manufacturer's authorized agent (by written acknowledgement) and submit the procedure for verification for dryness to the Designer for acceptance.

Design for backfill to be placed at a minimum of a 6-inch layer of sand or pea gravel, tamped in the trench to provide uniform bedding for the conduit and the entire trench be similar to the bedding in 6 inch compacted layers to a minimum height of 6 inches above the top of the conduit. Require the bedding and backfill materials be a submittal for approval by the designer and manufacturer. The composition of backfill and compaction are extremely important to prevent settling and shifting of conduit, disruption of link seals, etc. therefore require that confirmation of approved material and compaction tests are performed by an independent testing agency on length of trenches of twenty (20) feet before additional backfilling is performed. Note that if the Contractor fails to provide sufficient notice for testing to be arranged and performed or if the compaction tests fail, all cost associated with obtaining confirmation testing shall be borne by the Contractor.

Hot taps are typically discouraged, however may be acceptable under certain conditions when allowed by the University Representative in conjunction with Facilities Operations and EHS, Public Safety. To ensure a quality installation, the Designer shall include within the specifications that at least 20% of the field welds shall be x-rayed by an independent qualified testing agency. Such test locations shall be identified with the testing agency in the field by the Designer. Any tests that fail shall be repaired and retested at the expense of the Contractor. Any welder that fails three weld tests shall be removed from the job and the welds that were performed by the welder, shall all be tested, repaired and retested at the Contractor's expense.

8.5 Potable Water

Potable water originates at UConn owned wellfields along the Willimantic and Fenton Rivers where it is treated and pumped to a 5.4-million-gallon reservoir located on the North end of campus. From there, it is pumped via the high-head pump house to a water distribution system serving UConn and portions of the surrounding community. The potable water distribution system includes all mains and service laterals plus the iconic water towers (standpipes) emblazoned with the husky logo on the North end of campus. It also includes a 1 MGD interconnection with Connecticut Water prior to the 5.4MG reservoir. This connection normally provides the water being delivered to the surrounding community but is available to supply more (to the UConn campus) should one or more of the wells become inoperable.

The University has retained the services of New England Water Utility Services (NEWUS), a subsidiary of Connecticut Water (CTW) as its water system operator. New installations as well as all changes to the University water distribution system shall comply with these standards and specifications. Any deviations shall be submitted to the University Representative in conjunction with Facilities Operations for approval.

New designs shall provide for redundancy for potable water mains and adhere to all State of Connecticut, Department of Public Health Regulations related to the design and installation of potable water systems.

Fire water service does not require a separate line from the potable water service, however the fire service must branch off before entering the building and must have a backflow preventer. Where feasible and for buildings exceeding 250,000 square feet, redundancy fire service shall be included. Water piping should be ductile iron Class 54 double cement lined with mechanical restraints on all joints. Cover pipes per Factory Mutual requirements.

Piping

Carrier pipe for potable water shall be ductile-iron, Class 52 double cement, double mortar lined with double bituminous seal coating inside, with push on style joints. If flanged pipe is required, it shall be Special Class 53 with ductile iron with threaded flanges.

Pipe of various sizes shall have a minimum wall thickness as follows:

Pipe Diameter (inches)	Class of Pipe minimum thickness		
	52	53	54
4"	0.29	0.32	0.35
6"	0.31	0.34	0.37
8"	0.33	0.36	0.39
10"	0.35	0.38	0.41
12"	0.37	0.40	0.43
14"	0.39	0.42	0.45
16"	0.40	0.43	0.46
18"	0.41	0.44	0.47
20"	0.42	0.45	0.48
24"	0.44	0.47	0.50
30"	0.47	0.51	0.55
36"	0.53	0.58	0.63

Cement mortar lining minimum thickness shall be as follows:

Pipe Size (inches)	Minimum Lining Thickness (inches)
3-12	1/8
14-24	3/16
30-54	1/4

The University has determined the following Manufacturer(s) to be of acceptable quality of Ductile Iron Pipe; Atlantic States Cast Iron Pipe Company, American Cast Iron Pipe Company, Clow Water Systems Corporation or Griffin Pipe Products Company - U.S. and Canada manufactured and finished only United States Pipe & Foundry Company.

The University has determined the following Manufacturer(s) to be of acceptable quality of restrained Joint Ductile Iron Pipe: United States Pipe & Foundry Company (TR Flex) or Clow Water Systems Corporation (Super-Lock)

Installation of Ductile Iron Pipe

The Designer shall incorporate into the specifications, careful examination of the pipe for defects before and during installation. Under no circumstances shall defective pipe be installed which is known to be defective. If any defective piece is discovered after having been installed. All pipes and fittings shall be thoroughly cleaned before they are installed and shall be kept clean until they have been accepted in the completed work.

Each piece of pipe and each fitting shall be installed upon blocking set at no less than two (2) different points along its length. The blocking shall be sound timber two (2) inches thick, twelve (12) inches wide and of a length equal to the diameter of the pipe. Wedges twelve (12) inches long, of four (4) inch by four (4) inch sound timber, shall be placed on the blocking to hold the pipes and special castings in position.

Require that blocks shall be firmly bedded on the trench bottom slightly below the grade of the finished pipe before the pipes are placed. After the pipes have been lowered into the trench, the wedges shall be placed and adjusted so as to bring the pipe to proper alignment and grade.

Joints

The Designer shall require all pipe joints be push-on type rubber gasket unless conditions dictate otherwise and employing a single, elongated grooved rubber gasket to affect the joint seal. All fittings and valves shall be of the mechanical joint type unless conditions dictate otherwise. Ensure all joints shall conform to the applicable ANSI requirements.

Acceptable quality of push-on locking or mechanical joint locking gaskets: "Field Lok" by U.S. Pipe, "Sure Stop 350" by Mc Wane, Griffin Talon RJ Gasket or approved equal.

Rubber Gasket Joints

The Designer shall require rubber gasket joints of the compressed rubber ring gasket type. Ensure the joints shall be thoroughly cleaned, prepared and installed in strict accordance with manufacturer's recommendations.

Only rubber gaskets furnished by the manufacturer of the pipe shall be used. Gaskets which have become damaged or which are defective in any way shall not be used in the work. Include that gaskets shall be stored in a cool, dark and dry place and shall be kept warm prior to their use in cold weather. Jointing materials shall fully comply with and be installed in accordance with the manufacturer's requirements.

Encasements

Design to include polyethylene encasement installed around the water main in accordance with AAWA C105-99, whenever the following conditions exist:

- A water main crosses above or below a gas main (includes metallic natural gas, jet fuel, fuel oil, and any other lines employing the use of a cathodic protection system). Encasement shall extend a minimum of 10 feet to either side of the crossing.
- A water main runs parallel to a gas main and is within ten feet of the gas main, the water main shall be wrapped. A water main is installed in corrosive soil, i.e. cinders, swamp, meadow mud, area of salt water intrusion, etc., it shall be wrapped the entire length.
- A water main is installed within 100 feet of an impressed current cathodic protection anode bed, it shall be wrapped the entire length.

Ensure the encasements be installed in accordance with AWWA standard C105-99 method "A", or latest revision. Direct the Contractor to cut to a length approximately 2 feet longer than that of the pipe section and have a 1-foot overlap of the tube around the pipe, provided at each end. Lower the pipe into the trench and make up the pipe joint, overlapping the wrap at the joint.

Valves and Valve Boxes

Valves shall be provided as necessary to facilitate normal operation, future work, and to mitigate the effects of a pipe break. Valves shall be provided with valve boxes brought to the surface with a lockable cover and located in planting beds or green landscaped areas with plantings to camouflage. To the

extent that is not possible, valves shall be located under sidewalks. Valve boxes for valves under sidewalks shall be equipped with access rings and plates made of stainless steel. To the extent possible, avoid installing piping and valves under roadways and great lawns.

Valve boxes shall include an adjustable collar and have a "right to close" (Clockwise) handle.

Check valves shall be cast iron, with flanged ends suitable for potable water. Acceptable manufactures include Val-Matic Surge Buster or approved equal.

Ensure that valves are set with their stems truly vertical. Valve boxes shall be carefully placed to insure the free and proper operation of the valves.

Non-rising stem shall be resilient wedge. The University has determined the following Manufacturer(s) to be of acceptable quality of isolation valves: Mueller or approved equal.

If a Watts back flow preventer is specified, a 909 model shall be specified.

Trenching

The Designer shall ensure Test Holes shall be excavated in advance of pipe laying where directed by the Company to determine the occurrence, location and dimensions of existing sub-surface structures and character of foundation material. They shall be backfilled in the same manner and with material similar to that specified for the upper portion of pipe trenches.

Backfill

Backfilling material for at least one (1) foot above the top of the pipe shall consist of selected fine material containing no stones larger than one-half inch in size. Backfill of the fine selected material shall be carefully and thoroughly tamped with approved tools in such a manner as to prevent settlement. Special care shall be taken to place the best sandy or gravelly material under the pipe on the quarters and to bring it up solidly so as to furnish a hard bed for the whole of the lower part of the pipe.

The required backfill above the one-foot layer of fine selected material may be placed in one layer provided it is compacted by means of a hoe-pack to achieve a 95% modified proctor density. If a hoe-pack is not used, the backfill shall be spread in layers not exceeding twelve (12) inches in depth prior to compaction. Each layer shall be carefully and thoroughly tamped with approved tools in such a manner as to prevent settlement after the backfill has been completed and to achieve a 95% modified proctor density. If in the opinion of the "Engineer or Inspector" the compaction of the backfilled trench is not suitable, compaction tests will be required to verify that proper compaction was achieved. All costs for compaction tests will be borne by the Contractor.

Blue marking tape reading "Caution - Water Line Below" shall be placed a minimum of 24" above the top of the water main.

The use of frozen material will not be permitted. The excavated paving, either bituminous or other, shall not be placed in the trench as backfill.

All settlement in backfill shall be repaired by the Contractor at his expense.

Prior to placement of permanent pavement all trenches shall have sufficient compaction to achieve a 95% modified proctor density.

Bank Run Gravel

Bank run gravel shall have a gradation within the limits given below. It shall be obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted. It shall not contain vegetation, masses of roots, or individual roots more than 18 inches long or more than 1/2 inch in diameter. It shall be substantially free from loam and other organic matter, clay, and other fine or harmful substances.

Sieve Size	Percentage by Weight Passing
6 in.	100
3-1/2 in.	90-100
1-1/2 in.	55-95
1/4 in.	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

Select Gravel

Select gravel shall have a gradation within the limits given below. It shall be obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted. It shall not contain vegetation. It shall be free from loam and other organic matter, clay, and other fine or harmful substances.

Sieve Size	Percentage by Weight Passing
3 in.	100
1/2 in.	80-100
No. 4	60-80
No. 40	10-30
No. 200	0-10

Handling

Proper and suitable tools for safe and convenient handling and installation of pipes, fittings and valves shall be used. Great care shall be taken to prevent damage to the protective coating. Minor damage to exterior coating may be patched with asphaltum. Excessively damaged material shall be removed.

Cutting Pipe

Pipe shall be cut by means of a pipe saw or other approved method in accordance with the manufacturer's operating instructions for the equipment to produce a clean true cut, free from irregularities and leave a smooth end at right angles to the axis of the pipe. All bevels shall be made with appropriate grinding equipment

Quality Assurance and Control

Ensure that the Contractor has been fully informed of exercising care in planning the work to arrange for the proper setting of all fittings, valves and other appurtenances required in the completed pipe lines.

Fittings shall be properly supported with additional blocking if required to maintain the pipe lines in alignment. All bends and tees shall be securely anchored by poured concrete blocking. After installation, all friction clamps, thrust rods and miscellaneous exposed metal threads are to be coated with asphaltum.

Valves shall be adequately supported (blocked) during construction.

Ensure requirements within the specifications for proper testing of the pipe once installed and prior to being backfilled.

- **Pressure Test:**

All newly installed pipe shall be subjected to a hydrostatic pressure test equal to 1.5 times the working (system) pressure at the point of testing, but in no case less than 1.25 times the working pressure at the highest point along the test section. Under no circumstances shall the test pressure exceed pipe or thrust restraint design limits, or be over two times the rated pressure of closed valves or hydrants located within the test area, or the rated pressure of closed resilient-seated gate or butterfly valves. Unless otherwise specified, the test pressure shall be maintained for a minimum of two hours with no more than a 5 psi pressure drop.

Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow offs are not available at high places, the Contractor shall make the necessary taps at points of highest elevation before the test is made and insert the plugs, if desired, after the test has been completed. The section to be tested shall be closed by valves, temporary flanges, plugs or bulkheads as required.

- **Leakage Test:**

The leakage test will be conducted at the same time as the pressure test. Leakage is the quantity of water required to maintain the pressure within 5 psi of the specified test pressure, it is not the measured drop in pressure. Leakage shall not exceed the number of gallons per hour as determined by the engineer.

Each valved section of pipe shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the inspector. The pipe connection and all necessary apparatus including pump and testing gauge shall be furnished. The Contractor shall notify the Designer when testing will be performed for witnessing.

If leakage is either visible or indicated by the above test procedure, the Contractor shall do whatever is necessary to locate and replace the pipe at his own expense. Upon completion of the replacement the pipeline shall be retested.

- **Disinfection:**

Before any section of pipeline is put into service, it shall be thoroughly disinfected in accordance with AWWA Standard C651-99, Section 4.4.2.

Chlorine tablets (5 G calcium hypochlorite) shall be supplied and placed by the Contractor on the inside top of each length of main as it is laid using Permatex No. 2 adhesive or equal. The

number of tablets used per length of pipe shall be as is indicated in Table 2 of the above specified AWWA Section (one for 6", two for 8", four for 12", etc.).

The completed line shall be slowly filled with water and allowed to stand under pressure for at least 24 hours before being thoroughly flushed. A sample of water from the section shall be collected for analysis in a sterilized bottle by CWC.

Should the analysis be unsatisfactory, the section shall be re-disinfected and retested until an analysis satisfactory to CWC is obtained. All costs for re-disinfection and retesting shall be borne by the Contractor.

8.6 Steam and Condensate Systems

Steam is generated at the University Power Plant and is distributed throughout the Storrs campus through a piping distribution system. The pressure is reduced for the steam distribution to 65 psig and a design temperature of 350°F. Condensate is returned to the power plant using gravity or pumped condensate return piping systems at temperatures ranging from 125°F – 180° F.

Where it is economical, it is preferred that all condensate and steam piping shall be installed in either a central utility tunnel or a dedicated steam tunnel. All tunnels shall have a mechanical ventilation system to allow non-permit confined space entry, LED lighting along the full length, and 120-volt convenience outlets at no greater than a fifty (50) foot intervals.

When a tunnel is not feasible, pre-Insulated (pipe in conduit) piping systems shall be used. Pre-insulated piping systems are used for steam, pumped condensate and high-pressure condensate (trap) lines and include all pipe, fittings, anchors, transitions, expansion loops, field joints, etc., to a point designated on the drawings inside a building, tunnel, or manhole wall. Carrier pipe insulation shall be aerogel. Mineral wool is not allowed. Pipe and conduit shall be factory coated with high solids, inorganic, zinc rich coating, 4 mils thick. Welds shall be touched up with a cold galvanizing compound before being insulated and covered with a pressure testable field joint. Exposed ferrous piping (inside of vaults) shall be coated with a two-part epoxy rated for 450F, similar to Sherwin Williams Core Cote, HT, FF, 10 mils prior to being insulated with calcium silicate and covered with aluminum jacketing.

Valves and traps should not be coated with the epoxy. They shall be insulated with removable thermal blankets similar to Insultech by Shannon Industries or approved equal. Insulation thickness in accordance with manufacturer standards for 125 psig steam.

Steam Piping

Carrier pipe for steam shall be domestic carbon steel, schedule 40, ASTM A106, Grade B, seamless. Fittings for steam shall be domestic carbon steel, standard weight, ASTM A106, Grade B, seamless. Certified Mill Test Reports for the steel used in the piping must be submitted for approval prior to installation. Steam piping must be produced and supplied by providers who are ASME certified installer for Pressure Vessels. Include in the requirements that the installing contractor must be manufacturer certified installers of the system at the time of bid and that they must provide an updated manufacturer's installation certification recognizing their firm as the certified installers for the system.

Include within the bid form, the Contractor must identify the manufacturer of the piping system to which their bid is based on and identify the firm's name who is a recognized certified installer of the manufactured system identified.

Pre-insulated piping systems shall be supplied with an HDPE outer jacket. Thickness shall be per manufacturer's specs but not less than 150 mils (for conduits < 15-in.) or 175 mils (conduits > 15-in.).

The system shall have vault water level monitoring and low point detection capability that is compatible with the University's Andover Continuum monitoring program. Break detection cables shall be within the outer insulation jacket of the pipe systems. All exposed pipe, thread-o-lets, end-seals, etc. shall be coated with an epoxy, inorganic zinc, or other corrosion prevention coating designed to protect ferrous materials in a salt spray environment. Where possible, provide a spring assisted soft seat check valve in casing vent lines, in lieu of a swing check (flapper style). Vaults shall have gravity feed to sanitary system where possible.

Wherever possible, design straight sections of forty (40) foot lengths to minimize the number of field welds. All fittings, anchors, and accessories shall be designed and prefabricated to job dimensions to minimize the number of field welds. All field joints shall have a heat shrink sleeve applied.

Steam Valves

Stainless Steel triple offset valves shall be used. Acceptable quality of steam valves Zwick, Crane, or approved equal.

Steam Traps

The Designer shall be aware of the danger of injury or death that might occur due to condensate induced water hammer (CIWH). Steam traps should be provided for the removal of condensate at collection points in the steam piping systems, at drip legs and at terminal ends of companion piping. All low points in steam lines and the ends of long headers should be provided with drip legs and traps. On headers with long sections, drip legs should be installed at intermediate points in addition to those at low points and at the ends. Steam traps should be installed to be accessible for periodic inspection. Each trap should serve only one collection point and shall be properly sized for both flow rate and ANSI pressure rating. Steam trap discharge lines shall be sloped for drainage. The Designer shall apply the trap manufacturer's recommended safety factor when sizing traps but in no case shall a safety factor of less than 3 be used. Isolation valves shall be before the strainers but after the trap. Strainers with blow down valves shall be located ahead of each float and thermostatic (F&T) trap.

Trap lines (Schedule 80) shall run separate independent pre-insulated steam conduit to a flash tank located outside of a building, vault, man-safe culvert, or manhole. Do not run it in the annular space.

Steam Seals

Gland seals shall be used whenever there is a penetration to a vault or building to prevent the influx of moisture into the conduit. End seals shall not be used. Sub-assemblies shall be designed to allow for complete draining and drying of the conduit system. In a vault, insulation shall be split rigid held in place by stainless steel bands installed on at least eighteen (18) inch centers with aluminum jacket.

It is important that the specifications call for the Supplier to analyze the layouts for stress and thermal movement of the carrier pipe and design accordingly and design to allow for complete draining and drying of the conduit system. The Supplier must certify that their field representative is experienced in

the installation of the system and that they will be present and conduct inspections of the work at certain but not limited intervals such as; unloading and staging of the material, preparation of the trench, installation of expansion loops, anchors, field joints, hydrostatic testing of the pipe, pneumatic testing of the outer jacket field joints, repair of any patch work and the back filling of the system. Include that the Contractor shall coordinate with the System's Representative their inspection at each interval and provide a daily report to the Designer the activities noting any issues or discrepancies while inspecting. Include that should the Contractor fail to coordinate with the Supplier's field representative and Supplier's field representative cannot attest and certify the entire installation is in accordance with manufacturer's installation requirements, the Contractor shall be required to uncover any portion of the installation of the system for proper inspection by the Supplier's field representative.

All steam piping shall have a seventy-five (75) year service life.

Condensate Piping

The condensate minimum design pressure shall be 125 psig saturated steam. The condensate operating system pressure is approximately 25 psig liquid and a design temperature of 190°F. Certified Mill Test Reports for the steel used in the piping must be submitted for approval prior to installation. Steam piping must be produced and supplied by providers who are ASME certified for Condensate Piping installation. Ensure proof of certification must be submitted for approval prior to installation.

Carrier pipe for condensate shall be domestic carbon steel, schedule 80, ASTM A106, Grade B, seamless. Fittings for Condensate piping shall be domestic carbon steel, schedule 80 (extra strong), ASTM A106, Grade B, seamless.

The University has determined the following Manufacturer(s) to be of acceptable quality for steam and condensate piping include Rovanco (Insul-800 High Temp Conduit), Perma Pipe (Multi-Therm 500), and Thermacor (Duo-Therm 505).

Require that conduits be pressure tested and field enclosures be electric thermo fusion.

If Expansion Loops and Elbows are specified to be prefabricated, the Designer must confirm and allow for adequate thermal expansion.

All condensate piping shall have a seventy-five (75) year service life.

8.7 Chilled Water

Chilled water is generally supplied from the plant at a temperature of 45 °F with a pressure (65 psig) ranging from a minimum of 50 psi and a maximum of 100 psi. Preferably chilled water coils should be designed with a delta –T no greater than 12°F for greater and therefore should return at 57°F or higher. The University has determined the following Manufacturer(s) to be of acceptable quality for smart control valves is Belimo or approved equal.

Underground distribution systems shall be rated for 150 psig at fluid temperatures ranging from 34-140°F. Design temperature of 40°F with operating temperature of 42°F.

Pipe

The University prefers the carrier pipe to be domestic carbon steel, schedule 40, ASTM A53, Grade B, ERW. Fittings for Chilled Water shall be domestic carbon steel, schedule 40, ASTM A53, Grade B, ERW.

Certified Mill Test Reports for the steel used in the piping must be submitted for approval prior to installation. Chilled water piping must be produced and supplied by providers who are ASME certified. Include in the requirements that the installing contractor must be manufacturer certified installers of the system at the time of bid and that they must provide an updated manufacturer's installation certification recognizing their firm as the certified installers for the system.

Require fittings, anchors, link seal and accessories are to be prefabricated to job dimensions to minimize the number of field welds and prevent the influx of moisture. The Designer shall specify that all field joints shall be pressure testable with an additional heat applied shrink wrap in accordance with the manufacturer's recommendations.

The University has determined the following Manufacturer(s) to be of acceptable quality for chilled water pipe include Polytherm by PermaPipe, Chill-therm by Thermacor, and Steel System by Rovanco.

Expansion loops and elbows are to be determined by the Designer in accordance with thermal stress analysis. All pressure testing ports shall be plugged and sealed via heat applied shrink wrap applied to entire circumference of pipe and marked as to where the test port was located.

The University prefers that all penetrations shall be sealed utilizing a water tight sleeve such as "Link Seal" or approved equal. Ensure that the specifications require the water tight sleeve be installed so it can be accessed from the inside of the structure (building, manhole, vault, etc.). The pipe alignment to the structure wall shall be perpendicular to accommodate installation of the water tight sleeve and sealing device. The penetration hole shall either be made utilizing a smooth sleeve during the casting of the wall or by core boring. All space between the back of the water tight sleeve and the exterior face of the structure shall be filled with waterproof polyurethane foam insulation. In areas below the water table, the space between the back of the water tight sleeve and the exterior face of the structure shall be filled with waterproofing grout. The exterior structure waterproofing system shall overlap the foam insulation or grout sealing to the outside of the piping system. If a membrane is used for waterproofing, the membrane shall overlap onto the penetrating pipe and be clamped with a stainless steel band clamp.

All piping shall have a seventy-five (75) year service life.

8.8 Sanitary Sewer System

Sanitary sewers are connected to a central sewer system leading to the University sewerage treatment plant. Storm water is run separately into a central storm system leading to the rivers.

All force main piping shall be utility grade and designed for corrosive internal and external conditions.

Gravity piping may be fiberglass Grade SDR 35 or Ductile Iron, with bell and spigot ends for gasketed joints, unless the piping is crossing other piping underground, at which locations the sanitary piping shall be changed to ductile iron.

Valves

Valve boxes must be specified with an adjustable collar, stainless steel with epoxy coated paint.

Check valves (one per pump) shall be a cast iron valve body with replaceable reinforced rubber internal component. An acceptable Manufacture for check valves is Val-Matic Surge Buster or approved equal.

Pump Isolation valves shall be all bronze (ball valves) or cast iron body with bronze internals, utility grade materials and construction. Valve operators (everything but actual pump isolation bronze valves) shall be constructed of 316 Stainless and shall be installed to allow the submersible pumps to be isolated and control levers to be accessible/operable at the wet well access elevation.

Non-rising stem shall be resilient wedge. An acceptable quality of isolation valves is Mueller or approved equal.

8.9 Lift Stations

The University has an existing lift station PLC monitoring system that was manufactured by Allen Bradley. Prior to 2014, the suite of PLC's utilized the Micrologix 1200 processors. Since 2014, Micrologix 1100 has been utilized. All new lift station monitoring systems shall be compatible with the existing systems and software (i.e. EZWarePLus by Maple Systems for the Human Machine Interface and RSLogix 500 Version 9 for the Programmable Logic Controller).

The Designer should confirm at the outset of the design of a lift station whether an annunciator or strobe warnings are required for pump failures or other critical alarms, which is dependent on the location and proximity of the station. If an annunciator is required, a push button on the inside of the lift station shall be provided to silence the alarm.

Human Machine Interface (HMI)

Each lift station shall have installed a human machine interface (HMI) that is a touchscreen showing graphically the status of all processors and allows operators to make set-point changes. The HMI is required to be wired to the processors through a dedicated cable. The HMI shall also display any alarms and shall indicate the time of the alarms. Operators should be able to acknowledge and reset the alarms from the HMI. The University has had success using Maple Systems HMI5000 series cable, however the Designer may specify other HMI manufacturer's capable of equal quality and characteristics.

Programmable Logic Controller (PLC)

The PLC shall be programmed to stop and start pumps based off the wet well level and connect to the SCADA system at the University's Water Pollution Control center, where readings, status and alarms are required to be graphically represented. The connection should be by Ethernet and utilize standard MODBUS protocol to communicate. Local to the lift station, the PLC shall also transfer data to the HMI, where operators can view the same data as at the SCADA. On the front of each control panel, there shall be pilot lights to indicate the pump status (green), pump failure (red), control by float (yellow), and high and low wet well levels (red). A three-position selector switch should also be provided with "hand", "off" and "auto" settings for all pumps.

