Appalachian
STATE UNIVERSITY

Facility Design Guidelines 2022

Appalachian State University
Office of Planning, Design & Construction

TABLE OF CONTENTS

DESIGN GUIDELINES

2 INTRODUCTION 26

3 CAMPUS STANDARDS

A APPENDIX - REFERENCE DOCUMENTS

POLICIES & PROCEDURES 1

PP 1.1 | ADMINISTRATION

This section outlines the procedures that are unique to the capital improvement projects at Appalachian State University. These requirements supplement the planning, design and construction procedures required by regulatory agencies, including but not limited to the North Carolina Building Code, the North Carolina Department of Administration's Office of State Construction (SCO) as outlined in the State Construction Manual and the University of North Carolina General Administration Design and Construction Guidelines. The SCO manual can be accessed at http:www.nc-sco.com/scomanual.aspx. The UNC Design and Construction Guidelines can be found at: https://www.northcarolina.edu/wp-content/uploads/2013/10/designconstruction_guidelines_rev_2-1-08.pdf

Designers should refer to Appalachian State University's current Master Plan for specific information on the intentional campus character of the buildings, landscape, and open space on campus. Capital improvement projects shall be designed in such a way as to enhance the campus environment and character.

The current Appalachian State University Master Plan can be accessed at the following website: http://pdc.appstate.edu

PROCEDURES

1.1.1 Designer's Relationship with the University

The Designer should understand that the University is the Owner and Client for the project, even though project planning and design for the University is a cooperative procedure involving many persons within the University, the State Construction Office (SCO) and other reviewing agencies. Furthermore, the Designer should understand that Facilities Operations and, specifically, the Office of Planning, Design and Construction oversee all capital improvement projects and serve as the project client.

1.1.2 Contact with the University

The University Project Manager (PM) is the primary contact for all correspondence and transfer of information during all phases of the project.

1.1.3 Design Contracts

- The Designer shall designate a project manager, who shall represent the Designer and their design consultant team throughout all phases of the project. As with the University PM, the Designer's project representative shall be the single point of contact for communications and decisions. Any change in the Designer's project representative during the life of the design agreement shall be made only after written request and subsequent approval by the Designer and the University respectively. The Designer shall provide an experienced project manager capable of effectively coordinating a multi-disciplined architectural/engineering team.

- As per the requirements set forth on the SCO website, the University uses the "Standard Form of Agreement between Owner and Design Professional" as found on the SCO website at www.nc-sco.com for most projects. Letter agreements are used on smaller and informal projects and are administered through the University of North Carolina General Administration or directly through the University, depending on the total project cost.

- The Designer shall provide all basic services for the project except survey and environmental, unless specifically included. On major projects, the University may engage quality assurance professional services such as for code review, commissioning, document coordination, Construction Manager at Risk, and other services to ensure compliance with project goals.

- The Designer may provide additional consultant services as determined by the scope of the project. When the Designer contracts with other professional consultants for these services, the owner must approve the consultants. A change of professional consultants during the term of the design agreement must be approved by the owner. All contractual obligations and changes must be formally amended, including fee and schedule modifications.

- The employment of professional consultants does not relieve the Designer from the responsibility for the entire project and for the full coordination of services required under the design agreement, whether the work is performed by the Designer or their consultants.

- On occasions, the University shall request the Designer hire a specialty consultant, and/or a specialty consultant specifically selected by the University, to support and/or supplement the work of the Designer. In such cases, the Designer shall be responsible for the performance of the specialty consultant per the terms of the original design agreement or as amended.

- Fee proposals should include the Designer's perception of the project scope of work, budgeted construction cost of work, and recommended scope of services. The Designer shall include a proposed fee, deliverables based on the scope and fee, project schedule, and any other University-requested information. The University shall generally negotiate a fixed fee or percentage of the construction cost fee for major projects. Fees must include all miscellaneous expenses such as, but not limited to, meals, mileage, and printing expenses. There will not be reimbursable fees added to the Fixed Fee.

- No payments to the Designer will be made without an executed agreement on file.

- The Designer must submit requests for amendments to the agreement, or requests for additional fees, prior to proceeding with the services. All design phase requests for additional services will not be considered once the construction contract has been executed. (Fix bullet margin)

- All invoices and contractors pay applications shall be submitted to the University project manager via email and ASU project Pay at asu-projectpay@appstate.edu and will only be approved for services performed to date. The invoices must be delivered as a PDF document and clearly marked as "Invoice" and include the project name, the SCO ID number, the project Code and Item numbers, the Appalachian State project number and the ASU Project Managers name (PM). Invoices must include the total fee for the project with a breakdown of amounts of each phase: Advanced Planning, Schematic Design, Design Development, Construction Documents, Bid and Award, Construction Administration and Close Out, as appropriate. The percentage complete and the amount currently requested for each phase must be clearly noted and totaled for a total paid to date and a current total due represented.

1.1.4 Project Delivery Schedule

The Project Development Schedule shall be up-dated and re-submitted with each end-of-phase submittal described in Section PP 1.3 Design Phases

In the proposal, the Designer shall identify project milestones, including design review submittals, document revision periods, and re-review periods. These milestones shall include start dates and durations of each major phase of pre-design, design phases, bidding and award, construction contract award, and the construction period. Also included where appropriate shall be the start dates and durations for funding decisions, surveys, hazardous materials design and abatement, zoning and environmental approvals and permits, other permits and approvals, commissioning, move-in times, etc.

1.1.5 Site & Existing Conditions Information

Projects within existing facilities shall include an appropriate review of the existing conditions as a part of the basic services. The University shall make existing documentation available to the Designer upon request and the Designer shall verify all information. The University cannot warrant the accuracy of any record documents or as-builts, including surface or sub-surface features. The Designer shall have the responsibility to verify the existing conditions to the greatest extents possible.

PP 1.2 | PROJECT REVIEWS

This section outlines the review procedure requirements which are unique to capital projects at Appalachian State University. These requirements supplement the most current addition of the North Carolina State Construction Manual required by the North Carolina Department of Administration, State Construction Office.

PROCEDURES

1.2.1 Initial Planning Conference

The University's PM will schedule an initial planning conference with the Designer and other University stakeholders as appropriate. This meeting is held as soon as possible after the professional is selected for the project. The intent of this meeting is to review the project goals, scope, budget and schedule, and special conditions unique to the University or the project. It is recommended that the Designer's consultants attend this meeting. It is usually appropriate for mechanical, plumbing, electrical controls and telecommunications consultants to attend to ensure project scope is clear to all parties.

Following the initial planning conference, the Designer will provide a preliminary design proposal and project schedule including the milestone dates through close-out. If acceptable, the PM forwards the proposal to the State Construction Office for review and approval. See the SCO manual for contract limits and regulatory requirements. Based on these requirement, a contract or letter agreement is prepared and subsequently executed.

1.2.2 Design Reviews

Planning and Design Process

A. Project Management

- The University's PM is the Owner's representative throughout the project. All correspondence, instructions, and approvals come to the Designer from the PM. Services rendered by the Designer, but not requested or approved in advance by the PM, shall not be compensated.
- The University manages the total project budget and requires the Designer to design to the Construction Cost of Work (COW) budget. This should be clearly documented as the basis of design. The Designer shall design the Base Bid and 85%-90% of the COW, with the remaining 10%-15% as alternates. The alternates must be structured such that if the alternate is not accepted, the facility is fully functional without that / those components. Alternates must be created such that potential bidders are not discouraged from bidding and that the bids are not inflated (i.e. complex alternates, which are difficult to define clearly on the construction documents, are not acceptable).
- The PM shall manage internal University reviews and approvals and shall instruct the Designer accordingly.
- The Designer must notify the PM of decisions that are critical to the project budget, schedule and quality so as not to delay the project. These critical decisions must be highlighted during the design process and milestone dates included in the project schedule.
- If the Designer believes additional services are required by the University beyond the scope of services defined by the agreement, the Designer must notify the PM and seek

approval before proceeding with the services. Additional fees must be negotiated and an amendment to the original agreement processed immediately. This also applies to terminated or suspended work.

- University projects normally involve many academic, student, facilities service groups as stakeholders. The PM arranges for and coordinates the Designer contact with these groups.

- Meeting minutes shall be kept by the Designer and be issued to the PM within five (5) working days of the meeting for review. The Designer shall distribute the minutes to all participants or others required to be copied.

- At each phase, the design team should review the project budget and scope. At this time, the team should establish a list of pending critical decisions and a timeline for their resolution by the University.

- The Designer shall work with the University Interior Designer through the PM for all interior materials selections, interior and exterior signage, way-finding, directories, furniture layouts and selections and room numbering systems. The University Interiors Designer must be involved at the initial design phases and throughout construction.

B. Coordination of Consultants

- On projects where a Construction Manager at Risk (CMR) is retained by the owner, the Designer may assist the owner with shortlisting and interviewing of the potential firms. At the project outset, the Designer and the CMR shall develop an agreed upon format for reconciliation of the scope and cost estimates and fully reconcile both for each phase of design. It is the responsibility of the Designer to invite the CMR to all project meetings during design. The Designer shall assist the CMR with structuring bid packages to foster the greatest HUB participation possible. Although the CMR is responsible for leading the pre-bid conference and the bid opening, the Designer is required to attend.

- On projects where a commissioning agent (CxA) is retained by the owner, the Designer shall develop the basis of design. The CxA will assist the owner with establishing the owner's project requirements (OPR). The Designer will integrate specifications provided by the CxA into the construction documents. The Designer shall assist in the coordination of and attend the pre-functional and functional tests and start up testing.

- On projects where asbestos and lead materials are suspected to be present, the Designer shall notify the owner and assist with identifying the necessary testing locations based on the project scope. Working with the hazardous materials consultant, the Designer shall incorporate into the construction documents the abatement design as required for the project. The hazardous materials consultant may be retained separately by the owner or be a consultant to the design team.

C. Testing

On projects where geotechnical exploration, seismic site classifications and special inspections are required, the Designer will develop the criteria for these studies and all testing for analysis during design or as required during construction shall be coordinated through the University PM.

Fire hydrant flows will be coordinated with the University project manager in conjunction with the Town of Boone Fire Marshall.

D. Design Phase Submittals

- The Designer should provide timely and complete submittals. The University shall

review the Designer's work for program and constructability prior to issuance to other reviewing agencies. Incomplete submittals may be rejected by the PM.

- The Designer is responsible for the management and performance of their professional consultants. Delay of a consultant's part of a submittal is considered an incomplete submittal from the Designer. The Designer is responsible for quality assurance reviews prior to the submittal to the University.
- Submittal requirements are described in detail in Section II: Planning Standards.
- The Designer shall include the agency review times in the project schedule, following the review durations established by the State Construction Office.
- The University requires electronic files of CAD documents at each end of phase submittal. These must interface with the software requirements of Facilities Operations. The Designer should coordinate the format and the media at the project initiation meeting with the PM.
- The Designer is required to participate in plan review conferences at completion of each phase submittal to review the project goals and scope. This is typically a group review, whereby University stakeholders and the Designer discuss the programmatic requirements and how the proposed documents meet the stated goals. These help to clarify design intent, conflicts constructability and to assist in definition of alternates.

1.2.3 Agency Reviews

The Designer will be responsible for the preparation and submittal of all local, state, and federal agency review and approvals required to accomplish the project scope of work. The Designer should work with the Office of Planning, Design & Construction to coordinate each submittal to the governing organization. Some of these may include:

- Ashe County Planning Department
- Watauga County Planning and Inspections
- Town of Boone Planning and Inspections
- North Carolina Department of Administration (NCDOA)
- State Construction Office (SCO)
- North Carolina Department of Insurance, Childcare Division (NCDOI)
- North Carolina Department of Labor (NCDL)
- North Carolina Department of Health & Human Resources (NCDHHR)
- State Historic Preservation Office (SHPO)
- North Carolina Department of Environmental Health & Natural Resources (NCDEHNR)
- North Carolina Department of Transportation (NCDOT)
- Appalachian Regional Health Department

  https://www.apphealthcare.com/environmental-health/food-protection-and-facilities-section/

PP 1.3 | DESIGN PHASES

This section outlines the design phase requirements which are unique to capital projects at Appalachian State University. These requirements supplement the most current addition of the State Construction Manual required by the North Carolina Department of Administration, State Construction Office.

PROCEDURES

Design Submittal

With each submittal phase, provide up to three (3) sets of printed documents, and an electronic file in AutoCAD and .pdf format or as determined by the University PM. The University shall review and approve the documents for completeness prior to submittal to other agencies. Coordinate size of plan sheets and if electronic plans instead of printed sets are preferred with the PM.

1.3.1 Programming / Advance Planning

The Designer shall facilitate an integrated design approach utilizing the designated representatives of the University and user group(s) to establish the design criteria for the project. The Designer will define the program, space needs, and site considerations for development of a project budget in this phase.

The Designer shall comply with the University's Standards and Guidelines

Programming/Advance Planning Submittals: At completion of this phase of the project the Designer will summarize all programmatic and advance planning criteria in written format to include:

- Project Budget
- Site Analysis
- Sustainable Design Criteria
- Detailed Space Program
- Code Summary
- Project Delivery Schedule
- Special Requirements

1.3.2 Schematic Design (SD) Submittal

a. General Requirements

In addition to the requirements of the North Carolina State Construction Manual, the following requirements apply to the Schematic Design submittal:

- All drawings submitted shall be dated, show scale and orientation of drawing, and include the official title of the project, as well as the University's project number, the SCO identification project number, and the name of the design professional.
- Floor plans shall have rooms identified by the program room numbers and program room names. Net and gross area of each floor and total gross area of each floor and the building shall be noted.
- Where applicable, site plans are required and shall note zoning district and indicate building setback requirements, as well as existing pedestrian/vehicular/ bicycle circulation, and those proposed during and following construction, access for disabled patrons, and fire and service access.

- LEED checklist indicating realistic project goals.
- The University Project Manager (PM), facilities, and other University stakeholders will create initial inventory of valuable and/or reusable building materials available for reuse in the project or other projects or for recycling.
- Owner's Project Requirements (OPR) documents as facilitated by the commissioning agent (CxA).
- Stormwater conceptual plan, which includes an existing conditions assessment, estimate of proposed impervious cover, and estimated size and location of proposed stormwater infrastructure and best management practices. Project location will determine if the Town of Boone Unified Development Ordinance or if the Watauga County Ordinance standards will be in effect for Stormwater Management requirements.
- If applicable, a geotechnical and seismic investigation, along with a hazardous materials analysis, will be commissioned by the owner in consultation with the design team and executed early in this phase for proper design and budget considerations.

b. Project Cost Estimate

Submit a written quantitative estimate of construction developed from complete schematic plans and outline specifications, per the SCO manual. Include estimated cost per square foot. Indicate the design professional's contingency as applicable.

c. Building Systems & Description of Construction

- Provide a project description using the following outline as a guide. This shall include a brief summary of building systems and materials proposed in the schematic design and a building code summary establishing occupancy group, construction type, building height, etc.
- Construction systems including structural members, wall system, roof design, water proofing, vertical conveying system, exterior and interior finishes.
- Life Cycle Cost Analysis using _____ software and sustainable design strategies as required by the Office of State Construction.
- Plumbing, air conditioning, heating and ventilating systems, ducts, filtration and piping, and building controls. Include appropriate Code references to be followed in design.
- Electrical services, including voltage and number of feeders. Provide specific description of items to be served by emergency power and describe consideration for any special areas.
- Fire detection and fire protection systems required for intended occupancy for the building.
- Site work and exterior utilities.
- Scope of communication systems and audiovisual equipment
- Scope of access control and security.

d. Schedule

- Provide updated project development schedule.
- The Designer shall not proceed to the Design Development Phase without written notice of approval from the PM for the Schematic Design Phase.

1.3.3 Design Development (DD) Submittal

In addition to the required deliverables noted within the Schematic Design Section, the Design Development submittal should also include the following items:

a. General requirements

1. Drawings submitted electronically must be in AutoCAD format. Each file shall be complete with any x-ref drawing files or shape files to be bound to the drawing file. Fonts supplied with current version of AutoCAD shall be used. The purge command shall be invoked to delete any unreferenced blocks, layers and line types. Provide polylines around each room on a separate layer.

2. Drawings shall show room and space uses, including location of items of fixed equipment, furniture layouts, and major pieces of movable equipment whether owner or contractor supplied or installed. Room numbers shall be finalized and approved by the University on the Design Development set of documents.

3. Program document showing net and gross square feet and comparison to the program requirements in previous phases of design. Program documents shall show how the proposed areas compare to the University of North Carolina Space Planning Standards also referred to as the "Eva Klein Study." The document can be found at:

   https://facilities.uncc.edu/sites/facilities.uncc.edu/files/media/Policy%20Statements/UP-601.4-SupplementalProcedures%20SPACE%20GUIDELINES.pdf

4. Where applicable, site plans are required and, in addition to the items required for the Schematic Design, the plans are also to include limits of construction, fences, construction access, laydown and staging areas. Also include proposed location of transformer, generator, waste and recycling collection, and all utilities that serve the building.

5. Landscape plan and other site improvements including exterior pedestrian and parking lot lighting, tree protection plan and details, roadways, walks, parking lots and any other hard surfaces, reflecting natural tendencies of pedestrian pathways as opposed to forced angles in hardscape routing.

6. Ceiling plans shall show all devices to be located in the ceiling, which must be coordinated with all disciplines.

7. Provide a review of interior finishes for approval.

8. Review and coordinate placement of exterior and interior building code required and wayfinding signage with University Interior Designer. Signage package to be procured by the University.

9. Outline proposed construction phasing needed to accomplish the project goals.

10. At the direction of the PM, identify any University-preferred brand items to be included in the project documents.

11. Include anticipated generator capacity if one is required for the project.

12. An updated LEED checklist identifying realistic, budget conscience measures to meet the projected goals.

13. Include Owner's Project Requirements (OPR) documents as facilitated by the commissioning agent (CxA).

14. Include statement from Designer verifying documents comply with the University

standards, guidelines and Codes.

