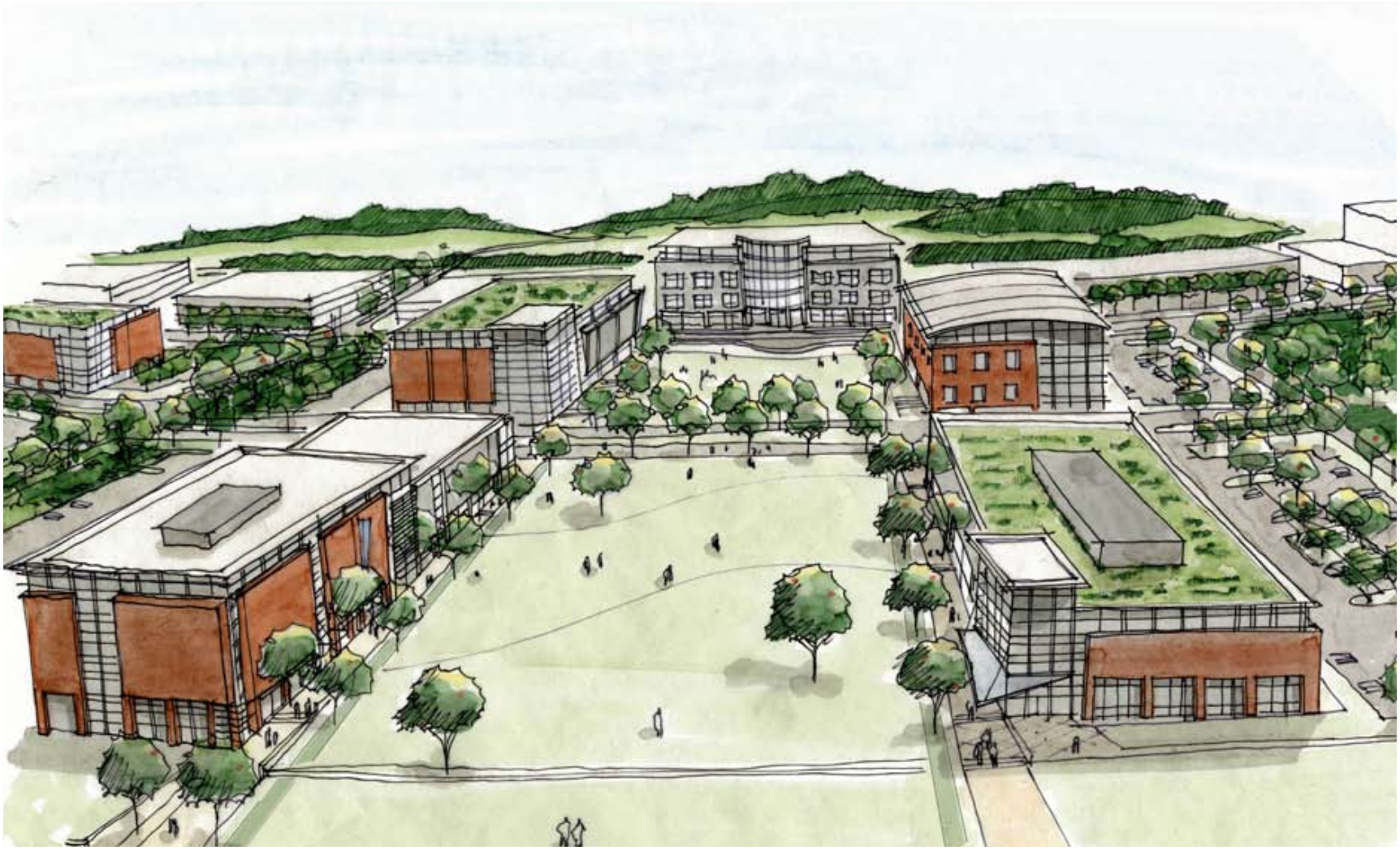
The University of Tennessee

Cherokee Farm

Master Plan and Development Guidelines

the innovation campus

October 2017



Conceptual Perspective of The University of Tennessee Cherokee Farm Campus

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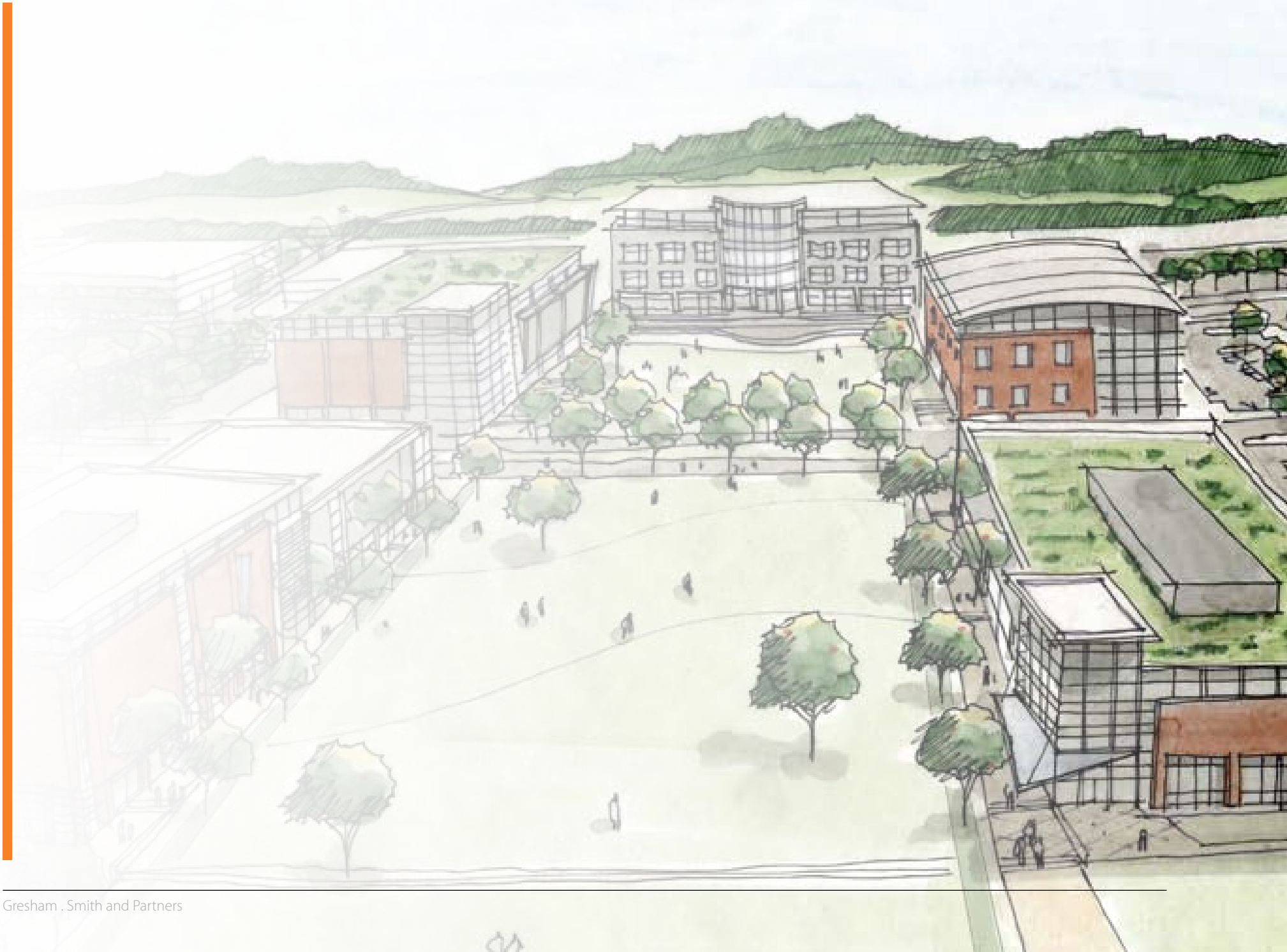


Introduction

1.0

1.0 INTRODUCTION

1.1 BACKGROUND

The University of Tennessee is developing the 200-acre Cherokee Farm property as a state-of-the-art science and technology research campus focused on solving problems of national significance. Located in Knoxville, Tennessee, the Cherokee Farm Campus lies immediately southwest of and across the Tennessee River from the University system's flagship campus in downtown Knoxville. Accordingly, the development of the Cherokee Farm Campus presents two compelling and interrelated opportunities: establishing a unique place for world class research while becoming a dynamic new asset in the city of Knoxville.