The PLC shall have an analog input module to read both the wet well level and pump amperage draws, a memory module for program back-up transport, and a real-time clock module. The enclosure housing the PLC should be at least NEMA 12 to withstand environmental conditions.

A surge suppressor is required to protect the HMI and PLC from voltage surges. If voltages exceed 150VAC, the surge suppressor should fault and should indicate the fault locally with a lit red LED. It is

preferred to install these where a transformer is installed that step downs the line voltage (typically 480VAC or 208 VAC around campus) to control voltage (120 VAC).

Level Transmitter and Floats

A level transmitter is a submersible hydrostatic transducer that is specifically designed to meet the rigorous environment of lift stations. The transducer shall be submersed to the bottom of the wet well where it will measure the pressure of liquid inside the well to atmospheric pressure. Each transducer shall be custom made of one (1) inch Schedule 80 PVC and attached firmly at the bottom of the wet well. A vent filter should be provided to prevent moisture from entering vented cable.

The University has determined the following Manufacturer(s) to be of acceptable quality for level transmitters are the Measurement Specialties Series 700, Rosemont/Mobrey transmitter or an approved equal.

Each lift station shall be equipped with a high float and a low float to operate pumps in case of a failure with the PLC or level transmitter. The floats shall be able to operate the pumps, but the PLC should control the pumps under normal operations. The high float is typically installed to be hanging at or just below the inlet pipe and the low float is installed to be hanging around the middle of the pump, to keep a level in the well to prevent the pumps from sucking air and burning out.

Functions and Relays

An alternating relay is required to alternate between the pumps each time the high float is activated. The alternating relay shall be hardwired into the “backup” float circuitry, meaning the PLC will not control/effect its operation. The alternating relay shall have a local selector to allow the automatic alternating pump to be overridden to take a pump out of service.

The timed delay relay should be activated each time the high float is activated. Should the low level float not be activated by the time the timer is finished, the “lag” pump should be commended to start to assist the “lead” pump. The timed delay relay timer should be adjustable to both seconds and minutes. The timed delay relay shall be hardwired into the “backup” float circuitry.

Intrinsic barriers limit the energy in a signal to prevent ignition or spark. These barriers are used in areas with dangerous concentrations of flammable gases or dust, such as enclosed wet wells of lift stations. Analog intrinsic barriers are used for the level transducer and is wired directly to the PLC’s analog input module. Digital intrinsic barriers are used in conjunction with floats and shall have two channels. Low float should be wired to channel one (1) and the high float should be wired to channel two (2).

A seal fail detection relay if required by pump manufacturer, shall be provided to measure the resistance of oil in the seal chamber and uses two probes. The pump should be allowed to operate if there is a seal failure. Operator is to be notified via SCADA and take all necessary precautions.

Power Supply

If lift station is only served by 208/480 VAC, then a transformer is required to step down the power feed to the control panel to 120 VAC. The 120 VAC is used to power components within the control cabinet only. An internal 24VDC converter is required to step down the power for analog signals, intrinsic barriers and network modules. A power disconnect is required on all cabinets.

A starter and VFD (if available) and a current transducer are required on all pumps. The starter shall have a heating element, which will trip if too much current is being drawn. The current transducer will provide accurate load trending information to the PLC. An over-temperature detection relay shall be installed on the motor as a safeguard, if required by the size of the pump.

The University has determined the following Manufacturer(s) to be of acceptable quality for motor starters by Square D or approved equal. The University has determined the following Manufacturer(s) to be of acceptable quality for current transducers by Veris Industries or approved equal.

8.10 Storm Drainage

The consultants should review all surface drains for compliance with ADA regulations in pedestrian areas and evaluate the use of atrium grates in landscaped areas.

Piping

All storm water piping shall be HDPE Type S or PVC SDR 35 material unless conditions require concrete/ductile iron. All catch basin structures shall be precast concrete (5,000psi min) with oil separator hoods where required in vehicle parking areas and all catch basin grating shall be galvanized steel. Yard drains shall preferably be cast iron, however they may also be PVC with bronze covers.

Detention Systems and Underground Tanks

Detention systems and underground tanks are preferable to be exterior to the building and below grade. Covers and locations of entry shall be easily identifiable from the surface. All water detention tanks shall be provided with a mixer and a chemical treatment system to control microbial growth.

All detention system and underground tank pumps shall have lift out devices so that they can be removed from the entry location without having to go into the tank.

Underground tanks that contain oil, grease or other potentially hazardous materials shall have a double-walled containment system, as well as, an alarm to the SCADA system for any breach of the interior tank.

Retention ponds and systems shall have a clay liner twelve (12) inches below the top and shall be planted with native grasses. Generally, the storm water system shall be designed to accommodate a fifty (50) year storm.

8.11 Reclaim Water

The University's Storrs Campus has a Reclaim Water Facility that feeds water to the Central Utility Plant, subsequently feeding the northern half of campus. Standard pressure of the pipes is 65-75 psi. Water quality standards are published monthly and can be obtained through the authorized Facilities Operations Representative. The reclaimed water system at the Storrs's campus is used for cooling towers, steam, toilets and irrigation.

8.12 Natural Gas

Natural Gas is taken from a 65 psi maximum medium pressure system available on the Storrs's campus.

The natural gas system is owned and operated by Connecticut Natural Gas, not the University. This public utility will design the system up to the gas meter, and the Designer is responsible for all work beyond the meter.

The Designer shall specify and provide all protection of any above-grade piping, meters or structures, including bollards or enclosures as required. All exterior valves or meters on the natural gas service shall be visible and shall be labeled as part of the project.

8.13 Electric Distribution

Refer to Section 15 Electrical Guidelines for details on Electric Distribution

8.14 Duct banks

Service running from existing and new manholes, buildings, transformers, switchgear pads shall be run in underground concrete encased duct bank(s). Where possible, organize conduits in such a manner as to provide "in-line" or "pull-through" cable installations. Provide for expansion between duct runs and fixed points. Include bonding jumpers and sufficient cable slack for any required movement. Cement all non-metallic conduit joints using a PVC primer and solvent cement.

The University owns and manages the majority of the electrical infrastructure system at Storrs and Eversource owns and operates the balance. Regardless of the ownership, all duct bank and electric utility work shall be done to Eversource standards and shall be approved by the University Representative prior to installation.

Electric Duct Bank

Duct bank shall be constructed with NEC 310.60 in mind, be five (5) inch Schedule 40 PVC minimum, not less than seven and half (7.5) inch on center. The as-builts shall calculate the final derating of duct bank based on the installed condition using a computer calculation solution following IEEE guidelines and true thermodynamic heat transfer calculations due to depth and/or proximity to other utilities. The designed derating shall be established and approved with the remaining duct bank system.

Manhole systems shall be as utilized by Eversource, with training racks, 4/0 copper ring bus, and not fewer than two ground rods, refer to Eversource design manuals for more information. At points within the electrical distribution systems conduit for fiber communications shall be introduced for SCADA monitoring. Coordinate points with UITS and Facilities Operations during design review.

Install rigid galvanized steel conduit encased in concrete under driveway, walkway and roadway. All empty conduits are to be installed with a minimum of 200-lb test noncorrosive pull wire.

Duct bank runs shall be no greater than three hundred (300) feet long, unless otherwise approved, and run into manholes as needed to serve the facility and install no more than the equivalent of two (2) 90° bends between the manholes. Terminations shall have sloped duct runs into manholes to drain, but shall slope away from buildings.

Service runs to outdoor or indoor building unit substations shall be through underground conduits. Provide a minimum of two (2) 5" but ideally four (4) 5" ductbanks to the medium voltage disconnects/pull section entrance. Runs between manhole to manhole shall be minimally (6) 5" conduits. Low voltage service runs to buildings shall be sized per load being services and shall include a minimum of one (1) spare conduits.

Ducts shall be run below gas lines and where ducts cross high temperature water lines a minimum separation of 3 feet shall be maintained, and a minimum of six (6) inch thick foam glass type insulation extending at least four (4) feet in both directions of crossing shall be used.

Telecommunications Duct Banks

The University is the service provider for voice, data, and TV to the Storrs Campus and as such, UITS provides the outside plant media to deliver these services. However, the Designer must include within the project's scope and budget the pathways necessary to deliver these services to the building. Typically, all pathways are underground duct banks; UITS requires a minimum of six trade size 4 conduits for feeder and distribution ducts, ducts that run from manhole to manhole, and two trade size 4 conduits for the service laterals, ducts that run from manhole to building. Feeder and distribution ducts are organized in a three-over-three fashion. All underground duct banks shall be encased in concrete. Manholes shall be spaced so that the duct banks between them do not exceed 600 feet in length and the sum of all bends shall not exceed 180°. Service laterals shall not exceed 300 feet in length. However, conditions may vary and these requirements may need to be modified. The Designer shall coordinate with UITS through the University Representative to ensure these pathways are of adequate size and configuration or if other pathway solutions or cabling requirements are needed.

All ductbanks shall be constructed of concrete encased non-metallic conduit. All bends shall have a minimum radius of 36 inches. Utilize manufactured bends wherever possible. Where bends are performed in the field, protect conduits against kinks or distortion of shape.

Feeder and distribution ducts shall enter on the narrow walls of the manholes. Ducts providing Service Laterals to buildings may enter on the long walls. Ducts shall not enter the manhole in the cover chimney. Conduits shall enter manholes perpendicular to the wall

Utilize installed Thermaducts for all conduits entering the manhole wherever possible. Populate the lowest knock-outs available to allow for future expansion. Conduits shall be installed flush with the interior wall of the manhole and shall not protrude into the interior space.

Splay all conduits entering the narrow wall of Telecommunication manholes. Equally separate duct banks so that half the conduits will enter near the left corner of the narrow wall and the other half will enter near the right corner of the same narrow wall. The splaying of the conduits should start at least 20' from the manhole. Service lateral ducts are not required to be splayed.

Provide #6 X 12" steel reinforcing bars inserted into manhole walls prior to concrete encasement of duct bank for grounding (TMGB).

At all road and driveway crossings the duct bank concrete shall be reinforced with engineer designed steel reinforcement.

Provide rigid metal conduit at the entrance to each building starting at 10' (min.) outside the foundation wall to termination in the equipment room. Bond the conduits to the TMGB with a #6 AWG copper ground wire and bonding bushings.

Patch walls around conduit entrances with hydraulic cement or watertight grout to prevent water infiltration. Seal all conduit entrances into a below grade building space with a mechanical modular sealing system (Link Seal® or equal).

Seal all conduit ends with blank duct plugs. Secure Muletape to duct plug.

The following are minimum clearances from any Telecommunications duct banks:

Utility	Crossing	Parallel
Gas Main	12"	30"
Gas Service	12"	12"

Water	12"	18"
Steam	18"	48"
Electric	12"	12"
Storm & Sanitary	12"	12"

Unless otherwise noted, maintain the following minimum buried depths. Measure from the top of the structure to the nearest portion of finished grade:

Structure	Depth
Duct Bank	30"
Manhole	12"

Materials for Telecommunications duct banks and manholes

Manholes/vaults shall be 38Y (Splay), "J"-type, made of precast concrete with the minimum interior dimensions of 6'W X 12'L X 7' H. Provide cast iron rings and manhole covers; load rated H-20 with a minimum diameter of thirty-two (32) inch. Manhole covers shall be labeled "TELEPHONE" or "COMMUNICATIONS".

Non-metallic conduit shall be rigid polyvinyl chloride conduit (PVC). Telephone duct Type-C, designed for direct burial or concrete encasement applications; RUS listed, meets or exceeds the requirements of NEMA TC-10 and Bellcore CAO 8546. Fittings shall match requirements for conduit.

Metallic conduit shall be rigid metal conduit. Steel, ANSI C80.1, hot dipped galvanized interior and exterior, NPT threads, ANSI B1.20.1. Fittings shall match requirements for conduit.

Conduit Spacers shall be Carlon "SNAP-N-STACK" SP4W20-2 or approved equal. Spacers shall maintain a minimum two (2) inch wall-to-wall separation of conduits in all directions and elevate bottom conduits a minimum three (3) inch above trench floor. Maximum spacing between spacers shall be seven (7) feet.

Encase conduits in concrete having nominal compression strength of 2500 psi, with 3/8" maximum aggregate crush stone or washed gravel. Concrete slump shall be between: 6" and 8" maximum.

Tracer Wire shall be minimum of #12AWG solid copper conductor insulation type UL listed THWN (Gas & Oil Resistant).

Provide grade level access to each end of the tracer wire. ABS tubular valve box with cast iron cover, color orange, accessible via standard pentagonal key. Tracer wire access box lug attached to underside of cover shall be rated for road surface applications. Install per manufacturer's instructions in close proximity to manhole cover with a maximum separation not to exceed five hundred (500) feet between boxes (i.e. Copperhead Industries, LLC "Snake Pit Magnetized Tracer Box" series or approved equal)

The Utility Marker Ball manufacturer that have been installed throughout the Storrs campus has been 3M™ EMS four (4) inch Extended Range five (5) foot Ball Marker - Telephone 1401-XR. Any marker balls other than the 3M™ EMS four (4) inch must be compatible with the 3M locator device currently utilized by the University. Installation shall be above the duct bank at intervals not to exceed 50' when duct bank is in a straight line. Shorten intervals as appropriate to accurately identify changes in direction.

Require rod and mandrel for each conduit and provide "Muletape" with distance markings. Muletape shall be flat, woven, polyester tape with a pulling strength of 1250 lbs. and pre-lubricated for easy pulling and durably printed with sequential footage markings. Neptco or an equivalent would be considered for the markings.

Provide blank duct plugs made of corrosion resistant high-impact plastic. Center washer expanders are required when tightened to prevent water and sediment infiltration. Provide with eyelets to secure the pull rope, which shall be Tyco Electronics "Jack Moon" or approved equal.

Require the first twelve (12) inch of backfill to be sand or other granular material, tamped using lightweight equipment such as pneumatic or vibrating tampers. Backfill shall be free from large stones, frozen materials, wood, and other extraneous materials. Place backfill in layers not exceed six (6) inch. Include marking tape above the duct bank and twelve (12) inch below finished grade. The plastic tape shall be durable and orange in color clearly indicating that there is a buried Telecommunications utility structure below.

Testing and As-built documentation requirements for Telecommunications duct banks and manholes

As part of as-built requirements, after backfill is complete, the University requires that duct bank's path be located and documented utilizing a 3M "Dynatel" type tracing tool, to identify both tracer wire and marker ball methods. The UITS Representative must be present for this test.

All duct bank's locations shall be accurately identified on the as-built document for telecommunications. Show cross-section detail of each duct bank segment, wall-to-wall conduit distances, triangulation reference distances from permanent landmarks to points along the duct bank to identify location, changes in direction, changes in configuration, and termination, GIS coordinates of each manhole cover and utility marker ball location along the duct bank's path and manhole wall elevation drawings showing conduit identifiers and locations

See Appendix IV – Telecommunications Design Guidelines and Performance Standards for additional information on telecommunication requirements

8.15 Manhole and Vault Covers

Where possible the University would prefer to minimize the amount of manholes/vaults. To the extent possible, manholes/vaults shall be made in single units with integral corners. If too large to be cast in a single unit, manholes/vaults shall be gasketed at all connections and shall be waterproofed on the exterior side and inspected prior to backfilling (with waterproofing having a minimum seventy-five (75) year service life). Manholes/vaults shall be cast with 5,000 psi concrete minimum. Drain pipes shall not be added. All ladders shall be specified as composite or non-corrosive.

All manhole/vault Covers, regardless of location, shall be designed for HS20 truck loading and shall be cast iron. All manholes shall be labeled with the appropriate utility it services and numbered and cast into the cover of the manhole. Designer must review with the University Representative in conjunction with Facilities Operations in schematic design for numbering sequence. All manhole covers shall be water tight.

Electrical– The preferred size of manholes shall be 8'x12'x7' with a thirty-eight (38) inch diameter opening. Manhole numbering shall be identified in schematic design for review by the University Representative in conjunction with Facilities Operations.

8.16 Pads and Precast Electrical Vaults

All transformers or other exterior electric service equipment shall be protected and mounted on concrete pads extending twelve (12) inch minimum beyond the dimensions of the equipment and have a thickness no less than six (6) inch with welded wire mesh minimum (or other reinforcement as required per the geotechnical report for the project).

8.17 Grease Traps and Oil Separators

Grease Traps shall be incorporated in any project that requires the installation of a commercial kitchen sink or an installation of a sink or three (3) bay kitchen sink where the likelihood of grease or oil cleanup would be performed. Such structure shall be located outside of the building with cleanouts on each line coming to and from the trap. Ensure that the location of the trap must be accessible by a service vehicle on a service path.

Trap shall conform with the requirements of the General Permit for the Discharge of Wastewater Associated with Food Preparation Establishments That Discharge to Sanitary Sewer.

All hydraulic elevator pits with sump pumps shall have oil separators designed within the pit.

9 Structural Components Guidelines

9.1 Block and Plank Construction

Camber shall be reviewed in plank design. Grout shall be installed where differences between planks occur. Floor leveler shall be provided where camber exceeds ½" at the midspan.

Where plank is to be exposed to view, all joints shall be caulked, taped and finished. Underside of plank shall be smooth and free from holes or pitting.

Always review the location and size of bearing plates and plank embeds to assure that they are not exposed to view after completed installation.

Electrical wiring may be run in empty cores, however always in conduit or with MC cable.

Load bearing CMU block shall never be less than 6" in width.

9.2 Concrete Construction

For concrete exposed to the exterior, provide epoxy-coated rebar or welded wire mesh in all applications.

For parking garage structures, provide a concrete sealer or traffic coating on all horizontal surfaces.

Where concrete is exposed to view, all surfaces shall be smooth, free from holes or pitting, and free from depressions or other indications of formwork.

Waffle slabs or lift form slabs shall only be utilized with advance written approval of the University.

9.3 Steel Construction

All steel exposed to the exterior shall be galvanized. Zinc oxide painting shall only be utilized when approved in advance by the University.

Horizontal deflection shall be limited at the highest point to $L/750$ or One (1) inch maximum.

9.4 Seismic Considerations

All structures shall consider seismic forces in their design. Expansion joints at walls, ceilings and floors with finished covers shall be provided at all locations where expansion is required.

9.5 Fireproofing

Cementitious and spray-on fireproofing are acceptable in non-exposed areas. Spray-on fireproofing is recommended at interior locations and steps should be taken during construction to avoid the fireproofing from getting wet. Cementitious fireproofing is recommended at exterior locations and where fireproofing is exposed to weather during construction. Fireproof paint is acceptable where interior steel is exposed to view.

9.6 Footings & Foundations

Design spread footings to the bearing values indicated in the geotechnical investigations for the site, but never less than 2 tons/square foot.

Perimeter grade beams at least 36" deep shall be provided around the perimeter of any structure greater than 100 square feet. Provide footing drains for all grade beams and footings.

10 Building Exterior Guidelines

10.1 Guiding Principles

The first level of importance for the University as it relates to an outside of the building is that the exterior is watertight and easy to maintain. Horizontal elements are susceptible to water infiltration over time and particular care should be taken in choosing appropriate systems that will be durable and long-lasting. The design should pay particular attention to flashing details, interaction between materials and joints, and proper overlapping of materials. The design should attempt to specify systems and materials that have a history of success and that can be easily maintained by the University.

10.2 Exterior Material

Specify no products that contain asbestos. It is up to the Designer when selecting finish materials, equipment and fixtures that they review the SDS (Safety Data Sheet) for disclosure of any asbestos containing materials for each product specified. The Designer shall provide a statement that no asbestos products were specified. Note that many products may still contain asbestos because they were not included in the EPA's 1989 ban and phase-out and these include pipeline wrap, vinyl composite tile, millboard, corrugated and flat cementitious sheets, roofing felt, cementitious shingles, roofing and non-roofing adhesives, sealants, and coatings. The Consumer Product Safety Commission requires

manufacturers to label products that contain asbestos, if a product. Include as a requirement of all submittals, an SDS with every submittal.

The aesthetic design of the building shall always be reviewed with the University during the concept design phase of the project. Generally, brick, architectural precast, metal and stone are acceptable building exterior materials. EIFS or Dryvit shall not be utilized. Wood components on the exterior of the building shall be minimized and are discouraged. Thin veneers are also generally discouraged.

For wall construction, limit horizontal surfaces in the exterior design. Projecting elements should be evaluated specifically for long-term durability, water-tightness and potential to accumulate water, debris or dust.

Careful considerations should be given to locations of control joints and exterior joints on the exterior of the building. Control joints in the exterior shall occur at no less than 30' on center. Expansion joints shall have internal drainage and shall be double containment systems.

10.3 Brick

Brick shall be compatible with surrounding building and contribute to a unified expression for the University. Normally, the Designer should select three to four representative samples of brick and present same for approval by the University prior to specifying same.

Facing brick shall be Grade SW with a minimum compressive strength of 8,000 psi. Generally, the brick shall have a uniform size throughout the building, unless previously approved by the University. Dimensional conformity shall be consistent with Grade FBX or FBS brick. A full depth brick (4" or greater) brick shall always be used at the exterior.

Brick and trim material shall be shown to have passed the ASTM C67 wick test. Any brick showing the signs of efflorescence shall be rejected. Any wall installation that shows areas of efflorescence shall be removed to discover the reason for water entrapment.

Generally, no sealing or coating of brick shall be allowed. If a water repellent is approved for use, it shall be "breathable" and shall have no less than a 10-year warranty.

Brick should not be utilized below grade.

When repointing brick, remove only the mortar between the bricks and do not allow overcutting of the joint.

10.4 Mortar

Designer is required to follow International Masonry Institute guidelines based on the particular application being applied. For existing conditions, mortar color shall match. Special colors in mortar are generally discouraged.

Do not use mortar that is stronger in compression than the brick or creates a bond greater than the compressive strength of the brick.

Joint reinforcement is preferred to be stainless steel, however at a minimum galvanized carbon steel wire is acceptable. Provide joint reinforcement and seismic bracing where required.

10.5 Sealants

Sealant warranty shall be a minimum of 10 years. The compatibility of the sealant with the exterior materials should be verified prior to specification. A double backer rod and sealant system should be utilized in all exterior applications.

10.6 Rain Screens

Rain screens are permitted in the exterior design, however the specifications shall include requirements to inspect and test all components of the back-up systems prior to installation of the rain screen.

10.7 Architectural Precast

All architectural precast shall be engineered, commercial grade and shall have reinforcement (welded wire mesh minimum). All precast shall utilize wet casting, and no dry casting shall be permitted. Freeze-thaw conditions shall be considered in the design and engineering of the precast panels. All precast shall be subject to inspection regardless of whether it is or non-structural.

Joints shall be of an adequate spacing to allow the proper installation of sealants. Panels shall not be designed to be in contact with each other.

All precast panel connections shall be subject to inspection in the field. Any slip connections that have been designed into the panels shall be tack welded after the installation to discourage future movement of the panels (unless required specifically by the engineer otherwise).

10.8 Stone

All stone on a project shall be from the same quarry, and from the same area or vein of the quarry for uniformity. For exterior applications, a thickness of 1 ¼" minimum is preferred. All stone utilized on a project should be "select grade" and be free from cracks, pits, spalls, seams or stains. Where possible, edges or corners of stone should be slightly chamfered to lessen chipping.

Projects should consider utilizing granite or other hard stones at the base of buildings where the grade comes in contact with the building.

All stone anchors shall be nonferrous metal, with stainless steel being preferred.

10.9 Damp proofing and Waterproofing

Designer shall be responsible for the interpretation of the geotechnical report of the existing sub-surface conditions for designing the appropriate level of waterproofing.

A waterproof membrane is preferred on all below grade and foundation installations, however at a minimum, damp proofing shall be provided. The waterproofing membrane or damp proofing shall have a minimum 20 year warranty.

All above-grade horizontal areas that are in regularly wet areas or are above interior spaces below shall have a waterproofing membrane system. The membrane system shall have a minimum thickness of 30

mils. Sleeves and openings shall be properly flashed. All exterior areas shall be flood tested after the installation of the waterproofing membrane system.

Generally, water repellents shall not be used on exterior brick or masonry walls. The Designer shall obtain approval in writing from the University Representative in conjunction with Facilities Operations for any proposed use.

10.10 Vapor Barriers

For locations where there is a high water table present, the installation of a vapor barrier is required. Occupied interior spaces designed at or below grade shall require the entire floor slab to have a vapor barrier. Vapor barriers shall be impermeable, with the slab on grade having a moisture rating of less than .01 maximum. Include within the specifications that all seams, tears and penetrations in the vapor barrier are to be sealed with tape or mastic. Such condition shall be inspected prior to concrete placement.

10.11 Punched or Fixed Windows

With the exception of historic renovation, window frames shall be steel or anodized aluminum. No wood is allowed unless required as part of a historic renovation. Thermally broken frames are preferred. Only commercial grade frames shall be utilized and no residential grade frames shall be allowed.

All windows shall be low-E double glazed, with a U-value no less than 0.27. It is preferred not to have operable windows, however the two exceptions are residential buildings and historic renovations, where operable windows are allowed. If operable windows are provided, also provide a contact tied into the BAS system indicating the window position so that any cooling systems can be shut off if the window is left in the open position.

Double hung windows are generally not utilized on campus, however if the University approves the use, specify complete operative tilt units with full size screens that can be easily repaired or replaced.

10.12 Glazing

When establishing the requirements of windows and doors for a particular application, specify the appropriate thickness of the glass units without oversizing. The University prefers glass thickness to be no greater than half an inch. Specify laminate glass and its color that can be easily obtained locally. The University would prefer that proprietary glazing unit is not specified, such as Viracon. Specify the performance demands that the glazing will undertake and allow for local replacement

10.13 Windows and Security Screens

Any operable window should be provided with a full window screen. Window screens shall have aluminum frames with aluminum hinges, and a lock to secure the screen, with mesh.

Security screens are required in residential buildings only. They are to be located at all first floor windows of living units and at all upper floors where a window is accessible by an adjacent roof. All security screens are to have steel frames and a painted steel mesh. All security screens shall be hinged and shall have releasable locks on the interior. Designer shall seek approval of specification from the University Representative in conjunction with the Division of Public Safety when specifying security screens.