15. Provide written responses to all review agency comments and indicate specifically how the comments have been resolved.

b. Description of Construction & Building Systems

1. Energy efficiency analysis as required by the NC SCO manual.
2. Structural

- Include a building code analysis, including all design dead and live loads, material specifications, and design stresses assumed during the design, including any assembly stresses where applicable.
- Specify the special mountain region wind category for Watauga County. Consult with the local AHJ for more information. Specify site specific snow load category.
- When structures employ a beam-column framework, a grid reference system using alphabetic and numeric symbols shall be utilized. When additions are made to existing structures, the original reference system shall be extended where practical.
- Include structural elements on floor plans to accurately show impact on spaces.

3. Thermal and Moisture Protection

- Continuity of water tightness and the thermal envelope is of special importance in this climate. Drawings should include how these elements are achieved.
- Specify roofing system with guidance from the SCO Roofing Design Criteria & consultation with the University PM & Facilities Operation Roofing Maintenance Staff

c. Mechanical

- For existing building renovations, evaluate the exterior envelope to properly size new heating and cooling systems load requirements.
- Indicate all required demolition and associated capping of piping and duct runs.
- Indicate waste, vent, and service mains, including water, air, gas, vacuum, steam, condensate, compressed air, hot water, chilled water, etc.
- Indicate pieces of equipment and double line duct runs. Include locations and connections of piping, tanks, pumps supply and exhaust fans, fume hoods, etc.
- Show pump layout and piping runs
- Provide equipment scheduled indicating sizes, capacity, operating characteristics, etc. Indicate adequate vehicular access to equipment and space required for maintenance of equipment. Review access to all equipment with the University.
- Provide air and water flow diagrams for supply and exhaust air, and water distribution systems. Indicate flow rates in mains and branches.
- Include BAS control schematics and sequence of operations. **The University will provide sequence of operations for each project.**
- Include large scale drawings and room section cuts of mechanical rooms to include:

  Layout of equipment to scale

  Elevations of built-up fan units showing air flow and access to components

d. Plumbing

Provide isometrics for water, sanitary, and gas piping.

e. Fire Protection

In addition to requirements of the NC State Construction Manual, fire protection drawings shall include:

- Pipe runs, standpipes, fire pump (if required), pumper connections, and test connections.
- Indicate if system will be wet, dry, or a combination of both. Carefully consider areas that are vulnerable to freezing, such as awnings, attics, and vestibules that are not properly protected from the cold, and whether a dry system is required.
- Indicate any special requirements or equipment.

f. Electrical & Telecommunications

In addition to requirements of the NC State Construction Manual, electrical drawings shall include:

- All required demolition, if applicable
- Show power, data, telecom and electrical room layouts on one drawing and lighting and fire alarm device layouts on a separate drawing. Include electrical, data, and casework on one sheet. Coordinate loose furniture layout with electrical and data plan in those areas where coordination in necessary with proper height of devices identified.
- Include emergency power plan, identifying special program needs in addition to life safety requirements.
- Provide single line electrical distribution diagrams showing primary service to substations and secondary service to distribution switchboards, motor control center, and panel boards for power and lighting.
- Indicate the point of connection to external utilities.
- Indicate and provide utilization schedule for each load center unit substation, motor control center, distribution and switchboards, telephone equipment rooms, and closets. Indicate minimum panel clearances required on plans.

g. Schedule

Provide updated project development schedule.

The Designer shall not proceed to the Construction Document Phase without written notice of approval from the PM for the Design Development Phase.

h. Project Cost Estimate

Follow all requirements as outlined and detailed for the Schematic Design Project Cost Estimate. Submit a written quantitative estimate of construction developed from complete Design Development plans and specifications.

1.3.4 Construction Documents (CD) Submittal

a. General Requirements

In addition to the requirements of the North Carolina State Construction Manual, the Construction Document submittal shall include:

- All corrections to drawings and specifications identified during previous design phase reviews and subsequent reviews shall be completed and incorporated into the construction documents. These include agency comments, CxA, CMR, and special construction circumstances (i.e. phasing, utility outages, access, etc.).

- The Designer is responsible for obtaining, incorporating and responding to Owner review comments. The Designer is also responsible for obtaining agency approvals in accordance with the North Carolina State Construction Manual.

- The Designer shall perform their own drawing quality control check to ensure that all disciplines have been coordinated throughout the documents. It is the Designer's responsibility to perform quality control of the contract documents.

- Where interior or exterior colors, materials, or finishes are specified, a color board of approved finishes shall be provided accurately depicting the materials, colors, and finishes to be used on the project and indicating their location within the project..

- Drawings, not specifications, shall include all schedules for plumbing mechanical and electrical, lighting equipment, doors and windows, room finishes, etc. All design details, sketches and drawings shall be shown on the drawings, not in the specifications.

- All symbols and abbreviations used on the drawings shall be identified in a legend or key.

- Drawings shall clearly dimension and accurately describe non-standard details and construction requirements including, but not limited to:

    1. Construction and expansion joint details
    2. Construction sequencing made necessary for specific conditions and protection of work in place.
    3. Concrete reinforcing details, including type placement and location of rebar splices.
    4. Connection capacity
    5. Water stops, etc.

- If contractors are to be prequalified, during the CD phase, the University will begin this process. The designer shall assist in the pre-qualification process by reviewing the list of contractors. The University will complete the pre-qualification process based on the submittals and the feedback from the designer.

b. Approved Erosion Control Plan

Storm drainage plan with table showing structures, pipe system, rim elevations and invert elevations.

c. Roofing

- Special design consideration shall be given and documented for roofing design requirements for the region including, but not limited to, wind uplift, snow loads, snow guards, impact of falling ice sheets from roofs. Approval of design criteria shall be obtained from the University PM. Follow the SCO Roofing Guidelines Manual, latest edition.

- Roof plans shall be fully developed and include all features and elements of the roof design in the construction document submittal, including roof slope and drainage, penetrations, and equipment. Refer to the Roofing Design Standard section for the complete list of roofing elements that are to be included and coordinated as part of the system.

d. Structural

- Construction drawings shall include a statement of special inspections, structural loadings, and details (i.e. floor, roof, cross-sectional, etc.)

- The geotechnical report shall be included as part of the contract documents

e. Mechanical and Electrical

- All ductwork plans are to be shown double lined, ¼" scale minimum. Provide an enlarged plan for all mechanical rooms. All ductwork and piping 3" and larger shall be shown double lined. Clearly identify locations of valves and dampers on drawing plans, sections, and installation details.

- General commissioning requirements, including Owner's project requirements and specific commissioning requirements for each discipline shall be included.

- Final LEED Checklist & Evaluation

- Owner Training Requirements

- A utility load summary sheet

- Air and water flow diagrams (for balancing purposed)

- Fully developed sequence of operations for HVAC controls that is provided by the University

- List of owner preferred alternates

- Designers shall confirm that all materials are identified in the specifications, thoroughly defined with a basis of design that is available and on the market. List all submittals, shop drawings, operations and maintenance manuals, warranties and certifications that shall be required for each product.

- As part of the beneficial occupancy, a sealed survey, performed by a professional land surveyor licensed in the State of NC, will be provided in pdf and AutoCAD formats of the accessible building entrance and routes, including all steps into the facility, to confirm they meet requirements of the building code. In addition, a site survey will also be provided, prepared by a licensed professional land surveyor, as part of the closeout documents of all above and below ground as-built improvements. This will require the contractor to engage a surveyor during the installation of underground improvements such as utilities.

1.3.5 PROCEDURES (under $2 million)

The Designer shall comply with Chapter 300 of the North Carolina State Construction Manual regarding design phases and submittal requirements. Reference: https://www.northcarolina.edu/wp-content/uploads/2013/10/designconstruction_guidelines_rev_2-1-08.pdf for further guidance.

The items outlined below describe supplementary requirements of the University for a process-based on the anticipated project cost being less that $2 million. These items may vary per project.

Design

- The University will work with the Designer to consistently seek ways in which to improve the design/review process for projects less than $2,000,000.
- The Designer is responsible for obtaining review comments and agency approvals in accordance with the State Construction Manual like the formal process.
- The number of submittals required for the project shall be determined with the Designer prior to final negotiation of the design contract or letter of agreement. Submittal options may include:
    1. Combine Schematic and Design Development submittal; or
    2. Based on the complexity of the projects, only a Construction Document review may be required.

PP 1.4 | BIDDING

This section outlines the bidding requirements which are unique to capital projects at Appalachian State University. These requirements supplement and/or highlight the most current addition of the North Carolina State Construction Manual required by the North Carolina Department of Administration, State Construction Office and the North Carolina General Administration.

This outline is specific to the Single Prime Contracting method that is most common and preferred project delivery method.

PROCEDURES

The Designer shall comply with the State Construction Manual and applicable North Carolina General Statutes regarding the bidding phase and submittal requirements.

The Designer shall coordinate all activities and information through the bidding process with the University Project Manager.

The date for the preferred alternate open meeting, pre-bid meetings and receipt of bids shall be established by the Designer in consultation with the University and SCO. A period of four (4) weeks is the typical duration between the publication of the Advertisement for Bids and the receipt of bids.

During the time of Construction Document development, the University will have identified pre-qualified contractors. Bid documents shall be made available to the prequalified contractors by the Designer.

It is the responsibility of the Designer to be aware of the Universities commitment to the State's Historically Underutilized Business (HUB) guidelines. The Designer will participate in this process to meet these goals. The ASU University HUB Coordinator can assist in this effort. As noted in the 2002 Guidelines for recruitment and Selection of Minority Businesses for Participation on State Construction Contracts, the Designer will:

a. Attend the scheduled pre-bid conference to explain minority business requirements to the prospective bidders.

b. Assist the Owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities.

c. Maintain documentation of any contact, correspondence, or conservation with minority business firms made in an attempt to meet the goals.

d. Review jointly with the Owner, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with the corresponding total dollar value of the bid and affidavit listing Good Faith Efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) – prior to recommendation of award.

Note that MBE requirements and 10% goal also apply on informal contracts. Documentation and data on MBE participation is required. The Owner has the responsibility to make a good faith effort to solicit minority bids and to attain the goal.

1.4.1 Bid Opening, Evaluation of Bids and Awards

Projects where Construction is $2 million and greater:

Follow the State Construction Guidelines
https://ncadmin.nc.gov/documents/construction-manual

- **No AIA Bid Bonds!!!!!**

Projects where the construction is $500,000 to $2 Million:

Follow the UNC General Administration guidelines and procedures.
https://www.northcarolina.edu/offices-and-services/finance-and-administration/capital-design-and-construction/

- **No AIA Bid Bonds!!!!!**

Projects where the construction cost is less than $500,000:

Public advertisement, bid bonds, performance bonds and payment bonds are not required but may be included. Consult with the University Project Manager if these requirements are required. The receipt of three (3) bids is not required to open bids, but at least three (3) bids should be solicited. Bids may be faxed or sent electronically to the Owner.

Typically bids should be received on Tuesday through Thursday at 2:00 PM or 3:00 PM to maintain consistency and for the availability of contractors. Unless a larger venue is required, it is preferred that the bid opening be held in the University's Planning Design and Construction conference room, with shall be coordinated with the PM.

PP 1.5 | CONSTRUCTION ADMINISTRATION

This section outlines the construction administration requirements which are unique to capital projects at Appalachian State University. These requirements supplement the most current addition of the North Carolina State Construction Manual required by the North Carolina Department of Administration, State Construction Office and the North Carolina General Administration. This outline is specific to the Single Prime Contracting method that is the most common preferred project delivery method.

PROCEDURES

1.5.1 Construction Contract

The Designer is required to thoroughly review the construction contract for completeness. Special attention shall be given to the accuracy of the SCO identification number, Appalachian State Project Number, and accurate complete Certificates of Insurance.

Specific to the Certificates of Insurance, this clause (or its full intent) must be included in the Endorsement Form:

> Notwithstanding, the preprinted cancellation provisions on this form, coverages afforded under these policies will not be cancelled, reduced on amount nor will any coverages be eliminated until at least thirty (30) days after mailing the written notice, by certified mail return receipt requested to the insured and the State of North Carolina (at the address of the Certificate Holder), of such alteration or cancellation.

Designers shall refer to the SCO Construction Contract Checklist for items required.

1.5.2 Pre-Construction Conference

During construction, the Designer and their appropriate consultants are expected to attend all project meetings.

Items to review as part of the Pre-Construction Meeting Agenda that are in addition to the SCO requirement:

> Electronic vendor payment information.
>
> Material testing and special inspections. Some projects may require the testing agency to be present at the pre-construction meeting.
>
> Requirement for a NC registered land surveyor to locate uncovered existing and new utility installations to record horizontal and vertical locations (prior to covering up the work). This information will be turned over as part of the closeout documentation.
>
> Review utility location services are through University Facility Operations, the Town of Boone, and the New River Light and Power which are above and beyond other utility location services.
>
> Noise, Dust Mitigation.
>
> Utility outages.

Pedestrian safety and traffic control signage requirements.

Campus No Smoking policy

Employee decorum on campus.

1.5.3 Notice to Proceed

Upon approval of all regulatory agencies, the Designer will coordinate with the SCO and the University's PM a date for each contract to proceed with work. The Designer will then issue a "Notice to Proceed" according to the type of construction contract for the project. This letter shall establish the start date and completion date for each contract.

1.5.4 Progress Meetings & Site Inspections

The Designer shall establish a schedule for progress meetings at the job site in accordance with the State Construction Manual. Minutes of the meeting will be kept by the Designer and distributed to all parties.

As required per the SCO Manual, inspections shall be qualified representatives of the Designer's firm and their consultants and shall be as often as necessary to ensure compliance with the contract documents, but in no case less than once per week while work is in progress.

The ASU Facilities Operations personnel will also observe work in progress and will provide comments to the Designer through the University's Project Manager.

PP 1.6 | FINAL CLOSEOUT

This section outlines the final closeout requirements which are unique to capital projects at Appalachian State University. These requirements supplement the most current addition of the North Carolina State Construction Manual required by the North Carolina Department of Administration, State Construction Office.

Procedures

The Designer shall comply with the State Construction Manual regarding the closeout requirements. The Designer shall provide the following project close-out services upon completion of the project:

1. Provide all record drawings and specifications in pdf and AutoCAD format per the Universities most up to date requirements upon full review of as-built documents from the contractor for accuracy and completeness confirming that all Addenda, ASI Change Orders and Field Order revisions have been incorporated.

2. Provide review of Operating and Maintenance Manuals for accuracy and completeness.

3. Review in coordination with the Commissioning Agent, Owner's training requirements, additions to the preventative maintenance program, contractor's proposed training agenda and proposed training personnel qualifications. Verify contractor completes training requirements.

4. Provide review of Warranty Manual confirming manufacturer warranties are included in addition to those specifically required by the contract documents. Confirm warranty start dates are the project acceptance date. Verify extended warranties are included.

Review Attic Stock Inventory for accuracy, completeness and handoff to Owner is verified with signature receipt.

DESIGN GUIDELINES 2

POLICIES & PROCEDURES 1

INTRODUCTION

The purpose of the Design Guidelines section is to convey guidance for planning, design and construction at Appalachian State University. The context for development of these guidelines is the main campus. However, many of these requirements should be considered applicable to all campus property. The guidelines offer direction for aesthetics and general design intent. The Designer should reference Section 3 - Campus Standards for detailed requirements.

The Campus Master Plan is the official document for continued growth and new development at Appalachian State University. It is expected that the Designer shall adhere to the design intent of the Master Plan and Guiding Principles.

Parameters

Appalachian State University strives to protect the history and traditions of the University's culturally rich mountain environment. These guidelines are intended to allow and encourage the campus to continue to evolve in such a way that each building contributes in a unique way to the context of the campus, while being respectful of its natural surroundings.

No written guideline can fully describe in detail all aspects of the required design criteria. These guidelines seek to portray a prescriptive approach for defining the parameters of a project and design outcome. The Designer shall solicit from the University preferred examples of existing design elements and building models that have successfully achieved these goals. These examples do not imply that the Designer should consider direct imitations. These examples merely illustrate buildings that respond appropriately to programmatic requirements, the immediate context and physical conditions of the site.

For design and construction of new facilities (or renovation of existing buildings) the Designer should carefully consider the following parameters as ingredients for each new project on campus:

1. Responsive to use
2. Sustainable
3. Flexible
4. Technologically advanced
5. Considers weather & topography
6. Pedestrian oriented
7. Exhibits detail
8. Expresses physical harmony
9. A 50-year solution
10. Model for learning

General Considerations

In addition to the parameters defined in the previous section, the University has defined several general considerations the Designer should address and/or integrate into each new project.

Design Within Available Funds

Designers are directed and required to base their designs upon the budgeted funds available. The Designer shall continually monitor program requirements and cost estimates to assure that the project is designed within the available funds and does not deviate from the quality standards established herein. If at any time, the Designer believes that satisfying the stated program requirements, at the level of quality desired, will exceed the budgeted funds available, then he or she must inform the University Project Manager without delay.

Energy and Materials Conservation

The University is dedicated to the principle of conserving materials and energy. University personnel will examine proposed construction for means of reducing not only the initial cost of energy and non-renewable resources, but also long-range operating costs. In addition to basic conservation requirements, the Designer should prioritize efficient building envelopes and consider the utilization of passive solar energy techniques, non-conventional and renewable energy resources, recycled materials content of specified materials, and non-conventional materials.

DG 2.1 | SUSTAINABLE DESIGN

Appalachian State University is committed to climate neutrality and has adopted a Climate Action Plan that outlines strategies to reduce building-related emissions and other environmental impacts. The University's design guidelines outline considerations that strike a balance between more efficient building practices and reliable technologies that reduce operations and maintenance costs.