The Cherokee Farm Campus will serve the entire University of Tennessee as well as other public and private partners, and will also be home to privately developed commercial office buildings. The research program for Cherokee Farm will emphasize interdisciplinary research in computing, computational science, biomedical, material and nanoscience, climate and atmospheric, environmental, energy, and emerging scientific opportunities. An important goal for Cherokee Farm is to become an international center for innovation where graduate and undergraduate education are featured in the context of cutting-edge research by organizations such as the Oak Ridge National Laboratory.

The University of Tennessee's stated mission for the Cherokee Farm Campus is to enhance the University's ability to promote economic development, maximize unique resources and partnerships, and take a national leadership position in innovative research.

1.2 MASTER PLAN

The Cherokee Farm Campus sits on a bend in the Tennessee River a mile-and-a-half southwest of downtown Knoxville. The University of Tennessee acquired the property in 1916, and since 1935, Cherokee Farm has provided a setting for dairy farm research and education. Significantly, because of its favorable location along the river and its rolling topography, the Archaeological Research Laboratory (ARL) at the University of Tennessee has also documented rich archaeological deposits at Cherokee Farm, identifying the site as the location of major Native American settlements dating from over ten thousand years ago until 1600 AD.

Today, Alcoa Highway, a state scenic highway that forms the east property boundary, links Cherokee Farm to the greater Knoxville region. With the University of Tennessee Medical Center located immediately across Alcoa Highway, Cherokee Farm assumes an important role as a gateway into the city from the south and the airport. Plans are already underway for improvements to Alcoa Highway, including a reconfigured interchange, and these improvements will figure prominently in the long-term development of Cherokee Farm.

Underpinning the Cherokee Farm Campus Master Plan is a series of planning principles that reinforce the University's vision for the campus. The principles are:

Principles:

- Emphasize design excellence and innovation throughout the campus
- Establish a campus framework of three quad complexes that supports flexible development options
- Integrate sustainable design strategies in all aspects of campus development
- Foster a spirit of collaboration and collegiality across the campus through a well defined, pedestrian friendly and comfortable public realm
- Maximize the site's rich history, context and potential as a cultural resource, neighbor and gateway
- Connect the campus to the city and region through shared public spaces and multiple modes of transportation

The Master Plan builds on the site's timeless characteristics and enduring strengths, its relationship to the river, the rolling topography and the mature shade trees. Accordingly, the campus buildings and public spaces, first and foremost, open to the river, maintaining a direct visual and physical connection to the region's environment and surrounding city. The development concept extends the relationship to the site further by preserving the area of mature trees and steepest slopes. This area becomes another significant organizing element, arrayed across the site in conjunction with the three quad complexes.

The archaeological site identified by the ARL along the river is the final major organizing element in the Master Plan. Approximately 46 acres of the Cherokee Farm Campus, the archaeological area provides a wide buffer on the river's edge and a strong complement to the grove of mature trees. Since the development concept concentrates all buildings outside the archaeological zone, the area offers a range of passive educational and recreational opportunities. Chief among these are ARL proposals to conduct field exercises for students and the general public and the City of Knoxville's planned greenway. The archaeological zone has been identified as eligible for listing on the National Register of Historic Places.

1.2 Master Plan

Illustrated Master Plan

The Cherokee Farm Campus Master Plan, then, includes a total of 17 potential building sites and approximately 1.6 million square feet of development on 77 acres. Proposed building heights range from three to five stories, with the taller buildings adjacent to Alcoa Highway. Building heights step down toward the river, with three and four-story buildings framing the quad complexes. Each of three quad complexes will function as distinct units, emphasizing unique areas of research and technology. The quad complexes, however, will be integrated through the network of campus streets, sidewalks, trails, and public spaces.

At build-out, the concept calls for shared parking structures, approximately 1,500 parking spaces, in addition to parking provided on individual building lots for a total of 4,000 spaces or approximately 2.5 spaces/1,000 square feet. For privately developed commercial office buildings, off-site campus parking will complement on-site building parking to meet the overall campus parking ratio standard. Lots will be used for surface and structured parking, as needed. In the early phases of campus development, the parking structure sites will provide surface parking for the first buildings.

Development Table

Development	Yield
Research Labs/Office (15)	1,400,000 sf.
Hotel/Conference Center (1)	160,000 sf.
Nature/Interpretive Center (1)	40,000 sf.
Total	1,600,000 sf.