10.14 Curtain Wall Systems

Curtain wall systems must be engineered and can be aluminum or galvanized steel. Clerestories are acceptable, but skylights or horizontally positioned glass are not preferred by the University. The University would prefer that a proprietary single source frame and glazing unit is not specified.

10.15 Entrances and Storefront

All double door entries/exits shall have rim devices with keyed removable mullions.

Entrance and storefront frames shall be thermally broken, where feasible. Anodized aluminum standard Stile is the preferred door type and must be designed to accommodate any equipment size within the building. The University Representative in conjunction with Facilities Operations must be consulted if any other materials are being considered.

The University would prefer that frameless glass entry doors are not specified. Do not specify in-ground closures. Consider thickness and weight of the glazing when specifying entrance doors, to avoid over stressing the hinges, closers and stops. Consider insulated pane with low-E coating glass systems. Specify glass that can be easily obtained locally. The University would prefer that any proprietary single source frame and glazing unit is not specified, prior approval from the University Representative in conjunction with Facilities Operations is required.

10.16 Vestibules, and Entrance Mats (including Automatic Openers)

At all public or main entrances, a vestibule is required. A conditioning system shall be utilized to over pressurize the vestibule. No air curtains shall be utilized. In situations with limited space where a vestibule cannot be provided, a revolving door shall be provided.

Recessed floor mats shall be utilized at all entries. For most buildings, the mats shall be removable steel grating. For residential buildings, provide recessed removable carpeting.

Automatic door openers shall be provided at all major entrances on all publically accessible buildings, and as required by code. Door openers mounted in the top jamb are preferred, and underground motors are not allowed. Door opener systems should accommodate the push button operation during normal operating hours, and be tied into the University's access control system for off-hours. Devices must be installed that prevent an individual from becoming trapped or crushed by the door, such as a reverse function or a push button, switch or key that is operated by an individual requiring continuous contact with the device in order for the door to open and close.

10.17 Flashing and Sheet Metal

All exposed sheet metal and flashings shall be copper, lead coated copper or stainless steel.

On all sloped roofs, utilize 6' minimum of ice shield at all eaves, in all valleys and at all gables. During all roof renovations or replacements, verify with the University Representative whether new reglets at all chimneys and parapets are required. Where roofing contacts existing masonry, install all new drip edges and replace all existing flashing.

10.18 Parapet Walls and Capstones

When parapets are existing or required, waterproof appropriately with flashing and counter flashing. Capstones are preferred to be cast concrete or granite, but limestone and metal are an acceptable alternate. Set all capstones with stainless steel pins.

All roof replacements shall incorporate any repairs and reflashing of the existing parapet.

10.19 General Roofing Considerations

All roofing systems shall have a class "A" rating as listed by Underwriters Laboratory, Inc., for fire resistance. All proposed roof designs and details shall be submitted to FM Global for review and approval prior to completing the construction documents.

In the design of replacement roofs, all roof drains shall be replaced with new and all curbing and parapets shall be rebuilt with all new waterproofing.

It is preferred that foamed-in-place roofing systems are not used. Designers shall obtain University approval in writing for any proposed use.

Pitch pockets generally will not be permitted. Designer shall obtain University approval in writing for any proposed use.

In locating where rooftop equipment will be placed, ensure that the equipment designed and planned for shall be no less than 15 feet away from roof edges. Any equipment designed to be installed less than 15 feet from a roof edge must first be approved by the University Representative in conjunction with Office of Environmental Health and Safety and be guarded with passive fall protection devices, such as a guardrail system or horizontal lifelines.

10.20 Shingle Roofing Systems

Asphalt and shingle roofing systems are not permitted unless prior approval is granted by the University Representative. The sole exception is where historical restoration requires a use of an asphalt or shingle roof. If required, only commercial architectural-grade shingles with a 30 year material warranty minimum shall be used. In the case of alike roof replacement, include replacement of the fascia board and drip edge.

10.21 Slate Roofing Systems

All slate roofing systems shall be engineered and shall not rely on empirical data. All slate shall have a minimum 75 year warranty. No OSB or plywood shall be used as a substrate. Relieving angles (eave and mid-roof) shall be utilized in the design of any slate roofing system where the slope is greater than 3 on 12. All designs of slate roofing systems shall be submitted for confirmation and approval by the structural engineer prior to utilization in the construction.

10.22 Membrane Roofing Systems

The University prefers EDPM roof systems over other roof systems. Membrane roofing systems color shall be specified based on a number of factors which must take into consideration the location of the building and its height in relation to other surrounding buildings. The membrane shall be at least 60 mils thick. Mechanically-fastened, tapered insulation shall always be utilized and a slope of no less than ½" per 12" shall be utilized. No ballasted roofs shall be specified.

A minimum unconditional ten-year material and workmanship guarantee for water tightness covering material and workmanship on the entire roofing system, inclusive of vapor retarders, insulation, bitumen, felts, membranes, flashings, metals, decks and any other feature required by the roof design, with no dollar limit from the Prime and subcontractor (where applicable) is required.

In addition, a minimum unconditional twenty-year unlimited manufacturer's guarantee for water tightness covering material and workmanship on the entire roofing system, inclusive of vapor retarders, insulation, bitumen, felts, membranes, flashings, metals, decks and any other feature required by the roof design, with no dollar limit. All manufacturer's materials used in the roofing system are to meet the latest standards for individual components of the roofing systems of the American Society for Testing and Materials.

Paver pathways shall be provided on all membrane roofs. Non-slip pavers shall be a minimum of two (2) feet square. Pathways shall go to all mechanical units, exhaust fans and roof drains. At all mechanical units, the pavers shall be provided around the entire unit, plus a minimum of six (6) feet X 6' six (6) feet at the access locations and coils.

For grease hoods, chemical hoods and other special conditions, specify an appropriate membrane surrounding the special conditions that will withstand the conditions.

Include in the design roof-top equipment screening, whether the project is new construction or a renovation. Confirm with the University Representative the type of screening that will be acceptable and incorporate into the Construction Documents.

10.23 Metal Roofs and Components

Metal roofing shall be a minimum of 14 gage and shall have a powder coated finish. Metal roofs shall not be used with the pitch is less than 3 on 12. Metal roofs shall utilize all concealed overlapping fasteners and shall require sealant be installed at all screw holes.

10.24 Green Roofs

Vegetated roof covers, also referred to as "green roofs", are layers of vegetation installed on building rooftops. Green roofs are an effective means for reducing urban stormwater runoff by replacing impermeable rooftops with permeable, vegetated surfaces. Rainwater is either intercepted by vegetation and evaporated to the atmosphere or retained in the substrate before being returned to the atmosphere through transpiration and evaporation

The green roof is a multilayered, constructed roof system consisting of a vegetative layer, media, a geotextile layer, and a synthetic drain layer. A variety of green roof designs exist. The simplest consists of a light system of drainage and filtering components and a thin soil layer, which is installed and planted with drought-resistant herbaceous vegetation. Modular green roof systems are available for new installations and building retrofits. These systems consist of interlocking modules containing plants that are shipped to the roof site for installation. The modules can be removed or replaced, thereby facilitating roof maintenance and repair.

Design considerations for vegetated roof covers include structural and load-bearing capacity, plant selection, waterproofing and drainage, and water storage.

10.25 Roof Hatches, Ladders and Access

It is preferred to have access to the roof by stairs, not ladders. Doors and roof hatches at the roof access shall have an alarm reporting back to Public Safety and shall have a keyed override on the inside, and key-less re-entry on the outside.

Where roof hatches are utilized, size the opening based on roof top equipment maintenance needs, but shall be no smaller than forty-two (42) inches square insulated with gasket covers. Specify standard sized manufactured roof hatches preferably rectangular in size, custom sized roof hatches are discouraged. Provide all roof hatches with safety-assist entrances such as “pop-up” grab bars. Provide adequate lighting and tie-offs at the tops of ladders and underneath roof hatches.

Where ladders are required, provide cages for any ladder that exceeds 15’ in height or as required by code. At the base, the ladder shall have a keyed retractable portion that does not allow non-maintenance personnel from accessing the ladder. Review the design to assure that ladders are provided at all changes in roof elevations and to make sure access is provided to all roofs.

10.26 Roof Drains, Gutters, and Downspouts

Roofing systems shall be designed to be gravity draining, without the use of lift stations or pumps. If a lift station is required, it shall specifically be approved by the University prior to use, and shall be outside the building.

All roof drains shall be cast iron, including the dome. When an existing roof is being replaced, the roof drains and the overflow drains shall generally be replaced at the same time.

It is preferable to have interior roof drains. If conditions only allow for exterior gutters and downspouts, they should be zinc-coated copper or lead. All gutters shall have gutter guards similar to Gutterglove or approved equal with a minimum 25-year warranty. Downspouts shall either connect to storm drains (never to curtain drains) or dispense into rain gardens. Only in cases where it is prohibited in connecting to existing storm drains shall the water be discharged to grade. Such conditions shall be brought to the attention of the University Representative in conjunction with Facilities Operations to determine how the discharge shall be designed. Should the decision be made to discharge to grade, the water must be directed with extensions at least 8’ away from the foundations of buildings. Downspouts and overflow drains shall not be directed to splash blocks at the base of the building and shall not direct any water onto sidewalks or other walking paths.

10.27 Fall Arrest Systems

Provide engineered tie-off anchor system and basket davits at all flat roofs where access within fifteen (15) feet of an eave or edge is required and for all sloped roofs. If safety lines or other active fall arrest systems are required, review the details of such system with the University Representative in conjunction with the Environmental Health and Safety and Facilities Operations prior to specifying in the design.

Install fall protection anchor points and/or lifeline systems on pitched roofs to enable safe maintenance of roof structures or mechanical systems located on rooftops. All roof anchors should be permanently identified as such.

For buildings under five stories, the University generally cleans the exterior of the building off lifts and does not require separate window washing or basket davits.

10.28 Louvers

Where feasible, exterior louvers should be hot dipped galvanized with a powder coat finish. Aluminum louvers are an acceptable alternative as long as the metallurgy and reactions are verified with the exhaust stream. Painted metal and plastic louvers are not permissible.

Generally, only standard sizes of louvers shall be utilized. If custom louvers are required, the University shall be notified prior to specifying same.

10.29 Testing and Commissioning

The Designer shall request prior to commencing with the work, whether the University is intending on requiring the commissioning the exterior building envelope or portions thereof. Regardless if the project will be commissioned, the Designer shall be responsible for coordination and witnessing water testing in the field for all new roof systems or roof replacements installations, all new window systems or window replacement installations and any new subsurface waterproofing installations that are a part of their design scope. Should there be breaches with the installation, the Designer will implement corrective measures to ensure receipt of a water tight envelope. The Designer shall also include in the specifications the requirement for the Contractor to specifically photograph the exterior waterproofing applications and installations, not limited to parapet flashing, foundations, and typical window installations.

Incorporate into the specifications that the Contractor shall perform its own water testing prior to requesting that of the University. Such request shall include the date, the time, what was tested, the extent of testing, results of the Contractors water testing(s) and corrective actions performed and when. Should there be more than one failed water test, outline within the specifications that any subsequent costs incurred by the University for re-inspection and witnessing of the water tight system shall be borne by the Contractor.

Roof Installations

The Manufacturer's Representative shall visit the site during the roofing work on a regular basis to ensure the installation is per their guidelines and requirements and provide a certified report to that affect.

Window Installations

At least 10% of exterior windows shall be water tested in the field. The testing shall be to 150% minimum of the maximum expected wind pressure. For complicated or oversized windows, or projects with a large number of windows, the Designer should consider additional wind tunnel testing requirements.

10.30 Snow and Ice Guards and Protection

The Designer shall provide a snow management strategy for all roof system designs. Such strategy shall be submitted to the University Representative for review at the end of Schematic Design. For all new roof installations, snow and ice guards shall be mechanically fastened to the structure. Canopies over

entrances below sloped roofs as redundant protection should also be included. Where possible, building entrances and traffic areas should be below gable ends, not eaves.

11 Interior Building Guidelines

11.1 Guiding Principles

Designs must take into account maintenance factors. Any aspect associated with locating and specifying finish materials, equipment, fixtures and establishment of ceiling heights, shall be determined based local availability, access and annual maintenance requirements.

When design calls for a sloped floor, the slope shall not exceed the capability for service equipment to access the finish material, equipment, fixtures or established ceiling height for annual maintenance. It is the Designer's responsibility to coordinate with installers or other consultants providing elements of the design to ensure reasonable regular maintenance access.

Specify no products that contain asbestos, It is up to the Designer when selecting finish materials, equipment and fixtures that they review the SDS (Safety Data Sheet) for disclosure of any asbestos containing materials for each product specified. The Designer shall provide a statement that no asbestos products were specified. Note that many products may still contain asbestos because they were not included in the EPA's 1989 ban and phase-out and these include pipeline wrap, vinyl composite tile, millboard, corrugated and flat cementitious sheets, roofing felt, cementitious shingles, roofing and non-roofing adhesives, sealants, and coatings. The Consumer Product Safety Commission requires manufacturers to label products that contain asbestos, if a product.

Specify only low or no VOC contained finish materials, to minimize the curing time and to allow for ample ventilation of products and finishes especially within occupied buildings.

Minimize the use of fabric and other porous surfaces with little or no water repellency because these are apt to collect dust, harbor organisms, and are difficult to clean/disinfect once subjected to water or moisture.

Refer to the University's Division of Student Affairs' accessibility checklists for additional requirements on renovations and new construction project designs, as well as food service areas.

11.2 Attic Stock

Generally, the University wants to limit the amount of attic stock provided for buildings. For large bulky materials, such as rolls of carpeting or millwork, do not specify any attic stock. For mass-produced common building components, such as ceiling tile, vinyl floor tile or carpet tiles, specify that only one standard box of replacement materials be provided to the University at the end of the project. For any project-specific specialty items, consult the University Representative in conjunction with Facilities Operations as to whether any attic stock is required.

For lighting, specify that all lighting shall have all new ballasts installed at the time the project is turned over to the University, and that an additional 5% of each ballast type shall be provided as attic stock.

For paint materials, require that no attic stock or materials be left on the building site at the end of the project.

11.3 Acoustic Standards

Building Systems shall be designed to meet ASHRAE guidelines for indoor and outdoor sound power levels. Comply with the most current ANSI/ASA S12.60 standards for other acoustic standards.

Refer to Appendix VI University Classroom Standards for other areas where acoustic considerations are required.

11.4 Ceilings

Suspended Acoustic

Select ceiling tiles that provide the appropriate humidity resistance to withstand tile sag. Provide humidity resistant ceiling tiles in high moisture areas such as laboratories, kitchens, locker rooms, indoor pools and areas that are not air conditioned. These ceilings should meet industry scrub-ability standards. Tiles located at ceiling plenums in areas of frequent access, such as at corridors and other high use public areas must be surface scratch and impact resistant. There shall be no exterior installations of suspended ceilings.

Suspended ceiling systems shall have exposed grid, 2x2 acoustic tiles in public areas and 2x4 acoustic tiles in non-public areas. There shall be no hidden grid systems or custom tiles specified.

Drywall and Other Ceiling Finishes

For ceilings needing regular access, suspended ceilings are preferred. Drywall for edge conditions and soffits are preferred.

11.5 Interior Lighting

Lighting (general, theatrical or emergency) shall preferably be accessible by ladder with a height distance of no more than 9' above finished floor for ease of maintenance. If the design demands cannot meet maximum height distance for ease a maintenance, design or specify a lighting system that can be mechanically lowered for maintenance service. Access to lighting systems by scissor lift, must provide for clear unobstructed access by a standard lift to get to the fixture and not require specialized equipment. For applications that cannot be accessed by a scissor lift, cat walks shall be incorporated for maintenance and access to lighting.

11.6 Interior Stairs and Hand Rails

All interior stairs shall be precast or pan with rubber or vinyl cover nosing. Handrails shall be simply designed and constructed of aluminum or brushed stainless steel, preferably non-painted. Should conditions warrant a coated handrail, factory powder coating shall be specified.

11.7 Wall Partitions

The Designer should incorporate the exclusion of foreign made drywall within the specifications. No less than 5/8" gypsum board shall be used for areas where vandalism and high impact resistance is not an issue. Double layer drywall is required in all corridors and areas prone to damage. Framing members shall be galvanized or provided with other corrosion resistant coating.

The Designer shall specify to allow for structural floor deflection by requiring deflection tracks for the top runner. The maximum deflection limit for gypsum board assemblies is L/240. Tile finishes applied to gypsum board assemblies require a maximum deflection limit of L/360.

Gypsum board finish levels shall be level four (4) minimum for all public area circulation walls and level three (3) for accessory spaces such as mechanical, electrical, janitor closets, etc. There shall be no level of finish less than level three (3) for any wall.

In wet areas such as shower rooms, wash rooms, kitchens and animal rooms, the use of glass-mat, fiber cement or paperless gypsum board tile backing or cementitious backer units with waterproof membrane shall be specified in lieu of moisture-resistant gypsum board (green board).

11.8 Corner and Wall Guards

In all service corridors, provide forty-eight (48) inch high vinyl or plastic corner guards at all exterior corners. Plastic or vinyl corner guards should not be utilized. On typical corridors, corner guards are not required.

In service corridors, provide a durable and projecting base and chairrail to keep moving items from contacting the wall. Infill between the base and chairrail, which should be forty-two (42) inch above the finished floor, with either diamond plate or FRP over plywood.

11.9 Wall Tile

The University prefers water barrier membranes to be incorporated within all bathroom and kitchen designs. Specify only glazed porcelain tile with non-stain additive to the grout.

All wet walls that comprise of sinks, showers and toilets, walls shall have full height ceramic tile. The remaining area walls in restrooms shall have a six (6) foot high wainscot of tile.

Under no circumstances shall the Designer specify tile that is imported, custom and/or not readily available.

11.10 Flooring

In general, flooring and base installation adhesives shall be low odor and low VOC. Ensure by checking the SDS sheet of the submittal on flooring material that the product does not contain any asbestos. Select appropriate flooring based on high static-load resistance to protect from indentation and for areas prone to chemical spills, chemical resistance.

All flooring material shall have a break transition at all door openings or corridor intersections, regardless if there is a change in material. Clean outs that are located within the floor area must have a decorative cover plate specified and shall be coordinated with the floor finish schedule to ensure that the clean outs do not get covered over. All floor material shall be scribed so that the material abuts cleanly around the cleanout cover.

Under no circumstances shall the Designer specify flooring material that is custom and/or not readily available. Wood or rubber flooring shall not be specified for any area (except athletic facilities).

Quarry Floor Tile and Ceramic Tile

Quarry tile shall be specified for all kitchen areas and have quarry tile base. Ceramic tile shall be specified for all bathrooms and food service areas and have ceramic tile base. Under no circumstances shall the Designer specify tile that is imported, custom and/or not readily available.

Stone Veneers and Terrazzo Floors

Stone and Terrazzo floors shall be specified for use at building entrances, lobbies and primary circulation areas only.

Vinyl, Resilient Flooring and Epoxy Floors and Wall Base

Solid vinyl tile, vinyl composition tile (VCT) and resilient flexible terrazzo tiles are acceptable flooring products for use in public spaces, such as secondary corridors. Tile size shall be 12" x 12" or 24" x 24" and shall have a 1/8" minimum thickness.

VCT shall be ASTM F 1700, Class 1 rated and shall be either monolithic in color or shall be from the manufacturer's standard color stock. Designer is responsible for ensuring that the color shall not be scheduled for discontinuation for a period of at least one year from installation.

Resilient stair flooring and trim shall be in utility stairs and other stairs not requiring special finishes. Specify heavy-duty, full tread width resilient flooring with integral nosing and tread edge abrasive strips. Epoxy flooring shall be UGL Drylock 1 part epoxy floor paint for interior/exterior concrete and wood surfaces with lower traffic areas. For high traffic areas on concrete slabs, use PPG Aquapon WB component A and component B, 2 part epoxy floor paint with skid additive (where needed) or approved equal. Grey is the preferred color (over a clear coat or other color). A minimum 10 year warranty should be specified

At non-tiled areas, wall base shall be rubber base, homogeneous, scuff and abrasion resistant. Use cove base at hard floors and straight base at carpet, 6" high minimum, 1/8" thickness, with pre-cut lengths of not less than 6' preferred. Outside corners shall be pre-molded and match straight sections in appearance. Do not wrap inside corners; cut and cope the base at inside corners.

The University generally does not use sheet vinyl flooring. If conditions warrant the use of sheet vinyl, the Designer should obtain approval from the University Representative in conjunction with Facilities Operations, prior to incorporating into the specifications.

Carpeting

Minimize carpeting whenever possible, and opt for resilient flooring, VCT tile etc. If carpet must be used, consider modular systems (carpet tiles) with low VOCs using little or no adhesive for installation. Carpet shall be constructed of nylon level loop or frieze for all corridors and heavy traffic areas. Carpet shall have a minimum face weight of no less than 30 oz., have non-organic backer and preferably be solution dyed. There shall be no custom coloring or under layment. Carpet tile should be installed on a quarter turn.

Ensure Carpet Research Institute (CRI) approved materials (carpet, adhesives, and cushion), installers, and installation methods are used.

Do not install carpet in basements or slab-on-grade concrete without a proper vapor barrier assembly. In all cases do not use carpet in the following areas:

- Cafeteria or food preparation areas
- Main entrances and lobbies
- Laboratories
- Utility spaces

When specifying carpet, the following are minimum requirements that must be met:

- Not custom: On quick-ship program
- Warranty: 15 years unconditional (example – chair pads should not be required)
- Certified: CRI Green Label Plus
- Product components: No red listed components
- Product construction: Tufted textured loop
Solution dyed
Carpet tile
- Fiber type: Antron or 6.6 Nylon fiber

11.11 Paint, Primers and Caulking

The University requires low or no volatile organic compound (VOC) or formaldehyde-containing/emitting products which can be found in but not limited to; paints, epoxies, adhesives, fillers, glues, plywood, insulation etc. Specify no PCB-containing products.

There shall be at a minimum one primer layer and two finish layers of paint required of all wall conditions. All caulking should be specified as paintable.

The University's standard for typical paint finish applications are as follows:

- Flat finishes are preferred at gypsum board ceilings and soffits.
- Eggshell finish is preferred for walls surfaces
- Semi-gloss finish is preferred for all trim

11.12 Exterior Doors and Frames

There is a prominent westerly wind on the Storrs campus and heavy duty hinges and closers shall be required. Oversized heavy-weighted doors create an issue for heavy duty hinges and closers. The Designer is responsible for carefully calculating the total weight load of the specified door including any glass which may be incorporated into the design of the door. Obtain fairly accurate wind loads at each exterior door location, document each directional open door swing against the directional westerly wind anticipated to determine the appropriate hardware needed to withstand the weight of the door and wind force demands. Reduction on the steel frame shall not be less than fourteen (12) gauge.

When doors or frames are standard grade, a single typical size should be specified (shall not exceed 7-0' in height, 42" width per single door) and should be available on a quick ship program.

Doors

The University would prefer that frameless glass entry doors are not specified. Exterior doors shall be metal thermally insulated that will not settle, sag or hold moisture and material shall not be less than 14gauge steel (aluminum is not allowed without prior written approval), with top and side channels that are no less than five (5') inch widths, solid without pockets and shall be reinforced with fire retardant

material for products in use. Rim panic devices, electronic latch retraction with full mortise lock set, continuous hinges, through bolts (not self-tapped) and door closers, factory finished and pre-machined are to be specified hardware.

Exterior wood doors are prohibited with the exception of where they exist at historical buildings and will not be waived by the State Historical Preservation Commission. In such cases, doors shall be solid wood, and doors that are wood panel pieced together are not acceptable.

The University has determined the following Manufacturer(s) to be of acceptable quality for typical exterior metal doors include; Ceco, Curries, Pioneer or Steelcraft.

Frames

Exterior frames shall be welded, 12 gauge minimum, factory finished and pre-machined for the specified hardware. Where exterior double doors are needed, it is required to specify a removable heavy duty steel mullion, key controlled rather than a fixed and pinned leaf configuration. Do not specify surface or concealed vertical rod exit devices. All exterior doors shall have aluminum thresholds and weather-stripping on all sides.

Store front door systems shall not be specified to provide typical manufacturer's hardware, but shall meet the University's hardware requirements.

11.13 Interior Doors and Frames

Solid core wood 1 3/4" doors are preferred, with factory finished clear or stain and pre-machined for hardware. However, do not specify wood doors in areas prone to high humidity or wet areas, where vandalism or security is a concern, or in instances where daily abuse will quickly damage the door. In cases where security and abuse are high, steel doors are preferred.

Interior steel doors shall be no less than 16 gauge, factory finished and pre-machined for hardware installation. Specify factory-applied rust-inhibitive primer to doors and frames. Ensure product compatibility with the specified finish paint products.

Acoustical steel doors shall have perimeter sound-stripping and appropriate STC rating for assembly locations near or adjacent to noisy machine rooms, television rooms, audio rooms, and elsewhere where noise control is needed. Special applications may require higher STC performance.

Knockdown frames are acceptable in renovations. All surrounding walls to the opening shall be reinforced with fire retardant blocking where possible.

When specifying doors with view windows, a cost effective preference is to have wire glass as opposed to a proprietary glass. If the door is solid and in a stairwell, specify doors is reinforced with steel channels and 30" x 24" vision kits (allowable by code).

Provide push or protection plates on the push side of wood doors at corridors and other heavy traffic areas.

11.14 Access Doors and Panels

Locate access doors in drywall, plaster and other inaccessible finishes to provide maintenance access to valves, controls, junction boxes, and other maintenance and testing items which otherwise would be inaccessible.

For access to valves, controls, junction boxes, and other maintenance and testing items where their location is not easily accessible at the opening, a preferred minimum size for an access panel is 48" x 48" for full passage, 36" x 36" minimum for torso only access. However, access panels may need to be larger and shall be sized large enough for a person, equipment and/or material to easily pass through it for its intended maintenance work. Factory prime the access doors to match adjacent wall or ceiling color being specified. In highly finished areas such as main lobbies or corrosive environments, special finishes such as stainless steel or bronze or finishes to complement the interiors should be specified. Doors should be equipped with screw-driver operated cam locks.