Building Standards - All new construction and major renovations shall be built to at least the U.S. Green Building Council's (USGBC) LEED Silver standard or equivalent. LEED Silver is the minimum design criteria. When pursuing LEED certification, point priority should be given towards designing energy efficient buildings rather than offsets or other non-project specific point opportunities.

To the extent possible, new buildings and major renovations should go beyond LEED standards. If an equivalent green building standard is used, the standard must be appropriate for the building's intended use and strive to be at least 30% more efficient than code. Potential building standards that support regenerative design should be consulted and considered include:

- WELL Health-Safety Building Certification
- Living Future's Core Green Building Certification
- Green Built Multifamily Certification (Residence Halls only)
- ENERGY STAR Certification for Buildings
- PHIUS+ Passive House Certification

Appalachian State University requests that the following criteria be considered and prioritized in all new construction and major renovation projects:

- Energy Efficiency
- Water Efficiency
- Indoor Air Quality
- Indoor Environmental Quality
- Low Impact Development
- Material Selection
- Waste Management
- Diversity, Equity, and Inclusion

Guidelines

Energy Efficiency - Appalachian State intends to reduce its carbon footprint by integrating energy efficient practices and technologies throughout the campus. To the extent possible, all new construction and major renovation projects on campus shall be designed in an energy efficient manner by addressing the following criteria:

- Reduce overall building energy loads by 30% as compared to the current NC Energy Code.
- Maximize the thermal efficiency of the building envelope.

- Designers shall work with a building envelope consultant for each project. All envelope designs should be internally reviewed by Facilities Operations.
- Utilize energy modeling and analysis. Thermal calculations are to use aged R-values.
- Utilize commissioning on all new projects to ensure systems are functioning as intended.
- Utilize LED lighting and dual-technology or ultrasonic occupancy sensor controls.
- Consider high efficiency mechanical systems that utilize proven technologies with successful operations and maintenance records. *See "Incorporating High Efficiency HVAC Technologies" for more information.*
- All equipment and appliances shall be ENERGY STAR rated.
- Incorporate Demand Controlled Ventilation. Each individual HVAC zone must have networked sensors that monitor dry bulb temperature, carbon dioxide, and relative humidity.
- Incorporate exterior shading devices or extended roof overhangs to control heat gain.
- Consider renewable energy sources.

Incorporating High Efficiency HVAC Technologies – Appalachian State University intends to incorporate proven technologies that reduce energy use, operation and maintenance costs, and environmental impacts. Balancing reliability with efficiency requires that the university takes advantage of newer efficiency technologies while also supporting the Facilities Operations staff that are responsible for maintaining and operating university systems. Facilities Operations requires the following two conditions when considering new, higher efficiency technologies such as magnetic bearing chillers, condensing boilers (off campus locations only), or similar:

a.) **10-year extended warranty** on all parts, labor, and refrigerants (if applicable) on all new, high-efficiency HVAC systems.

b.) **Life Cycle Analysis –** The university requires a Life Cycle Analysis using the university-approved LCA software platform that considers energy savings, maintenance costs over the life of the system, and any other potential operational issues . A copy of the completed analysis must be provided to the university in the original source format so that the LCA can be vetted by university staff.

Water Conservation – Appalachian State University has made significant progress in reducing the amount of water consumed on campus. To continue this trend, the university, the extent possible, seeks to maximize water efficiency in new construction and major renovation projects. The Designer should consider water efficiency measures such as:

- All water products (toilets, urinals, faucets, shower heads, irrigation controllers, etc.) shall be WATER SENSE rated (or equivalent).
- In renovation projects, ensure existing plumbing will successfully remove waste when considering low-flow technologies.
- Minimize freshwater use for landscaping by implementing technology to enable water capture and reuse as part of the building design.
- Protect surface water by preventing culverts from flowing into daylit surface water. Existing surface water enclosed in culverts will be daylit to the extent practical.
- Utilize permeable surfaces as much as possible.
- Select drought resistant plantings

Indoor Air Quality (IAQ) - The University will maintain healthy and comfortable interior environments that promote learning and increase the safety of occupants. Facilities should be designed and

constructed to:

- Meet current ASHRAE ventilation standards.
- Incorporate or pursue WELL Health-Safety Building certification standards.
- Include networked sensors that monitor dry bulb temperature, carbon dioxide, and relative humidity in each individual HVAC zone.
- Prevent the infiltration of moisture into buildings.
- Supply adequate levels of outside air to ensure indoor air quality.
- Eliminate the use of ozone-depleting materials.
- Utilize low Volatile Organic Compounds (VOC) products for all interior spaces.

Indoor Environmental Quality (IEQ)– When designing new construction and major renovation projects, the health and well-being of occupants shall be prioritized. IEQ considers the conditions inside a building and the impact those have on occupants. To the extent possible, lighting levels, air quality, thermal conditions, and ergonomics should enhance the quality of life of the people occupying the building. Strategies to consider include:

- Ensure ventilation systems are capable of reducing indoor air pollutants under any outside weather condition experienced in Boone, NC.
- Maximize daylighting for occupied spaces.
- Maximize views to the exterior for all occupied spaces.
- Install operable windows.
- Utilize low-emitting materials.
- Provide acoustical privacy as appropriate.
- Specify ergonomic furniture.
- Explore Biophilic Design opportunities

Low Impact Design (LID) - New building developments should utilize storm water management techniques to reduce the impact of built areas on the natural movement of water. LID principles prioritize preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. Examples of specific LID practices include:

- Stormwater Wetlands
- Bioswales
- Riparian Buffers
- Cisterns
- Underground Pipe Storage
- Planted Filtering Strips

Material Selection - The design and construction for new buildings and major renovation projects should include strategies that utilize materials with minimal environmental impact. Projects that require the demolition of a buildings should consider if reusing building materials is feasible.

- Purchasing practices should consider the embodied carbon of materials.
- When selecting materials, the Designer should consult the environmental profile of specific products.
- Demonstrated carbon footprint – If a certain products costs less, performs as well, and meets aesthetic requirements, the Designer is required to go with products with the smallest carbon footprint.
- Specify local materials as a first preference, then regional products to reduce shipping energy cost.

- The carbon sequestering properties of building materials (i.e. big timber frames vs steel for smaller buildings) should be considered to the extent possible.
- Utilize flexible design and flexible spaces to provide a maximum lifespan for the use of the building.
- Maximize the recycled content of building materials.

Waste Management – The amount of waste created both during construction and during occupancy is affected by design considerations. Appalachian State University requests that Designers consider how the design of new buildings and major renovation projects will impact waste management. Considerations of effective waste management diversion include:

- During design, create a solid waste management plan that is included in the specifications.
- To the extent possible, specify construction materials that are recyclable and design to minimize waste.
- During construction, waste is to either be separated into separate containers and sorted onsite or sent to a material recovery facility.
- Include strategies for occupant generated waste.
- Designers to consult with the University's Zero Waste Leadership Team to ensure campus standards are met.
- Review Solid Waste Management Plan with Facilities Operations and the Office of Sustainability prior to the end of the design process.

Diversity, Equity, and Inclusion – Appalachian State University is committed to developing and supporting a diverse campus culture. The University requests that Designers consider the following on new and major renovation projects:

- Does this project support the UNC system's requirement to prioritize contracting with minority and women owned businesses?
- Will this project marginalize or displace people in Boone or elsewhere?
- Are health and safety prioritized not only for future occupants but also for the people designing and constructing the project?
- Can this project exceed requirements from the Americans with Disability Act to support and engage all occupants?

DG 2.2 | FACILITY SITING CRITERIA

It is the intent of the facility siting criteria to emphasize continuity for the planning of new facilities on campus. Significant opportunities arise during the site planning stages of design and have a tremendous impact on the overall success of a project. The University requires that each new facility planned for the campus follow the Facility Siting Guidelines to insure a comprehensive approach to the site design.

Guidelines

2.2.1 Facility Siting *The Designer shall visit the site and evaluate proposed locations of elements of the project. Site design alternatives must comply with the design intent of the approved campus master plan.*

For new construction or additions to existing buildings, site selection is generally indicated in the building program requirements. Designs should address the following criteria:

1. Reinforces the functional relationships of the building program.
2. Meets access requirements for pedestrian, bicycle and service
3. Works with the existing topography to minimize cut & fill material
4. Responds to existing sub-soil conditions
5. Avoids unnecessary environmental impacts
6. Maximizes sustainable design principles for solar orientation
7. Responds appropriately to the locations of existing utilities and infrastructure
8. Maximizes views to and from the building
9. Considers construct-ability issues for contractors access
10. Provides fire truck access
11. Minimizes on-campus surface parking
12. Maximizes open space areas
13. Preserves nature where possible
14. Considers extreme weather conditions of the region

DG 2.3 | SITE DESIGN

A primary task of all campus architecture and landscape design is the physical definition of streets and public spaces as places of shared use. Streets lined by buildings or landscaping rather than parking lots are more interesting to move along, especially for pedestrians and provide a safer environment. The following guidelines serve to unify the campus through site design principles that will be applied to all projects.

Guidelines

2.3.1 Handicapped Accessibility *It is the policy of the University to make all areas of the campus, and all buildings located within the campus, physically accessible to all students, faculty and staff, regardless of individual limitations which may affect mobility.*

The Designer is directed and required to consider in their designs, and to otherwise accommodate, the special requirements of all segments of the University population, including wheelchairs users, and others using walking aids, the hearing impaired, and those with sight limitations.

The Designer is required to meet all appropriate regulations as set forth by the current North Carolina Accessibility Code and adopted amendments.

2.3.2 Walks, Ramps & Steps *These elements shall provide safe routes for all user groups of the campus.*

Walkways:

1. Design consideration should be given to align walkways to connect to major destinations circulation paths and offer pedestrians a safe, interesting and relatively direct means of travel.
2. Walks should not dead-end into the middle of parking lots and other vehicular-oriented areas.
3. Special consideration should be given to locations where pedestrian pathways cross vehicular routes and shall be handicapped compliant.
4. Where primary pedestrian traffic intersects roadways, brick paving material should continue across the vehicular route.
5. Existing brick paving materials and patterns should be continued as a means of maintaining visual continuity across the campus.
6. Consistent walkway widths should be maintained across the campus and respond to pedestrian movement and emphasize a hierarchy for pedestrian circulation.

Standard walkway widths to be applied are:

Major pedestrian corridors: 16

feet wide Major pedestrian walks:

8 feet

wide

Minor walks: 6 feet wide (minimum)

Ramps and Steps:

1. Siting and building design should minimize the need for steps or ramps when possible. Alternative grading measures should be considered.
2. Ramps should be installed for supply and service deliveries.
3. Ramps should be installed for handicapped accessibility for renovation projects.
4. Provide overhead exterior lighting for all steps and ramps. Recessed wall or step lights below 24" is discouraged due to salt and water degradation.
5. All walking surfaces should have a surface providing traction. Carborundum or similar abrasive will NOT be permitted.
6. The building design shall take into account the need to protect steps and ramps from the fall of snow from roofs at entrances and along walkways. Snowmelt heat mats will be considered

See handrail requirements in section 3.5 for specifications.

2.3.3 Service & Utilities

Utilities and service areas should be screened or otherwise hidden from the view of the pedestrian. Locate trash storage, loading, and truck parking to minimize visibility from the street/sidewalk and building entrances. Avoid locating service and loading areas along important view corridors.

7. All exterior trash or dumpster areas should be screened. The enclosure should be made of materials and colors compatible to that of the principal structure.
8. Where feasible, screen loading docks and truck parking from public view using building mass, freestanding walls, and/or landscaping.
9. Consult with the utility companies early in the design process about the location of utility boxes and meters. Ensure that all utility equipment is located, sized, and designed to be as inconspicuous as possible. All utilities, both new and existing, should be placed underground in conduits and vaults. Vaults shall not be located in streets, parking areas, or sidewalk areas where subject to road salt application. All utility services should be underground.
10. Do not locate HVAC equipment on the street-side of the building. In addition, locate all building-mounted utility meters and service equipment to the side or rear of the building. Screen all rooftop equipment from public view.

2.3.4 Environmental Protection

All campus development should respect natural resources as an essential component of the human environment. The most sensitive landscape areas, both environmentally and visually, are steep slopes greater than 15%, watercourses, and floodplains. Any development in these areas should minimize intervention and maintain the natural condition except under extreme circumstances. Where

practical, these features should be conserved as open space amenities and incorporated into the overall site design.

1. Piping of creeks should be avoided and channelization should be minimized.
2. Where crossing of existing creeks is necessary, a bridge structure is superior to a culvert. Bridges permit the natural ecosystem of the stream to remain unimpeded under the crossing.
3. Existing vegetation and large specimen trees should be preserved and incorporated into the site design in order to create a natural landscape and the impression of a mature landscape.

2.3.5 Outdoor Lighting *Outdoor lighting should provide a safe and visible pedestrian realm for the University as well as perpetuate the character for the area.*

Lighting for outdoor conditions should comply with the design guidelines outlined by the IDA (International Dark-Sky Association).

1. All lighting shall be light emitting diode (LED) unless there is a more efficient alternative.
2. Use a low intensity of high-quality white light, which will provide good, uniform visibility while avoiding light pollution.
3. Cut-off fixtures are required because they are more efficient than non-cutoff fixtures at casting light on the sidewalk and avoid light spillage and pollution.
4. Outdoor lighting should consider the illumination of sidewalks and other multiuse pathways using low intensity fixtures that provide an even distribution of light while avoiding areas of intense shadows.

2.3.6 Public Art *Works of art have contributed to the visual quality of ASU over a long period of time. This amenity adds a visual texture and character that should be continued as appropriate.*

1. Public art should be constructed and placed to add beauty and character to the campus. The piece of art is should have meaning and give meaning to the campus and contribute to the academic mission of the University.
2. Artwork may be free-standing pieces (e.g. sculpture or water fountain) or it may be integrated into its surroundings as an architectural element (e.g. relief sculpture imbedded in pavement or a wall, a mosaic or mural on a wall, lighting or sound effects, or decorative railing or lighting).
3. All lighting of artwork should be in conformance with campus standards.

DG 2.4 | CIRCULATION ELEMENTS

These Design Guidelines encourage the development of a network of interconnecting streets that work to disperse traffic while connecting and integrating various areas of the campus. Equally important, these guidelines encourage the development of a network of pedestrian paths, sidewalks and bicycle lanes that provide an attractive and safe mode of travel for pedestrians and cyclists.

Guidelines

2.4.1 Access Management *The control of driveways, roadways and other curb cuts through a comprehensive access management program should be a high priority to maintain the efficient operation of the major campus corridors, thereby securing the long-term infrastructure investment.*

Street designs on the campus should permit the comfortable use of the street by cars, bicyclists, and pedestrians. Pavement widths, design speeds, and the number of vehicle lanes should be minimized without compromising safety. The specific design of any given street must consider the building which fronts on the street and the relationship of the street to the campus's street network.

Driveway standards based upon NC DOT standards as well as best practices for corridors similar to those found throughout the campus.

1. The Minimum Spacing between median openings shall be 1000 feet. Where the NC DOT Median Crossover Guidelines conflict, the stricter of the two standards should prevail.

2.4.2 Connectivity *The campus should consist of a well-connected street network that provides internal and external connections.*

Traffic studies have shown that highly connected street networks provide much greater mobility for a campus community at less cost. A high degree of connectivity should occur not only at the level of arterials, but also on collector, local and other secondary roads. Such connectivity vastly improves a street network's performance. The street pattern should not force short trips of one or two miles onto arterials; it should be possible to make trips of this sort by using collector or other secondary streets. With a highly connected street network, cross-campus trips should be possible using fairly direct secondary roads.

1. Good transportation design requires the development of a network of interconnecting streets that disperse traffic and support transit options while connecting and integrating the campus with the existing urban fabric of the surrounding area. A network of narrower streets with reduced curb radii slows and disperses traffic, and provides a pedestrian-friendly atmosphere.

2. Main campus roads should have a cross-section width of 48' and a speed limit of 25 MPH. Facility access roads should have a cross-section width of 36' and a speed limit of 25 MPH. Service roads should have a cross-section width of 24' and a speed limit of 20 MPH.

3. For good, clear visibility, intersections are to be perpendicular, have lighting arranged at 90 degrees to each street, and maintain a 50-foot landscape setback from each corner.

2.4.3 Pedestrian & Bicycle Circulation *Provide a complete network of paths that interconnect building entrances, parking, transit stops, sidewalks and crossings, adjacent properties, adjoining off-street paths, and other key destinations on or adjacent to the site.*

1. Pedestrian pathways should be provided from the street to the parking area between buildings, as necessary to ensure reasonably safe, direct and convenient access to building entrances and off-street parking. They should be clearly defined and enjoyable to use. To aid pedestrian navigation and comfort, provide the following elements along paths:
    - Landscaping, such as rows of trees and shrubs, flower beds, and planters
    - Campus standard outdoor lighting fixtures
    - Small way-finding signs
    - Vertical architectural elements, such as markers or arches
    - Seating and resting spots
    - Special paving
2. Whenever pathways cross internal drives and curb cuts, provide a highly-visible crosswalk, made of a material that provides strong contrast with the vehicular surface (imbedded elastomeric paint or unit pavers in concrete). Consider elevating the crosswalk to the level connecting walk. Also use warning signs and light fixtures to alert drivers to crossings
3. Pedestrian routes should be direct and should minimize potential conflicts with vehicles. For pedestrian safety and comfort, where a main pedestrian route must go along or across a parking lot or driveway, provide a separate path with buffer landscaping and other amenities.
4. Provide pedestrian and bicycle links to each adjacent property (in addition to the public sidewalk). They should be highly visible and conveniently located. Avoid steps; provide curb ramps to accommodate wheelchairs, bicyclists, and baby strollers. If the adjacent lot is undeveloped or under developed, provide part of the connection or maintain the potential for a future link.
5. No pedestrian paths should be less than six feet (6') in paved width. Multi-use paths (bicycle and pedestrian) should not be less than eight feet (8') in paved width, though ten feet (10') is preferred. Whenever parking abuts a walkway (head-in, diagonal or parallel), add one and one half feet (1.5') to the walkway width to accommodate car overhang or opening car doors. A wheel stop may be used to prevent car overhang instead.