Development	Yield
Parking	4,000 parking spaces
Total	4,000 parking spaces

1.3 SUSTAINABLE DESIGN

Before turning to the development guidelines, it is important to highlight The University of Tennessee's commitment to developing the Cherokee Farm Campus in a long-term, sustainable manner. The definition and technology of sustainable design will change over the course of the campus' development, and consequently, it will present different challenges to each new partner and designer. Nevertheless, sustainable design will always require a comprehensive integrated approach that evaluates the local, regional and global impact of every design decision.

As a minimum standard, the University will follow the State of Tennessee Sustainable Design Guidelines (SDG) to direct sustainable design at Cherokee Farm. The SDG may be found as an appendix in The University of Tennessee Designers' Manual available from the University's Division of Facilities Planning and on the University's website. Many of the campus development guidelines described later in this document incorporate directly the guidelines from the SDG manual and are identified in italics. Following are the six broad categories addressed in the SDG and key stainability concepts associated with them.

Another important source for sustainable design strategies is the Leadership in Energy and Environmental Design (LEED) certification program from the U.S. Green Building Council. As the Tennessee SDG recommends, all construction projects should strive to meet or exceed minimum standards established in the most current and applicable LEED rating system for campus and research buildings. While achieving LEED certification is not a requirement, these guidelines do recommend LEED Silver Certification or higher as a goal for new construction at the Cherokee Farm Campus.

1.4 RELATIONSHIP TO OTHER DOCUMENTS

The development guidelines complement the Standard Ground Lease for the Cherokee Farm Campus, including the Common Area Maintenance clause of the lease agreement. Where these development guidelines conflict with other requirements or standards, the more restrictive standard shall apply. All campus planning and design projects should reference those documents during the development process.

The University of Tennessee Designers' Manual guides the design and development process for University capital projects. All designers need to review and familiarize themselves with the Designers' Manual. The University of Tennessee's Division of Facilities Planning is the contacting agency for any questions regarding the Designers' Manual.

In addition to coordinating with The University of Tennessee's Division of Facilities Planning, privately developed commercial buildings must meet all requirements contained in Knoxville-Knox County development codes and regulations.

Six Categories:

Tennessee Sustainable Design Guidelines

1. **Land Management:**
   Minimize erosion impacts during construction; use native plants; reduce irrigation; mimic natural stormwater patterns; reduce heat island effects; limit light pollution; and promote public transit, walking and bicycling.

2. **Water Efficiency:**
   Decrease the demand for potable water; manage water quality and quantity at the site.

3. **Energy Efficiency and Atmosphere Protection:**
   Evaluate on-site renewable energy sources such as solar, wind, and geothermal; evaluate building systems for most efficient use.

4. **Material and Resource Use:**
   Recycle all possible construction and demolition materials; use recycled and rapidly renewable materials where applicable; use locally manufactured products and materials to the extent possible.

5. **Indoor Environmental Quality:**
   Reduce airborne contaminants in ventilation and mechanical systems; limit volatile organic compounds in building materials; allow natural daylight and external views.

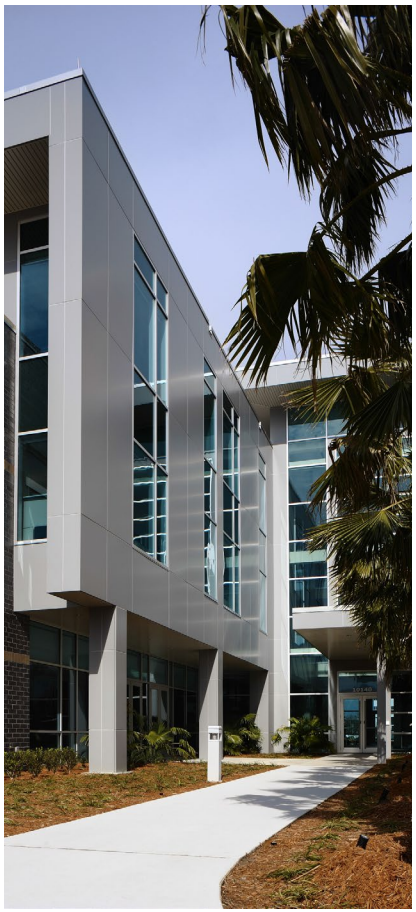
6. **Innovation:**
   Pursue innovative ideas and standards that surpass the minimum requirements.

