

2.4 Building Envelope

2.4.1 General Guidance on Building Aesthetics

General Guidelines

Intent

This section provides designers with a statement of basic design Principles on exterior aesthetics.

Resources

The Master Plan

Sections 2.1.1, 2.1.5, 2.1.9, 2.2.3, 2.3.1, and 2.3.2 of this document.

Design Criteria

The designer must address at a minimum the following criteria when designing new campus facilities and/or renovating existing buildings:

- The new building must be integrated with the Master Plan.
- Unless specifically stated in the project program, there are no pre-established design styles, materials, or solutions for any project.
- Campus unity and character take precedence over an individual building's uniqueness. New buildings must be integrated into the campus whole with methods and means for integrating new facilities into the existing campus fabric carefully addressed by the designer.
- The building must relate to, and if possible, strengthen, existing traffic patterns, both pedestrian and vehicular.
- A new building's exterior must relate to its interior and function.
- Future expansion should be considered.
- Durability and ease of maintenance of exterior envelopes must be addressed.

2.4.2 Thermal and Moisture Protection

General Guidelines

Intent

The thermal and moisture protection systems designed and installed on university buildings must be both effective and easily maintained. The design for the building's thermal and moisture protection system must not be compromised to aesthetic considerations. University buildings are of institutional quality and must be designed and built to last. Ease of maintenance and low operational cost are prime considerations. All thermal protection must meet, at the minimum, the latest requirements of the North Carolina State Construction Office and the North Carolina Department of Insurance.

Resources

AIA Architects' Handbook of Energy Practice

NC State Construction Office State Energy Code
National Roofing Contractor's Association The NRCA Roofing
And Waterproofing Guide
American Concrete Institute Guide to the Use of Waterproofing.
Dampproofing Protective and Decorative Systems for Concrete
Brick Institute of America Dampproofing and Waterproofing
Masonry Walls
Nation Concrete Masonry Association Waterproofing Coatings
for Masonry
Concrete Specification Institute Specifying Water Repellent Coating

Design Criteria

Waterproofing methods must comply with the highest of current industry standards. The designer is expected to make certain that the prevention of moisture from entering into interior spaces and/or from entering into various building systems is a top priority. Building designs (shapes, materials, details, etc.) that do not lend themselves to straightforward, direct, and secure waterproofing methods are discouraged and, if used, must be carefully and thoughtfully detailed.

Thermal protection must, at a minimum, meet all State Construction Office criteria. Thermal insulation, in combination with size, number, and orientation of windows is an important building component affecting life-cycle cost. The designer is expected to demonstrate that this important criterion has been given proper consideration as the design progresses. In renovation projects, existing R values should be increased in exterior walls, roofs, and replacement windows, whenever possible.

2.4.3 Exterior Materials

General Guidelines

Intent

This section provides designers with general considerations to use in choosing exterior (facing) materials.

Resources

Brick Masonry Technical Notes
Sections 2.1.1, 2.1.5, 2.1.7, 2.1.9, 2.3.1 and 2.3.2 of this document.

Documentation

All exterior materials specified must be clearly detailed to ensure they are used as intended by its manufacturer and/or trade association. All exterior materials must be carefully and effectively detailed to prevent damage from moisture.

Upon commencement of construction, the designer will be required to inspect and provide copies to the owner of the contractor's purchase orders for masonry. The designer is expected to monitor closely the delivery schedule for masonry and notify the owner immediately if any deviations from the agreed upon schedule for delivery appear.

Design Criteria

Brick Masonry

Brick masonry is used in the majority of campus structures. On the original campus, brick should be considered as the major facing material. Brick color and shape must be approved by the Building Committee. Typical brick is Northampton 1000 by Triangle Brick Co. Mortar color is Roanoke Type S with lime.

Architectural Concrete

The university has had mixed results in using architectural concrete. Designers specifying concrete as a finish material must have complete specifications for quality control and execution. Designers must have filed representatives on site whenever exterior concrete is placed to ensure compliance with specifications.

Exterior Panels

When using exterior metal, stone, or concrete panels, their life-cycle post, appearance over time, and ease of maintenance must be considered. Use of these materials must be approved by the Building Committee. Preferred facia panels are limestone

2.4.4 Windows

General Guidelines

Intent

Designers should ensure window systems for all new facilities have been carefully designed considering aesthetics, energy efficiency, life cycle costs, maintainability, and day lighting.