6. Bike racks should be located close to the main building entrance so they are highly visible and convenient. To facilitate access, install a curb ramp in any drive near the bike parking.

2.4.4 Transit *The regional transit system (APPALCART) should be maintained and enhanced as one of the greatest resources of the campus and surrounding area.*

1. Bus stations (bus stops) should be ½ to 1 mile apart, unless increased speed and/or higher ridership justifies closer placement. Stations shall be incorporated into new campus projects where appropriate.
2. Pedestrian access to the stations should be maximized. Evaluate ridership and staging areas with the AppalCart Director to ensure it is sufficient.
3. Lighting and campus standard shelters should be provided. Station and shelter design shall also be coordinated with AppalCart and University staff.
4. Where appropriate, park and ride facilities should be provided in close proximity to significant bus stations. Shared or joint use parking should be encouraged.
5. The impacts of cross traffic in relationship to transit should be minimized using grade separations, queue jumps or signal preemption.
6. Each station should have good access for other modes of travel including autos, pedestrians, bicycles, electric vehicles, buses and shuttles.

2.4.5 Parking *Parking lots (and decks) should not dominate the frontage of pedestrian oriented streets, interrupt pedestrian routes, or negatively impact surrounding developments.*

1. Parking lots or decks should be located behind buildings whenever possible. Parking lots should not occupy more than 1/3 of the frontage of the adjacent building or no more than 64 feet, whichever is less.
2. Shared parking is strongly encouraged.
3. Consider the feasibility of providing a parking structure rather than surface parking to conserve land and minimize the impacts on the environment.
4. Parking aisles should be separated from one another by planted medians with shade trees. When possible, it is recommended that parking aisles and their shade trees be aligned in a solar orientation to cast shade on parked cars during the summer months.
5. Large surface parking lots larger than 75,000 square feet of vehicular surface should be visually and functionally segmented into several smaller lots enclosed by landscaping.
6. Parking lots along the street must be screened from the adjacent street and sidewalk by low walls and/or landscaping.
7. Parking structure layout will be coordinated with Parking and Traffic for lane and parking stall dimensions. Structure facades should be treated with approved building materials. The façade should be designed to visually screen cars and incorporate design elements from surrounding bldgs.
8. Pedestrian entries should be clearly visible. The vertical circulation should not be located in the center of the structure so that it is difficult or circuitous to locate.

9. Bicycle racks and storage lockers are strongly encouraged inside new parking structure.
10. Alternative fuel stations (electric vehicle chargers) should be considered for new parking structures as directed by the University.

DG 2.5 | LANDSCAPE C HARACTER

The mountain landscape of ASU creates a sense of place for students, faculty, and visitors to the campus. This sense of place encourages social interaction which is a vital aspect of any pedestrian campus. Because the area is composed of diverse site and building elements, the landscape character is the integral component that serves to unify and create an attractive whole.

As ASU continues to grow, some landscapes will need to be preserved, while others will need to be expanded or created. Campus landscape should not inhibit creativity to proposed landscapes but provide an environment where creativity can flourish within parameters that are set to protect the overall campus unity.

The goal of the campus landscape is to achieve a comprehensive landscape fabric that is aesthetically attractive while also being practical and cost-effective to maintain. The overall philosophy of the guidelines is to foster a sense of community through the use of indigenous plant material that enhances the overriding sustainable approach to the campus environment.

As outlined in the Guiding Principles, it is important that the "University emphasize the quality of the natural environment" and "preserve the natural habitat". For this reason, it is imperative that future growth consider the existing plant material and how this will be integrated into the overall concept of the landscape plan for a specific project.

For specific material suggestions and size requirements, please refer to Section 3 - Campus Standards.

Guidelines

2.5.1 Trees *New tree plantings will be made on a regular basis and existing mature trees and quality tree stands should be protected as a valuable campus resource.*

New construction on campus, whether it be expansion or infill- related, begins to put intense pressure on existing, mature trees and often results in the compaction of their critical root zone. All new projects should consider this fact and plan to enforce tree protection measures and enhance the site with new tree plantings.

Many of the older trees on campus will inevitably become less viable and will be lost to disease or other causes at some point in the future. The preservation, protection, and ongoing health of campus trees should never be a second priority for any proposed project.

1. Existing trees shall be preserved whenever feasible.
2. When selecting which trees to preserve, the following shall be considered: existing and proposed grading, age and vigor, condition and type of tree, location of site improvements, utility connections, wildlife and environmental benefits.
3. Trenching, placing backfill in the critical root zone, driving orparking equipment in the critical root zone, and dumping of materials detrimental to plant health in close proximity of a tree to be preserved is prohibited.
4. Should any tree designated for preservation die during or soon after a construction project, the contractor shall be responsible to replace it with a size and species type approved by the University.
5. Protective barricades shall be placed around all trees designated to be saved prior to grading.

2.5.2 Plantings *Campus plantings should create a unified design theme through the use of plant massings, native material, ease of maintenance, and simple, elegant designs that are scale appropriate for the area.*

Plantings truly enhance the quality of life for everyone at ASU. Shrubs, herbaceous plant material, and trees filter pollutants in the air and water help mitigate wind effects and solar heat gain, stabilize soil to reduce erosion, and provide beautiful aesthetics within the built environment.

The other critical ambition of plantings is to provide a human scale to the campus that makes people feel comfortable and safe. Safety in the landscape is a serious consideration that can be addressed by discouraging design that creates "hiding places". Simple arrangements that are appropriate for the scale of a specific context should be encouraged throughout the campus while taking advantage of a landscape's ability to create vistas, frame views, and provide visual termini. The creation of a healthy growing environment for plantings should be a joint effort of arborist, horticulturists, landscape architects, and native plant biologists.

The University encourages the maintenance and enhancement of habitat for various forms of wildlife and to create new woodlands through natural succession and reforestation where appropriate.

1. Site disturbance and erosion should be minimized through retention of existing vegetation and avoiding development in sensitive areas.
2. Plants to be selected for the campus should be native to the bio-region, long lived, relatively pest free and practical to maintain.
3. Establish new tree plantings along all major walkways and major campus streetscapes.
4. Define outdoor living spaces and quads with plantings to create informal gathering spaces with access to seating.
5. Expose the additional expanse of Boone Creek along Rivers Street and Hardin Creek along Hardin Street and embellish with rock and plant material appropriate to a mountain stream following proper stream restoration design.
6. Provide landscape screening around exposed building equipment such as transformers or mechanical units.
7. The corners of street intersections, particularly gateways and site entries (from both street and sidewalk) should be distinguished by special landscape treatments: flower displays, specimen trees and shrubs, accent rocks, low walls, signage, decorative lighting, sculpture, architectural elements, and brick paving. Features for vehicular entry points must meet NCDOT's sight triangle requirements.
8. The plantings (softscape) should be balanced with the special paved areas (hardscape).

2.5.3 Open Space *As the campus continues to grow and evolve, dedicated open space should be protected, preserved, and enhanced as appropriate.*

Open space preservation and creation will be vital to the health, function, and beauty of the overall campus. The plan proposes a mix of formal and informal areas that recognize the existing conditions and build upon the inherent beauty of the campus.

1. To ensure that open space is well used, it is essential to locate and design it carefully. The space should be located where it is visible and easily accessible from public areas (building entrances, sidewalks). Consider views and sun exposure into account as well.

2. New open spaces should contain direct access from the adjacent streets. They should be open along the adjacent sidewalks and allow for multiple points of entry. They should also be visually permeable from the sidewalk, allowing passersby to see directly into the space.

3. The space should be well-buffered from moving cars so that users can enjoy and relax in the space. The space may be visible from streets or internal drives but should not be wholly exposed to them. Partially enclose the space with building walls, freestanding walls, landscaping, raised planters, or on-street parking to help buffer it and create a comfortable "outdoor room".

4. Do not overlook general open spaces (not part of the dedicated open space). These areas help tie the campus together into a memorable experience thus giving them great value.

5. Utilize infill project whenever possible as the campus grows and expands. This will not only maintain the campus as a walkable environment by not extending the limits beyond a comfortable walking distance, but it will also protect open space from being pressured as new development is planned.

6. The design of these spaces can be enhanced with plazas, fountains or public art.

7. Maintaining open spaces at varying scales is also important and encourages both passive and active spaces within the campus setting.

8. Conserve open land, including those areas containing unique and sensitive features such as natural areas, wildlife habitat, streams or creeks, wetlands and floodways.

9. Promote compact building design accessible to open space amenities and with a strong campus identity.

10. All lands within areas required to be maintained as open space shall be protected by a permanent conservation easement, prohibiting further development.

11. Lands to be preserved as open space should include wetlands, floodways, soils unsuitable for development, mature woodlands, significant wildlife habitat, historic archaeological and cultural features.

12. Create additional open grassed areas where possible, to provide an enjoyable place for relaxation and recreation.

DG 2.6 | ARCHITECTURAL CHARACTER

While Appalachian State does not have a single consistent vocabulary of architecture on campus, there are a number of key elements and details found in many of the newer buildings on campus. In order for new buildings or additions to be integrated into the fabric of the campus, it is important for the Designer to be aware of such building attributes.

The intent of the guidelines is to loosely define the elements of a building in order to maintain a consistent vocabulary for each new project on campus.

Guidelines

2.6.1 Building Form & Massing *Building form and scale should be of human proportion.*

The massing of buildings on campus are generally four or five stories in height. This excludes some of the residence halls which require taller buildings to increase the density of occupants over a smaller footprint.
The interface of interior and exterior space through the use of covered entries, arcades or courtyards should be considered in the initial form of the building. In addition, the massing should respond to the size of the adjacent context as well as the functional requirements of the program.

Some design elements to consider in designing proportionately scaled buildings include:

1. Recessed entries at ground level
2. Alter exterior walls in depth and dimension
3. Introduce a base or plinth to the lower level of the building
4. Vary the heights of the building to create distinct or separate massing
5. Articulate the building facade with humanly proportioned windows or openings

2.6.2 Facades *Each building facade should be articulated in a simple consistent manner.*

1. Windows or openings should be spaced at regular intervals to create a horizontal pattern along the facade. This may vary depending on the function and scale of the structure.
2. The Designer should carefully consider the relationship between roof forms and massing when developing the design for the elevations of the building. Structural expression at the exterior may be included but should be incorporated in a thoughtful manner.
3. In general, design elements of the facade should appear to become “lighter” in the order from bottom to top of building (heavier base: lighter top).
4. The use of more than three (3) primary building materials is discouraged.
5. Accent details of precast or stone should be included to add design interest.
6. Avoid tight internal corners, usually north facing that is in shade year round.
7. Exterior Insulation & Finish Systems (EIFS), stucco or plaster shall not be used.

2.6.3 Entrances *Placing the main entrance is perhaps the single most important step the Designer takes during the evolution of a building plan.*

1. Placement of the main entrance should face primary pedestrian routes. The main entrance must be a bold, visible shape which is a significant feature of the design for the facility.
2. All entries must be easily identifiable and visually impressive for those entering the building. Covered entrances are preferred for protection from snow or inclement weather upon entering the building.
3. Primary and secondary entries should be connected internally with a direct route to allow pedestrian passageway from building to building on campus.

2.6.4 Roofs *Special attention should be given by the Designer to the roof forms.*

1. Sloped metal roofs are preferred. Roof forms should be designed carefully with other massing elements of the building. Multiple gabled roof configurations are encouraged to be included in the design.
2. Flat roofs should be kept to a minimum and only used as a secondary roof form. When possible, mechanical equipment should not be located on the roof. In addition, penetrations of any roof system should be kept to a minimum.
3. Roof access must be as safe as possible. Ladders inside closets are not acceptable. Consideration should also be given for the need to access to multiple roof levels. Public access to any roof area is not acceptable.

2.6.5 Fenestration *Windows and doors located in exterior walls should be recessed to create shade and shadow along the building facade.*

1. Openings are another means for providing an appropriate human scale to the exterior appearance of a structure. Appropriately sized individual windows or openings, treated as penetrations of the wall surface, are preferred to large expanses of glass.
2. Larger openings may be used to express principle entries, gateways or as vertical separation of massing along a building facade.
3. Orientation and solar gain of openings should be a priority for the design of the exterior.
4. Appropriate overhangs or screening devices should be considered.
5. Appropriately sized operable windows with screens and clear (Low-E) glass is recommended to be used where feasible.
6. Efficiency of windows should be a major consideration when selecting windows. Associated U-factor shall not be higher than 0.28.

2.6.6 Arcades *Arcades, archways or colonnades may be incorporated into the design of the exterior.*

1. These elements may freestanding or integrated into the building facade.
2. The height to length ratio should be expressed proportionate to human scale

DESIGN GUIDELINES 2

POLICIES & PROCEDURES 1

INTRODUCTION

The purpose of the Design Guidelines section is to convey guidance for planning, design and construction at Appalachian State University. The context for development of these guidelines is the main campus. However, many of these requirements should be considered applicable to all campus property. The guidelines offer direction for aesthetics and general design intent. The Designer should reference Section 3 - Campus Standards for detailed requirements.

The Campus Master Plan is the official document for continued growth and new development at Appalachian State University. It is expected that the Designer shall adhere to the design intent of the Master Plan and Guiding Principles.

Parameters

Appalachian State University strives to protect the history and traditions of the University's culturally rich mountain environment. These guidelines are intended to allow and encourage the campus to continue to evolve in such a way that each building contributes in a unique way to the context of the campus, while being respectful of its natural surroundings.

No written guideline can fully describe in detail all aspects of the required design criteria. These guidelines seek to portray a prescriptive approach for defining the parameters of a project and design outcome. The Designer shall solicit from the University preferred examples of existing design elements and building models that have successfully achieved these goals. These examples do not imply that the Designer should consider direct imitations. These examples merely illustrate buildings that respond appropriately to programmatic requirements, the immediate context and physical conditions of the site.

For design and construction of new facilities (or renovation of existing buildings) the Designer should carefully consider the following parameters as ingredients for each new project on campus:

1. Responsive to use
2. Sustainable
3. Flexible
4. Technologically advanced
5. Considers weather & topography
6. Pedestrian oriented
7. Exhibits detail
8. Expresses physical harmony
9. A 50-year solution
10. Model for learning

General Considerations

In addition to the parameters defined in the previous section, the University has defined several general considerations the Designer should address and/or integrate into each new project.

Design Within Available Funds

Designers are directed and required to base their designs upon the budgeted funds available. The Designer shall continually monitor program requirements and cost estimates to assure that the project is designed within the available funds and does not deviate from the quality standards established herein. If at any time, the Designer believes that satisfying the stated program requirements, at the level of quality desired, will exceed the budgeted funds available, then he or she must inform the University Project Manager without delay.

Energy and Materials Conservation

The University is dedicated to the principle of conserving materials and energy. University personnel will examine proposed construction for means of reducing not only the initial cost of energy and non-renewable resources, but also long-range operating costs. In addition to basic conservation requirements, the Designer should prioritize efficient building envelopes and consider the utilization of passive solar energy techniques, non-conventional and renewable energy resources, recycled materials content of specified materials, and non-conventional materials.

DG 2.1 | SUSTAINABLE DESIGN

Appalachian State University is committed to climate neutrality and has adopted a Climate Action Plan that outlines strategies to reduce building-related emissions and other environmental impacts. The University's design guidelines outline considerations that strike a balance between more efficient building practices and reliable technologies that reduce operations and maintenance costs.

Building Standards - All new construction and major renovations shall be built to at least the U.S. Green Building Council's (USGBC) LEED Silver standard or equivalent. LEED Silver is the minimum design criteria. When pursuing LEED certification, point priority should be given towards designing energy efficient buildings rather than offsets or other non-project specific point opportunities.

To the extent possible, new buildings and major renovations should go beyond LEED standards. If an equivalent green building standard is used, the standard must be appropriate for the building's intended use and strive to be at least 30% more efficient than code. Potential building standards that support regenerative design should be consulted and considered include:

- WELL Health-Safety Building Certification
- Living Future's Core Green Building Certification
- Green Built Multifamily Certification (Residence Halls only)
- ENERGY STAR Certification for Buildings
- PHIUS+ Passive House Certification

Appalachian State University requests that the following criteria be considered and prioritized in all new construction and major renovation projects:

- Energy Efficiency
- Water Efficiency
- Indoor Air Quality
- Indoor Environmental Quality
- Low Impact Development
- Material Selection
- Waste Management
- Diversity, Equity, and Inclusion

Guidelines

Energy Efficiency - Appalachian State intends to reduce its carbon footprint by integrating energy efficient practices and technologies throughout the campus. To the extent possible, all new construction and major renovation projects on campus shall be designed in an energy efficient manner by addressing the following criteria:

- Reduce overall building energy loads by 30% as compared to the current NC Energy Code.
- Maximize the thermal efficiency of the building envelope.

- Designers shall work with a building envelope consultant for each project. All envelope designs should be internally reviewed by Facilities Operations.
- Utilize energy modeling and analysis. Thermal calculations are to use aged R-values.
- Utilize commissioning on all new projects to ensure systems are functioning as intended.
- Utilize LED lighting and dual-technology or ultrasonic occupancy sensor controls.
- Consider high efficiency mechanical systems that utilize proven technologies with successful operations and maintenance records. *See "Incorporating High Efficiency HVAC Technologies" for more information.*
- All equipment and appliances shall be ENERGY STAR rated.
- Incorporate Demand Controlled Ventilation. Each individual HVAC zone must have networked sensors that monitor dry bulb temperature, carbon dioxide, and relative humidity.
- Incorporate exterior shading devices or extended roof overhangs to control heat gain.
- Consider renewable energy sources.