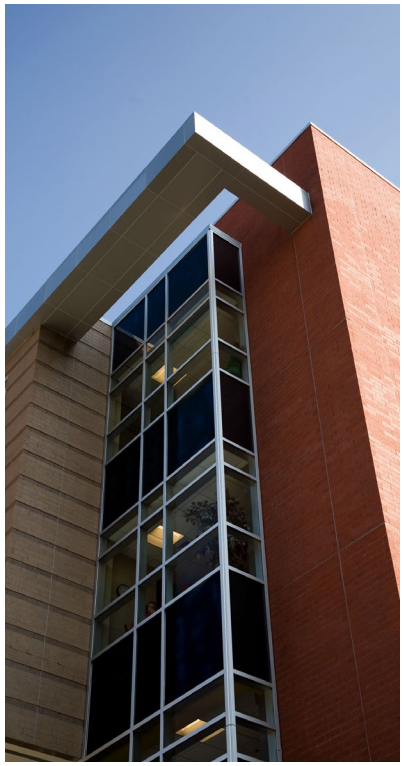
Development Guidelines Architecture

2.0

2.0 DEVELOPMENT GUIDELINES

The purpose of the development guidelines is to supplement the Master Plan and achieve the vision and principles set forth therein. The guidelines are the basis for review of all planning and design projects at the Cherokee Farm Campus. Flexibility is a hallmark of the campus plan, and the development guidelines extend that principle to individual projects as they pursue excellence and innovation. Over time, each building and site improvement should advance the master plan, producing a unified and cohesive campus. Designers must demonstrate compliance with the guidelines through the University's development review process (See Section 3.0).





2.1 ARCHITECTURE

2.1.1 Goals

- Provide high quality buildings that demonstrate sustainable principles and are contemporary, functional, well designed, visually interesting and compatible with their surroundings.
- Express the innovative and creative spirit of the campus through variation in building massing, fenestration, materials, details and systems.
- Incorporate flexible design principles, recognizing that research programs change over time.
- Encourage human-scaled buildings that provide a sense of enclosure and support pedestrian-oriented public spaces.
- Promote interaction among faculty, students and visiting researchers in an open, inviting and creative environment.

2.1.2 Building Heights

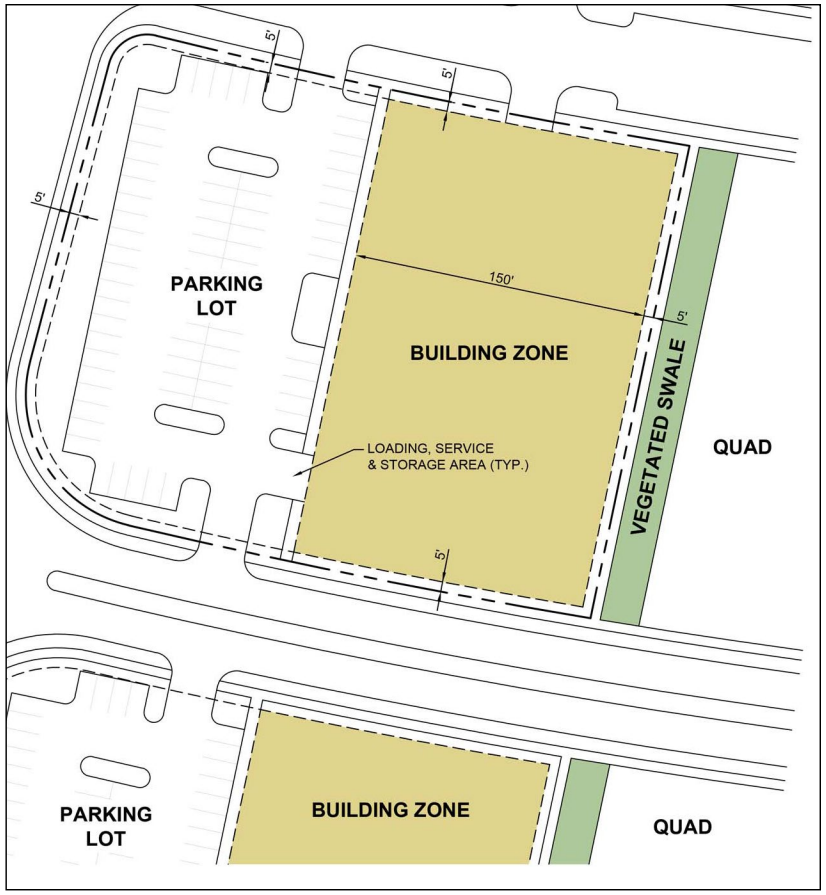
The Master Plan calls for buildings that respond to the topography and historical context of the site.