11.15 Service Doors and Security gates

All service doors shall be heavy duty industrial doors from a single manufacturer of both the door and operator application. Rolling service doors shall be 14 gauge minimum and shall be slatted. Overhead sectional steel doors shall be insulated with an R value of no less than 17. The University has determined the following Manufacturer(s) to be of acceptable quality for service doors and security gates include, Overhead Door Company or approved equal.

11.16 Door Hardware

Specifying hardware by an allowance within the contract documents is prohibited. Hardware sets shall be developed for each unique condition for the building. Due to high use, door hardware must be of heaviest duty and grade available with no plastic components within its mechanical use. All finish hardware shall be coordinated to match with existing hardware or in cases of all new hardware and shall be supplied as satin chromium plated (US26D) or satin stainless steel (US32D) unless specifically specified otherwise.

Exterior doors, which are not the main access point(s) to the building and non-residential buildings, shall be keyed exit only.

Hinges and Butts

All exterior doors must have electrified mortis continuous stainless steel bearing-gear type hinges, tested for 1.5M cycles. The University has determined the following Manufacturer(s) to be of acceptable quality for hinges and butts include; Stanley, Ives, McKinney, and Marker.

Coordinators

Double doors shall be used in conjunction with key removable steel mullions and exit rim devices. Door coordinators are discouraged.

Exit and Panic Hardware

For applications where the exit is for emergency purposes only, panic hardware must be specified with a local audible alarm. All doors with exit devices shall be equipped with a keyed dogging device to hold the push bar down and the latch bolt in the open position, with the exception of fire rated doors and

electric dogging. All exit devices shall be a rim device unless otherwise presented and approved. The University prefers stainless steel brushed finish for all exit hardware. The University has determined that the acceptable quality level for exit and panic hardware shall be similar to the Sargent 16-8800 Series or Von Duprin 98/99 Series.

Cylinders and Locksets

There shall be no standalone locks without expressed written authorization from the University Representative in conjunction with the Locksmith Department. The Designer is responsible for the coordination of keying decisions with the end user and the University Locksmith together. Cylinder finish shall be US26D, unless otherwise approved by the University Representative.

Special Keying Requirements

Any room containing medium voltage equipment shall be secured by a high voltage electrician's key.

Interior:

Interior hardware shall have a lock button on the inside of each room, unless otherwise directed. Interior double door applications, it is preferred to be rim x rim x mullion with surface vertical rod less bottom rod, if allowed by code. The University has determined the following Manufacturer(s) to be of acceptable quality for cylinders and locksets include; Sargent 10 Series, Schlage Everest ND Series or approved equal.

For Residential and Academic applications, mortise locksets shall be specified. The University has determined the following Manufacturer(s) to be of acceptable quality for mortise locksets include; Sargent 8200 Series or the Schlage L Series.

Exterior:

All exterior door hardware applications shall provide for key override from the outside for emergency purposes and have an electronic latch retraction. Exterior locksets shall require electronic controls and not be supported by batteries. The University has determined the following Manufacturer(s) to be of acceptable quality for cylinders and locksets which include; Sargent 8800 series or Von Duprin 98/99 series or approved equal.

Exterior double door hardware shall be controlled by two rim devices and have a center mullion with cylinder key lock for release.

Security and Access Controls

Should the University determine the need for controlled access and surveillance to specific areas of the building, the Designer shall coordinate and adjust hardware specifications to list those manufacturers with products that are compatible with the specified security control system platform. Refer to Section relating to Infrastructure Security Systems.

To ensure that the building envelope is secured at all times, the exterior egress doors shall be specified with card access exit device or mortise electronic lockset. Door status monitoring, latch bolt monitor

request to exit sensor and electric latch retraction shall be included and will report back to the Police station.

Electrified hinges are preferred with compatible hardware that controls exterior doors, verses electronic strikes. There shall be no standalone electronic access control devices specified, including wireless systems. All locks must be wired with power over Ethernet (POE).

Door Closers

Provide heavy duty cast iron, continuously adjustable, surface mounted parallel arm closers. Closure durability must be rated for 10M full load cycle rated, 30-year full warranty. Closers must feature separate adjustment for latch speed, general speed and back-check. Hydraulic fluid shall require no seasonal adjustment. Specify through-bolting door mounted components. Doors of high peak volume traffic or used for deliveries should be specified as hold open. Floor type and overhead-concealed closers are not acceptable. Do not under any circumstances specify in-ground closures. The University has found the quality level of the door closers should be similar to the LCN 4119 Series or Sergeant 281 Series with 30-year warranty.

Automatic Door Openers Systems and Hold Opens

A presence sensing type device shall be installed and wired into the door opening system in lieu of an approachable safety mat. A push-plate switch shall be installed and wired into the system inside the building, and located near the entryway to permit operation of the door from both inside or outside the building. Operator and presence sensors shall be adjusted to allow sufficient timing delay of closing to permit wheelchair access. No in-ground door openers/closers operators shall be specified. The University has determined the following Manufacturer(s) to be of acceptable quality for automatic door openers include; Besam, Keane, Monroe, Gyro Tech or approved equal.

Door Trim Units

All mop and kick plates shall be 2" less than the width of the door. The University has determined the following Manufacturer(s) to be of acceptable quality for the door trim units include; Hager, Ives, and Trimco or approved equals.

Thresholds

The University has determined the following Manufacturer(s) to be of acceptable quality for thresholds include; Hager, National Guard, Pemko, Reese or approved equal.

Weather-stripping

All exterior doorways, enclosed loading docks and hatches shall be provided with weather-stripping. The University has determined the following Manufacturer(s) to be of acceptable quality for weather stripping include; Zero, National Guard, Pemko, and Reese or approved equal.

Door stops

Floor mount door stops are preferred, however in conditions where floor mounts are not conducive, wall mount stops are acceptable only if blocking has been install behind the gypsum wall board.

11.17 Millwork and Finished Carpentry

When choosing wood for cabinets, millwork and finish carpentry, generally choose species that are native to the United States and are readily available. Exotic species should be avoided. Always specify low formaldehyde and low VOC materials in millwork and carpentry. Wood veneer products are acceptable, however durability is a primary concern for the University and the Designer should be selective as to where veneers are utilized. Laminate finishes are generally acceptable to the University.

11.18 Countertops

Work surfaces shall be sized to permit safe access to utility outlets, and within easy reach of storage units located above the work area. The standard work surface depth is 2 feet. Deeper surfaces may be necessary to support large equipment. Counter heights should generally be 36", with a section lower to meet accessibility and code requirements.

11.19 Bathroom Accessories

Paper dispensers are preferred over electronic hand dryers. Toilet and paper towel dispensers are furnished by the University's current paper supplier and details of same should be requested from the University Representative. Sanitary dispensers are also provided by the University's paper supplier.

11.20 Toilet Partitions and Screens

The University prefers to have the toilet partitions posted from floor to ceiling where practical, made of solid 1" minimum high density polyethylene with continuous plastic wall brackets, solid plastic shoes and latch strike hardware. University has determined that the quality level provided by Santana Products or approved equal are acceptable.

11.21 Lockers and Benches

Lockers should generally be metal, and should not be wood or plastic. For most applications, 12" wide stacked lockers are preferred. If used in an athletic facility, lockers should also be vented.

Benches should generally be affixed to the structure with a minimum of two legs. Standard benches are 6' long. Benches may have wood seats or plastic laminate seats.

11.22 Window Treatment

Typically, manual vertical blinds are provided in the buildings on all windows. Some applications and building types require black-out shades, and these should be provided in addition to the vertical blinds. Should conditions require the use of electronic shades, the Designer must seek prior approval from the University Representative and Facilities Operations prior to specifying. Specifying film applications on windows is prohibited, with the exception of new residential bathroom window applications.

11.23 Building's Interior Directories and Signage

All signage shall be static and shall not be specified to be electronic unless specifically requested by the University Representative.

The University's primary color palette is as follows;

Navy Blue – Pantone 289C, C10 M76 Y12 K70 RO G14 B47

White – Opaque White, CO MO YO KO R255 G255 B255

Grey – Pantone 430C C33 M18 Y13 K40 R124 G135 B142

Building Directories

Building directories are to be provided within the main entrance area of all buildings. Design of the directory shall be pre-approved by the University Representative in conjunction with the Sign Committee Representative.

Interior Signage

All interior signs shall meet Green Building Focus Materials (GBFMs) requirements. Require that the Contractor provide mock-ups for University approval prior to installation of same

The University requires the following special warranties for interior signage: Manufacturer shall agree to repair or replace components of signs that fail in materials or workmanship including but are not limited to: 1) deterioration of metal and polymer finishes beyond normal weathering; 2) deterioration of embedded graphic image colors and sign lamination. A five-year unlimited warranty must be provided on the signage materials.

All identification, directional and informational sign applications shall be cast acrylic sign panels. The faceplate panel shall be laser cut from 1/16 in. clear, cast-acrylic and finished with a 3/8 in. subsurface opaque color border. The faceplate shall be permanently bonded to a black acrylic back plate allowing for changeable message. Permanent room identification and/or ADA compliance shall be achieved with a photopolymer acrylic faceplate. Photopolymer ADA faceplates shall provide 1/32 In. raised tactile graphics, and Grade II braille. This faceplate shall provide for permanent messages and optional subsurface applications. Provide paper or polystyrene inserts to allow for changeable message Inserts that can be easily updated as required. Signs shall be wall mounted or flag mounted to any surface using selected fasteners, brackets and adhesives recommended by the sign system manufacturer.

Informational and identification signs shall be 9 in x 9 in. x 1/16 in. in dimension with 9 in x 6.5 in. being white in color and 9 in. x 2.5 in. being blue in color. Office signs shall be 9"x 6.5" x 1/16" in dimension with 9 in x 4 in. being University white in color and 9 in. x 2.5 in. being University blue in color. Tactile Characters and Grade 2 braille raised 1/32 inch (0.8 mm) above surface with contrasting two colors.

The University has determined the following Manufacturer(s) to be of acceptable quality for signage include; APCO Graphics, Inc., ASI-Modulex, Inc., and Kroy Gemini Incorporated.

12 Public Safety Systems Guidelines

12.1 Guiding Principles

Providing buildings and sites that are safe is one of the primary tenants of the University. Proper design and constructability of Infrastructure Security Systems for new construction and renovations at the University is paramount. The University has adopted the Crime Prevention through Environmental Design (CPTED) philosophy and requires the Designer to take into account such philosophy in the positioning of a new structure, landscape and building design. Every building on campus has a unique purpose, therefore safety and security design shall be specific for each building. Design an appropriate physical protection system that utilizes building occupants and technology that will protect the assets accordingly.

The Designer shall incorporate existing systems when applicable, to ensure a seamless co-existence of new installations. Only certified **professionals knowledgeable in the systems** shall perform all such designs.

Design documents shall provide details of all fire protection and security systems. Before finalizing the intended design within the Design Development phase on any University owned property, the Designer shall obtain confirmation from the University Representative in conjunction with Division of Public Safety that all details concerning public safety have been covered and are acceptable. Such details shall also include the preliminary site logistics plan which shall reflect site and building access and egress paths by the public and occupants.

For many projects, the Division of Public Safety will have jurisdiction over the review and approval of the design plans as they relate to permitting responsibilities. However, if the project exceeds the State's Threshold Building Limits, the Office of State Building Inspectors has jurisdiction and review authority over the project. The Designer is required to meet all requirements of the Office of State Building Inspectors, as well as, all University Standards for Threshold projects.

12.2 Infrastructure Security System

Guiding Principles

All designs shall ensure clear sightlines and adequate lighting for safety and surveillance to protect the assets within the building and campus grounds. The Designer is responsible for coordinating the security system with any landscape design for review with the University Representative in conjunction with University Division of Public Safety and University Landscape Design.

A well-designed infrastructure security system shall be included in the program to identify what needs to be protected and provides four groups of security components: deterrence, detection, delay, and response. These four items in addition to what type of work is being performed in the building or space as well as equipment housed shall be the basis of need.

- **Deterrence** – to prevent unwanted visitors from gaining access to school grounds or buildings, and deterrence to avert the impact of natural threats that could result in potential harm to students, staff and property.
- **Detection** – to quickly locate, identify and contain the movement of an unwanted party who has gained unauthorized entry to the building.
- **Delay** – to impede, isolate and forestall the movement of an unwanted party within a building; to prevent access to classroom areas and common gathering points within allowing adequate time for a public safety response.
- **Response** – to ensure that coordinated, interactive and reliable communication system and procedures are in place to facilitate an immediate and effective response from public safety and medical agencies.

The design shall allow for the monitoring of points of entry/egress by natural and/or electronic surveillance during normal hours of operation and during special events.

For new construction or renovations to existing buildings, if the building has occupancy that requires access after normal hours, design shall identify one key entrance to be designated as an “afterhours” entry point to the building. Such entrance shall be clearly identified as such with a sign at the entry door. Where feasible, incorporate into the design for an afterhours space that can be segregated in such a manner that the rest of the building can be secured.

Signs identifying the designated after-hours access entrance shall following the sign standards and shall state: “After Hours Entrance”. Follow sign requirements within 7.21 Way finding, Informational and Directional Exterior Signage.

Public Areas consist of areas made available for use by the public, including but not limited to, campus grounds, parking areas, building exteriors, loading docks, areas of ingress and egress, classrooms, lecture halls, study rooms, lobbies, theaters, libraries, dining halls, gymnasiums, recreation areas, and retail establishments. Areas in which persons would not have a reasonable expectation of privacy, but to which access is restricted to certain University employees, such as storage areas, shall also be considered public areas.

Private Areas consist of areas in which a person has a reasonable expectation of privacy, including but not limited to, non-common area do residence halls, residence hall corridors, bathrooms, shower areas, locker and changing rooms and other areas where a reasonable person might change clothes. Additionally, areas designed for the personal comfort of University employees or the safeguarding of their possessions, such as lounges and locker rooms, and areas dedicated to medical, physical or mental therapy or treatment shall be considered private areas.

Generally at a minimum, all buildings (with the exception of Residence Halls) shall include card key access control, alarm notification and camera(s) to all entrance and exit points, include just intrusion alarm with card key for roof hatches.

The security management system control panel shall be installed in the main telecommunications distribution closet. Ensure that there is two (2) dedicated data connections and two (2) dedicated isolated power outlets where the control head end unit will be located. The Designer is responsible to coordinate the control hardware with the standard doors and frames. The Designer shall clearly have defined pathways and identify them in the as-built drawings. IP address will be coordinated with the University.

12.3 Security Management Systems

For projects where there is a high risk factor to the building, occupants or grounds, the Designer shall provide a designated ASIS certified security consultant independent of any product manufacturer or dealer.

The University has determined the following internet protocol system to be of acceptable quality and performance for the Surveillance **System; Genetic**.

Ensure that the specifications call for a certified technician who is an authorized service representative of the proposed equipment with the requisite training and authorization from proposed equipment manufacturer to install and program the solution specified at the time of installation.

Technician shall be responsible for training designated personnel in access card programming.

Power over Ethernet (PoE) is required for any dedicated data drop on or within a building. Where feasible, data drops shall be inaccessible and hidden from view to prevent unauthorized tampering with connection.

A single UTP Category 6, plenum cable is required for each data location. These data drops are to be terminated in a dedicated patch panel and switch in the telecommunications room. Designer must insure data jacks are included in the Communications drawings.

For distances beyond what can be supported by Category 6 plenum cable, such as outside poles, fiber optic cabling dedicated to a network switch installed in a NEMA 4X rated control box mounted to the pole. Locations with 110 power requirements shall take into consideration the need for step down transformers. Emergency power circuits are preferred. Poles and conduits shall be grounded.

The design and functionality of the security system shall include:

- Configuration of embedded systems such as Access Control System, License Plate Recognition, and Video Monitoring Systems.
- Live event monitoring.
- Live video monitoring and playback of archived video.
- Alarm management.
- Reporting, including creating custom report templates and incident reports.
- Federation for global monitoring, reporting, and alarm management of multiple remote and independent ACS and/or VMS systems spread across multiple facilities and geographic areas.
- Global cardholder management across multiple facilities and geographic areas each with their own independent ACS system.
- Microsoft Active Directory integration for synchronizing USP user accounts and ACS cardholder accounts.
- Intrusion device and panel integration (live monitoring, reporting, and arming/disarming).
- SIP Intercom device integration for bi-directional communication.
- Integration to third party systems and databases via plug-ins (access control, video analytics, point of sale, and more).
- Dynamic graphical map viewing.
- Asset management system integration.

In locations where access control and surveillance cameras work in tandem, time stamp of both systems shall synchronize to insure entry and exit times match recorded video.

- System is to be programmed to alert Public Safety if access is opened outside of Facilities first shift hours (0700-1500).
- All perimeter doors shall lock at a specified time, except for one central door (After Hours Entrance) which shall remain open until a designated time. This insures all people are entering the building through the main entrance.

Security Cameras

All building exterior doors and service areas shall have video surveillance cameras installed. Such surveillance shall be monitored and recorded back to the Command Center located at the University's Police Department. Inside building entrances a designated sign that notifies the public that the

building is under surveillance shall be posted. Use of cameras shall be limited to public areas. Follow requirements for interior signs at the end of Section 7.

If needed electronic shielding will be placed in the camera so that the camera cannot be used to look into or through windows into private areas either on University property or privately owned residence not located on University property.

Cameras shall be an integrated IP-based field mounted camera. Basis of design for Cameras shall be on the needs of performance. As technology advances the basis of design will change therefore it is the Designer's responsibility to inform the University Representative for any new innovative devices that will provide enhanced surveillance for the application.

Components shall be protected from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include coverage for voltage surges of external wiring of each conductor's entry connection to the manufacturer's requirements for the camera.

Conduits, connectors, hand holes and secured boxes shall be weather-proof.

For situations where the camera needs optimum night –time camera viewing, include back focus and adjustments necessary to obtain such viewing.

Access Control Systems

Access Control System shall support a variety of access control functionality, including but not limited to:

- Controller (Unit) management, door management, elevator management, and area management
- Cardholder and cardholder group management, credential management, and access rule management
- Badge printing and template creation.
- Visitor Management.
- People counting, area presence tracking, and mustering.
- Offer a framework for third party hardware integration such as card and signature scanner

The University uses a card access system for entry into the buildings and public spaces within the building. Individual offices, bedrooms or other private rooms utilize a traditional key systems and non-electronic hardware. The design of the card access system in the building needs to be compatible with the access system hardware and software that is currently being utilized on the campus.

Warranty/Guarantee

The Designer is to include within the detailed specifications any component of the Security System Infrastructure that the manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period. Security System components include all hardware, firmware, devices, and other materials and labor unless specifically excluded in this document.

Ensure that the Contractor provide a complete coverage of parts, labor, installation and software warranty on all components associated with this purchase, for a period of one (1) year following acceptance of the entire system. Warranty period shall commence upon official acceptance by the University of the entire network system.

During the warranty period, the University requires a four (4) hour response time for system or component failures from the Contractor and shall provide all available software and firmware upgrades, patches, hot-fixes, etc. to include all labor, at no additional cost to the owner. Advanced replacement of each component in need of replacement or repair at no additional cost to the owner.

12.4 Code Blue Emergency Telephone

Any project that entails work outside of a building that impact or add sidewalks shall take into consideration the requirement of moving or adding a Code Blue Telephone. Designer shall review with the University Representative to determine if a Code Blue Telephone is required. The spacing of the blue light posts shall be such that from any location on the site, at least one Code Blue Telephone can be seen.

See Appendix IV - Telecommunications Design Guidelines and Performance Standards for further information and details about emergency call box requirements.

12.5 Central Fire Command Station

At Regional Campuses, stand-alone structures and other areas off of an existing campus network, the communication system from the building alarm system to a receiving station shall be based on compatible technology. Due to concerns over key holder contact, repair contracts, cost of monitoring, and potential delays in transmission of non-priority alarms, the University Storrs 911 center shall be the first choice alarm receiving center and use of third party receivers (i.e.; ADT, Brinks, etc.) shall only be used when the existing network cannot be extended and found to be the only practical solution.

On the Storrs and Depot campus phone networks, the system shall be provided with a Direct Style 7 network, to be connected to the existing campus Central Station Fire Alarm System 4120 network True Site Work Station (TSW) by SimplexGrinnell is located in the Public Safety Building in Storrs. The network interface shall provide and be programmed to use the following minimum capabilities:

- Graphic screens shall be programmed at the TSW (head end receiver) that depict an actual representation of the building floors, annunciating all alarm points in the building. These points shall be programmed to change color depending on their state of activity (red for alarm, green for normal, etc.).
- The 4120 network interface shall provide to the TSW:
 - Control of the remote panel allowing the operator to acknowledge devices individually or in groups.
 - The ability to silence signals and reset the remote panel.
 - Set-host service functions which will allow remote node data access including reports on all individual initiating devices.
 - Programming and diagnostics capability of the remote 4120 node.

12.6 Fire Alarm Systems and Components

The University has standardized critical life safety infrastructure for reliability and compatibility of operating systems, as well as consistency of parts stock, technician and user training and testing protocols. All primary (panel, programming, network interface, etc.) fire alarm equipment and programming shall be manufactured by SimplexGrinnell. Secondary components and some communications equipment may be from other manufacturers if compatible with the SimplexGrinnell alarm receiving system and is approved by the University Representative in conjunction with the Fire Chief as an equal. Examples include, but are not limited to Vesda detection systems, interface or control modules, dialers for non-networked locations, etc.

With renovations, the age of the existing system components should be taken into consideration when specifying the re-use of existing system components in conjunction with additional new system components being added to the overall system. The Designer is responsible for investigating the existing system being impacted and confirming with the University Representative in conjunction with UFD the strategy for utilizing existing versus new components. Do not assume and leave the investigation to the Contractor.

Building Main Control Panel and Enunciation Configuration

The building's main fire alarm control panel shall be located at or as close to the main entrance of the building as possible. The location of this panel shall be approved by the Division of Public Safety designee. In cases where, due to existing wiring infrastructure or other factors that necessitate locating the main fire alarm control panel in a location that is not near the main entrance, a fire alarm remote control-capable enunciator shall be installed at the main entrance.

A minimum 80-character alphanumeric display shall be mounted at 5'6" to the center of display above the floor.

If the panel is located in an area that is controlled and not publicly assessable, such as a locked and dedicated fire command room, the labels may be on the exterior of the panel enclosure, otherwise it shall be on the interior of the panel enclosure. The labeling shall be of a pre-manufactured or site produced label, and can never be hand written. Labeling shall be located in an area such as on the inside surface of the panel door or similar that would be protected but readily visible to authorized users.

The fire alarm panel shall be labeled with the following information:

- location of the battery charger panel
- location of the battery box
- location of any Notification Appliance Circuit (NAC) panels
- location of the AC power supply overcurrent protection device (OCPD) for that panel
- a contact number for the fire alarm service provider (if the system is not being monitored and serviced by the University)
- the alarm transmission method (fiber network, dialer, etc.)
- the account or node identity at the receiving location shall also be described

NAC panels shall also have a label indicating battery location and designed size, as well as, the AC power OCPD location. The inside of the battery box shall be labeled with the amp hours rating of the batteries

required by the fire alarm design. Battery system and charger system shall be readily accessible to the satisfaction of the Division of Public Safety Representative for normal testing and maintenance.

For secondary power supply and back-up battery capacity, regardless of the presence of an emergency generator, provide a minimum of 24 hours standby and 15 minutes of alarm time capacity.

Excess Capacity

A minimum of 20% excess cabinet space above that required shall be incorporated into the original design and configuration of the fire alarm system. It is preferred that the excess space be within the main fire alarm panel, however if in order to achieve such excess space a separate panel is required, it shall be mounted immediately next to the main fire alarm panel.

For ID Net Addresses, provide a minimum of 20% excess addresses for each ID net circuit or card utilized above that required for the original design and configuration of the fire alarm system on the day that the Certificate of Occupancy (CO) or Certificate of Approval (CA) is issued.

For Notification Appliance Circuits, provide a minimum of 20% excess notification circuit capacity in addition to 20% excess signal circuit capacity on each signal circuit card utilized in the system than required for the original design and configuration of the fire alarm system on the day that the Certificate of Occupancy (CO) or Certificate of Approval (CA) is issued.

When a project is renovating a space, the Designer can utilize the excess capacity in existing fire alarm panels, and does not need add new panels or capacity unless it utilizes greater than 95% of the existing panel capacity. If less than 5% capacity remains, the Designer shall provide an increase in panel, ID net addresses and NAC capacity to the requirements herein.

Fire Alarm Pre-programmed Panel Keys

The operation of the "hot" or "soft" keys shall be password protected to prevent unauthorized control of fire alarm functions. Capability of one stroke key control or hot key button control (after password access) and includes the following disabling features:

- All audible and visual signals, while only generating one (1) trouble transmission, shall be provided.
- The automatic release of magnetic door hold open devices and fire shutters, while only generating one (1) trouble transmission shall be provided.
- The elevator bypass feature, while only generating one (1) trouble transmission shall be provided.
- The interconnect feature with other fire alarm panels/systems within the same building, while only generating one (1) trouble transmission.
- Other control by event features such as air handling unit shut down and activation of smoke control systems, while only generating one (1) trouble transmission for each group of like features being disabled.

Activation of the Fire Alarm and Devices

The Designer shall be responsible to ensure that all initiating devices shall be placed in locations that are readily accessible for routine maintenance and testing. Duct detection that cannot be readily accessible shall be provided with readily accessible remote alarm/test/reset switches, appropriately labeled. All initiating devices shall be addressable and clearly labeled with their device number. The label shall be

clearly visible from floor level and from the typical direction of travel into and through the protected building from the direction of the main Fire Alarm Control Panel (FACP). All FACP pre-programmed keys, zone labels, function keys, instructions and initiation device labels shall be typed.

Devices in locked rooms shall be located such that they can be observed from the corridor or have a remote LED display in the corridor in order to view the status of the device.

Description of device location shall be geographically driven and landmarked to room numbers. The list of the point descriptions shall be submitted and approved prior to final acceptance by the Division of Public Safety designee.

In addition to any specific detection devices required by the State Building Code, Connecticut Fire Prevention Code and/or the Connecticut State Fire Safety Code, automatically addressable detection shall always be provided.