Resources

National Bureau of Standards, A Guide for Window Design
Construction Specifications Institute, Aluminum Windows
Architectural Aluminum Manufacturing Association, various publications.

Design Criteria

Windows must relate to the architecture of the whole.

Window size and number must be closely coordinated to the design of building's mechanical system. The designer must take into account the effect that window design has on the building's energy costs, the comfort of the building's users, and the building's use. Operable windows should be provided to allow for ventilation in the event of HVA C failure.

Window operators must be accessible. The height of the control must not exceed 36" max AFF and have a clear floor space of 30" x 48". Windows must be double pane, insulated, aluminum frame, anodized finish.

2.4.5 Doors

General Guidelines

Intent

This section provides the designer with guidance on acceptable door materials. The designer is expected to choose materials and size doors appropriately in concert with the purpose and architecture of the building.

Resources

ANSI A115.1 Door and Hardware Preparation

NFPA 101

NFPA 80 Fire Doors and Windows (latest edition)

Americans with Disabilities Act

NC Building Code (latest edition)

ANSI Quality Standards, section 1300 (latest edition)

Documentation

All doors must be carefully scheduled with respect to size, type, rating, material, framers, jamb conditions glass and linear size type and position, hardware type, thresholds, finish, and any special conditions. Drawings must be used to make distinctions between differing details.

Design Criteria

To satisfy accessibility requirements, the preferred width of doors shall be 36" minimum, with an opening force not greater than 5 lbs for interior, 8 lbs. for exterior, or the least pressure allowed by governing enforcement agency. Thresholds shall be level or flush preferred, and door hardware shall be lever type or equivalent substitute. Doors to all public spaces including restrooms shall be 36" minimum. Alterations or renovations to existing doors shall include the addition of an auto door operator in areas where maneuvering space is less than 18" or there is no 5' x 5' level floor. the main entrance or the entrance nearest accessible parking in new construction shall have an automatic door operator.

See section 2.6.4 of this document.

Doors can be an impediment to mobility access. Doors than open into the path of pedestrian traffic can be a safety hazard. The purpose of specifying door size, threshold, pressure, and maneuvering space is to reduce or eliminate the difficulty encountered by a wheelchair user, someone using walking aids such as crutches, or someone pushing a cart. The designer must also avoid the safety hazards posed to someone small in body size or someone with low vision.

Hardware

See also section 2.6.4 for guidance on building entrances. The University uses the Best keyway system. The designer shall call for this system in the specifications. Contractors shall supply construction cores, and shall supply an allowance for the purchase of keys and permanent cores, to be procured and installed by the University. For new buildings, the contract should call for 5% shelf stock for locksets.

Door closers should be by Norton, and all exit hardware should be by Von Duprin.

2.4.6 Roofs and Roof Access

General Guidelines

Intent

The design of the roof, including its structure, deck materials and slope, access, roof-top equipment, drains, and details must be considered by the designer as a unit. Roof design should be kept as simple as possible. The designer is expected to have the expertise on staff to coordinate all phases of roof design or be prepared to hire consultants who can provide such expertise.

Resources

NC State Construction Office, Roofing Design Criteria
(latest edition)

National Roofing Contractors Association, The NRCA Roofing and
Water Proofing Manual

See also section 2.8.10 of this document.

Design Criteria

The designer must provide a roof design that first provides a completely leak-free barrier to water if properly installed. The building design must consider the roof's integrity from the beginning of design so the design decisions made later in the process do not compromise the roof's ability to perform its job.

An important consideration in this regard is the thoughtful consideration of construction scheduling. A major cause of early roofing failures and damage is construction traffic over the completed roofing system before final acceptance. If construction damage to the roofing system is likely, temporary roofing should be considered. The system must lend itself to future reroofing.

In new buildings, roof slope shall be built into the structural decks. slope shall not be achieved by using tapered insulation or light weight fill. Slope shall not be less than 1/4" per foot.

Access to the roof shall be via on OSHA -approved stairway, and preferably through a penthouse structure, not a roof hatch. Refer to section 2.8.10 of this document for additional requirements. This is a mandatory requirement if equipment that must be maintained is located on the roof. In cases where access to the roof is by elevator, the elevator shall meet accessibility standards.

If activities offered to the public are located on the roof, they must be accessible (i.e. weather-station instruments, environmental station, greenhouses, or any class project work, etc.)