- The maximum building height in all development zones is 5 stories. The actual height may vary depending on floor-to-floor heights, but should not exceed 75 feet above average grade, defined as the average of the existing highest and lowest grade on a lot.
- Above 3 stories or 45 feet, building façades fronting a quad or street should step back a minimum of 10 feet.
- Building heights should correspond with adjacent buildings to achieve an overall compatible scale.
- Building heights should respond to changes in grade across the site, maintaining views of the river from the upper portions of the campus.

2.1.3 Building Location and Orientation

For all buildings, the building setback shall be a minimum of 5 feet from the lot line. Multiple offsets and recesses shall be used to break up exterior building walls and avoid uninterrupted exterior building walls from occupying the entire length of a building setback line. The maximum percentage of an exterior building wall at the building setback line adjacent to Cherokee Farm Way or Accelerator Way shall be 30 percent. For buildings facing the quads, including garages, the building zone shall have a maximum depth of 150 feet as measured from the front setback. All vehicular use areas, including parking areas and internal driveways, located adjacent to lot lines shall be screened by a perimeter landscape strip of evergreen shrubs a minimum of 3 feet in height at maturity. The perimeter landscape strip shall be a minimum of 5 feet in width.

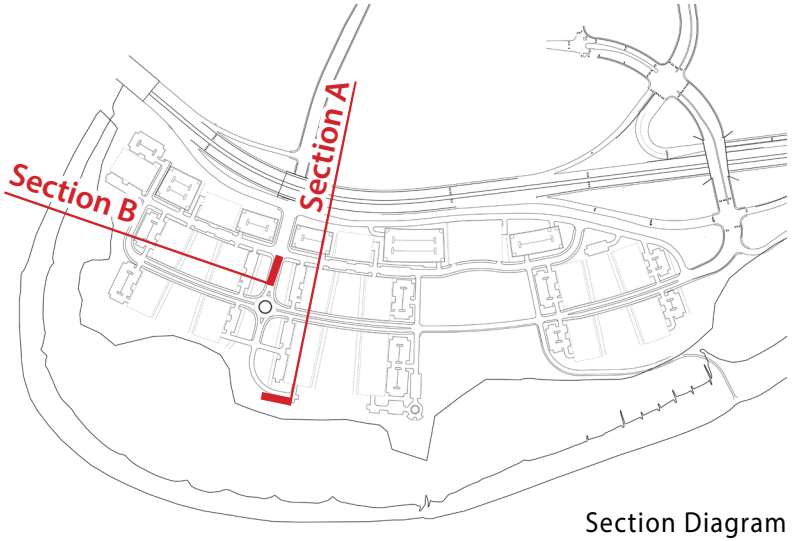
- While following the design intent expressed in the Master Plan, buildings may occupy any location within the building zones identified in the Master Plan, excluding the required building setback area.



- Buildings should orient active uses to adjacent public spaces, streets and sidewalks, parks and plazas.
- Buildings should respond to the natural topography of the site to minimize site disturbance.

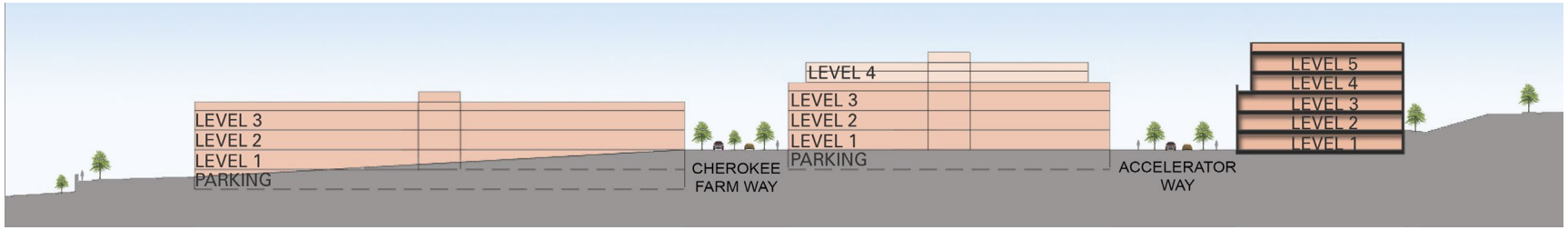
Sustainable Design:

- *Select the building orientation (north, south, east, west) that best suits the site's solar attributes (solar energy, heat gain and daylighting) and topography.*