Smoke and Heat

The preferred installation of smoke and heat detectors is on the ceiling with sidewall installation only as a contingency.

Activation of any single heat detector, water flow sensor, special hazard detector (flame, explosion, etc.), or pull station in any occupancy class shall activate the general evacuation signals, as well as, transmit a fire alarm signal to the Public Safety TSW, or other approved reception point.

It shall be the responsibility of the Designer and installer to verify the use of all spaces and equipment within the space to determine the proper type of initiation device and to provide proper coverage, so as to reduce the number of nuisance alarms. Areas that contain environmental conditions which would likely cause false alarms may require the use of heat detection or smoke detection with a Carbon Monoxide sensor as an example.

The fire alarm system's response to the activation of smoke detector(s) shall be based upon the following:

Elevator Recall

Smoke detectors that serve as area detection and elevator protection/control shall operate as noted in sections below, along with the code required elevator control functions. Smoke detectors that are dedicated to elevator protection/control only shall perform required elevator control functions, as well as, transmit a fire alarm signal to the Public Safety TSW. Local annunciation shall not be required. Activation of heat detection, even if dedicated to elevator functions, shall activate the general evacuation signals as well as transmit a fire alarm signal to the Public Safety TSW.

Residential Spaces

Activation of any one (1) dorm/sleeping room smoke detector in which only 1 smoke detector protects that compartment shall result in local annunciation in that compartment and connected compartments (i.e. suites, etc.), and the transmission of a fire alarm signal to the Public Safety TSW but shall not result in the activation of a general evacuation signal in any other part of the building.

Activation of any two (2) or more smoke detectors in dorm/sleeping rooms (or suites of sleeping rooms) shall result in the transmission of a fire alarm signal to the Public Safety TSW and activation of general evacuation signals.

Activation of any one (1) common area or mechanical space smoke detector shall result in the transmission of a fire alarm signal to the Public Safety TSW and activation of the general evacuation signal.

Business – Assembly – Mercantile – Storage – Other Occupancies

Activation of any one (1) area smoke detector, which shares air/compartment space with other smoke detectors, shall result in the transmission of a fire alarm signal to the Public Safety TSW and but shall not result in the activation of the general evacuation signal.

Activation of any two (2) or more common area smoke detectors that share the same air or compartment space shall activate the general evacuation signal as well as transmit a fire alarm signal to the Public Safety TSW.

Activation of any one (1) smoke detector, in which only 1 smoke detector protects that one compartment, shall result in the transmission of an alarm signal to the Public Safety TSW and shall activate the general evacuation signals.

Carbon Monoxide (CO) Detection

CO detectors shall be installed where required by code and the fire alarm system's response to the activation of the Carbon Monoxide sensor in the smoke detector shall be based upon the following:

- **Residential**

Activation of any 1 Carbon Monoxide sensor in dorm /sleeping rooms (or suites of sleeping rooms) shall result in that device sounding locally and throughout any connected rooms of an individual suite, the transmission of a priority 2 alarm to the Public Safety TSW, but shall not result in the activation of a general evacuation signal in any other part of the building.

Activation of any 2 or more dorm/sleeping room Carbon Monoxide sensors shall cause those devices to sound locally and throughout any connected rooms of an individual suite, the transmission of a Priority 2 alarm to the Public Safety TSW, and shall activate the general evacuation signals.

- **Business – Assembly – Mercantile – Storage – Health Care – Educational – Detention**

Activation of any 1 common area Carbon Monoxide sensor shall result in the transmission of a priority 2 alarm to the Public Safety TSW but shall not result in the activation of the general evacuation signal.

Activation of any 2 or more common area Carbon Monoxide sensors shall result in the transmission of a priority 2 alarm to the Public Safety TSW and shall activate the general evacuation signals.

- **Speaker Strobe Units**

Voice capability is not typically required in all areas since the University does not use the fire alarm system for public announcements, but it is to be provided for any areas required by code.

It is preferred that where voice capability is incorporated or required, the addressable speaker strobe should be a red unit. Where required, speaker strobe units shall be installed onto common circuits and appropriately activate via programming with standardized fire evacuation messages.

- **Flow Devices**

If any device is activated on a wet sprinkler system or dry suppressor system, the emergency evacuation alarm should sound on a building-wide basis, and notification sent to the Public Safety TSW.

12.7 Fire Protection/Extinguishing Systems

Include within the extinguishing systems specifications that all shop drawing submittals on sprinkler systems shall reflect plans of all device locations back to the service, riser diagrams and current hydraulic calculations.

It is preferred that all new projects include a fire protection or suppression system. Renovations to buildings that do not already have sprinkler coverage in the building shall be reviewed on a case by case basis with the University Representative and Division of Public Safety designee.

Sprinkler flow switches shall be equipped with an integral time delay device which shall be able to provide a delay of no less than 25 seconds from the time water begins to flow to the activation to the time of the alarm or as close to that value as can be adjusted in the field. In no case may the delay be programmed greater than 40 seconds.

Pre-action systems shall have addressable monitoring points, or have a releasing panel that will provide signals to the main system indicating tamper, pressure conditions, trouble, and alarm.

All risers, valves and appurtenance shall be readily accessible for normal and emergency maintenance and resetting. Zoning of the sprinkler system should be reviewed with the University Representative and the Division of Public Safety designee during the Design Development phase and should not be finalized until approved by both. Shut off valves shall be provided on each floor and for each zone, and shall preferably be located in stairwells.

It is preferred to have the main drain for the sprinkler system to be piped directly to the outside of the building, with provisions made to prevent soil erosion during testing. If the main drain is interior to the building, a large basin shall be provided to accommodate the volume of water required to drain the system. The drain room shall also have a floor drain, however the sole reliance on the floor drain to drain the sprinkler system is prohibited.

All sprinkler equipment required to service and maintain the system shall remain the property of the University. For renovations of existing systems, unused or replaced equipment shall be kept or discarded at the discretion of the Division of Public Safety designee.

System Control Valves and Switches

Each control valve shall be provided with an addressable tamper switch. Control valve height shall not exceed seven feet (7') from the walking surface, unless approved by the Division of Public Safety designee. If the valve height exceeds seven feet, it shall have a chain-equipped handle. The control

valve indicator shall be readily accessible and visible from the floor without the use of a ladder. The control valves shall be equipped with locks (keyed as Cat 83) and a chain or cable.

Individually addressable sprinkler flow switches and addressable control valve tamper switches shall be provided for each control valve and inspectors test valve on all sprinkler systems, including limited area sprinkler systems.

Training and Documentation

The Designer shall require the sprinkler system installer to provide one full day of training on the system, which shall include field review of the locations of all components of the system with University fire department representatives. Electronic as-built drawings (with a copy of the valve lists) shall be provided to the Division of Public Safety and shall contain the location, area/function served, and “normal setting” (open or closed) for each valve.

12.8 Fire Department Connection

For buildings at Storrs, the University’s standard fire department connection (FDC) is a 4” Storz type connector. For buildings at the regional campuses, the type and size of the FDC shall be determined by the local fire department. The location and number of FDC’s required for a project should be reviewed and approved by the Division of Public Safety designee early in the project design, but in no case shall there be less than one FCD per building.

12.9 Fire Extinguishers and Cabinets

The goal is to provide sprinkler coverage throughout buildings, and thereby minimize the number of fire extinguishers in the building. Fire extinguishers are still required for certain uses in the building, such as chemical laboratories, and the appropriate type of extinguisher should be provided for each special use. To allow quick response and replacement, fire extinguishers should be installed on brackets and not in cabinets. This will minimize wall damage and intrusion on wall fire ratings. All fire extinguishers shall be Buckeye Brand or approved equal.

12.10 Emergency Services Apparatuses

Service road access for rescue and firefighting apparatus shall be provided to all four sides of the building and courtyards, if possible and practical. The largest fire truck serving the Storrs campus currently is the 1994 Aerial Truck (also known as a “Tower 122”). The inner turning radius is 30’ and the outer radius is a minimum of 53’. The stabilizing jacks require a solid (paved or compacted) surface of 18’ wide by 50’ long minimum. If service road access cannot be provided on all four sides of the building, the Designer should review the available access with the Division of Public Safety designee.

12.11 Fire Hydrants

Fire hydrants shall be located to allow ready access in proximity to the intended center location of the fire department operations, and preferably within close vicinity to the front of the building. However, the hydrant location must be far enough from the building to keep firefighting apparatus and personnel out of potential collapse zones. The area around a hydrant shall have a minimum of a 3’ radius of paved or hard area around the hydrant on all sides to allow for the turning of the valve stem. The area between the hydrant and the apparatus shall have a minimum of 10’ clear of width (5’ to each side of the hydrant) to allow for hose line placement and working area.

The University Division of Public Safety shall be consulted regarding acceptable types of fire hydrants. Fire hydrants shall be painted red, unless the hydrant is on a high pressure line, in which case the hydrant shall be painted orange.

12.12 Fire Water Lines

It is preferred that new buildings have a separate domestic water service and fire water service. Where feasible, and for buildings exceeding 250,000 square feet, provide a redundant fire service (ie. three services).

The pressure of the fire loop in the vicinity of the University varies between 40 psi and 80 psi. Prior to commencing the design, it is the Designer is responsible to have a pressure test conducted by an independent third party at the nearest fire hydrant to the project. Such testing cannot commence without first notifying and obtaining an approval to proceed with the testing from the of the University's Fire Department prior to conducting the testing.

12.13 Key Securing Systems

All building projects, new construction and renovations will include a Knox Box key storage device to interface with the Knox Rapid Access System implemented and maintained by the University fire department. The Knox box is a safe-like enclosure and can be either surface or flush mounted outside the building. The location of the box shall be approved by the Division of Public Safety designee. If an alternate key securing system is proposed, it shall be compatible with the existing University system and also subject to approval by the Town of Mansfield (for Storrs based projects).

On the Storrs and Depot Campuses, the Knox box shall be equipped with the option that allows the box to be monitored by the building fire alarm system and shall be designed to tie into the system. If a fire alarm system is not available to monitor the box, a security alarm shall be used. If neither exists, the Division of Public Safety designee shall approve alternate security procedures.

Control of Keys

On the Storrs and Depot campuses, the University fire department will maintain the Knox access key. At other facilities and branch campuses, the Knox box shall be keyed to the local fire department (if a system is already in place) or coordinated with the local fire department to register for a new Knox box system.

12.14 Communication

Radio Amplification System

For any new building or addition to a building that exceeds 10,000 square feet, the radio amplification system shall be checked and verified that receiving and sending coverage meets the following, including below grade spaces:

- A minimum signal strength of one (1) microvolt (-107 dBm) available in 90% of the area of each floor of the building, including below grade where applicable, when transmitted from University Public Safety Dispatch.
- The frequency ranges, which must be supported, shall be in the 800 MHz range for the University's Police Department and UHF for the University's Facilities Operations Department; with a 100% reliability factor. Frequencies shall be determined by the designer/vendor

conducting the required research at time of system design to assure compatibility with existing communications.

Any radio communication boosters, repeaters, etc. required to be added to meet the coverage requirements will be of the same capability and quality as the existing public safety radio systems in areas such as radio identifiers, trunking, digital protocols, etc.

Amplification System

Building and structures which cannot support the required level of radio coverage shall be equipped with an internal multiple antenna system with FCC-accepted dual frequency range bi-directional UHF and 800 MHz amplifiers. Frequencies shall be determined by the Designer conducting the required research at time of system design to ensure compatibility with existing systems.

If any part of the installed system or systems contains an electrically powered component, the system shall be capable of operating on an independent battery and/or generator system for a period of at least twelve (12) hours without external power input. The battery system shall automatically charge in the presence of an external power input. The amplification system, if powered, will be monitored by the building fire alarm system. If the system shifts to auxiliary power as stated above, the buildings fire alarm system will indicate trouble for that dedicated zone or addressable monitoring device when the building uses an addressable fire alarm system.

For new buildings, the Designer shall provide two (2) raceways in the walls into which the cable could be laid. Such raceways shall include an opening in the roof, which allows for replacement of an exterior antenna, and, access to each floor.

Acceptance Testing Procedures

When modification or enhancement to an in-building radio system is required, and upon completion of the installation, it will be the Designer's responsibility to ensure that the radio system has been properly tested and witnessed to ensure the two-way coverage on each floor, including below grade, of the building.

Each floor of the building, and below grade, shall be divided into a grid of approximately twenty (20) equal areas. A maximum of two (2) non-adjacent areas will be allowed to fail the test. The test shall be conducted using a Motorola MTS2000, or equivalent, portable radio, talking through the University radio system and conducted under the supervision of the University's Communications Manager. The center of the grid area will be located for the test. The radio will be keyed to verify two-way communications to, and reception from, UCPS Dispatch.

The gain values of all amplifiers shall be measured and the test measurement results shall be provided to the Division of Public Safety designee and the University's Communications Manager.

Qualifications of Acceptance Test Personnel

The Designer will be responsible to require the Contractor to perform all tests associated and that the test shall be conducted, documented and signed by a person in possession of a current FCC license, or a current technician certification issued by either the Associated Public-Safety Communications Official International (APCO), the Personal Communications Industry Association (PCIA), or the National Association of Business and Educational Radio (NABER).

13 Plumbing Guidelines

13.1 Guiding Principles

The Designer is responsible for coordination of all building systems involved within the project and to minimize the number of joints within the run and cross connections. To that means, include language within the specifications that any unnecessary short pipe runs will be replaced at the Contractor's expense.

All piping layouts, directional flows and shut off valves shall be included in all as-built plans. The Designer is responsible for ensuring that the information is required from the Contractors.

13.2 Plumbing Fixtures

Flush Valves and Toilets

The University prefers where practical the installation of automatic flush valves, with rechargeable lithium-metal batteries for self-generating hydropower. The University has determined the following Manufacturer(s) to be of acceptable quality for flush valves include Toto or approved equal, and for toilets, acceptable quality include Kohler, American Standard and Crane.

Sinks/Lavatories

The University prefers where practical for restrooms the installation of an integral sink with the counter top.

Faucets

The University prefers the use of automatic battery faucet sensors in all public bathrooms on the campuses. Fixture shall have water conservation aerators and self-generating hydro power sensors. Under no circumstances shall washer faucets be specified unless in a kitchen or laboratory application. The University has determined the following Manufacturer(s) to be of acceptable quality for faucets include Simons, Toto and Delta.

Drinking Fountains – Bottle Filling Stations

The University has adopted a program to incorporate Bottle filling stations at all drinking fountain locations. The University has determined the following Manufacturer(s) to be of acceptable quality for bottle filling stations is Halsey Taylor and Elkay.

13.3 Interior Steam and Condensate Piping

Steam piping shall be A53, Grade B, ERW, schedule 40. Condensate piping shall be A53, Grade B, ERW, schedule 80.

13.4 Domestic Hot Water Systems

The use of plastic and iron pipe is prohibited. Recirculating hot water distribution systems shall be used to maintain proper supply water temperature. Heat tracing is not an acceptable solution in maintaining proper water temperature.

Should existing conditions only allow for individual water heating, such heaters shall be instantaneous point of use heaters. There shall be no hot water heaters unless explicitly approved by the University Representative in conjunction with Facilities Operations and the Office of Environmental Policy.

The number of fixtures shall be designed for the full peak load, and diversity factors can only be applied when all points in the system are 100% controlled.

13.5 Domestic Cold Water Systems

Under no circumstances shall domestic water be used for process cooling. Where required variable speed pumps are required and not fixed speed booster pumps. The use of plastic and iron pipe or valves are prohibited. Pex tubing is acceptable.

13.6 Protection of Potable Water Supply

The Designer is responsible for individual sizing of all backflow preventers when they are required. Review design parameters with the University Representative in conjunction with Facilities Operations when backflows are required.

13.7 Water Piping and Insulation

The University prefers the use of copper piping with minimum one (1) inch armafex insulation, and does not approve of the use of steel piping or PVC/plastic piping for water lines.

Viega Pro-press or Victalic grooved mechanical joint couplings are acceptable pipe connections. No type F piping shall be specified. Insulation is required for all chilled water and domestic cold pipe and any ball valves must have an extension and must have a split cover and seal terminators on either side of the split cover.

13.8 Sanitary and Vent Piping

The University prefers only cast iron for waste piping, and plastic or copper for vent pipes.

When adding to an existing waste pipe or tapping into an existing waste pipe, the Designer is required to verify existing conditions of the impacted lift station and perform calculations for the additional flow and its impact on the existing lift station, prior to completion of Design Development. All calculations shall not rely on assumptions or verbal response of existing conditions and calculations shall be presented for review and further direction by Facilities Operations prior to proceeding with the intended design.

13.9 Pipe and Valve Identification/Labeling

To the extent possible, the same color scheme should be used for utilities and services inside and outside the building for labeling piping. Each system or service type should have a different color. Within a room of a building, the labeling of all pipes should be observable from the floor and should have an arrow attached to each showing the direction of flow. Potable and non-potable water must be clearly labeled.

Isolation and Shut-Off Valves

The Designer shall be responsible to plan and outline the location of all isolation valves. Each floor of a building shall have at least one isolation valve controlling each utility service for each floor and the

location shall be clearly marked and accessible in a pipe chase. The designed location of the access panel shall be coordinated with the furniture plans to ensure that the access panel will not be blocked.

13.10 Floor Drains

All floor drains shall be self-primed and have a continuous waterproofing flash membrane that carries up perimeter wall finishes. The University has determined the following Manufacturer(s) to be of acceptable quality for floor drains is Zurn or approved equal.

Cleanouts

The Designer is responsible to detail in the finish specifications an unobstructed access of the cleanouts. Preference would be to place them in the floor.

13.11 Pumps and Ejectors

Sewer Ejector/Grinder Pumps

The Designer shall not design for the use of sewer ejector pumps in support of new kitchen or bathroom locations where there is not existing plumbing and waste line available. The University has determined the following Manufacturer(s) to be of acceptable quality for sewer ejector pumps include Zoeler and Liberty or approved equal.

Ground Water Pumps

The University has determined the following Manufacturer(s) to be of acceptable quality for ground water pumps include Zoeler, Liberty, and Wild.

Domestic Water Booster Pumps

Booster pumps shall be variable speed drives. Isolation valves shall be all bronze (ball valves) or cast iron body with bronze internals, utility grade materials & construction. The University has determined the following Manufacturer(s) to be of acceptable quality for variable speed drive booster pumps include Gould's or Grundfos.

13.12 Exterior Wall Spigots

All buildings shall be designed with exterior wall spigots at a minimum at each corner of the building. The Designer is responsible to work with the University Repetitive to locate the spigots. Specify only frost proof spigots with a vacuum breaker.

13.13 Gas Piping and Systems

Only the use of black iron piping on the gas mains is acceptable. From the isolation valve, concealed flex pipe is not acceptable on secondary gas pipes.

14 Mechanical Guidelines

14.1 Guiding Principles

It is the required that all project work where there are Building Systems being impacted, they be designed to the highest efficiency possible. All systems design and equipment selection shall be determined by life cycle cost analysis including first, operating, and maintenance costs.

Wherever possible and where there is adequate capacity, connect the new project to the existing central steam and chilled water systems. If an individual centralized building system must be

constructed, design sufficient space for the redundancy of the systems. Locate central systems (chillers, pumps, air handling units, etc.) in the basement and/or penthouse mechanical rooms.

In mechanical rooms that have the potential for releases of refrigerants, alarms or emergency signals shall be included to alert building occupants of releases.

Unoccupied areas such as mechanical and electrical rooms shall be automated ventilation and heat to 50°F for temperature control and shall be connected to the building controls system. See Section-Building Planning Guidelines for more requirements on Mechanical Rooms.

Locate motor control centers and panel boards directly servicing the Mechanical equipment within the mechanical room and size them to accommodate expansion or temporary bypass of normal equipment electrical protections when servicing normal breakers or starters. Keep the controls and boards apart from plumbing as much as possible. Due to the hostile temperature and humidity environment often found in mechanical rooms, variable frequency drive (VFD) controllers shall be located outside of the mechanical rooms. In cases where controllers must be installed within mechanical rooms, adequate protection from temperature and humidity fluctuations must be taken included in the design to protect the VFDs.

When designing for new heating or cooling systems, whether it be new construction or renovation, the Designer must review with the University Representative in conjunction with Facilities Operations the options for the systems before establishing the construction cost estimate and proceeding with the design. Do not automatically assume in the case of a renovation that the existing systems will be added to or utilized.

Design equipment and controls for the different types of occupancy and schedules within the building. Provide setback temperature controls, with manual override, for nights, weekends and holidays. HVAC equipment, including individual electrical components as well as electric motors, shall be UL certified and stamped at the manufacturer's facility prior to shipment.

Specify rotating equipment for 200,000-hour minimum L50 bearing life or more, if readily available.

Maintenance of mechanical equipment is a high priority with the University. Design for easy service access to the equipment and all components of the HVAC systems, especially mechanical parts and filters. Provide access doors, inspection plates, etc. and include piping unions for equipment replacement. With each decision on placement of a piece of equipment, include and meet manufacturer's recommended procedures for maintenance, clearance and accessibility.

When locating equipment, avert fall protection concerns by orienting the equipment such that access points are facing the center of the roof area and not the roof edge. On flat roofs, install rooftop equipment no less than fifteen (15) ft. away from roof edges. Any equipment installed less than fifteen (15) ft. from a roof edge must be guarded with passive fall protection devices, such as a guardrail system or horizontal lifelines.

All electrical for any roof top equipment when fed from below, shall be run through the curb connections. First elbow shall be 1.5R with the duct liner of hospital grade non-fibrous insulation.

The Designer shall take into consideration how the Contractor will be heating and/or cooling the space during construction and prior to occupancy. If it is determined that utilization of new and/or existing equipment is needed, the Designer will be responsible for ensuring that new filters are specified at acceptable intervals and at the time of turnover.

System filters should be high efficiency air filters (meeting ASHRAE 52.1-1992 Dust Spot 40% or greater), such as extended surface types (pleated, bagged, enhanced media). Supplement with lower efficiency pre-Filters if possible.

14.2 Heating Systems

Plant steam (when available and access is within close proximity) shall be used for heating a building. If there is no plant steam, natural gas shall be used for any major equipment. Where both plant steam and gas are not available, propane shall be used.

Due to the University's Environmental Title V permitting requirements, care must be considered when specifying fuel burning equipment on the campus. Where possible, centralized steam solutions should be considered to allow metered and diversified loads to meet the code required load calculations and actual conditions. Generally, if a decentralized stand-alone heat source is utilized, natural gas units are preferred

The University prefers a four pipe system in all buildings or mixed use floors. The Designer shall provide a life cycle cost analysis to install a 2 pipe system for review with the Facilities Operations Representative prior to any value engineering initiative.

With the exception of vestibules, electric should only be used for heating if no other energy source is available.

14.3 Cooling Systems

Central Utility Plant provided chilled water is preferred where assessable and available for building air conditioning and process chilled water requirements. If it isn't available, then a centralized chilled water system would be the preferred means for HVAC needs and for process cooling for equipment. If chilled water systems are used for process cooling or other year round cooling applications, then provision for economical winter chilling should be provided. If the centralized chilled water system is not readily accessible, the University's secondary preferred method of cooling is direct expansion or unitary chillers.

The University prefers outside air economizer systems while promoting energy conservation for building cooling when conditions permit.

All AC condensate drains shall be trapped with adequate depth for system pressure differential and have attached cleanouts.

When designing for roof top air handlers, minimize the length of exterior duct work. All exterior ductwork must have a pitch to it to prevent water puddling. If duct runs are going to impede access ways, the Designer must design bridges over them to protect the ducts from damage and to ensure ease in accessing other equipment and areas on the roof.

14.4 Ventilation Requirements

Consider heat recovery and free cooling systems to maximize delivery of outside air while promoting energy conservation.

If gas lines are installed, locate vent pipes away from air intakes and up to the roof line, including purge lines from boilers, etc.

All ventilation systems shall have the capacity to meet cooling and ventilation requirements with enthalpy based economizer control.

Intake Air

The Designer is responsible for ensuring that the air intake vents are not in close proximity to other potential pollutant sources, e.g., loading docks, dumpsters, cooling towers, exhaust fans, vent pipes, etc. Ensure bird screening and other bird roosting deterrents around and near air intakes are clearly specified. Ensure air intakes account for snow fall and subsequent melting to prevent moisture from entering the building. Do not rely on loading dock open area as the intake air. It is desirable that the intake be located a minimum of 10 feet above grade. Design to ensure that the air intake is conditioned before being released inside. Designer to ensure that intake air is equal to building/space exhaust air requirements to avoid negative pressure in the building.

Make-up air or 100% outside air systems that use water for heating or cooling must use inhibited propylene glycol at a burst protection concentration of -10F° (28%) to protect the coils.

Ensure during the planning process a minimum, turndown ratio (minimum air flow) is specified to meet the minimum ventilation requirement for the occupants, so that variable air volume (VAV) terminal units provide ample fresh outside air per person to meet ASHRAE 62- requirements. For adequate turndown control of modulating minimum outdoor air and modulating 100% economizer functions, it is desirable to provide two separate control dampers, each sized for the range of airflow for each application.

Return Air

For sound mitigation, the University prefers ducted returns rather than open plenums. The Designer is to ensure that return air and/or exhausts are not within close proximity of the intake air. Specify power open and spring close for all louvers.

14.5 Ductwork and Air Distribution

General Requirements

Design systems to maximize flexibility to accommodate future changes and renovations. This should include future additional capacity and room to add additional components. Design duct and piping systems for a minimum of 100% design flow, including foreseeable immediate future loads.

All duct work shall be exterior insulated and have access cuts with clear markings on locations. Interior insulation/lining of HVAC systems is not recommended. If sections must be lined for acoustical reasons, use non-porous or low-porosity, durable materials that do not support microbial growth.

Maximize individual environmental control through enhanced zoning, i.e., systems that allow occupant adjustment of temperature and airflow.

Design for no more than four feet in length of flex duct, fully supported and stretched. Ensure that no more than one and half (1.5) radius turn, where a diffuser box is desirable.

In critical areas, minimize the number of individual systems but provide cross connections for redundancy wherever possible.

14.6 Control Dampers and Control Valves

The University has determined the following Manufacturer(s) to be of acceptable quality we expect for control dampers; Tamco or equal.