Incorporating High Efficiency HVAC Technologies – Appalachian State University intends to incorporate proven technologies that reduce energy use, operation and maintenance costs, and environmental impacts. Balancing reliability with efficiency requires that the university takes advantage of newer efficiency technologies while also supporting the Facilities Operations staff that are responsible for maintaining and operating university systems. Facilities Operations requires the following two conditions when considering new, higher efficiency technologies such as magnetic bearing chillers, condensing boilers (off campus locations only), or similar:

a.) **10-year extended warranty** on all parts, labor, and refrigerants (if applicable) on all new, high-efficiency HVAC systems.

b.) **Life Cycle Analysis –** The university requires a Life Cycle Analysis using the university-approved LCA software platform that considers energy savings, maintenance costs over the life of the system, and any other potential operational issues . A copy of the completed analysis must be provided to the university in the original source format so that the LCA can be vetted by university staff.

Water Conservation – Appalachian State University has made significant progress in reducing the amount of water consumed on campus. To continue this trend, the university, the extent possible, seeks to maximize water efficiency in new construction and major renovation projects. The Designer should consider water efficiency measures such as:

- All water products (toilets, urinals, faucets, shower heads, irrigation controllers, etc.) shall be WATER SENSE rated (or equivalent).
- In renovation projects, ensure existing plumbing will successfully remove waste when considering low-flow technologies.
- Minimize freshwater use for landscaping by implementing technology to enable water capture and reuse as part of the building design.
- Protect surface water by preventing culverts from flowing into daylit surface water. Existing surface water enclosed in culverts will be daylit to the extent practical.
- Utilize permeable surfaces as much as possible.
- Select drought resistant plantings

Indoor Air Quality (IAQ) - The University will maintain healthy and comfortable interior environments that promote learning and increase the safety of occupants. Facilities should be designed and

constructed to:

- Meet current ASHRAE ventilation standards.
- Incorporate or pursue WELL Health-Safety Building certification standards.
- Include networked sensors that monitor dry bulb temperature, carbon dioxide, and relative humidity in each individual HVAC zone.
- Prevent the infiltration of moisture into buildings.
- Supply adequate levels of outside air to ensure indoor air quality.
- Eliminate the use of ozone-depleting materials.
- Utilize low Volatile Organic Compounds (VOC) products for all interior spaces.

Indoor Environmental Quality (IEQ)– When designing new construction and major renovation projects, the health and well-being of occupants shall be prioritized. IEQ considers the conditions inside a building and the impact those have on occupants. To the extent possible, lighting levels, air quality, thermal conditions, and ergonomics should enhance the quality of life of the people occupying the building. Strategies to consider include:

- Ensure ventilation systems are capable of reducing indoor air pollutants under any outside weather condition experienced in Boone, NC.
- Maximize daylighting for occupied spaces.
- Maximize views to the exterior for all occupied spaces.
- Install operable windows.
- Utilize low-emitting materials.
- Provide acoustical privacy as appropriate.
- Specify ergonomic furniture.
- Explore Biophilic Design opportunities

Low Impact Design (LID) - New building developments should utilize storm water management techniques to reduce the impact of built areas on the natural movement of water. LID principles prioritize preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. Examples of specific LID practices include:

- Stormwater Wetlands
- Bioswales
- Riparian Buffers
- Cisterns
- Underground Pipe Storage
- Planted Filtering Strips

Material Selection - The design and construction for new buildings and major renovation projects should include strategies that utilize materials with minimal environmental impact. Projects that require the demolition of a buildings should consider if reusing building materials is feasible.

- Purchasing practices should consider the embodied carbon of materials.
- When selecting materials, the Designer should consult the environmental profile of specific products.
- Demonstrated carbon footprint – If a certain products costs less, performs as well, and meets aesthetic requirements, the Designer is required to go with products with the smallest carbon footprint.
- Specify local materials as a first preference, then regional products to reduce shipping energy cost.

- The carbon sequestering properties of building materials (i.e. big timber frames vs steel for smaller buildings) should be considered to the extent possible.
- Utilize flexible design and flexible spaces to provide a maximum lifespan for the use of the building.
- Maximize the recycled content of building materials.

Waste Management – The amount of waste created both during construction and during occupancy is affected by design considerations. Appalachian State University requests that Designers consider how the design of new buildings and major renovation projects will impact waste management. Considerations of effective waste management diversion include:

- During design, create a solid waste management plan that is included in the specifications.
- To the extent possible, specify construction materials that are recyclable and design to minimize waste.
- During construction, waste is to either be separated into separate containers and sorted onsite or sent to a material recovery facility.
- Include strategies for occupant generated waste.
- Designers to consult with the University's Zero Waste Leadership Team to ensure campus standards are met.
- Review Solid Waste Management Plan with Facilities Operations and the Office of Sustainability prior to the end of the design process.

Diversity, Equity, and Inclusion – Appalachian State University is committed to developing and supporting a diverse campus culture. The University requests that Designers consider the following on new and major renovation projects:

- Does this project support the UNC system's requirement to prioritize contracting with minority and women owned businesses?
- Will this project marginalize or displace people in Boone or elsewhere?
- Are health and safety prioritized not only for future occupants but also for the people designing and constructing the project?
- Can this project exceed requirements from the Americans with Disability Act to support and engage all occupants?

DG 2.2 | FACILITY SITING CRITERIA

It is the intent of the facility siting criteria to emphasize continuity for the planning of new facilities on campus. Significant opportunities arise during the site planning stages of design and have a tremendous impact on the overall success of a project. The University requires that each new facility planned for the campus follow the Facility Siting Guidelines to insure a comprehensive approach to the site design.

Guidelines

2.2.1 Facility Siting *The Designer shall visit the site and evaluate proposed locations of elements of the project. Site design alternatives must comply with the design intent of the approved campus master plan.*

For new construction or additions to existing buildings, site selection is generally indicated in the building program requirements. Designs should address the following criteria:

1. Reinforces the functional relationships of the building program.
2. Meets access requirements for pedestrian, bicycle and service
3. Works with the existing topography to minimize cut & fill material
4. Responds to existing sub-soil conditions
5. Avoids unnecessary environmental impacts
6. Maximizes sustainable design principles for solar orientation
7. Responds appropriately to the locations of existing utilities and infrastructure
8. Maximizes views to and from the building
9. Considers construct-ability issues for contractors access
10. Provides fire truck access
11. Minimizes on-campus surface parking
12. Maximizes open space areas
13. Preserves nature where possible
14. Considers extreme weather conditions of the region

DG 2.3 | SITE DESIGN

A primary task of all campus architecture and landscape design is the physical definition of streets and public spaces as places of shared use. Streets lined by buildings or landscaping rather than parking lots are more interesting to move along, especially for pedestrians and provide a safer environment. The following guidelines serve to unify the campus through site design principles that will be applied to all projects.

Guidelines

2.3.1 Handicapped Accessibility *It is the policy of the University to make all areas of the campus, and all buildings located within the campus, physically accessible to all students, faculty and staff, regardless of individual limitations which may affect mobility.*

The Designer is directed and required to consider in their designs, and to otherwise accommodate, the special requirements of all segments of the University population, including wheelchairs users, and others using walking aids, the hearing impaired, and those with sight limitations.

The Designer is required to meet all appropriate regulations as set forth by the current North Carolina Accessibility Code and adopted amendments.

2.3.2 Walks, Ramps & Steps *These elements shall provide safe routes for all user groups of the campus.*

Walkways:

1. Design consideration should be given to align walkways to connect to major destinations circulation paths and offer pedestrians a safe, interesting and relatively direct means of travel.
2. Walks should not dead-end into the middle of parking lots and other vehicular-oriented areas.
3. Special consideration should be given to locations where pedestrian pathways cross vehicular routes and shall be handicapped compliant.
4. Where primary pedestrian traffic intersects roadways, brick paving material should continue across the vehicular route.
5. Existing brick paving materials and patterns should be continued as a means of maintaining visual continuity across the campus.
6. Consistent walkway widths should be maintained across the campus and respond to pedestrian movement and emphasize a hierarchy for pedestrian circulation.

Standard walkway widths to be applied are:

Major pedestrian corridors: 16

feet wide Major pedestrian walks:

8 feet

wide

Minor walks: 6 feet wide (minimum)

Ramps and Steps:

1. Siting and building design should minimize the need for steps or ramps when possible. Alternative grading measures should be considered.
2. Ramps should be installed for supply and service deliveries.
3. Ramps should be installed for handicapped accessibility for renovation projects.
4. Provide overhead exterior lighting for all steps and ramps. Recessed wall or step lights below 24" is discouraged due to salt and water degradation.
5. All walking surfaces should have a surface providing traction. Carborundum or similar abrasive will NOT be permitted.
6. The building design shall take into account the need to protect steps and ramps from the fall of snow from roofs at entrances and along walkways. Snowmelt heat mats will be considered

See handrail requirements in section 3.5 for specifications.

2.3.3 Service & Utilities

Utilities and service areas should be screened or otherwise hidden from the view of the pedestrian. Locate trash storage, loading, and truck parking to minimize visibility from the street/sidewalk and building entrances. Avoid locating service and loading areas along important view corridors.

7. All exterior trash or dumpster areas should be screened. The enclosure should be made of materials and colors compatible to that of the principal structure.
8. Where feasible, screen loading docks and truck parking from public view using building mass, freestanding walls, and/or landscaping.
9. Consult with the utility companies early in the design process about the location of utility boxes and meters. Ensure that all utility equipment is located, sized, and designed to be as inconspicuous as possible. All utilities, both new and existing, should be placed underground in conduits and vaults. Vaults shall not be located in streets, parking areas, or sidewalk areas where subject to road salt application. All utility services should be underground.
10. Do not locate HVAC equipment on the street-side of the building. In addition, locate all building-mounted utility meters and service equipment to the side or rear of the building. Screen all rooftop equipment from public view.

2.3.4 Environmental Protection

All campus development should respect natural resources as an essential component of the human environment. The most sensitive landscape areas, both environmentally and visually, are steep slopes greater than 15%, watercourses, and floodplains. Any development in these areas should minimize intervention and maintain the natural condition except under extreme circumstances. Where

practical, these features should be conserved as open space amenities and incorporated into the overall site design.

1. Piping of creeks should be avoided and channelization should be minimized.
2. Where crossing of existing creeks is necessary, a bridge structure is superior to a culvert. Bridges permit the natural ecosystem of the stream to remain unimpeded under the crossing.
3. Existing vegetation and large specimen trees should be preserved and incorporated into the site design in order to create a natural landscape and the impression of a mature landscape.

2.3.5 Outdoor Lighting *Outdoor lighting should provide a safe and visible pedestrian realm for the University as well as perpetuate the character for the area.*

Lighting for outdoor conditions should comply with the design guidelines outlined by the IDA (International Dark-Sky Association).

1. All lighting shall be light emitting diode (LED) unless there is a more efficient alternative.
2. Use a low intensity of high-quality white light, which will provide good, uniform visibility while avoiding light pollution.
3. Cut-off fixtures are required because they are more efficient than non-cutoff fixtures at casting light on the sidewalk and avoid light spillage and pollution.
4. Outdoor lighting should consider the illumination of sidewalks and other multiuse pathways using low intensity fixtures that provide an even distribution of light while avoiding areas of intense shadows.

2.3.6 Public Art *Works of art have contributed to the visual quality of ASU over a long period of time. This amenity adds a visual texture and character that should be continued as appropriate.*

1. Public art should be constructed and placed to add beauty and character to the campus. The piece of art is should have meaning and give meaning to the campus and contribute to the academic mission of the University.
2. Artwork may be free-standing pieces (e.g. sculpture or water fountain) or it may be integrated into its surroundings as an architectural element (e.g. relief sculpture imbedded in pavement or a wall, a mosaic or mural on a wall, lighting or sound effects, or decorative railing or lighting).
3. All lighting of artwork should be in conformance with campus standards.

DG 2.4 | CIRCULATION ELEMENTS

These Design Guidelines encourage the development of a network of interconnecting streets that work to disperse traffic while connecting and integrating various areas of the campus. Equally important, these guidelines encourage the development of a network of pedestrian paths, sidewalks and bicycle lanes that provide an attractive and safe mode of travel for pedestrians and cyclists.

Guidelines

2.4.1 Access Management *The control of driveways, roadways and other curb cuts through a comprehensive access management program should be a high priority to maintain the efficient operation of the major campus corridors, thereby securing the long-term infrastructure investment.*

Street designs on the campus should permit the comfortable use of the street by cars, bicyclists, and pedestrians. Pavement widths, design speeds, and the number of vehicle lanes should be minimized without compromising safety. The specific design of any given street must consider the building which fronts on the street and the relationship of the street to the campus's street network.

Driveway standards based upon NC DOT standards as well as best practices for corridors similar to those found throughout the campus.

1. The Minimum Spacing between median openings shall be 1000 feet. Where the NC DOT Median Crossover Guidelines conflict, the stricter of the two standards should prevail.

2.4.2 Connectivity *The campus should consist of a well-connected street network that provides internal and external connections.*

Traffic studies have shown that highly connected street networks provide much greater mobility for a campus community at less cost. A high degree of connectivity should occur not only at the level of arterials, but also on collector, local and other secondary roads. Such connectivity vastly improves a street network's performance. The street pattern should not force short trips of one or two miles onto arterials; it should be possible to make trips of this sort by using collector or other secondary streets. With a highly connected street network, cross-campus trips should be possible using fairly direct secondary roads.

1. Good transportation design requires the development of a network of interconnecting streets that disperse traffic and support transit options while connecting and integrating the campus with the existing urban fabric of the surrounding area. A network of narrower streets with reduced curb radii slows and disperses traffic, and provides a pedestrian-friendly atmosphere.

2. Main campus roads should have a cross-section width of 48' and a speed limit of 25 MPH. Facility access roads should have a cross-section width of 36' and a speed limit of 25 MPH. Service roads should have a cross-section width of 24' and a speed limit of 20 MPH.

3. For good, clear visibility, intersections are to be perpendicular, have lighting arranged at 90 degrees to each street, and maintain a 50-foot landscape setback from each corner.

2.4.3 Pedestrian & Bicycle Circulation *Provide a complete network of paths that interconnect building entrances, parking, transit stops, sidewalks and crossings, adjacent properties, adjoining off-street paths, and other key destinations on or adjacent to the site.*

1. Pedestrian pathways should be provided from the street to the parking area between buildings, as necessary to ensure reasonably safe, direct and convenient access to building entrances and off-street parking. They should be clearly defined and enjoyable to use. To aid pedestrian navigation and comfort, provide the following elements along paths:
    - Landscaping, such as rows of trees and shrubs, flower beds, and planters
    - Campus standard outdoor lighting fixtures
    - Small way-finding signs
    - Vertical architectural elements, such as markers or arches
    - Seating and resting spots
    - Special paving
2. Whenever pathways cross internal drives and curb cuts, provide a highly-visible crosswalk, made of a material that provides strong contrast with the vehicular surface (imbedded elastomeric paint or unit pavers in concrete). Consider elevating the crosswalk to the level connecting walk. Also use warning signs and light fixtures to alert drivers to crossings
3. Pedestrian routes should be direct and should minimize potential conflicts with vehicles. For pedestrian safety and comfort, where a main pedestrian route must go along or across a parking lot or driveway, provide a separate path with buffer landscaping and other amenities.
4. Provide pedestrian and bicycle links to each adjacent property (in addition to the public sidewalk). They should be highly visible and conveniently located. Avoid steps; provide curb ramps to accommodate wheelchairs, bicyclists, and baby strollers. If the adjacent lot is undeveloped or under developed, provide part of the connection or maintain the potential for a future link.
5. No pedestrian paths should be less than six feet (6') in paved width. Multi-use paths (bicycle and pedestrian) should not be less than eight feet (8') in paved width, though ten feet (10') is preferred. Whenever parking abuts a walkway (head-in, diagonal or parallel), add one and one half feet (1.5') to the walkway width to accommodate car overhang or opening car doors. A wheel stop may be used to prevent car overhang instead.

6. Bike racks should be located close to the main building entrance so they are highly visible and convenient. To facilitate access, install a curb ramp in any drive near the bike parking.

2.4.4 Transit *The regional transit system (APPALCART) should be maintained and enhanced as one of the greatest resources of the campus and surrounding area.*

1. Bus stations (bus stops) should be ½ to 1 mile apart, unless increased speed and/or higher ridership justifies closer placement. Stations shall be incorporated into new campus projects where appropriate.
2. Pedestrian access to the stations should be maximized. Evaluate ridership and staging areas with the AppalCart Director to ensure it is sufficient.
3. Lighting and campus standard shelters should be provided. Station and shelter design shall also be coordinated with AppalCart and University staff.
4. Where appropriate, park and ride facilities should be provided in close proximity to significant bus stations. Shared or joint use parking should be encouraged.
5. The impacts of cross traffic in relationship to transit should be minimized using grade separations, queue jumps or signal preemption.
6. Each station should have good access for other modes of travel including autos, pedestrians, bicycles, electric vehicles, buses and shuttles.

2.4.5 Parking *Parking lots (and decks) should not dominate the frontage of pedestrian oriented streets, interrupt pedestrian routes, or negatively impact surrounding developments.*

1. Parking lots or decks should be located behind buildings whenever possible. Parking lots should not occupy more than 1/3 of the frontage of the adjacent building or no more than 64 feet, whichever is less.
2. Shared parking is strongly encouraged.
3. Consider the feasibility of providing a parking structure rather than surface parking to conserve land and minimize the impacts on the environment.
4. Parking aisles should be separated from one another by planted medians with shade trees. When possible, it is recommended that parking aisles and their shade trees be aligned in a solar orientation to cast shade on parked cars during the summer months.
5. Large surface parking lots larger than 75,000 square feet of vehicular surface should be visually and functionally segmented into several smaller lots enclosed by landscaping.
6. Parking lots along the street must be screened from the adjacent street and sidewalk by low walls and/or landscaping.
7. Parking structure layout will be coordinated with Parking and Traffic for lane and parking stall dimensions. Structure facades should be treated with approved building materials. The façade should be designed to visually screen cars and incorporate design elements from surrounding bldgs.
8. Pedestrian entries should be clearly visible. The vertical circulation should not be located in the center of the structure so that it is difficult or circuitous to locate.