The University has determined the following Manufacturer(s) to be of acceptable quality we expect for control valves; Belimo, Flow Control or HCI.

14.7 Humidification

If humidification is required, it shall be via clean steam, steam HX, or canister steam systems using chemical-free, demineralized water to maintain optimal indoor air quality. The humidifier section must be downstream of heating coils. Any porous duct liner/insulation must be located at least fifteen (15) feet downstream of the humidifier section. Adequate access for inspection and maintenance must be available for the humidifier section. It is the responsibility of the Designer to take into consideration the water condition when humidification is required.

The University has experienced a number of valves being installed above humidifiers, which cannot be accessed, so the Designer is responsible for the coordination of where valves are to be placed to ensure easy access for maintenance purposes.

14.8 Pumps

Centrifugal Pumps

Preference is to use centrifugal "smart" pumps where applicable. Larger pumps shall be based mounted, direct coupled and shall include suction strainer with turning veins as supplied by the pump manufacturer. efficiency. Pump motors shall be selected with the highest NEMA nominal efficiency available. Ensure that the specifications outline that the listed manufacturer's installation requirements shall be strictly followed.

The University has determined the following Manufacturer(s) to be of acceptable quality of centrifugal pumps: Grundfoss, Bell & Gossett, and Taco.

Ejector Pits and Pumps

If there is a need for an ejector pit for a building, it shall always be designed outside of the building with ready access for service vehicles and shall be designed equivalent to a lift station with submersible grinder/chopper pump.

14.9 Isolation Valves

All isolation valves shall be selected for their design duty. Locations shall be in close proximity and accessible to the utility or equipment being serviced. Isolation valves 2 ½" in diameter or larger installed in an inaccessible location, shall provide chain operators.

Steam valves greater than two and half (2.5) inches in size shall be stainless steel triple offset butterfly valves. Steam valves less than or equal to two and half (2.5) inches in size shall be ball valves with extended stems to facilitate insulation. Butterfly valves greater than eight (8) inches on steam valves shall have gear operators and electrical actuators. Ensure if electrical actuators are specified, that the electrical drawings identify power it it.

Water valves greater than three and half (3) inches in size shall be iron butterfly valves. Water valves less than or equal to three and half (3) inches in size shall be ball valves. Butterfly valves greater than eight (8) inches on water valves shall have gear operators.

Condensation isolation valves shall be located before the strainers and after the trap. In-line meters for Chilled Water flow shall have isolation valves.

14.10 Fan Coil Units

Units shall be selected with premium high efficiency ECM motors. The University prefers units that have a sloped top to prevent storage use. Ensure that the selected unit has disposable filters for efficient maintenance.

14.11 Ventilation Hoods

Kitchen Exhaust Hoods

All kitchen ventilation should be provided to eliminate odors to the building maintain the building at neutral or positive pressure. An 80%/20% split of makeup air should be provided for the hood/space

Fume Hoods

All fume hoods shall be designed to act as a constant air speed fan. Unless project requirements deem otherwise, each hood shall be supplied with its own fan unit. Each hood shall be provided with an airflow indicator and electronic controls to adjust the air velocity at any given sash height. Audible (horn, buzzer, or bell) and visual (RED light) alarms shall be provided to indicate when air velocity is outside the acceptable range.

If allowing for exterior flex coupling connections, the Designer is responsible for ensuring that the pipes are shielded from the UV light.

For new building construction, avoid exterior duct work, unless conditions deem otherwise. In such cases the duct work shall be stainless steel properly supported.

When program calls for multiple fume hoods, the hoods shall be monitored and controlled. The University has determined the following Manufacturer(s) to be of acceptable quality of monitoring and controls system: Phoenix or Accuvalve.

14.12 Hydronic Piping

The design of chilled water systems in buildings is dependent on chilled water supply conditions and desired return conditions. Chilled water will be supplied from the plant at a temperature of 42°F and pressure ranging from 50 to 100 psi.

The available differential pressure, which varies throughout campus ranges from 10 psi to 50 psi depending on the proximity of the building to the Central Utility Plant (CUP).

The University prefers that a plate and frame heat exchanger be used in new buildings to separate building loop from campus loop. Pressure independent control valves should be installed at every cooling coil. The University has determined the following Manufacturer(s) to be of acceptable quality for pressure independent control valves include; DeltaP Valve or approved equal.

Pot feeders and filtration shall be provided with all hydronic heating and cooling loops to allow for chemical treatment and sampling. The system shall be initially treated and chemical control established prior to turning the piping over to Facilities Operations.

For hydronic systems using glycol, means shall be provided for adding glycol to the system.

For all hot water heating systems pumping shall be away from the heat source and the no-pressure change point and on the suction side of the pump. The expansion tank, air elimination and makeup water valve shall be on the suction side of the pump. Pressure and temperature gauges (with shutoffs) shall be provided on the supply and return to provide for operator monitoring.

14.13 Cooling Coils

Chilled water coils should be designed for a delta-T of 16°F or greater. Therefore, chilled water should be returned at 58°F or higher. Cooling coils must be certified according to AHRI 410: 2001 Standard for Forced-Circulation Air-Cooling and Air-Heating Coils. Furthermore, cooling coils shall be designed and specified to minimize water pressure drop, minimize air pressure drop, and minimize the potential for moisture carryover.

14.14 Cooling Towers

All cooling towers shall be stainless steel design and shall include sand filters. Cooling towers shall be installed with factory controls and sump heaters. Capacitance controls for water makeup. All fan motors shall be outside the air stream and direct drive or gear driven with VFD's. Access platforms, ladders and motor davits shall be provided.

The University has determined the following Manufacturer(s) to be of acceptable quality for water treatment of cooling towers: Dolphin Systems or approved equal.

14.15 Building Distribution Systems

Air Distribution

Size and locate VAV boxes to be no greater than 50' apart. There shall be no take-offs after the VAV. The University has determined the following Manufacturer(s) to be of acceptable quality for VAV boxes is Bellmount or approved equal.

Adjustment on the diffusers and perforated diffusers shall not be specified. Remote control adjuster diffusers are preferred.

When conditions require interior air handlers, such units shall not exceed eighteen (18) inch above the ceiling grid. If access to the unit is in excess of fifteen (15) ft. above the finished floor, a hoop air handler is required.

14.16 Piping Prohibitions

Include within the Demolition section of the specifications for any gas pipes being altered or removed, the Contractor must cap/seal the ends of the removed gas pipe with duct tape to contain the off gasses coming from the pipe.

If gas lines are installed, locate vent pipes away from air intakes; this includes purge lines from boilers, etc.

Hot, chilled and condenser water lines shall not be installed over or near electrical switchgear, motor control centers, transformers, nor in elevator machine rooms and shafts.

Type-F pipe shall not be used in any application on campus.

14.17 Metering of Hydronic Piping Systems

The University supplies chilled water, steam, and portable water to the main hub of the Storrs campus. Such utilities supplied by the University shall be metered and monitored utilizing the preferred electronic software which will be compatible with what electronic monitoring already exists in the building or the area around a new building. The Designer is responsible for obtaining approval from Facilities Operations on the most appropriate monitoring software for the project application, prior to finalizing the Design Development Phase.

The peripheral areas of the Storrs campus mostly do not have chilled water, steam, and portable water supplied by the University. In those instances, the private utilities will be responsible for any metering.

Chilled water flow should be metered at the building utility entrance using magnetic or V-cone flow meters. In-line meters should have isolation valves. Water velocity at the building entry should be per ASHRAE Guidelines. Meters shall be connected to the building management system for monitoring consumption.

14.18 Testing and Balancing

Testing and balancing of all VAVs and systems is required on all projects, and all testing and balance reports should be submitted to both the Designer and University Representative for confirmation of operating results.

14.19 Testing and Commissioning

All mechanical and plumbing systems projects require commissioning of some level. Enhance commissioning shall be considered by the Designer and University Representative. The commissioning agent shall be hired directly by the University and shall be engaged in design review with the Designer prior to the start of the Design Development phase. The Commissioning agent shall work with the Designer to identify and define the level of commissioning needed on a project by project basis.

15 Electrical Guidelines

15.1 Guiding Principles

Prior to starting design, the Designer shall visit, review conditions, measure and document existing conditions for any and all projects that require new additions or replacement of any electrical

equipment and system. Designer is expected to perform their own coordination of the various new system installation with existing conditions to ensure the design is feasible to be achieved by the Contractor.

Projects shall not eliminate, substantially change, nor alter any available circuit switching capabilities of the primary electrical system in any renovation, addition, demolition, or new building project. Design teams shall endeavor to fortify switching capability, resiliency, and reliability of the primary electrical system their project is powered by factoring isolation points, such as compact pad-mounted MV switchgear, for any new services.

The University generally desires a single service solution within all projects, and that the main service be provided at 480/277V with 208/120V sub services as required. In cases where the size and load profile will work with less transformation, HVAC equipment at 208/120V may be provided. Single phase services shall be avoided when connected to University distribution equipment, and are generally not acceptable to the University; but may be provided in parts of the campus served solely by Eversource. The Designer shall determine the most practical utilization voltage during schematic design and present it to the University Representative in conjunction with Facilities Operations for review and acceptance.

All buildings require life safety systems to back-up the code-required egress and evacuation elements. The back-up power can be in the form of a local generator, connection to the University's central emergency power loop (4160) when available, a central inverter system, or in rare occasions unit equipment. Some existing buildings have unit battery pack emergency lighting systems, and in such buildings continued use of that equipment may be required. Projects should look to eliminate the individual unit equipment for a central inverter scheme whenever possible if the building requires only emergency lighting. Unit battery equipment should not be utilized in new construction, except where requested by the University, or otherwise required by Code. Some form of battery backed lighting should be provided in main electrical rooms, especially emergency electrical rooms, where servicing may be required with no building power available, small inverter schemes are preferred.

Residence Halls, Dining Halls and Research Buildings are required to have additional Stand-by Power systems to continue to allow these types of buildings to fully operate during an extended period of lost primary power ("shelter in place" provisions). Stand-by power for these types of buildings can be either on a local generator or on the University's 4160 back-up loop. In some cases, it may be prudent to have a small central inverter for the emergency lighting system to allow egress if the emergency system fails, and shelter in place is no longer an option. Buildings with Stand-by provisions should utilize load shedding ATS schemes to ensure standby power usage does not interfere with code required emergency systems. Depending on criticality of the standby load, more than one standby ATS should be considered, to prevent generator(s) from being sized unreasonably large.

In addition to life safety and stand-by power requirements, provisions should be made for connections of an alternate power source for each building or integral resiliency of the normal power service. The resilient power shall be a main-tie-main lineup, sized so that each half of the lineup feeds no more than 45% of the building load including the Standards required growth capacity for the building under Design; and individually can carry that entire load from either source. Where available a primary tie provision between the primary sources of a main-tie-main shall be provided to allow upstream feeder maintenance without service interruption. This tie shall be comprised of a fused switch in one side of the primary loop switches, and a disconnect on the other set of loop switches; and, shall be rated to accommodate 600A E-Class fuses, and smaller. The preferred method of this scheme would be

implemented with Vacuum Breakers and Protections Relaying using PLCs to allow automated rollover of the primary sources. Design of the building should include loop-fed primary feeders and an exterior low voltage panel box located in a secondary area, such as a loading dock, for easy connection of the alternate power source (such as a mobile generator). Kirk key interlock schemes to project Staff and the Public should be designed and approved by the University Representative, and shall only be established for the utilization voltage equipment. The connection point shall use Cam-Lok or equivalent lugs for quick connection of the generator, and generally should be designed to provide generator grounding from this connection point. The connection point shall include a phase rotation meter, and this meter shall be commissioned to indicate the normal power service rotation for ease of future connections by the University. No interlock schemes shall be provided for any primary equipment.

As-builts and Record Set Drawings: Designer shall ensure that the final documents reflect all existing path ways from device to device and the home run. Require Contractor to provide redlines of all runs and pathways, circuits and wires and label all devices in an organized fashion to ensure that circuits are utilized resourcefully. Any and all panel schedules shall be included in the as-built file documents.

15.2 Medium Voltage Utility Power

Primary electric service shall be designed on a project by project basis and must meet or exceed the primary feed standards of the local public utility, Eversource. All electrical design distribution shall be approved by the University Representative in conjunction with Facilities Operations.

All primary and secondary power are to be installed in underground duct banks where they are sized to allot sufficient empty conduit for future expansion, and encased in concrete. All medium voltage designs shall be to 95 kV BIL minimum design.

In new construction or major renovations, it is required that locations for primary service, new medium voltage switchgear, and transformer locations be established during schematic design. This will allow sufficient time to review the plan to minimize the prominence of utility services and review screening options and give the Designer direction as to if the primary cabling will be provided and installed by the local utility company or included with the bid documents for award to the Contractor. Installation of unit-substation equipment is allowed within the University, but given the fire rating requirements may only prove to be practical in new or major renovations of buildings.

When there is insufficient space within an existing Electrical Room to add medium voltage components, a 3-hour fire rated enclosure shall be provided. The system shall be designed so that the medium voltage feeder is never considered the primary buildings service. In the event where this 3-hour vault houses a unit-substation, it shall have secondary fusing and be regarded as the first means of disconnect.

The Designer shall be responsible to clearly establish the required electrical scope for the project. In most cases scope will include extension of medium voltage feeders through new/existing manholes to establish a loop feed configuration; connection to the system via new/existing medium voltage switchgear; utilization voltage transformation for the project; and, all downstream electrical components within the building. The medium voltage feeder source shall never be assumed to be the nearest available feeder, and in order to get the electrical capacity for the building, the project may require extension of a medium voltage feeder beyond the boundaries of the project limits.

The Designer shall consult with the University Representative in conjunction with Facilities Operations to confirm the source of power for any particular location. The primary or main distribution service voltages utilized at various Campus installations are as follows:

Avery Point Campus: Source is an 8.32 kV, 3-phase radial feed underground distribution system by Groton Utilities. The University of Connecticut takes secondary service at various voltages: 4160Y/2400V, 480Y/277V, and 208Y/120V.

Depot Campus: Source is supplied overhead from Eversource at 13.8 kV.

Greater Hartford Campus: Depending on actual location, the source to the Campus is a 23,000V, 3-phase loop feed underground distribution system, or a 23 kV underground from Eversource. The overhead system in which low voltage secondary service exists is 120 / 208V.

Law School Campus: Source is from a University radial and/or loop underground system supplied from a 23,000 volt grounded system. The 23 kV service is provided by Eversource. The Law Library building, which is off the 23 kV service, is a 480 Y / 277V system. Building unit substations transform and distribute power within each building. The University shall be consulted regarding power source at this location.

Stamford Campus: Source is from a University 13,200-volt 3- phase loop. Power supplied at 23 kV from local utility supplier.

Storrs Campus: The University's primary source of power comes from the University's CoGen plant which is interconnected with a utility substation on North Eagleville Road at the northwest corner of campus. Distribution from the substation consists of 13.8 kV Multi Ground Wye (MGY) feeders. Typically, the 13.8 kV system is a campus loop feed underground distribution system. While portions are overhead, the long term strategy is to relocate all primary feeders underground. Portions of the campus not near the core campus and along Hillside Road extension are serviced by Eversource. In all aspects of primary service design, Eversource will be utilized by the University as our third party consultant to review all primary service feed designs and installations proposed. However, the Designer remains responsible for all aspects of the electrical requirements not limited to; specifying and detailing of the primary and secondary services, transformers and switchgear, inclusive of appropriate grounding.

Torrington Campus: Source is from Eversource at 13,200 volt with a 3-phase underground radial distribution system.

Waterbury Campus: Source is from Eversource at +8 kV with an underground distribution system. The utility company shall be consulted regarding power source location.

Other Remote Locations: The University's Representative shall be consulted regarding power source, location and characteristics for any remote locations.

15.3 Labeling of Electrical and Low Voltage Equipment

Proper labeling of devices and raceway in the buildings and infrastructures is critical to the University. This is especially true when all spaces, inclusive of vestibules and corridors, within a campus building are assigned room numbers. All breakers shall be labeled with the type of load and area served in all cases.

Schedules shall be typed, or utilize printed labels or signage. Use of pencil, pen, or permanent marker is not acceptable to the University. Reasonable abbreviations are acceptable if more definite information is provided, such as. "Receps HW-104 by RM-110". Any level of renovation updates shall be required to follow these same requirements. Ensure that all equipment labeling shall be identified and included on the approved sets of drawings and that the Electrical Contractor is responsible for affixing them to the gear.

Raceways

Raceways shall be labeled in regular intervals along a span with a printed label secured to the raceway via clear shrink wrap in new, and mechanically fastened for rework. The label shall indicate the origin of the feed by way of room number of panel and panel designation and the destination room and device along with the voltage and system type, i.e. normal, emergency, standby etc. A label shall be affixed where a feed enters or exits a junction box common with multiple circuits. Any rise from a concealed condition or through floors shall be labeled.

Conductor: Shall have printed plastic tagging installed within panelboards, junction boxes, and at final termination point indicating circuit number. When more than one neutral is run in common raceway it shall be tagged with the circuit it is acting as the grounded conductor for.

Enclosures

Enclosures shall have printed labeling installed on the cover and matching label on the interior surface similar to raceway. For gang junction boxes containing wiring devices such as receptacles or light switches this is especially important even for switch legs. It should be readily apparent which panel serves the device so that resetting tripped breakers, or isolating devices for work is not burdensome for the maintenance staff.

Fire Alarm Systems: Fire alarm system components shall be likewise labeled and tagged consistent with general electrical systems. Refer to Section on Public Safety for specific naming conventions to utilize for Fire Protection circuiting and signaling.

Less than 1000V Panelboards and Switchgear

Panelboards and Switchgear shall have printed labels installed indicating load served and location. The source information shall be provided at the main means of disconnect or next to the panel designation for main lug only panels. Breakers in panels and switchgear shall have ampacity information on the operating handle, or the entire breaker manufacturers tag shall be exposed. If the manufacturer's cover designs do not provide this information ampacity shall be included within the labeling. Where the gear is installed with breakers having trip setting adjustments a log book shall be installed on the outside of the gear in a clear sheath, with all finalized and commissioned settings for each breaker of the assembled board. This log book shall be a college ruled, bound, composition style book, with ample capacity to record future changes by others. Inspection window shall be installed in all main switchgear.

13.8kV Equipment

13.8kV Equipment shall have University nomenclature assigned on the design documents and proper tagging installed on the equipment. The University owns the cabling on our campus by Eversource in large portions we follow their procedures for switching and tagging so their employees can be kept safe in a known manner while working on the campus. Nomenclature will be provided to the Designer by the

University Representative in conjunction with Facilities Operations on all new switchgear. This nomenclature generally includes a switch designation and labeling of all switch and fuse cubicles for PMH style gear. For transformers the nomenclature is assigned based on the feed source. In all cases the Designer shall document the nomenclature on drawings and specify the labels shall be installed prior to energizing equipment. Failure to provide proper nomenclature may cause undue delays on other projects. Each cable within a manhole shall have a punched copper tag affixed to the cable with no fewer than two mechanical band fasteners. The tags shall include the source manhole or device immediately upstream, the destination, the phase, the date of install, the company doing the work, and the splicer making the connections or their immediate supervisor in responsible charge of the work.

4160V Equipment

4160V Equipment similar to all requirements of 13.8kV equipment with the exception of the University being the sole owner of all cabling and equipment on the system.

Color coding of Conductors

Phase	208/120V	480/277V	4160V	13.8kV/7967V
A	Black	Brown	Green	Green
B	Red	Orange	Blue	Red
C	Blue	Yellow	White	White
N	White	Grey	NONE; Z Grounded	Bare
Ground	Green	Green	Bare	Concentric
Isolated Ground	Green w/ Yellow Stripe	Green w/ Yellow Stripe	NA	NA

15.4 Grounding

Identify all systems that need to be bonded to the grounding electrode system in new and especially renovation projects.

In new steel framed construction a #4/0 AWG bare copper grounding ring shall be installed around the perimeter of the building to allow bonding of building steel, and other items as required by the Code. Any concealed grounding connection shall be made via permanent cadweld, and any exposed grounding shall be made via a listed connection. For other construction types a counterpoise ground may be utilized, and during renovations it should be decided during schematic design as in some cases a full ring is warranted.

No grounding system shall rely solely on the conduit as an equipment grounding conductor. Grounding shall be carefully designed to avoid parallel path situations for proper clearing of L-N versus L-G faults.

15.5 Transformers

Except where for technical reasons other windings are required, all transformers shall be Delta Primary, Wye Secondary; and be installed to create separately derived electrical systems in all cases with a fully rated neutral connection. Any exception will need written approval from the University Representative.

Under no circumstances shall oil filled transformers be designed and specified for installation within a building or enclosure. Nor be allowed to remain where the main service is part of a project's scope. Under no instance shall a project enclose as existing oil filled transformer as part of its design. Oil transformers are for exterior applications only.

Oil filled transformer 13.8 kV

Oil filled 13.8kV transformers shall utilize flame resistant dielectric oil, be dead-front, and include thermostat, pressure gauge, pressure relief valve, test/drain petcock, fluid level gauge, and tap changer for minor voltage adjustments. They shall have loop and radial disconnects, with unused bushings terminated with elbow lightning arrestors. Cores shall utilize copper windings. They shall always be installed on a transformer vault meeting current Eversource specifications and the appropriate precast pad. Primary service shall enter on the left of the vault, and secondary on the right relative to the doors. Primary shall have one loop around the vault minimally for service and replacements of elbows. In all cases enough primary and secondary conductors will be within the vault to extend six feet above the pad to accommodate future transformer replacements from other vendors. Bayonet fusing may be required depending on if external fusing is available on the project. Secondary links, and immersed primary fusing, surge arrestors, etc. not accessible from the enclosure shall not be designed.

Oil filled transformer 4160 V

Oil filled 4160Vtransformers shall meet the same requirements as the 13.8 kV transformers with the following exceptions: a) radial disconnects and loops switches shall not be utilized, only straight A to B loop bussing shall be used; b) bayonets and secondary links should not be utilized; and c) PMH-19 switchgear and type 6F SF6 interrupters shall be placed ahead of the switchgear to serve as primary protections and feeder loop switches.

Dry-Core Medium voltage Transformers

Dry core medium voltage transformers shall be copper wound, with provisions for cooling fans, with primary and secondary protections in the Unit Substation lineup. Temperature monitoring devices shall be installed and integrated with the building controls system. Loop switches on the primary may be required, but two available feeders shall be brought in and arranged to service the transformer core so cable failures can quickly be resolved. Cores shall be fully rated for intended load without the use of supplemental fans.

Dry-Core Transformers Less Than 481V

Dry core transformers less than 481 volts shall be designed and specified as copper wound, high efficiency cores, and Energy Star rated minimally. Primary and secondary protections shall be included with the secondary protections installed as close to the transformer as practical, or directly into the panelboard served within distances per code. K-Rated transformers shall be utilized for non-linear loads established during a project. Transformers shall be ventilated with outside filtered air, heating provided, and fire protection monitoring similar to the medium voltage requirements. Single large dry core transformers are preferential to multiple transformers throughout the building space. It is preferred that transformers only be installed where accessible by riggers without architectural modifications to accommodate servicing. Transformers shall have Class 220 or better insulation and be NEMA TP1 or better with ventilation being the only openings in the enclosure.

Buck-Boost Transformers

In some instances, it is practical to utilize buck-boost configurations for matching voltages to specific pieces of equipment. When designing entire laboratories or when multiple pieces of equipment use a non-standard University voltage and a common solution using adjustable output line-conditioning equipment or transformation should be implemented. Consult further with the University Representative prior to finalizing the design. These devices shall only be utilized for specific end devices,

and never for building system components. All building system components shall utilize standard University voltages and power systems unless approved in advance by the University.

Transformer Room Requirements

The rooms housing transformer equipment shall be sized to accommodate removal and service to cubicle sections without architectural modification, i.e. proper sized doors, hatches, etc. to facilitate rigging and rigging equipment. Transformers shall be placed on housekeeping pads, and shall utilize top entry of secondary conduit to facilitate cubicle replacements. Provisions for placing workmen's grounds within the medium voltage sections are required.

Cores shall be selected to be the highest efficiency possible, and shall minimally be Energy Star rated. Filtered outside air shall be used for cooling these spaces, and heat shall be supplied to provide 50-degree F. Core temperature shall not be factored as a heating source for the purpose of heating the space.

Where containing wet fire protection systems supervised isolation valving and temperature monitoring of the fire protection space shall be provided and integrated with the building controls system and a trouble alarm on the Fire Alarm Control panel to protect against freeze damage. Electric unit heaters in place of hydronic systems shall be acceptable. Temperature monitoring shall be provided and integrated with the building control systems. Air Conditioning shall not be used to cool these spaces. Transformers shall have Class 220 or better insulation and be NEMA TP1 or better with ventilation being the only openings in the enclosure.

15.6 Trip Breakers

Any design employing adjustable trip breakers shall have proven coordination by the Design Development phase with the basis of design components. For emergency power systems no mis-coordination will be acceptable. AIC ratings for gear shall be selected utilizing the infinite bus method, however arc flash labeling shall never be assigned using infinite bus.

15.7 Distribution Equipment

Downstream low voltage (< 1000V) distribution equipment, if fused, shall be fully coordinated with the unit-substation main, or isolation disconnects. Coordination with available fault current and arc flash capacity shall be considered when designing the distribution.

Low Voltage Less Than 1000V Distribution

Low voltage distribution shall be all copper bussed, with bolt-on circuit breakers. All panels shall be braced with appropriate AIC ratings available at the mains, series ratings are not acceptable. Panels installed within spaces not designated and secured as electrical rooms shall have hinged covers with provisions for locking. Larger frame panels within secured areas may not require hinged doors. No individual panel shall exceed forty-two (42) poles, and all panels shall be listed for service in the space installed. Exterior panels shall have provisions for thermal management to prevent frost or excessive heat. Panels shall be a complete dead-front listed assemblies of sheet steel, with steel trim, rear access to bussing shall not be provided. Boxes shall be constructed with lapped and screwed, or welded corner construction. Gutter space shall be provided as code dictates but not less than 4 inches on the side and 6 inches at the top and bottom. Multi-section boards shall have a minimum gutter space of 8 inches at the top and bottom. Coordinate number of spare breakers with Facilities Operation's needs, with a target of not fewer than 30% spare spaces. Feeders to a panel shall be rated to carry the rating of the

panel, and conduit shall be sized to accommodate the frame capacity, or not less than one and half (1.5) inch conduit. Manufacturers shall be selected that allow full view of the labeling and trip dials of all breakers. Manufacturers that require removal of covers to view circuit breaker information shall not be selected.