9. Bicycle racks and storage lockers are strongly encouraged inside new parking structure.
10. Alternative fuel stations (electric vehicle chargers) should be considered for new parking structures as directed by the University.

DG 2.5 | LANDSCAPE C HARACTER

The mountain landscape of ASU creates a sense of place for students, faculty, and visitors to the campus. This sense of place encourages social interaction which is a vital aspect of any pedestrian campus. Because the area is composed of diverse site and building elements, the landscape character is the integral component that serves to unify and create an attractive whole.

As ASU continues to grow, some landscapes will need to be preserved, while others will need to be expanded or created. Campus landscape should not inhibit creativity to proposed landscapes but provide an environment where creativity can flourish within parameters that are set to protect the overall campus unity.

The goal of the campus landscape is to achieve a comprehensive landscape fabric that is aesthetically attractive while also being practical and cost-effective to maintain. The overall philosophy of the guidelines is to foster a sense of community through the use of indigenous plant material that enhances the overriding sustainable approach to the campus environment.

As outlined in the Guiding Principles, it is important that the "University emphasize the quality of the natural environment" and "preserve the natural habitat". For this reason, it is imperative that future growth consider the existing plant material and how this will be integrated into the overall concept of the landscape plan for a specific project.

For specific material suggestions and size requirements, please refer to Section 3 - Campus Standards.

Guidelines

2.5.1 Trees *New tree plantings will be made on a regular basis and existing mature trees and quality tree stands should be protected as a valuable campus resource.*

New construction on campus, whether it be expansion or infill- related, begins to put intense pressure on existing, mature trees and often results in the compaction of their critical root zone. All new projects should consider this fact and plan to enforce tree protection measures and enhance the site with new tree plantings.

Many of the older trees on campus will inevitably become less viable and will be lost to disease or other causes at some point in the future. The preservation, protection, and ongoing health of campus trees should never be a second priority for any proposed project.

1. Existing trees shall be preserved whenever feasible.
2. When selecting which trees to preserve, the following shall be considered: existing and proposed grading, age and vigor, condition and type of tree, location of site improvements, utility connections, wildlife and environmental benefits.
3. Trenching, placing backfill in the critical root zone, driving orparking equipment in the critical root zone, and dumping of materials detrimental to plant health in close proximity of a tree to be preserved is prohibited.
4. Should any tree designated for preservation die during or soon after a construction project, the contractor shall be responsible to replace it with a size and species type approved by the University.
5. Protective barricades shall be placed around all trees designated to be saved prior to grading.

2.5.2 Plantings *Campus plantings should create a unified design theme through the use of plant massings, native material, ease of maintenance, and simple, elegant designs that are scale appropriate for the area.*

Plantings truly enhance the quality of life for everyone at ASU. Shrubs, herbaceous plant material, and trees filter pollutants in the air and water help mitigate wind effects and solar heat gain, stabilize soil to reduce erosion, and provide beautiful aesthetics within the built environment.

The other critical ambition of plantings is to provide a human scale to the campus that makes people feel comfortable and safe. Safety in the landscape is a serious consideration that can be addressed by discouraging design that creates "hiding places". Simple arrangements that are appropriate for the scale of a specific context should be encouraged throughout the campus while taking advantage of a landscape's ability to create vistas, frame views, and provide visual termini. The creation of a healthy growing environment for plantings should be a joint effort of arborist, horticulturists, landscape architects, and native plant biologists.

The University encourages the maintenance and enhancement of habitat for various forms of wildlife and to create new woodlands through natural succession and reforestation where appropriate.

1. Site disturbance and erosion should be minimized through retention of existing vegetation and avoiding development in sensitive areas.
2. Plants to be selected for the campus should be native to the bio-region, long lived, relatively pest free and practical to maintain.
3. Establish new tree plantings along all major walkways and major campus streetscapes.
4. Define outdoor living spaces and quads with plantings to create informal gathering spaces with access to seating.
5. Expose the additional expanse of Boone Creek along Rivers Street and Hardin Creek along Hardin Street and embellish with rock and plant material appropriate to a mountain stream following proper stream restoration design.
6. Provide landscape screening around exposed building equipment such as transformers or mechanical units.
7. The corners of street intersections, particularly gateways and site entries (from both street and sidewalk) should be distinguished by special landscape treatments: flower displays, specimen trees and shrubs, accent rocks, low walls, signage, decorative lighting, sculpture, architectural elements, and brick paving. Features for vehicular entry points must meet NCDOT's sight triangle requirements.
8. The plantings (softscape) should be balanced with the special paved areas (hardscape).

2.5.3 Open Space *As the campus continues to grow and evolve, dedicated open space should be protected, preserved, and enhanced as appropriate.*

Open space preservation and creation will be vital to the health, function, and beauty of the overall campus. The plan proposes a mix of formal and informal areas that recognize the existing conditions and build upon the inherent beauty of the campus.

1. To ensure that open space is well used, it is essential to locate and design it carefully. The space should be located where it is visible and easily accessible from public areas (building entrances, sidewalks). Consider views and sun exposure into account as well.

2. New open spaces should contain direct access from the adjacent streets. They should be open along the adjacent sidewalks and allow for multiple points of entry. They should also be visually permeable from the sidewalk, allowing passersby to see directly into the space.

3. The space should be well-buffered from moving cars so that users can enjoy and relax in the space. The space may be visible from streets or internal drives but should not be wholly exposed to them. Partially enclose the space with building walls, freestanding walls, landscaping, raised planters, or on-street parking to help buffer it and create a comfortable "outdoor room".

4. Do not overlook general open spaces (not part of the dedicated open space). These areas help tie the campus together into a memorable experience thus giving them great value.

5. Utilize infill project whenever possible as the campus grows and expands. This will not only maintain the campus as a walkable environment by not extending the limits beyond a comfortable walking distance, but it will also protect open space from being pressured as new development is planned.

6. The design of these spaces can be enhanced with plazas, fountains or public art.

7. Maintaining open spaces at varying scales is also important and encourages both passive and active spaces within the campus setting.

8. Conserve open land, including those areas containing unique and sensitive features such as natural areas, wildlife habitat, streams or creeks, wetlands and floodways.

9. Promote compact building design accessible to open space amenities and with a strong campus identity.

10. All lands within areas required to be maintained as open space shall be protected by a permanent conservation easement, prohibiting further development.

11. Lands to be preserved as open space should include wetlands, floodways, soils unsuitable for development, mature woodlands, significant wildlife habitat, historic archaeological and cultural features.

12. Create additional open grassed areas where possible, to provide an enjoyable place for relaxation and recreation.

DG 2.6 | ARCHITECTURAL CHARACTER

While Appalachian State does not have a single consistent vocabulary of architecture on campus, there are a number of key elements and details found in many of the newer buildings on campus. In order for new buildings or additions to be integrated into the fabric of the campus, it is important for the Designer to be aware of such building attributes.

The intent of the guidelines is to loosely define the elements of a building in order to maintain a consistent vocabulary for each new project on campus.

Guidelines

2.6.1 Building Form & Massing *Building form and scale should be of human proportion.*

The massing of buildings on campus are generally four or five stories in height. This excludes some of the residence halls which require taller buildings to increase the density of occupants over a smaller footprint.
The interface of interior and exterior space through the use of covered entries, arcades or courtyards should be considered in the initial form of the building. In addition, the massing should respond to the size of the adjacent context as well as the functional requirements of the program.

Some design elements to consider in designing proportionately scaled buildings include:

1. Recessed entries at ground level
2. Alter exterior walls in depth and dimension
3. Introduce a base or plinth to the lower level of the building
4. Vary the heights of the building to create distinct or separate massing
5. Articulate the building facade with humanly proportioned windows or openings

2.6.2 Facades *Each building facade should be articulated in a simple consistent manner.*

1. Windows or openings should be spaced at regular intervals to create a horizontal pattern along the facade. This may vary depending on the function and scale of the structure.
2. The Designer should carefully consider the relationship between roof forms and massing when developing the design for the elevations of the building. Structural expression at the exterior may be included but should be incorporated in a thoughtful manner.
3. In general, design elements of the facade should appear to become “lighter” in the order from bottom to top of building (heavier base: lighter top).
4. The use of more than three (3) primary building materials is discouraged.
5. Accent details of precast or stone should be included to add design interest.
6. Avoid tight internal corners, usually north facing that is in shade year round.
7. Exterior Insulation & Finish Systems (EIFS), stucco or plaster shall not be used.

2.6.3 Entrances *Placing the main entrance is perhaps the single most important step the Designer takes during the evolution of a building plan.*

1. Placement of the main entrance should face primary pedestrian routes. The main entrance must be a bold, visible shape which is a significant feature of the design for the facility.
2. All entries must be easily identifiable and visually impressive for those entering the building. Covered entrances are preferred for protection from snow or inclement weather upon entering the building.
3. Primary and secondary entries should be connected internally with a direct route to allow pedestrian passageway from building to building on campus.

2.6.4 Roofs *Special attention should be given by the Designer to the roof forms.*

1. Sloped metal roofs are preferred. Roof forms should be designed carefully with other massing elements of the building. Multiple gabled roof configurations are encouraged to be included in the design.
2. Flat roofs should be kept to a minimum and only used as a secondary roof form. When possible, mechanical equipment should not be located on the roof. In addition, penetrations of any roof system should be kept to a minimum.
3. Roof access must be as safe as possible. Ladders inside closets are not acceptable. Consideration should also be given for the need to access to multiple roof levels. Public access to any roof area is not acceptable.

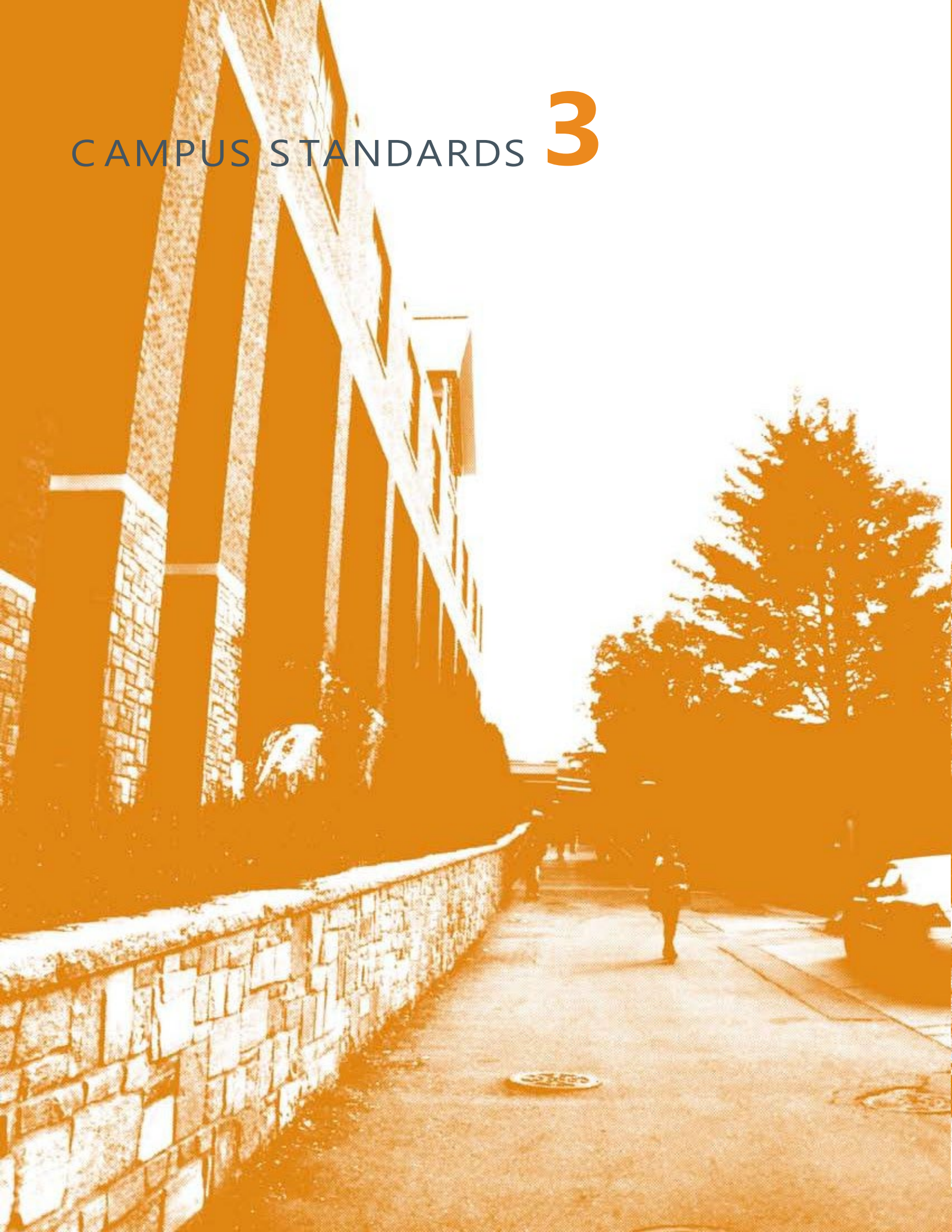
2.6.5 Fenestration *Windows and doors located in exterior walls should be recessed to create shade and shadow along the building facade.*

1. Openings are another means for providing an appropriate human scale to the exterior appearance of a structure. Appropriately sized individual windows or openings, treated as penetrations of the wall surface, are preferred to large expanses of glass.
2. Larger openings may be used to express principle entries, gateways or as vertical separation of massing along a building facade.
3. Orientation and solar gain of openings should be a priority for the design of the exterior.
4. Appropriate overhangs or screening devices should be considered.
5. Appropriately sized operable windows with screens and clear (Low-E) glass is recommended to be used where feasible.
6. Efficiency of windows should be a major consideration when selecting windows. Associated U-factor shall not be higher than 0.28.

2.6.6 Arcades *Arcades, archways or colonnades may be incorporated into the design of the exterior.*

1. These elements may freestanding or integrated into the building facade.
2. The height to length ratio should be expressed proportionate to human scale

CAMPUS STANDARDS 3



GENERAL INFORMATION

Energy Conservation
All projects constructed on University property shall comply with the energy performance requirements as outlined by the North Carolina Department of Administration, State Construction Office. Life cycle cost benefit and energy consumption analyses shall be provided, for all new and renovation projects.

The Designer is encouraged to maximize building envelope efficiency and consider the utilization of efficient mechanical and electrical systems (please see extended warranty and Life Cycle requirements), passive solar energy techniques, non-conventional and renewable energy sources.

Materials Conservation
The University is dedicated to the principle of conserving materials. In addition to basic conservation requirements, the Designer should consider the utilization recycled materials content of specified materials and non-conventional materials. Salvage of scrap materials shall be pursued to the maximum extent practical, especially with regard to scrap metals and lumber.

Accessibility
It is the policy of the University to make all areas of the campus, and all buildings located within the campus, physically accessible to all students, faculty and staff, regardless of individual limitations which may affect mobility. Accessibility should relate to universal design principles when the approach involves "direct access".
This also includes delivery of goods and services to the facility. If a loading dock is provided, there should also be a ramp with at least 4 feet of clearance or at grade access for the service entrance to accommodate mail delivery, courier services, etc.

Flexibility
Flexibility in the arrangement and use of a building is a fundamental requirement. In addition, the ability to accommodate growth and change should be a principle criteria in the selection of materials, and in the design of the structural, mechanical and electrical systems.

Maintainability
Designers are required to consider long term durability and maintainability when designing and specifying equipment, materials and finishes. First cost should not be the over-riding consideration.

Replacement of Equipment
All equipment must be accessible to service personnel without causing disruption to campus activities. Equipment rooms should be of ample size for maintenance, repair and easy removal of equipment. Equipment must be located so that service personnel can easily gain access; permanent ladders and platforms must be provided as required.

Local Products
When it is possible, and where it is consistent with the desired quality and cost of the project, materials and equipment manufactured or distributed by local vendors should be incorporated into the design of the project.

Standard Stock Items
Designers are directed and required to base their designs upon standard stock items whenever possible. Do not use end of run or items being taken out of stock. Where custom-built items are required, the Designer shall clearly indicate this information on the contract documents.

CS 3.1 | GENERAL REQUIREMENTS

- Standard Materials & Equipment
- Alternates
- Temporary Facilities
- Temporary Tree Protection
- Cutting and Patching Pavement
- Site Limits

Standards

1. **Standard Materials & Equipment:** Unless otherwise noted or as directed by Office of Design & Construction, all materials and equipment specified on University projects shall comply with the standards set forth by the State Construction Manual.

2. **Temporary Facilities:** Each Contractor, shall install, operate, protect and maintain temporary services. Where permanent utilities are available and can be tapped, the University may decide to allow use of these rather than having additional temporary services installed.
    - Temporary steam service will be provided to the Contractor only after an application for service has been filed with the ASU Physical Plant.
    - Temporary water service will be provided by connecting to the university water system. The Contractor shall contact the ASU Water Plant and Physical Plant to coordinate installation of the service.
    - Temporary electric service should be requested through the New River Light & Power Company.

3. **Temporary Tree Protection:** Prior to the start of construction any existing trees within the proposed construction site are to be evaluated by the ASU Physical Plant Landscape Services to determine the location of a safety barrier fence around the root zone of the trees. At no time is the area directly under the drip line of the tree to be used for storage or disturbed by machinery. Barrier fencing shall be installed on a radius of at least eighteen inches (18") for each inch of trunk diameter [12 inch trunk diameter = 18 feet tree protection zone radius].