Medium Voltage 1000V Distribution

Metal-clad switchgear shall not be installed outside, nor in any space containing any mechanical piping. A full rigging path into the room will be maintained during any project, and the room will be secured with a high-voltage electrician's lockset. Feeders shall enter into a disconnect from the bottom, so a main device and fusing can protect the energized top bus and individual distribution cubicles can have the bottom bussing/terminations de-energized to protect against dropping items into live bussing. Provisions for workmen's grounds shall be available across all the cubicles. Fusing cartridges shall be selected to hold E trip curve fusing and be one man serviceable. Porcelain shall not be utilized for any component, modern insulating thermoplastics, etc. shall be specified. To offer the campus better metering and support for planned microgrids, switchgear using vacuum interrupters with dielectric gasses such as SF6 should be considered during design. Current and potential transformers for these devices shall monitor all 3 phases independently; open-deltas will not be acceptable for protections. They shall be utilized for metering feeders as well, and integrated into Powerlogic and PI system or both. Specific metering requirements shall be finalized by end of DD phase for acceptance by the University Representative in conjunction with Facilities Operations. See Appendix V Building Automation Standards for more details on controls.

For exterior applications utilize PMH style equipment with fixed fusing, live front terminations rated for 600A. Cases shall be stainless steel with factory powder coat finishes. Interlock mechanisms shall not be specified for these devices. Gear shall have standard grounding bars for workmen's grounds. All PMH gear shall be installed on proper vaults with windows sized for such application to meet Eversource requirements. PME style gear with hinged fuse compartments shall not be acceptable for use on the University campus. The most used configuration on campus are the PMH-9, PMH-5, and PMH-3, refer to manufacturers literature for schematics as required. Feeder ties will no longer be allowed on a single PMH-9, ties shall be made with a pair to allow fusing for protection of the tied circuits and inadvertent trip of both feeders due to animal activity shorting on open switch blades. Vault windows shall have protective shields installed to prevent animals from entering the PMH switch from the conduit system.

Switchboards

Designer shall be responsible for all coordination study models and providing same to the University in a SKM PTW32 V7.0 compatible format as a closeout document inclusive of all custom libraries utilized or created for the model.

The switchboards shall be copper bussed with bolt-on circuit breakers, or factory provided tap lugging. When in excess of 600A, or any multiple feeder situations, they shall be draw out type. Breakers shall be fully coordinated with adjustments for instantaneous, short-time, and long-time adjustments minimally. Fuses should not be utilized in switchboards unless, based on available short circuit current, they are absolutely required. Ground fault protections should be considered and provided in addition to requirements for the main, depending on loads serviced. All switchboards shall be installed on a housekeeping pad, be bottom fed, and have suitable crown boxes for distribution to occur from the top to facilitate cubicle replacements or additions.

Switchboards shall allow full view of the labeling and trip dials of all breakers. Manufacturers that require removal of covers to view circuit breaker information are not acceptable, with the exception of draw out breakers. Coordinate spare breaker requirements with Facilities Operation's, but target approximately 20% spare breakers. Switchgear is not meant to be used as a panelboard, therefore single pole breakers or breakers less than 200AF shall not be contained within a proposed or specified piece of switchgear. Sufficient space shall be reserved to easily allow power factor correction capacitors to bolt onto the main bussing, this is especially important in large mechanical projects.

Load shedding transfer switches should be discussed with the University Representative to determine what level of controls and the priority of switching that is required for each project.

15.8 Wiring and Conduit – Electrical and Fire Alarm

Taped splices shall never be utilized on the University campuses. Medium voltage cabling shall be XLP or EPR MV-105 cable having 133% insulation, and bare copper neutral. Finalize the required provisions by the end of the Schematic Design phase.

Raceways

In slab conduit shall be PVC or fiberglass piping schedule 40. All metallic conduit or sheaths shall be steel. There shall be no type NM. The University has determined the following Manufacturer(s) to be of acceptable quality for in slab conduit: Romex or approved equal shall be specified.

Fire alarm cabling shall be in metallic conduit. Metallic piping within slabs has caused issues with conduit deterioration across all of our campus buildings and should not be specified unless required by code.

15.9 Light Fixtures

Generally, the look and finish of luminaries shall be proposed by the Designer, however all new lighting fixtures shall use LED ballasts on the campuses, and shall be DLC or Energy Starr approved. The Designer shall limit the selections in the specifications to three compatible manufacturers for each designated fixture. When selecting lighting using replaceable bulbs, the project should try to utilize common bulb types and ballasts to limit the required attic stock for multiple types of bulbs and ballasts. Lighting fixtures should be selected from the Design Lights Consortium Qualified Product List to maximize rebate opportunities for the University, especially in major renovations.

Color of the light shall be 3500 kelvin on the interior and 4000 kelvin on the exterior. Such fixtures shall be tied into the lighting control system.

The following illumination levels are recommended by the University. Illumination levels referenced are maintained levels measured at a 30" height from the floor or at an actual work surface and represent an average level for the area. Levels as given are a general guide only and deviations and special applications shall be discussed during program sessions, and shall comply with latest IESNA standards.

Area/Room Name	Maintained Foot Candles
Offices & Secretarial Areas	45-60
Laboratories	70-75
Study Areas & Classrooms	45-60
Conference Rooms & Meeting Rooms	35-50

Lecture Halls, Multi-Purpose/Auditoriums Corridors & Stairwells	35-50
Cafeteria	20-40
Lobbies, Lounges/Receptions	30-35
Mechanical, Electrical, Telephone & Elevator Machine Rooms	25
Receiving Areas	30
Storage Areas	10-15
Restrooms & Locker Rooms	15-30
Critical work areas such as tissue labs, Culture plate areas, instrument rooms, etc.	80-100
Temporary site lighting for security	1-3
Walkways for pedestrian security	2-2.5
Parking Lots	1-.5
Parking Decks	5

15.10 Lighting Controls

Occupancy controls shall utilize infrared systems; combined or solely sonic devices shall not be utilized. Daylight harvesting should be implemented where practical. Lighting controls shall have dimmers unless prohibited by code. Each lighting fixture shall have its own occupancy sensor and daylight harvesting control.

Specialized lighting systems will be required on a case by case basis such as for lecture halls, dining halls, sports facilities etc. Such systems shall be web based.

15.11 Emergency Lighting

The Designer shall provide proper illumination for all egress paths within a project. The design shall be photo metrically proven using a computer modeling software such as AGI32 using vendor supplied luminaire models and the calculated values from the least performing specified equal shall be shown on the construction drawings in 1-foot by 1-foot grid along the egress path.

Unit battery pack equipment for emergency lighting systems shall be avoided in major renovations, and shall not be utilized in new construction except: in electrical rooms, especially ones serving the emergency system and where code otherwise requires. Where generation is not provided, utilize central inverter systems to provide emergency power to the normal lighting fixtures.

For ease of maintenance and security of buildings, the University's preference is for emergency lighting circuits to limit switching and keep a night lighting path on at all times within a corridor egress path. Offices, classrooms, and other programmatic spaces shall be switched where emergency lighting is installed if the space classification allows such under the Code. Mechanical rooms, electrical rooms, and telecommunication rooms shall not provide occupancy controls for any lighting.

15.12 Automatic Transfer Switches

When generation is provided it should be tiered as 1, 2, and 3 as required by the NEC via multiple automatic transfer switches. When connected to the central 4160V alternate service system the building must use tiered transfer switches compatible with the existing ASCO system. If an emergency system exists within a building, it should be utilized after determining sufficient capacity exists.

Emergency systems shall be metered at the source of power and on the load side of the transfer switch with a Powerlogic compatible system. Meter type shall be approved by the University Representative in conjunction with Facilities Operations prior to incorporating into the Construction Documents. Automatic transfer switches shall be tied into the fire alarm system to report switch status, and generator failure as a trouble signal.

Transfer Switches

All transfer switches shall be specified as 4-pole devices, and all power systems entering a building shall be designed as separately derived systems. In some cases, the University may accept 3-pole transfer devices where the building is not anticipated to be connected to the ASCO 4160 system or other similar regional system. Care must be taken in existing buildings and renovations not effecting existing electrical distribution to determine existing bonding configuration. When re-using existing distribution, ensure raceway integrity and grounding exists. It is prudent to specify new feeders to distribution equipment in the event panels are reused in a major renovation, or to carry suitable allowance for their replacement. When relying on legacy distribution equipment, construction documents shall require contractor to verify integrity of feeders and overcurrent devices.

15.13 Emergency Generators

Due to our Environmental Title V permitting requirements care must be considered when specifying generating equipment on the campus. Generators shall have a #4/0 AWG bare copper ground ring around their base, cadwelded to perimeter copper ground rods. Grounding whips shall be extended from this ring to provide equipment grounding and neutral bonding at the overcurrent protection device on the generator.

Generators shall utilize polling controllers that detect failed sensors versus failed or trouble within the generator and status shall be monitored by the building controls system or SCADA system, coordinate with Facilities Operations through the University Representative. Utilize sound proof enclosures with access doors on both sides of the generator minimally or utilize hospital rated mufflers. Options should be selected to accommodate minimally a 5-year manufacturer's warranty.

The Designer must incorporate all manufacturer equipment specification and performance data sheets for the engine and generator set including emission rate data representing operations at maximum (100%) operating load conditions. Emissions information representing average emission levels over a pre-defined duty cycle, such as required for EPA certification, will not be sufficient. The emissions data at maximum operating load should include emissions data for NO_x, Sox, CO, volatile organic compounds (VOC), and particulate matter (PM₁₀ and/or PM_{2.5}, if available). If emissions data are available for partial load operation (e.g., 75% and 50% load), those data should also be provided. A copy of the EPA emissions certificate, showing that the engine complies with EPA's non-road emission standards or with 40 CFR Part 60, Subparts IIII or JJJ, as applicable, should additionally be provided.

15.14 Electrical Metering Requirements

The University utilizes the Square D Powerlogic system for metering buildings throughout campus and any new electric metering shall be compatible with same. For main service meters a CM4T series and for sub-meters a PM8 series is utilized. The main service metering should have instrument transformers to allow transient and sub-cycle metering available on the CM4T services to function. These meters shall be installed remote from the gear in a suitable enclosure with provisions for shunting the CTs for maintenance operations. The University generally prefers to use split core CTs so they can be easily

serviced, however PTs are required for services 480V and below, when it is after an Eversource meter. PTs are required for services 480V and above. The instrument transformers should be high accuracy, but not necessarily requiring revenue grade, unless operated immediately downstream of an Eversource meter. All metering should be done cold sequenced to allow local isolation of potential sources for major repairs to metering equipment. Meters shall be daisy chained together using RS485 to a common Ethernet gateway device. The gateway is usually the EGX100, but in some cases where local users may have a need for building load information an EGX300 with integral webserver may be selected. For the cases where Eversource metering is required, the Powerlogic system components shall be downstream of the revenue metering equipment, with all instrument transformers in a separate compartment from the Eversource revenue equipment. These meters shall be specified with factory startup services. .

15.15 Lightning Protection

The Designer shall provide consideration of a lightning system in new construction projects at the University. Systems will be designed to all relevant UL and NFPA standards (UL 96/96A & NFPA 780 inclusive of all cited references). If existing lightning protection systems are in place, the Designer shall be responsible to keep the system functioning anytime a roofing or similar system modifies the existing installation, and report to the University any found deficiencies of the existing system. The University will provide the consultant with direction to implement all or some of the identified corrections to deficient components.

Consideration should be taken in bonding piping, such as fire protection risers, to adequately discharge high frequency electrical disturbances such as lightning. This may require oversizing bonding conductors to account for skin effect impedances. New buildings and major renovations shall have a lightning protection consultant review bonding detailing.

15.16 Building Automation and Utilities Management Systems

The Designer is responsible to fully design the environmental monitoring and distributed control system inclusive of all accessories required for the data collection, control and monitoring of the mechanical, electrical, water or other systems unless specifically exempted.

BAS (Building Automation System)

The current monitoring platform for building automation systems is Andover Controls, Continuum. However, for any new construction or buildings that require a complete upgrade to the existing BAS, the University has determined the following Manufacturer(s) to be of acceptable quality for monitoring platforms; Andover Controls, Continuum or Automated Logic Corporation's WebCTRL.

See Appendix V – Building Automation System for additional information and requirements.

SCADA System

The University has standardized on the SCADA Management System for monitoring and reporting of external lift and pump station motors, electrical and pumping levels.

A fiber optic loop provides monitoring of all utilities infrastructure. OsiSoft PI is the data reporting historian and central control is fed back to the Water Pollution Control Facility. Depending on the utility being monitored, measurements can be on flow level, temperature, pressure, and/or conductivity. Consult with the University Representative in conjunction with Facilities Operations on the data points required for monitoring.

The following are areas that SCADA is connected to:

- Water Pollution Control Facility
- Reclaim Water Facility
- Central Utility Plant
- Lift/Pump Stations
- Steam and Condensate Lines
- Storm Drainage

Power Logic monitoring system

The University currently uses PowerLogic to monitor consumption, power quality, demands, as well as other variables of our electrical systems.

Veeder Root

The University currently uses Veeder Root to monitor in-ground and above ground propane or oil tank, the tank monitoring system shall be a Veeder Root monitoring system.

15.17 Electric Charging Stations

Refer to the “Guidelines for the installation of electrical vehicle charging stations at State-Owned Facilities” that the State of Connecticut manages for all electrical charging station requirements. The need to install a charging station shall be determined on a project by project basis.

16 Telecommunications

The Designer is responsible to have a competent certified sub-consultant in the field of telecommunications design. At the request of the University Representative, the sub-consultant must provide evidence of a BICSI certified Registered Communications Distribution Designer (RCDD) or equal and licensed professional with the State of Connecticut (i.e. PE or TLT). The University reserves its right to request another consultant with the experience and expertise required.

See Appendix IV – Telecommunications Design Guidelines and Performance Standards for requirements.

17 Audio Visual

17.1 Guiding Principles

When required in a program, the Designer is to provide adequate and dedicated space for a complete high performance audio system for classrooms or conference spaces. Designers shall include within your overall services, an independent specialty consultant for Audio Visual design, in support of any project that includes classrooms, lecture halls, and conference rooms. Such consultant shall not be affiliated with or is a representative of any manufacture of any type of audio visual products. Nor shall the consultant to the Designer use the services of a sub-consultant tier who is affiliated with or is a representative of any manufacture of any type of audio visual products. All designs shall be reviewed and accepted by the University Representative in conjunction with UITS/AV Technology and incorporated into the design before the completion of the design development phase.

When video conferencing is required, the video XXX conference system shall be a video based system (h.323 and/or SIP) that uses a hardware based video conferencing codec. Web conference software based collaboration solution shall include Skype, FaceTime, and WebEx. And have the ability to simultaneously connect to more than one video conference participant.

See Appendix VI – Classroom Design Guidelines for audio visual requirements for classrooms and teaching labs.

17.2 General Conference Rooms

Conference rooms which require videoconference capability should be designed using either the Entry-level or High-end recommendations outlined below.

Entry-level conference room: Shall be designed to be a cost effective system, which allows for both video and web conferencing. The system will also function in a local presentation capacity, where conference room attendees can view content from a laptop computer. This system will be controlled by remote control and the monitor should be controlled by a wall mounted pixie-switch type controller.

This system will include:

- A wall mounted smart monitor appropriately sized based on room specifications (e.g., viewing distances, available space, and other environmental factors). *Please note that this system can be installed on a cart for portability for an additional charge.*
- Ability to videoconference to internal and external VTC equipped conference rooms and readily available desktop VTC applications. This will enable participants to
 - Share laptop content through VTC
 - Perform multisite conference hosting with more than two sites. *Please note that this option requires prior coordination with UITS.*
- Ability to videoconference to internal and external web clients using software on user supplied laptop. A fixed USB camera and microphone will be provided to connect to laptop. The remote participants will be seen/heard via the monitor.
- Ability to display laptop video (HDMI and VGA) and audio on monitor without using VTC.

17.3 High-end conference room solution:

The high-end conference room solution is designed to support most audio/video conferencing needs, be intuitively operated, and also function in a local presentation capacity. This system will be controlled by a touch panel system, which enables functions such as turning on the monitor, selecting the correct input, and connecting a call. The following options are available to further enhance the functionality of the system: a dedicated computer, multisite conference hosting, and an integrated telephone conferencing.

This system will include:

- A wall mounted smart monitor appropriately sized based on room specifications (e.g., viewing distances, available space, and other environmental factors).
- An option to have a permanent computer installed in the room system.
- Ability to videoconference to internal and external VTC equipped conference rooms and readily available desktop VTC applications. This will enable participants to
 - Host a conference with multiple participants
 - Share laptop content through VTC

- Share room-based PC content through VTC (if equipped)
 - Ability to videoconference to internal and external web clients using software on user supplied laptop. A fixed USB camera and microphone will be provided to connect to the laptop. The remote participants will be seen/heard via the monitor.
 - Option for audio only and mixed audio/video participation.
 - Ability to display laptop video (HDMI and VGA) and audio on monitor without using VTC.
- Ability to control the entire system through a single source (e.g., touch panel, control panel).

Manufacturer's providing acceptable quality of products and equipment is being formulated. Designer's AV consultant will be provided with the most current list of acceptable product performance on a project by project basis.

18 Elevators/Lifts Guidelines

18.1 Guiding Principles

The desire of the University is to encourage "walk-up" as the primary transportation for at least the first three stories of any building, and to have mechanical lifting systems as the secondary means of transportation for most building occupants. Vertical transportation systems need to be designed around accommodating the capacity for all possible uses of the building. The Designer should pay particular attention to the University's scheduling in choosing the number of elevators or lifts, since normally large volumes of students, staff and faculty utilize vertical transportation over very short times at the beginning and end of classes. The University highly discourages the use of escalators in buildings.

18.2 Passenger Elevators

Separate passenger elevators should be provided for any building over three stories in height and as required by code. Holeless hydraulic elevators are preferred for low-rise and mid-rise applications.

At least one cab shall be able to accommodate an ambulance stretcher. The cab finishes shall generally be durable, with plastic laminate wall panels being preferred. A mid-rail should be provided on the walls. Glass, mirrors and high-end wall finishes are prohibited. The flooring shall be tile in most buildings, except residential buildings, where the flooring shall be carpeting. All passenger elevators shall have 8' clear ceilings and should have LED lighting with protective covers.

Emergency contact buttons should be tied into the University's public safety system as the primary responder. Additionally, all elevator controllers shall be required to send a malfunction signal to the BAS system. No security cameras are required in the elevators. The University generally utilizes Otis controllers that tie into the University's BAS system, so it is preferable to specify equipment compatible to same. Regardless, if the elevator controls include a microprocessor, the University shall receive all equipment and information to reprogram the equipment including software source codes.

The University has determined the following Manufacturer(s) to be of acceptable quality for elevators include Otis, Schindler and Theissen Krupp.

18.3 Freight Elevators

Each building should have at least one freight elevator that serves all floors, even if it is a combined passenger/freight elevator. The freight elevator capacity shall be 4,000 lbs. minimum, and the platform shall be at least seven (7) ft. x nine (9) ft. wide. All elevators shall have ceilings that provide eight (8) ft. clear height.

Where there are dining services being supplied, deliveries or operations are on two separate levels, a freight elevator shall be located within a reasonable distance from the kitchen. Such freight elevator does not have to be designated to Dining Services, however other user access must not have to enter the kitchen for use.

Freight elevators shall have stainless steel walls and doors, with a diamond plate steel floor and a removable rubber mat. All freight elevators shall have a railing at the base of the walls and at 3'-6" above the elevator floor to protect the walls. The elevator should be provided with hanging points and protective mats on three sides of the elevator. Ceilings should also be stainless steel and should have LED lighting with protective covers.

18.4 Elevator Floor Identification

A number system is preferred for the elevator buttons that identify the stops. The numbers should follow the floor labeling standard outlined in Appendix II - Electronic Document and Plan Submission Requirements. The floor designation shall be provided adjacent to all elevator buttons in braille, regardless of the type of elevator.

18.5 Elevator Pits and Shafts

All elevator shafts shall have sump pump pits. However, it is the University's preference that the sump pump not be permanently installed. A removable pump shall be provided to the University for the building. The designer shall provide a storm drain connection at a nearby location with a removable cover in the case of emergency. If a permanent sump pump is provided, then the drain for the pump will need to be piped to an oil water separator.

All elevator pits shall have oil/grease interceptors included into the design.

Provide adequate lighting and power in all elevator pits, and at least one 120V outlet on the inside of the elevator shaft at mid-height. It is preferred that all elevator shafts be built of six (6) inch masonry block. Elevator pits deeper than 3 feet shall have fixed ladder access with "pop-up" safety grab bars or stair access.

The Designer shall incorporate into the specifications and closeout requirements that there be an oil analysis performed before the installation of the hole on the soils by an independent third party. Include that if the Contractor fails to perform such test that they are accepting the soils as clean from contaminants. Should the analysis reflect oil residual within the soils, the Contractor must find and fix any leaks and abate the contaminated soil. Warranty period shall be extended consecutively every 6 months with initiation of additional oil analysis and abatements until analysis reports no residual oil leakage.

18.6 Elevator Machine Rooms

Elevator equipment rooms shall be constructed with curbs to contain any hydraulic oil spill. Sufficient acoustic dampening shall be provided in the elevator machine room such that the operation of the equipment cannot be heard from outside the room. All elevator machine rooms shall have mechanical ventilation and adequate supply air.

18.7 Elevator Maintenance and Service

The specifications shall include the requirement for the elevator installer to provide 100% of the elevator maintenance and service for the first year after substantial completion of the building. Service shall require a response time of a maximum of four hours from the request. In addition, the elevator equipment shall have a minimum warranty on capital repairs for a period of not less than 10 years. After ten (10) months from substantial completion, the elevator installer through the Contractor of record, shall provide an analysis of the hydraulic oil showing there are no contaminants in same or shall replace it prior to turn-over.

18.8 Lifts and Dock Levelers

Where possible, install ramps for ADA compliance rather than lifts. Regardless of location, all lifts and dock levelers shall be exterior grade. All components on the lift or leveler shall be powder coated steel. For loading docks with more than two bays, at least one shall have a dock leveler.

19 Space Planning Guidelines

See Appendix III – Space Planning Guidelines

20 Chemical Storage Guidelines

20.1 Guiding Principles

When requested, provide an area for chemical storage where incompatible chemicals can be segregated according to their class, e.g., oxidizer, reactive, corrosive, and flammable, etc. Racks should be securely anchored to walls, and shelves built with a ¼-inch lip on the edges. The storage area should include:

An approved, corrosive storage cabinet (if needed); an NFPA/OSHA/FM-approved, non-vented flammable liquids storage cabinet(s); a ventilated cabinet for the storage of highly toxic/carcinogenic or odorous materials; and an NFPA-approved flammable liquids refrigerator (if needed). Flammable storage cabinets need to be designed to protect the contents of the cabinet from a room fire. All solvent storage units should be electrically grounded.

When required by the program, a compressed gas cylinder storage system ensuring rigid and secure supports for gas tanks in use; segregated and labeled locations for full and empty cylinders in storage shall be provided. Full cylinders should be stored in a mechanically ventilated storage area with separation between incompatibles (e.g., O₂ and flammables).

Emergency information shall be posted on the exterior of doors; the information should be clearly visible from the hallway and include:

The department's name; room number; faculty member(s) responsible with office phone number(s); laboratory occupant(s) name(s) and home phone numbers(s); emergency phone numbers for fire/police/ ambulance, Facilities Operations (Work Order Control), Environmental Health and Safety, and the Student Health Services. University EHS has pre-printed yellow cards to serve this purpose.

21 Furniture Fixtures and Equipment Guidelines

Furniture, fixtures and equipment (FF&E) will be unique to each project, however the selection of the FF&E should emphasize durability. All FF&E is required to be commercial grade. Limit the number of different types and colors of FF&E, and emphasize consistency between rooms and finishes, to maximize the flexibility and interchangeability for the University to relocate FF&E between spaces. Consider storage requirements of FF&E in the design to assure that rooms can be completely emptied.

22 Classroom and Lecture Hall Space

See Appendix VI – Classroom Design Guidelines for all details and requirements regarding classroom and lecture hall spaces.

23 Athletic and Recreational Space

The University fields 24 NCAA Division 1 teams and requires first-class athletic facilities. The University is part of the American Athletic Conference (AAC) in the majority of its sports (i.e. Hockey East in men's and women's ice hockey). The Designer should identify which sports are being served by the athletic facility and must attain and comply with the latest NCAA and Conference requirements for each sport. The University's Division of Athletics currently manages at the Storrs campus the Greer Field House, Guyer Gymnasium, the Climbing Center, racquetball courts, fitness center Wolf Zackin Natatorium Pool, all practice and athletic game fields, Harry A. Gampel Pavilion, the Werth Family Basketball Champions Center, George J. Sherman Family Sports Complex, Burton Football practice facility, J.O. Christian Baseball Field, Morrone Soccer Stadium, Burrill Family Softball Field, Frietas Hockey arena, the University tennis courts, and other recreational spaces. Recreation manages the two outdoor softball fields located in the Agricultural area as well as in North campus. Residential Life is responsible for managing the outdoor volleyball and basketball courts. In addition, Recreation currently operates and manages the Outdoor Adventure Center as a satellite facility in the Student Union.

Interior Spaces

When designing interior space for an athletic facility, consider the following:

- Having sufficient lighting, and access to lighting for the maintenance of same via catwalks, is extremely important in the design of athletic facilities. All lighting should be high efficiency and dimmable, and a lighting control system should be provided, such as Musco, Hubbel or approved equal. For competition venues, must meet NCAA standards
- Athletic facilities require the appropriate support facilities for the sports to be included in the design, such as fitness, training and weight rooms, warm-up facilities and space, home and

visitor's locker rooms, maintenance and office facilities for coaches and staff. Include at least one conference room in the facility.