4. **Cutting and Patching Pavement:** Where any paving is cut for placing new utility lines, the asphalt shall be neatly cut and removed with an asphalt cutter. Breaking the asphalt out with a backhoe or other means will not be acceptable. Boards or other suitable material shall be placed under the backhoe out-rigging to prevent damage to the asphalt.
    - In parking lots, pavement shall be replaced with a minimum of six inches (6") of course aggregate base course, followed by a minimum of three inches (3") of Type I-2 asphalt.
    - On streets and on parking lot travel lanes which experience frequent transit bus traffic pavement shall be replaced with a minimum of five inches (5") of Type HB asphalt base, two inches (2") of Type H binder, and two inches (2") of Type I-2 asphalt surface course.

5. **Site Limits:** The limits of the construction site are to be established by the Designer in coordination with the University. These limits shall be shown on the construction drawings. The location of site fences, staging and parking, if required by the project, shall also be shown.

    - The construction area shall be enclosed with a six feet (6') chain link type fence with top rail.
    - Drawings shall also specify the area to be used for material storage during construction.

C S 3.2 | EXISTING CONDITIONS

- Structure Removal
- Relocated Equipment
- Blasting

Standards

1. **Structure Removal:** In open areas, foundations of structures shall be removed entirely. Where new structures will replace existing structures, indicate extent of foundation removal on the drawings.

2. **Relocated Equipment:** Special concern shall be taken with equipment to be reused. Establish schedule for removal and reinstallation through the University. Relocation of existing equipment shall include: Disconnection and Moving, Restoration and capping of utilities. Recording existing piping arrangements to facilitate reinstallation, and replacing utilities/extensions required to complete reinstallation.

3. **Blasting** is strongly discouraged. If blasting is authorized by the University, a blasting plan and schedule must be submitted by the contractor to the Designer's geotechnical engineer for approval. Blasting plan will include at a minimum: seismograph monitoring locations, dust, traffic, and noise control contingencies. Contractor is responsible to document conditions of adjacent structures when collateral damage is possible. Contractor is responsible for collateral damage to existing conditions.

C S 3.3 | CONCRETE

- Foundation Systems
- Walks, Ramps and Traffic Areas
- Sidewalks
- Dumpster Pads
- Recycle Container Pads
- Exterior Walls
- Interior Floors
- Walls, Columns and Ceilings

1. **Foundation Systems** shall be designed to comply with the recommendations of a geotechnical engineer and/or licensed structural engineer. Driven steel pilings are not recommended.

2. **Walks, Ramps and Traffic Areas:** All exterior concrete ramps, walks, loading docks, aprons, and other such surfaces subject to wetting shall be finished with a non-slip broom finish. See Section CS 3.32 for additional information. Exterior caulked expansion joints shall be provided where needed along buildings, walls, curb and gutter, etc.

3. **Sidewalks** constructed with concrete will be a minimum of six inches (6") deep with a six inch (6") gravel base on compacted earth. Concrete walkways, minimum 4000 psi (because of amount of service trucks), with non-slip broom finish are the standard for typical campus sidewalks. Walkway elevations shall be 1" higher than the adjacent finish grade. Brick pavers should only be considered for accent areas and not main travel areas.

    - Pervious Concrete Mix for sidewalks and other paving conditions may be substituted as a slab or under-slab installation. The Designer should consult the University Project Manager for standard applications.

4. **Dumpster Pads** shall be constructed of a twelve feet (12') wide by eighteen feet (18') long concrete pad (5000 psi minimum) with minimum reinforcing of #4 rebar at 12" on center each way. The pad shall be a minimum of eight inches (8") deep with a six inch (6") gravel base on compacted earth and be provided with positive slope away from the building or towards a storm drain to avoid standing water.

    If a loading dock is provided, the container pad shall be located at the dock. Provide laminated tread dock bumpers for truck delivery lanes. There shall be no bumpers on the dock at the pad location. Instead, provide a stop six inches (6") from the rear of the pad for each dumpster, consisting of three (3) pipe bollards filled with concrete.

    The bollards shall be finished with one (1) coat exterior metal primer, and two (1) coats exterior bronze "synthetic enamel". The bollards shall be six feet six inches (6'-6") in total length with three feet (3') set in concrete. If the bollards cannot be used, then a reinforced concrete stop shall be poured in place at the same location. This poured stop shall be six inches (6") deep by seven inches (7") high.

    A clearance of seventeen feet (17') shall be provided above all dumpster pads for handling of refuse container by the trash truck. Refuse container shall be so positioned that it cannot be easily blocked. Turn-around space for the servicing truck shall be provided.

5. **Recycle Container Pads** shall be provided for recycle containers. This pad shall be located as near the refuse container pad and should be easily accessible. Slab construction shall be similar to dumpster pads. Overall size will vary depending on number of containers.

6. **Exterior Site Walls** shall be erected using Elkstone Veneer, the campus standard in an ashlar pattern. Walls should have drainage in the form of gravel and leech drain pipes properly pitched in the direction of flow. Include top and bottom of wall elevations. Consideration

should be given to the maximum slope above and below walls, required drainage swales and if guard railing is required for fall hazard conditions. The Elkstone is quarried from Western Carolina Stone in Morganton, NC. The University standard wall caps are "Kenoran Sage" or equal. Cold Springs Quarry in Cold Springs, Minnesota is one source for this material.

Exterior site walls constructed from segmental blocks shall be the campus standard VERSO_LOK retaining wall system. For this type of system, geotechnical information may be required. In addition, provide top and bottom of wall elevations, location of wall relative to other features such as catch basins, parking lots, curb and gutter and fencing, maximum slopes allowed above and below walls, required drainage swales and if guard railing is required for fall hazard conditions

If retaining walls can be integrated in such a way in public spaces to serve as seat walls they must be 16" to 18" high and 18" wide built with Elk Stone or masonry, with tops including slight positive slope for drainage.

7. **Interior Floors** constructed with concrete shall be level, without trowel marks, dirt, rust stains, and especially oil based paints (stains) or oil or grease spots. Floors shall not be finished with a penetrating seal and hardener for concrete that is receiving floor coverings. Concrete floors not covered with a flooring material shall receive one smooth coat of membrane seal. Prior to the installation of floor coverings over concrete floors, the concrete shall be tested for the unsuitable moisture levels utilizing the ASTM F2170 test to validate that the concrete floor will meet the recommended installation parameters from each specific flooring material manufacturer.

8. **Walls, Columns and Ceilings**: All exposed surfaces of concrete walls, columns, ceilings, and parapets shall be hand cleaned and rubbed to remove stains, foreign matter, burrs, fins, and any other surface irregularities after removal of form ties and after any repairs and patching work has been completed. Exposed surfaces shall be left true to line and plane, and free from form marks and other imperfections. Cosmetic coatings used to disguise underlying defects are not acceptable.

General Concrete Notes:

- Include cold weather requirements addressing materials and procedures for concrete placement.
- Concrete floors with floor drains shall be sloped uniformly to the floor drain. The surface shall be tested at the earliest practical time to assure that water will flow to the drain. The slope requirement shall be detailed on the structural drawings so that the slopes are installed where pours are made.
- Roof decks for any built up roofing system must be standard weight concrete.
- All exterior concrete shall be designed with a minimum of 4000 PSI strength in 28 days, and six to eight percent (6-8%) entrained air. A maximum water to cement ratio shall be 0.45.
- All concrete should have wire or steel rods or both as a reinforcement properly suspended in the pour. All steel rods should be tied, with an overlap of one foot (1') in all linear runs and at intersections.

C S 3.4 | MASONRY

- Unit Masonry
- Brick Pavers

- Precast or Natural Stone
- Mortar

Standards

1. **Unit Masonry:** In most exterior conditions, face brick with precast and stone are preferred. shall be "Guilford Blend" manufactured by the Hanson Brick company. Alternate colors of brick and coursing patterns are acceptable but must be approved by University. Use of oversize brick and glass block is not acceptable.

2. **Precast or Natural Stone** is recommended to be integrated into the design of the exterior for copings, stools and accents. Precast finishes should be selected from a range of natural colors. Campus standard natural stone is Elkstone.

3. **Mortar** colors shall be compatible with the color of brick, stone or precast concrete. It is recommended the Designer select from a range of natural colors.

4. **Brick Pavers** shall be 60 mm interlocking pavers, color "Harvest Blend", traffic bearing, and constructed on a concrete base over compacted earth. Top dress brick pavers with polymeric sand.

General Masonry Notes:

- Include cold weather requirements addressing materials and procedures for each masonry division.
- Evaluation of the building enclosure system must be performed to determine direction of vapor flow, risk for condensation and proper design of vapor retarder location. The Boone climate is unique for the State so details cannot be replicated from projects outside of this climate zone. Follow ASHRAE guidelines.

DG 3.5 | METALS

- Structures
- Column Base Plates
- Lintels
- Exterior Ferrous Metals
- Shop Primer
- Exterior Railings
- Cold Formed Metal Framing
- Expansion Joint Covers

Standards

1. **Structures** shall be designed with due regard for vibration, deflection, and avoidance of ponding. Consider expansion and contraction into account in the design and detailing.

2. **Column Base Plates** should be designed for ease of installation. Consider using anchor bolts with double nuts and one and one-half inch (1 ½") space to grout after leveling. Exterior galvanized metals that are to be painted shall follow proper preparation, cleaning and etching procedures to receive exterior primers and high performance paint.

3. **Lintels** shall be hot-dip galvanized after fabrication.

4. **Exterior Ferrous Metals** shall be hot-dip galvanized after fabrication. Field welds shall be ground and have cold galvanizing applied.

5. **Shop Primer** for ferrous metal shall be manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field- applied topcoats.

6. **Exterior Railings** including hand rails and guard rails shall be welded 1 ¼" schedule 80 steel pipe. Railings for ramps and steps shall be core drilled and grouted into the concrete step or sla. Grout pockets or sleeves shall be installed to prevent collection of water at the attachment points. Railings shall be ropery cleaned, primed, and painted with Sherwin Williams (preferred, see Paint Specifications for acceptable alternatives) Acrolon 100 in Hartford Green.

   Hand rail pockets, or sleeves, shall be designed to shed water and prevent corrosion.

7. **Cold Formed Metal Framing** shall be heavier than 25 gauge.

8. **Expansion Joint Covers** on interior floors shall be of color and texture that matches adjacent carpet or floor covering. Aluminum covered joints shall be avoided.

General Metals Notes:

- Structural steel shall be stored in a manner that will prevent damage from falling objects and soiling from mud, concrete and debris.

- Handrails, stairs, and other items incorporated into the work in the early stages of construction shall be properly protected from weather, falling mortar, concrete, debris, water and other abuses.

- On-site mock up panels including all major materials of the building envelope shall be included in the design documents and constructed to allow for evaluation of the materials and quality of construction prior to finalizing any material orders. These panels shall be constructed with adequate time to allow the decision making process to take place, usually several weeks.

C S 3.7 | THERMAL AND MOISTURE PROTECTION

- Membrane Waterproofing
- Metal Roofing
- Snow Guards
- TPO Roofing
- EPDM Roofing
- Built-up Roofing
- Vapor Barriers
- Walkway Pads
- Downspouts
- Building Envelope

Standards

1. Building envelop and roof design shall be designed by a qualified building envelope and roofing designer/consultant.
2. The designer shall select roof systems which are suitable for the facility and comply with the latest version of the "Roofing Design Criteria" from the NC State Construction Office. To evaluate possible systems, the designer must consider the following design parameters:

    - Life of roof system
    - Initial cost of roof system and additional building costs required for proposed roof system
    - Maintenance costs and requirements
    - Energy costs associated with proposed roof system
    - Building height, roof slope, wind resistance, etc. **Wind uplift design loads shall be for a 120-mph zone.**
    - Present and future use of building, including specific uses on the building that could affect the roof system.
    - Environmental contaminants and pollutants that could affect the system
    - Life expectancy of the building
    - Structural properties of the roof superstructure
    - Type of roof deck: metal decking is preferred.
    - If structural concrete deck is required, metal decking shall be perforated to prevent moisture issues. **Architect shall coordinate with structural designer.**
    - Slope and drainage of the roof
    - Vapor retarder requirements
    - Roof traffic, access requirements and penetrations
    - Code and insurance requirements or restrictions
    - Aesthetics
    - HVAC internal pressures
    - On reroofing projects, University preference is to update insulation levels to current NC Energy Code regardless of whether or not existing insulation levels are allowed under grandfathered clause.
    - Coverboard under membrane are preferred to protect integrity of insulation.

3. Once design parameters have been established, the systems shall be evaluated by the designer based on:
    - Minimum requirements established by the University
    - Roof system that is best suited to the project considering all factors.

4. **Requirements for a Total System Warranty –** Warranty (membrane and system) shall be for a minimum of 20-years by the manufacturer and 5 years for the installation. **Warranty shall be provided for wind uplifts loads of 120 mph.** After two-years contractor shall return for onsite inspection.

    - On all new and re-roof projects, thermal imaging analysis shall be performed at 18 months following completion of the project. Imaging shall be performed by a third-party firm that specializes in this type of work. The firm shall be hired by the Owner. Costs incurred by the imaging company will be by the Owner if the roof system performs at an acceptable level. However, if the roof fails, the costs borne by the consultant and all repairs will be required to be paid by the roofing contractor (or general contractor)..

5. Sloped metal roof is the preferred design method by the University.
6. Large, expansive areas of flat roofs are not acceptable and should be kept to a minimum.
7. Multiple gabled roof configurations are recommended depending on the size and scale of the project.
8. Avoid locating HVAC equipment or other equipment on a building roof if possible. If equipment is required on the roof, it shall be screened completely from ground view. If required to locate HVAC systems on a roof, a fully enclosed penthouse is preferred.
9. **Membrane Waterproofing** shall be provided at the following locations:

    - All exterior walls below grade that enclose rooms and spaces.
    - Walls at below grade elevator pits.
    - Elevated toilet rooms, housekeeping closets and all floors containing floor drains. Included in the specifications will be requirements for waterproofing system flood testing to be observed and documented by the University PM. The system will be repaired and tested until it is proven to be leak-proof.
    - Avoid-placement of mechanical rooms over finished spaces. If this condition cannot be avoided, consider using resinous epoxy flooring in the mechanical rooms to waterproof floors and curbs to protect openings around ducts and piping between floors.

10. **Metal Roofing** shall be required on all sloped roofs and should be a 0standing seam, twenty-four (24) gauge, metal roofsystem.

    - The color will be determined based on the surrounding context and in association with all other building materials although “Hartford Green” is typically preferred color.
    - New buildings shall have a minimum roof slope of ¼” per foot accomplished by sloping structure.
    - Existing roofs with less than ¼” per foot will be evaluated individually for the appropriate result. If additional slope is required, tapered insulation may be used to accomplish the ¼” per foot slope.
    - **Install three inch (3”) stainless steel eyebolts or U-bar every twenty feet (20’) on or near the ridge line to meet OSHA’s standards for roof maintenance. (**Requires annual inspection.)

11. **Snow Guards** shall be shall be required on all sloped roof structures along areas accessible to pedestrians below or where roofs or property can be damaged below.

    Snow guards should be specified as the bar or pipe style application, mounted to the standing seam of the metal roof. Individual pad style guards are not acceptable. Quantity determined per manufacturer’s guidelines for numbers of rows and anchoring.

12. Roof systems subject to grease laden exhaust shall be PVC.

13. **PVC Roofing** is the preferred system for low slope roofs. This system provides a heat-reflective and

energy efficient roofing systems, which can help reduce cooling requirements. Single ply membrane should extend completely over parapet walls where feasible. This single-ply roofing membrane also provides exceptional resistance to ultraviolet, ozone and chemical exposure. Minimum thickness shall be sixty (60) mil thick unless otherwise approved by the University.

PVC Roofing must be fully adhered. Mechanically fastened is not preferred because of thermal bridging and may only be considered on a case by case basis. Solvent-based adhesives are currently preferred over water-based adhesives that may breakdown with exposure to water.

The Designer should work with Office of Design & Construction and Facilities Operations for selection of the appropriate system, depending on the application including color.

14. **EPDM Roofing** systems are preferred to built-up systems. Single ply membrane should extend completely over parapet walls where feasible. Single ply systems shall be a minimum of sixty (60) mil thick.

15. **Modified Bitumen can be considered on a case by case basis.**

16. Single ply ballasted roofs, built up roofs and spray foam roofing systems are not allowed.

17. Single-ply roofing shall be a minimum of 60 ml thick and extend completely over parapet walls. Metal cap shall be provided at all parapet locations Metal coping caps shall have standing seam joints or Drive Seam.

18. Light weight concrete shall not be used to create slope on new buildings.

19. Use crickets, saddles and edge strips to direct water flow away from parapets and penetrations. Backslope is to be confirmed during detailing in the design phase.

20. Overflow drains are required and shall not be tied into the primary roof drainage system. Highly visible systems such as scuppers or daylighted drains are required for overflow drains.

21. **Vapor Barriers** are required on all roofs, new or replacement. Vapor barriers shall be either torch applied or self-adhering and installed per manufacturer's instructions. Adhesion tests are required.

22. **Walkways Pads** (prefabricated) from roof access to, and around, roof-mounted equipment shall be required for maintenance access.

23. **Downspouts** shall be sealed at the bottom with a cast iron boot and have a slip joint on the lower 10' section to allow removal from the boot for cleaning. Screens shall protect the tops of all downspouts. Angled turns shall be fully open inside the downspout to prevent clogging.

    - Downspouts or roof leader connections to the underground piping shall have a clean out located below the boot for the underground portion of the drain pipe. The underground pipe shall equal or exceed the capacity of all downspouts entering it. The clean out shall have a bolted or screw -on cover plate.

24. Use crickets, saddles and edge strips to direct water flow away from parapets and penetrations. Backslope is to be confirmed during detailing in the design phase.

25. **Drip Edges –** All coping caps or other capping methods shall have a minimum one-half-inch (1/2") drip edge.

26. **HVAC equipment** located on roof must no impede the flow of water. HVAC contractors must use a manufacture certified roofing contractor for all penetrations.

27. Overflow drains are required and shall not be tied into the primary roof drainage system. Highly visible systems such as scuppers or daylighted drains are required for overflow drains.

28. Dedicated roof walkways shall be provided to and around all rooftop equipment and other areas as directed by the PM.

29. The designer shall evaluate existing roof conditions for roof replacements or repair projects to include vapor retarder requirements, deck type, expansion joint locations and details, roof insulation conditions, drainage, roof access, roof contaminants, fire rating, and wind uplift factors, and all other applicable parameters.

30. Existing roof decks shall be analyzed by a registered structural engineer if roof loads are in question.

31. For re-roof projects, an evaluation shall be undertaken by the designer to determine if a roof survey by nuclear meter or other means may be necessary.

32. For re-roof projects, drains should be inspected either by flood test (3/4" garden hose for at least 15 minutes). If draining impaired, camera must be used.

33. **Protection for Work in Place –** All roofing projects shall provide adequate protection for roofing systems that are either not part of the project or have already been completed. All roof drains shall be protected both from damage and construction debris that could clog roof leaders.

34. Domestic hot water frost-free hydrants should be located on roof for maintenance. Hydrant shall be accessible from the interior and should have a ¼ turn valve for isolation. Quantity to be determined for each specific project.

35. **Roof access** shall be evaluated and insulated roof hatches, ladders, means of fall protection and other components may be required as determined by the University.
    - All roofs must be accessed by means of a hatch or doorway without disturbing any occupied spaced.
    - All roof access must meet NC Energy Code with adequate insulation and weather stripping.
    - See HVAC guidelines for additional information for roofs with significant equipment located on roof.

36. Avoid complex flashing details. Minimize use of pitch pans or sealant pockets. Maintain a minimum 18" flashing height above finished roof.

37. Minimize roof penetrations. If structural penetrations are unavoidable, use round structural steel shapes to facilitate flashing. University prefers boot flashing and secondary umbrella flashing. Provide for thermal breaks. Equipment supports for rooftop mounting shall be a minimum 18" in height. Use prefabricated equipment supports where possible. Equipment support frames or stands shall provide the following working clearances:

Width of Equipment	**Ht. of Legs Above Finished Roof**
Up to 25"	18"
25-37"	24"
37-49"	30"
49-61"	40"
Over 61"	50"

38. All sheet metal flashings and trim shall be fabricated and installed by an experienced sheet metal contractor.

39. All sealants used in conjunction with roof related sheet metal shall receive a sealant primer and the sealant color shall match the adjacent sheet metal.

40. On re-roofs, evaluate conditions of existing construction at flashing terminations and address deficiencies that would allow water to bypass flashing terminations.

41. On re-roofs, evaluate existing conditions with design criteria to eliminate damage by fastener penetration.

42. On re-roofing projects, all abandoned or unused equipment shall be removed, unless otherwise directed by PM.

43. Where lightning protection is provided, run above the roof membrane and attached with fasteners set in adhesive. In locations where cables contact membrane, sacrificial membrane layers shall be provided. If membrane penetrations occur, gooseneck style flashing shall be installed.

44. On re-roofs, existing lightning protection shall be removed, reinstalled and re-certified. Costs associated with this

work shall be included in the project budget, with work being performed by the contractor.

45. Special design consideration shall be given and documented for roofing design requirements for the region including, but not limited to, wind uplift, snow loads, snow guards, impact of falling ice sheets from roofs. Approval of design criteria shall be obtained from the University PM. Follow the SCO Roofing Guidelines Manual, latest edition.

46. **Roof plans** shall be fully developed and include all features and elements of the roof design in the construction document submittal including roof slope and drainage, penetrations, and equipment. Refer to the Roofing Design Standard section for the complete list of elements that are to be included and coordinated as part of the system. Roof plans should identify the R-value and thickness of installed insulation (tapered plan, as-built of insulation).
    - Mechanical units, exhaust fans, vents
    - Piping, conduit and related supports
    - Roof walkways, screens, hatches, and ladders
    - Roof drains, overflow drains, and scuppers
    - All penetrations
    - Expansion joints and curbs
    - Gutters and downspouts
    - Valley ridges, saddles, and crickets

47. The drawings shall include as a minimum complete details of roof system and components including:
    - Each perimeter roof condition
    - Each penetration condition, including vent flashing
    - Each roof-related sheet metal fabrication
    - Equipment curbs, skylight curbs (if existing, no new skylights), and roof hatches
    - Roof expansion joints and area dividers
    - Piping and equipment supports
    - Typical roof drain and overflow drain including sumps and flashings
    - Scuppers

48. Roof flashing details shall indicate as a minimum the following components:
    - Roof deck and wall substrate and other adjacent materials. Insulation including separate layers and vapor retarders.
    - Roof flashing membrane
    - Cant Strips
    - Flashing attachment
    - Counterflashing, through wall flashing, and reglets
    - Sealants
    - Wood nailers and blocking, including adequate attachment

Building Envelope

In addition to the previously mentioned roofing requirements, Appalachian State University requires that all new buildings and major renovation projects strive to exceed the latest North Carolina Energy Codes. The Designer should prioritize energy efficient buildings that minimize utility costs and maximize occupant comfort. Considerations to minimize energy consumption at the building envelope include:

- Consider the climate and thermal zone of Boone, NC.
- Optimize thermal insulation
- Incorporate high performance glazing
- When appropriate, consider effective solar shading devices
- Analyze envelope performance with energy modeling
- Commission envelope and consult with a building envelope specialist

Roof / Wall Systems

- Building envelops shall have continuous air and thermal barriers. Provide proper detailing to ensure continuing at roof to wall transitions and penetrations through the air barrier assembly.
- Air leakage of building envelope assemblies shall meet or exceed Section C402.5 of the NC Energy Code.
- Air Barrier systems should minimize infiltration and exfiltration
- Building insulation thermal calculations must include the use of aged R-values to ensure actual performance equals designed thermal properties.
- Roof solar reflectance and thermal emittance shall meet or exceed Section C402.3 of the NC Energy Code.
- Roof insulation should incorporate multiple layers (2 or more) with staggered insulation joints.

Fenestration Systems – The University's goal is to achieve the best possible daylight transmission while minimizing thermal heat transmission.

- Fenestration in building envelope assemblies shall meet or exceed Section C402.4 of the NC Energy Code.
    - Windows shall have a maximum U-value of 0.28.
- **Glazing** size limitations (prevent excessive sized windows). Insulated Glazing Units should typically not exceed 50 SF. Generally speaking, the most available (and economical) width is 60" or less, because it can be heat-treated on a high-speed furnace. Widths of 60" to 84" are available from a number of fabricators, a few of which can handle widths up to 96". As the size increases, the cost is likely to be higher.
- Glazing specifics should be considered at each specific site to minimize energy consumption.
    - Low-emissivity (low-E) shall be selected when appropriate to improve thermal performance.
    - Ceramic window films should be considered for large sections of glazing with large solar exposure.
- **Window Testing -** AAMA 503 be included in specifications for window testing. This is the "Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems". This voluntary specification requires both the ASTM E 783 (air leakage resistance) and ASTM E 1105 (Procedure A) Uniform Static Air Pressure Difference. Where a chamber is built on the interior or exterior of the window, a static air pressure is provided in conjunction with water from a calibrated spray rack.
- Refer to ASTM E 122 for further information on calculating sample size of windows to be tested. The recommended testing schedule is at least 1 test per 100 SF of installed product. For larger projects, recommend testing at intervals of at 5% completion of window installation, 50 % completion and 90% completion. Number of tests at each interval shall be determined based one the rule of thumb of 1 test location per 100 SF of installed product. It is advantageous to all parties for an initial test to be conducted as soon as possible for each different type of window system installed.
- If any window fails, the attributing factors to the failure should be identified and corrections documented. The corrections shall be carried forward to all successive window installation. The failed window shall be restested and an additional window of similar type should also be tested at no additional cost to the Owner.
- **Exterior Doors** (Thermal Performance Requirements) – Designer
- **Exterior Doors** (Thermal Performance Requirements) – Designer should consider strategies to minimize heat loss from air movement during operation, heat loss from air movement through perimeter detail, and radiant heat loss through the door materials
    - Durable and sufficient weather stripping between operable sash and the door frame.

HVAC Integration

- An integrated and efficient building envelope should reduce operating costs as well as the size of the HVAC needed to maintain adequate building pressure, healthy indoor air quality, and adequate thermal comfort.
- Ensure HVAC system is balanced and review need for dedicated dehumidification process, depending on interior conditions.

C S 3.8 | OPENINGS

- Interior Doors
- Exterior Doors
- Fire Rated Doors
- Aluminum-Framed Entrances and Storefronts
- Windows
- Door Hardware
- Automatic Door Operators
- Louvers and Vents

Standards

1. **Interior Doors,** except in special situations, typical doors shall have a minimum width of three feet (3'-0") and a standard height of seven feet (7'-0"). No doors greater than eight feet (8' 0") in height.

    - Non-fire rated doors shall be solid-core wood doors similar and equal to Weyerhauser, Code DSC-1. Particle core doors are not acceptable.

    - Wood doors shall be specified as transparent, prefinished stain.

    - Wood door veneers shall be birch, oak, maple or cherry.

    - Double doors should generally not be used because of the problems involved in securing these doors. Where double doors are required, a key-removable mullion with Von Duprin hardware will be used.

2. **Exterior Doors** shall have a minimum width of three feet (3'-0") and a standard height of seven feet (7'-0"). No doors greater than eight feet (8' 0") in height. Doors leading from the outside to vending equipment shall have a minimum door opening of three feet six inches (3'-6") wide.

    - Exterior doors shall have a maximum opening angle of one hundred twenty (120) degrees.

    - Entrance doors are to close against a full length jamb at the strike. Double doors are to have a center post mullion. Doors in gang sets are preferred and should swing in parallel to each other.

    - All exterior doors and jambs shall be hollow metal (steel) or an aluminum and glass (storefront system). For exterior openings, use of hollow metal doors and frames should be reserved for mechanical and service areas due to the effect of salt corrosion.

    - Due to high wind conditions, all exterior doors (unless an automatic entrance) shall require a lever handle and must latch.

    - Entrances to a building should never be designed as part of the smoke evacuation system.

- An air lock or vestibule shall be provided at each entrance to the building for energy conservation purposes and to improve thermal comfort. Avoid design of air lock vestibules that also house the elevator access for the entire building.

3. **Fire Rated Doors** shall be hollow metal in high use areas. Solid wood stave core doors specified with 2" wide stiles can be used where traffic is not extreme. Chalk core doors should not be used.

    - Doors which open to corridors and which contain glass, shall use either one-quarter inch (1/4") UL fire-rated tempered glass Glass shall not exceed one hundred (100) square inches per door.
    - Corridor and stairway doors, which are required to be fire doors or smoke doors, may be equipped with magnetic hold open devices connected to the fire alarm system.
    - Hollow metal frames shall be welded, minimum 16 gauge steel. No knock down frames allowed.
    - Hollow metal doors shall be reinforced at the top of door for closer attachment.
    - Exterior hollow metal doors shall be polyurethane, insulated, minimum 18 gauge steel, unless a heavier door is required. For exterior openings, use of hollow metal doors and frames should be reserved for mechanical and service areas due to the effect of salt corrosion.

4. **Aluminum-Framed Entrances and Storefronts** shall have wide stile with eight inch (8") (minimum 6") mid-rail stile doors. Narrow stile doors are not acceptable. Aluminum entrances shall be a .125-inch wall-thickness, aluminum enclosed-tube frame with screw-applied door stops. Continuous hinges are to be used unless otherwise approved by Office of Design & Construction.

5. **Curtain Wall Systems** are acceptable for design on larger scale projects. Parameters relating to solar gain should be considered. The Designer should include specifications for testing air and water infiltration of the system.

6. **Windows** requirements are as follows:

    - Energy efficiency windows shall be selected with a maximum U-value of 0.28
    - Exterior curtain wall, storefront and window systems will have integral thermal break frame construction, shall be double-glazed as a minimum and shall have baked-on enamel paint finish. Color is to match the University standard.
    - Window sills shall be held off the ground and floor a minimum of 12"
    - Operable windows with insect screens are preferred and should be included in habitable spaces such as offices where possible.
    - The orientation and solar gain potential of windows is always an important consideration of low E-glass is required. Installation of mirror or highly reflective glass is not allowed. Integrated exterior sunshades should be considered as a sustainable solution to allow daylighting and temper solar heat and glair.
    - Recessed window openings which emphasize depth and shadow lines are recommended. A minimum depth of two inches (2") is recommended from face of the exterior wall to face of window frame.
    - Window sections shall be so constructed as to enable outside glass surfaces to be

cleaned from inside the building (in-swing, removable, or pivoted) except for those which can be reached from the ground and that are no higher than forty feet (40') above grade.

- Window sections may be equipped with concealed locks and removable keys for roof access. For certain buildings, fire department access and emergency escape windows are required to be operable from within, without the use of a special key. All keys shall be turned over to Physical Plant with a minimum of one key per each thirty (30) windows, or two (2) per floor, which ever is greater.

- Replacement windows will be aluminum with baked enamel paint finish.

- Generally wood door frames and wood windows are not allowed. Use of these materials must be approved by the University PM.

- Glass areas shall be double-glazed with vacuum seal and shall be one- quarter inch (1/4") minimum, clear, polished glass.

- Bathroom windows located on an exterior wall shall have obscure glass interior pane.

- Ledges and openings which can become bird roosts shall be eliminated or bird roosting prevented by sheet metal installed at a forty-five (45) degree angle, by non-rusting wire or by other suitable means.

7. Door Hardware within each type of device, Hinges, Exit Devices, Locksets, and Closers shall be furnished totally by one manufacturer unless schedule indicates otherwise. Without exception doors shall be equipped with one of the following hardware selections: Sargent Series / Von Duprin Series / American Device

   Finish shall match existing hardware in renovation projects, US26D (Satin Chrome) finish shall be used on all hardware since these are standard stock items. Other finishes (US3, US4, US10, US26) are special order items with long delivery times, and are generally discouraged.

   Interior Door Closers shall be **Medeco KeyMark 4**. Closer shall be heavy duty and have adjustments for back check, closing speed, latching speed, and delayed action cycle. Bracket type shall be specified.

   Exterior Door Closers shall be Sargent series 281. Closer shall be heavy duty and have adjustments for back check, closing speed, latching speed, delayed action cycle and spring power adjustments. Rixson floor mounted, Model No. 27, with Q-series pivots, are acceptable for exterior doors only, with the approval of Office of Design & Construction. Cold Weather Fluid (CWF) shall be used in all exterior door closers.

   Labeled Doors Closers shall be Sargent series 281 non-hold open type. Non- labeled doors shall have Sargent series 1431 and hold open feature at maximum degree of swing.

   Magnetic Hold Open Devices for fire doors shall be provided at stairways and corridors.

   Kickplates shall be US18 gauge 18-8 type, 302 stainless steel, satin finish. Size shall be eight inches (8") high by two inches (2") less than door width.

Hinges for aluminum storefront doors use: Continuous Gear Hinge, Select (SL-11HD) for non-electric doors. Continuous Gear Hinge, Select (SL- 11HD) prepped for a Von Duprin Transfer Bar (EPT-2 Transfer Bar x SP28 Finish) for electric doors.

- Interior and corridor doors shall have heavy weight, premium quality stainless steel ball bearing hinges. All interior and corridor doors wider than three feet (3'-0") and/or taller than seven feet (7' 0") shall have four (4) ball bearing hinges.
- All reverse wing doors shall have heave weight, premium quality stainless steel non removable pin hinges.
- Continuous hinges for fire doors shall be stainless steel.

Panic Hardware shall be provided for all doors serving fifty (50) or more persons. Exterior door panic hardware shall be Von Duprin 99 series. Center the bar on door 37" above the floor. Where possible, the bar shall be equipped with cylinder dogging in leu of allen-wrench dogging.

- Interior door panic hardware shall be Von Duprin 99 series.
- Stairway and corridor doors shall be UL listed 99L-F series.

Thresholds for all exterior conditions shall be thermally broke aluminum.

Sound Gaskets are required on mechanical room door off public

corridors.

General Hardware Notes:

- Provide a Knox Bix with dual cylinders at entrances where emergency responders would access. This may be where the fire alarm control panel or closest annunciator panel is to the street. Coordinate location with the local fire marshal. Recessed boxes are preferred.
- Closers shall be mounted on the door rather than on the frame. Closers mounted on storefront systems require reinforcement at the frame and doors.
- Card Reader access should be provided at a minimum of two (2) entrances when possible. Power transfer shall be provided at hinge for door access control. ADA operation must work in conjunction with card reader feature.
- Overhead stops are preferred. Hold-open or select hold-open features on overhead stops are not desirable except where required for the function of the building. Walls stops are acceptable. Do not use floor stops.
- Stair doors leading to roofs are to be secured. Doors shall be equipped with closers, double cylinder dead bolt locks and a self-locking lockset.
- Stair doors to the outside of the building shall have panic devices (as required by code). Doors shall be equipped with an overhead stop and a closer which is not exposed to the weather.

- Stair doors to the inside of the building shall have closers, latches and stops. Latches shall be activated by panic devices equipped with a thumb piece or lever handle function on the stair side of the door.

- All access doors to roof hatches to roof shall be lockable and keyed to the University mechanical equipment room key.

8. **Automatic Door Operators** shall be provided at all handicapped accessible entrances and work in conjunction with the University card reader system. Operators shall be completely protected from the weather. The housing for the push button shall have a weatherproof seal to prevent water from entering to prevent freezing during cold weather.

- Acceptable manufacturers for operators include LCN.