- Flooring types will vary based on type of facility and usage. All bare concrete should be sealed.
- Mechanical systems need to be efficiently designed and scalable, able to maintain the building during unoccupied buildings with minimal energy use, but have the capacity to heat or cool for large attendance events. Humidity control and demand ventilation are required.
- Individual spectator seating is preferred in most athletic facilities, however when more practical, aluminum bench seating is allowed. Individual seats should be plastic laminate, and not wood. Type and variety will depend on facility type.
- Electronic scoreboards and digital displays should be included in all athletic facilities; such as display systems by Daktronics or approved equal

Timing systems should be provided in all athletic facilities, such as those by Colorado Time or approved equal.

Athletic facilities should include the infrastructure (conduit, cable and power) for television, satellite hook-ups and cell and internet service within the buildings. Most athletic buildings will need a separate internal repeater for large traffic volumes on the cell and internet systems.

Provide at least one oversized, roll-up door at grade in order to transport large pieces of equipment into or out of the building

Signage should be considered within the design of the building, including directional signs, static permanent signage, and locations for banners, which should be provided in all buildings. A legacy area should be included in the design and located near the main entrance to the facility.

Include space and facilities in the design for a press box in all athletic competition venues

In locker rooms, individual showers are preferred over gang showers.

Exterior Spaces

The University has a wide variety of field surface types, but is generally utilizing natural turf for new outdoor fields. Assure that outdoor fields have adequate underdrainage systems and are slightly crowned for storm water run-off.

Exterior lighting is generally required for all outdoor fields and spaces, to a level that the sporting event can be undertaken during the evening, competition venues must have field lighting which meets or exceeds NCAA guidelines.

24 Laboratory and Research Space

The Designer shall review specific laboratory and research space requirements with the University Representative at the outset of any project that includes these types of spaces.

See Mechanical and Electrical Sections for details on all MEP equipment and systems.

25 Residential Space

25.1 Guiding Principles

The Division of Student Affairs is committed to providing housing that allows students the opportunity to experience the best of campus life. Recent renovations have focused on code compliance, fire protection, and enhancing the appearance of existing facilities. The construction of new residence halls will provide opportunities for greater interaction among students to enrich their out of classroom experiences and ultimately add to their academic personal success.

The preference is to have ten (10) ft. finished ceiling heights for all residential complexes. However, should financial constraints prohibit such a height, a minimum finished ceiling height of nine (9) ft. is required.

25.2 Exterior Building and Grounds

When designing a new or renovation to an existing residential facility, consideration shall be given to the overall approach to the building. Create landscaping and roadway systems around the complex to provide for proper flow of people and goods - especially during opening and closing of the residence halls. Provide vehicle access to drop off and pick up areas for opening and closing of the residence halls that are barrier free and level to the entryways for pedestrians while controlling vehicular access. Take into consideration effective methods of pedestrian flow to and from the residential area to dining halls and other areas of campus. Incorporate lighted pathways, parking lots, recreation areas and seating areas with benches and bike racks that create a social conversation area.

The building envelop design should be appealing while functional for maintenance. Create a central, highly recognizable single "main entry" to the building(s). Design to incorporate card key access hardware and security cameras at all entrances utilizing the standards established. Install window screens on all windows and impose window stops to minimize access through the windows. Create a functional, hidden service area and entrance with a concrete slab for a 30-yard dumpster (used at opening and closing of the semesters). Provide energy efficient double hung sash windows with integral insect/security screens.

25.3 Entrances and Common Areas

It is preferred that all main entries have a vestibule with adequate heating and ventilation. Entry doors should have automatic door openers with the card access systems.

Consider locating a formal lounge adjacent to the main entrance/lobby with a small public bathroom. Adjacent to the main entrance create a front desk area that includes: offices, a Resident Assistant duty area, meeting space and an enclosed storage space for supplies.

Central gathering spaces such as meeting rooms, student lounges and studies rooms do not necessarily have to be located on the main floor of the building. In situations where the top floor of the building provides for a nice view of the area vistas, consider placing such common areas on the top floor of the building.

25.4 General Mechanical, Electrical, Plumbing, Telecommunications and Fire Life Safety

Interior surfaces, systems, and fixtures must be made of vandal resistant materials, ensuring long-term wear and ease of maintenance while providing aesthetic appeal. All wiring, conduit, pipes, etc. shall be enclosed within wall cavities, do not allow for exposed conduit or wire mold.

Mechanical and Plumbing

For residential applications, any exhaust, water and drain piping shall be run in vertical chases and branched off within the walls as opposed to running horizontal in the corridor ceilings. The vertical chase must remain accessible for the corridor.

It is preferred that each bedroom, suite or apartment have individual HVAC room controls to allow for adjustment of the temperature by 3-5°F.

Electrical

In each Student room, provide a duplex electrical outlet every 5 ft. on center on side walls only and have each room on its own circuit breaker. Provide duplex outlets at a minimum every 20 ft. in all other areas including corridors within the Resident Halls.

Backup power shall be incorporated in all new residential building designs. Backup power shall support all fire life Safety systems and also allow the building to marginally function for occupancy during an extended outage. The University must continue to house and feed students during emergency events and the back-up power shall accommodate same.

Telecommunications - Cable

In each Student's room there shall be one data jack that covers data and phone per occupant. There shall be one cable television jack per student rooms. There shall be a data jack every 16 ft. in all Study rooms, Lounge rooms and Game rooms.

See Appendix IV – Telecommunications Design Guidelines and Performance Standards for additional information and requirements regarding residential buildings.

Fire Life Safety

Buildings shall be fully sprinklered with hard-wired smoke detectors in each room. A wire cage shall be specified to protect sprinkler heads in areas that are accessible to accidental damage (stairwells, corridors, etc.). Standpipes in stairwells (used for sprinkler system) must have locking cap on the chain.

25.5 General Finishes

Ceilings

All circulation and gathering public areas shall have gypsum board ceilings. All residential rooms shall be exposed deck.

Flooring

All building entrances shall be designed to have built in floor walk off mat at least 4' deep into the building. All office areas, meeting rooms, student lounges and studies rooms shall have carpet tile with complimentary color/pattern changes with a quarter turn of each tile upon installation. All corridors and resident rooms shall have VCT. All bathroom rooms shall have ceramic tile. All shared living space shall have carpet tile.

Walls

All walls shall be vandal proof resistant. The preferred material for all corridors and common areas is double layered sheetrock with a chair rail. Resident rooms shall be double sheetrock and bathrooms shall be cement board with waterproof membrane.

Interior paint must be washable, medium luster (no flat paint on surfaces that are within access to residents).

Doors

All student room doors shall be solid core laminated/vinyl covered for cleaning purposes, with peepholes, door closures and locking keyed hardware. The University may consider the use of card readers for future residential buildings.

Hardware

All designated ADA accessible student rooms, bathrooms, corridors to those rooms, laundry rooms, lounges, studies, recreation and fitness room to have automatic door openers.

25.6 Bedrooms

Standard bedrooms shall be designed as double or single occupancy. Double occupancy rooms shall be approximately 165 sq. ft. and single rooms shall be approximately 130 sq. ft. Rooms shall be large enough to house a single bed, desk, chair, dresser and built-in closet per person. Floors shall be vinyl tile, no carpeting. Windows shall have horizontal blinds. Single surface mounted ceiling lights shall be installed.

25.7 Apartments

The typical 2-bedroom apartment (housing no more than 4 residents) shall have a full kitchen, dining/living area, washer and dryer and private bathroom for each bedroom. A full kitchen shall include an oven, microwave, and refrigerator, but does not require a dishwasher.

25.8 Suites

The University has three suite models that shall be utilized within the design programming.

Shelter Model (less than 150 sq. ft. per student). This type of housing provides bedroom and bathroom space and minimal social and support space.

Campus Life Model (150-200 sq. ft. per student). This type of housing includes bedroom and bathroom space, plus support space (such as laundry areas and storage rooms), and program and social space for activities that help young people experience the best aspects of campus life in a college sponsored residential setting.

Academic Model (200 plus sq. ft. per student). This model adds space for formal and informal academic experiences to the Campus Life Model, such as space for faculty in residence, tutor offices, seminar rooms, etc.

25.9 Student Lounge, Game Room and Leisure Space

Create these spaces with open floor plan and no doors. Provide areas for bulletin boards/building postings and vending machines. Floor finish shall be vinyl tile.

Create a recreation game room to house a pool table or ping pong table, big screen TVs, etc.

25.10 Study Rooms

Create smaller study lounges on each floor. Design with sound retardant finishes where possible.

25.11 Multi-purpose Rooms

Create a large multi-purpose room for residential meetings (40-50 people) and study space. Design with an audio/visual/IT component. Floor finish shall be carpet tile.

25.12 Resident Assistant (RA) and Hall Director Rooms

Provide a single room for Resident Assistant (130 sq. ft. minimum size). Desired ratio of 1 RA to 35 residents.

25.13 Restrooms / Bathrooms / Showers

General Guidelines

For every 40 residents, provide a dedicated men's bathroom, dedicated women's bathroom, and two individual flex bathrooms.

All baths shall have a large mirror area; adequate bathroom exhaust systems; appropriate GFCI electrical outlets every three feet at sink and mirror locations; LED lighting (ceiling and over mirror); private shower stalls with adjacent changing area and built in storage for toiletries and adjustable showerheads. Design for private toilets and showers, gang showers are not acceptable. Private showers shall provide for a foot rest within the shower and a changing area with a shelf for personal items within the space.

All bathroom areas no matter the size shall have underneath the finish floor a waterproof membrane pitched to the floor drains to prevent flooding.

There shall be no bathtubs or urinals. All toilets, shower heads, and faucets shall be specified as low flow, 1.5 GPM water conservation.

Ensure that all shower valves shall have integral stops. Manufacturer's providing acceptable quality for shower valves with integral stops are: Simmons, Safety Mix or Delta.

All bathrooms with the exception of flex restrooms, shall have a closet with sufficient storage for residents to use for their personal hygiene products and clothes to hang.

Exterior windows within a bathroom shall be frosted opaque from the factory. Film application is prohibited.

Public Bathrooms

Incorporate a series of public bathrooms on the first floor next to the formal lounge located in proximity to the entrance/lobby. They shall be gender neutral and accessible with a sink and toilet.

Flex – Gender Neutral Bathrooms

There shall be a minimum of two flex bathrooms per living floor. Flex bathrooms shall be handicap accessible, gender neutral and complete with toilet, accessible shower and sink. The Designer is to ensure that appropriate design of the hardware associated with this type of bathroom addresses cases where a handicap person who cannot open and lock the door on their own, that the automatic door assist secures the room when occupied. And where the same occupant activates the assistance call alert, the automatic door assist unlocks for emergency assistance.

Semi-Private Bathrooms

Incorporate a semi private bathroom within an apartment or suite. There shall be two sinks within the bathroom with storage cubbies for personal hygiene products. Toilet shall be private with a locking door and exhaust fan and shower shall be private with a changing area, exhaust fan and locking door within the shared bathroom.

25.14 Laundry Rooms

Develop centrally located laundry rooms in each building(s). Access to the laundry rooms shall not require occupants to pass through the main entry/lobby of the building. Provide areas for bulletin boards for building postings. Calculate 24 residents to one washer/dryer set. Incorporate table space for folding and one standard size laundry cart per washer/dryer set. The University has determined the following Manufacturer(s) to be of acceptable quality for washers and dryers shall be Speed Queen or approved equal.

25.15 Student Trash and Recycling Room

Follow the requirements outlined in Section: Interior Building, for a trash storage room immediately adjacent to the loading dock or service area. In addition, the Designer must program a minimum of one (1) separate student trash room for each Residence Hall floor for student trash and recycling. Such room shall be sufficient enough to easily place 2-4 50 gallon containers.

25.16 General Storage Room

Incorporate a room sufficiently sized for equipment, supplies and furniture storage.

25.17 Mailbox Area

The demand for mail areas shall be determined on a project by project basis. Currently there are central locations in the vicinity of residential halls for student mailboxes.

25.18 Bicycle Storage

Incorporate a room for the storage of bicycles. Provide a secured door from the exterior and to the interior of the building. Provide racks for the students to secure their bikes.

25.19 Outdoor Recreational Areas

The program for any residential hall shall include sufficient recreation space for the students for general volleyball, tag football, and frisbee play.

25.20 Residential Furniture

The Designer is responsible to incorporate interior design services which includes furniture layouts and coordination of data/telecom and electrical with the furniture locations. If requested by the University,

specify the different types of furniture needed and provide three acceptable manufacturers that are equal for each piece. The furniture should be durable and practical and for high volume.

26 Dining Hall and Convenience Retail Space

26.1 Guiding Principles

When designing residential operation's production, serving and dining areas all areas should be considered as subsets of one holistic experience when developing plans for dining facilities. The following provides guidelines for standards that should be implemented in facility design.

Sustainable Development

The development of sustainable facilities is an important Dining Services initiative and should be included as an integral component of the design process. Sustainable materials should be utilized where possible, such as low volatile organic compound (VOC) paint and vinyl. Sustainable use of water, electric and waste should be addressed.

Theming

During pre-schematic design, consideration must be taken to theme the dining. Many thematic environments are best presented in the foyers, lobbies, and dining areas, since available space in serving areas is normally fully utilized for food service equipment and functions.

Mechanical, Electrical, and Plumbing

In addition to those overall standards for MEP that has been provided, for dining facilities provide flexibility for future modifications of production, dining and serving areas by strategically locating all mechanical, electrical, and plumbing (MEP) service. This includes potential future areas that may require electrical or plumbing outlets. Where possible, conceal all utilities such as exposed wires and floor drains for maximum visual aesthetics. Provide for data and wireless access in appropriate sections of the dining area. Consider current and potential future needs for power, data outlets, and internet access in the dining areas.

Soda beverages deteriorate cast iron more quickly than PVC, therefore the University requires that all design work associated with dining service area sinks or other areas that provide soda products shall specify Schedule 40 PVC piping for drains.

Flooring

Ceramic tiles with sealed, dark grout are the most durable floor coverings for serving areas and travel paths for customers and employees. Quarry tile is preferred for all kitchen areas for its non-slip smooth, easily cleanable, non-absorbency, and durability. Provide cove base that matches the flooring.

Walls

Durability should be a major consideration when selecting construction materials for walls. Walls shall be easy to clean.

For serving areas, tile is the preferred wall coverings. Tile colors and designs may also be used to reinforce the themed environment of the facility. Corner guards and bumper rails on walls are mandatory and should utilize stainless steel or similar materials. Doors should also be protected by

bumper guards manufactured from stainless steel or other durable materials to protect doors from damage.

Provide stainless steel finish behind ovens, grills, fryers and any other equipment that emits high levels of heat. Provide ceramic tile/stainless steel/frp (fiberglass reinforced panels- most cost effective) throughout kitchen if budget allows. If budget is a consideration, provide frp in wet areas and semi-gloss paint. Use semi-gloss paint throughout

Ceilings

Ceilings shall be easy to clean. Mylar suspended ceiling is acceptable.

Lighting

Specify flexible lighting that provide sufficient light levels for the activities of the space. Light fixtures in food preparation areas to have protective covering over lamp. If menu boards are used and are not electronic, provide adequate light to illuminate boards.

Window Treatment

Vertical blinds are preferred over horizontal blinds or drapes because they are easier to clean and adjust light levels effectively.

Countertops

Countertops shall be smooth, easy to clean, anti-microbial. Free of breaks, open seams, cracks, chips, inclusions, pits, and similar imperfections. Free of sharp internal angles, corners, and crevices. Finished to have smooth welds and joints. Example: stainless steel. Not to be used: Copper, galvanized metal, wood

26.2 New Construction

When evaluating criteria to determine site selection, each alternative should be considered based upon its adequacy under forecasted conditions, such as increase of student population in the adjacent areas. The availability of adequate handicapped parking areas and loading dock access should also be a consideration.

26.3 Serving Station Counters

Serving areas that feature a desired "scatter" configuration is preferable. This type of design offers desired advantages that enable these facilities to serve the most amounts of people in the shortest amount of time. The configuration of each serving station area must accommodate the type of food service options to be provided. Designs should consider flexibility for future changes to accommodate the delivery of alternative menu selections. Different types of serving stations include hot food service from warming containers, grill-to-order cooking stations, sandwich preparation stations, self-service buffet style stations, and other specialty configurations that may feature a combination of menu selection delivery methods. Entree stations should be prominently located in the servery area.

Lighting shall be sufficient and flexible for both the front and back of the serving stations, for cooking, serving, and cleaning. Serving stations need the ability to be serviced from the back in most instances. A shelf for dishes should be located below serving counters. Cups should be available at counter level, where possible, and sized to match demand at peak capacity.

Serving station counters should be commercial quality. Stainless steel provides a durable, easily cleaned surface, but should not be over utilized to create an “institutional” feel for the facility. Solid surface materials also provide durable surfaces and are available in a variety of colors. Functional and attractive serving stations can be achieved by utilizing a variety of durable materials that are compatible with the interior finishes and architectural character of the facility. Limit the use of wood inside the serving area, because it can be easily stained or damaged and can be difficult to clean. Do not use wood as a cove base. Trash receptacles need to be located under counters or out of sight.

Front service of beverage stations and consolidation units (ice maker/dispenser and beverage dispensers in one unit) are usually preferred, because less space is required. Beverage stations should be located where they do not conflict with queuing line for food serving stations and are provided by a University vendor. Glass holders should be provided adjacent to the beverage stations to minimize customer traffic. Easy access to beverage stations from the dining area for refills should be provided that does not disturb the flow of customers in the serving area.

Salad Bars and Soup Stations

Salad bars may be island configurations with access from all sides or just one side for customer access. Include accommodations for both hot and cold wells so the salad bar station may also be used as a universal station of self service offerings like a breakfast buffet or specialty selections. Address proper “sneeze guards” design for easy access by customers and provisioning by the dining facility staff. Soup stations and salad bars should be located together, where possible, and include accommodations for hot bread, crackers, and similar items. Salad plates, soup bowls, and soup spoons should also be located at each station, as required.

26.4 Specialty Food Stations

Consider special needs for dessert and cold food stations, such as refrigeration, plumbing, and electrical requirements. Provide flexible display spaces that can be reconfigured as service options change. Non-refrigerated food selections include cereal, fruit, and other items served and consumed at room temperature. All serveries must include a gluten free area that has an ambient area for product, a refrigerator, a small freezer and a toaster unit.

Locate silverware stations near the serving lines or entrance. Napkin dispensers, may also be required at the same location. Provide for adequate access (from the rear if possible) to re-supply silverware and other supplies with minimal disruption to customers. Utilize only commercial quality materials and other products, as needed.

26.5 Serving Station Signage and Menu Board

Non-Electronic Signage identifying each serving station should be commercial quality and integrated into the architectural designs. Overhead serving station signs, such as individual letters or neon, help to identify each station and the type of food selection available. These signs may also be used to reinforce the themed environment of the facility through terminology, colors, images, and materials.

Accommodate for menu board display information at each serving station and/or a central location near the servery entrance to confirm daily menu choices and prices. Menu boards should be easily changeable and located where they do not obstruct the transaction area. Electronic menu boards or display screens controlled by a central computer system allow easy updates and changes, however some of these systems may be cost prohibitive and shall be confirmed with the University Representative.

Menu information can be effective at eye level or overhead, provided they are easily legible, even during crowded conditions of peak periods.

Menu display signage should be located near the entrance to the serving area to provide food selection and price information. A menu display should be presented at eye level and located where it does not obstruct the flow of people entering the serving area.

26.6 Condiments and Amenity Stations

Condiment stations should be centrally located as you exit the serving area. Depending upon the size of the facility, additional smaller condiment stations with popular refill items may also be needed in the dining areas. An ice cream freezer with an area for toppings should be adjacent to the servery. This area should be equipped with a dipping well for bulk ice cream.

26.7 Validine Stations

Validine stations need to be located at the entrance of the dining facility. Provide space for the cashier to sit inside the cashier station that allows transactions to be conducted from both sides. Provide adequate queuing and counter space. Cashier stations should not appear cluttered or disorganized.

26.8 Dining Area

Dining areas should provide flexibility to reconfigure tables and chairs for maximum efficiency. Tables should be a mix of high tops, community tables, traditional seating and low conversational areas. Microwaves, water stations, and supplemental condiment stations located in the dining areas are effective.

Chairs and Tables

Seating groups should vary with a combination of tables with four, six and eight seats. Square tables offer the most flexible options to rearrange the seating areas as needed and to place tables together for small group functions. Booths should be used selectively. Corners and other awkward areas next to walls and windows are good potential locations for booths with bench seating. Chairs should not be located too close to a transition of floor materials (tile to carpet). Allow room to push chairs back from the table, as needed. Chair rails are required to prevent wall and/or chair damage, especially if walls are constructed of rough stone or concrete. Stackable chairs offer the most flexibility for storage, reconfiguration, and are also cost effective. Flat leg bottoms are preferred over those with casters on non-carpeted floors due to caster maintenance problems. No dining floors should be carpeted. Cloth or wood seats are preferred for chairs and bench seating.

26.9 Foyers, Lobbies and Corridors: Floors and Walls

Natural stone materials, terrazzo or dark ceramic tiles with sealed, dark grout are the most durable floor coverings in foyers, lobbies, and corridors due to the high traffic in these areas. Recessed walk-off mats inside the entry where customers hit four footsteps on each mat will reduce maintenance cost for flooring. Walls should be constructed of durable materials or wall coverings with corner guards.

Foyers and lobbies should address foul weather requirements with easily cleanable floor materials. Foyers and lobbies must be adequately sized with large cueing areas. Walk-off mats inside the foyer and removable rugs in lobby areas should be provided for particularly bad weather days. Consider the need for bicycle racks and trash receptacles outside each entrance of dining facilities.

26.10 Kitchen / Production

Kitchen production facilities shall have suitable plumbed emergency eyewash equipment in areas wherever corrosive materials, such as oven cleaners, may be used.

Floor sinks are required for equipment that requires indirect waste lines – three compartment sinks, espresso machines, etc. All drainage must meet FOG (fats, oils and grease) compliance. Schedule 40 piping shall be specified for all kitchen drains and soda dispenser drains.

Clean/ Wash Area

Located the wash area near the kitchen entrance for dish drop off, wash area can be divided by specific activity – ex. tray/dish rinse off area, drying racks, etc. A three-compartment sink is required for utensil washing. Sinks must have adequate drain boards, racks, or tables large enough to accommodate all soiled and cleaned items that may accumulate during hours of operation. A mechanical flight type dishwasher will be used in addition to the utensil sinks.

Food Preparation Area

Located near cooking and service area and have easy access to storage and refrigeration areas, food preparation area can be divided by activity – ex. veggie wash/chop, Food prep sink, cutting areas, dry mixing area, etc. Design for sufficient in number and size designated food preparation sinks, with an indirect waste drain, are required if produce is cleaned on site. Sufficient number of food preparation sinks to include for wash, soak, rinse, drain, cool, thaw, or otherwise process any food that requires placement in a sink. Splash guards around sinks may be required to prevent contamination of foods and food contact surfaces.

Cooking Area

Located adjacent to food preparation area and near storage areas, cooking areas can be divided by activity – ex. baking area, frying station, grilling station, etc. And include but not limited to; convection ovens, stoves, fryers, Panini makers, grills, steamers etc. Incorporate proper equipment ventilation requirements. Unless conditions deem otherwise, all kitchen exhaust shall be roof installed. The Designer is to ensure that any Kitchen ventilation hoods conditioned for grease, shall have a roofing protection system to protect the roof area surrounding the exhaust.

Service Area

Located adjacent to seating areas if applicable and food preparation, service areas must include food “drop off” area, warmers, sneeze guards, etc.

Hand Washing Area

Hand washing sinks are required in each food preparation area and service area. Each sink must be equipped with hot and cold running water with a mixing faucet, soap, paper towel dispensers, and hand washing reminder signs. Hand washing sinks must be sized to allow employees to wash hands simultaneously.

Storage Area

Located near the delivery area, cold storage areas must have adequate refrigerated storage must be available for the separation of raw and ready-to-eat foods. Refrigeration requirements are based on the menu. Cooling of potentially hazardous foods will require equipment that is capable of meeting

cooling requirements for PHF's. Dry storage must be located in an area that will not be impacted by refrigeration failures and outside weather conditions.

Delivery

Located near to a loading dock/delivery door and storage areas, size delivery door (and other doors) to allow adequate clearance for items stored/transported (ex. Palates, dish return carts, etc.) as well as for the installation of new and future equipment. Include an inventory desk with a computer and telephone. And location for disposal of garbage, recycling, etc.

26.11 Restrooms

Restrooms shall be conveniently located near the food establishment and accessible to employees during all hours of operation. It is preferred to have separate restrooms from the patrons, however they may be used jointly by patrons and employees, provided patrons accessing the toilet room are excluded from food preparation area and unpackaged food storage areas.

26.12 Support Space

Janitor Room

A mop/utility sink is required and must be located so foods are not contaminated. May include washer/dryer for linen laundering, mop sink, hot water heater, cleanser/chemical storage, etc.

Staff Space

Provide desk, chair and filing space for the Supervisor and lockers for employee's personal items

26.13 Kitchen Equipment

Kitchen equipment shall be developed in concert with the University Representative and University Dining Services and will be unique to each project.

27 Specialty Structures / Areas

27.1 Parking Garage

Parking garages can be constructed out of reinforced concrete or precast concrete. All reinforcing in parking garage construction shall be epoxy coated. Specify a hardener to be applied to all surfaces of the parking garage, and a membrane waterproofing system over all occupied areas within a parking garage. Wheel stops should be provided at all perimeter parking spaces.

The standard parking space at the University is 9'-0" wide by 18'-0 long. One-way traffic loops are acceptable as long as there are up and down transfer ramps provided on each floor. Snow removal and drop locations should be identified in the plans and safety provisions provided for same. Parking garages are generally controlled with an entry and egress gate system that must be compatible with the University ID badges.

All mechanical and plumbing pipes are required to be protected as dictated by State code. Heat tracing of any metal piping may be required and utilized to avoid the freezing of piping in unconditioned space. Electric charging stations should be provided on the entry level of the garage in dedicated spaces for electric vehicles.