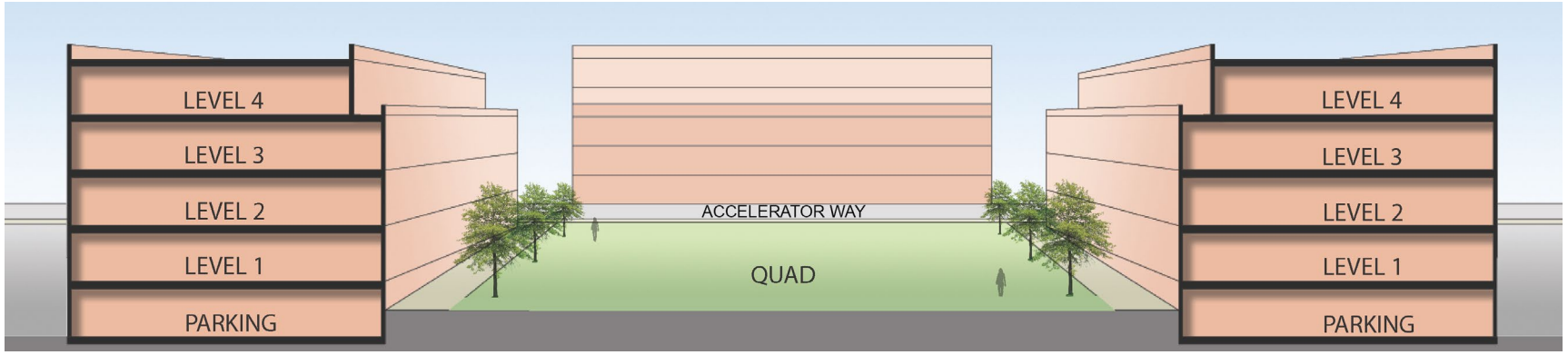


Section Diagram

Building Location and Orientation



Section A: View from South

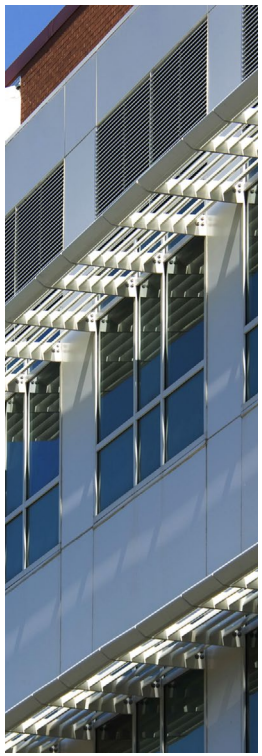


Section B: View East From Cherokee Farm Way

Reference: State of Tennessee Sustainable Design Guidelines, section 1.02; C: Energy Efficiency and Atmosphere Protection, (2.b.iii.), Energy Efficiency of Building Systems.

2.1.4 Façades

Building façades shape the identity of the campus, orient visitors to the site and serve as walls for public spaces. Building façades should have visual appeal and reflect the innovative spirit of the campus.



- All building façades should be comparable in quality to the primary entry façade.
- Building entrances should be distinct and intuitive and visible from the street and parking.
- Many buildings may have multiple public entrances. The entrances should express a clear hierarchy.
- Building façades should avoid large expanses of blank walls by varying materials, textures, forms and fenestration.
- Canopies, recessed windows and other shading devices are encouraged to create visual interest and scale and to respond to solar heat gain and daylight harvesting.
- Retail or restaurant uses on the ground level of parking structures should have a minimum 70% glazing, as measured between 2 and 12 feet from the adjacent ground plane. Transparency and reflectivity should allow visibility from the street during the day.
- Maximum building glazing is 70% of the total surface of each façade.
- Façade treatment should reflect solar orientation. To reduce solar heat gain and glare, designers are encouraged to utilize vegetation, screens, louvers, roof overhangs, recessed windows, light shelves and/or high efficiency glazing.

2.1.5 Massing

Building massing can reinforce the site's landform and the relationship of the campus to its larger context. The Master Plan calls for horizontal massing of buildings, leaving vertical elements to signal landmarks and gateways.

- Vertical and horizontal articulation of building mass is encouraged to establish scale and interest along building edges.

- Building wall offsets, projections and recesses, such as pilasters, should be used to break down the massing of a single building into bays.
- Building massing and form should maximize sunlight in all adjacent exterior public spaces, such as plazas and courtyards.

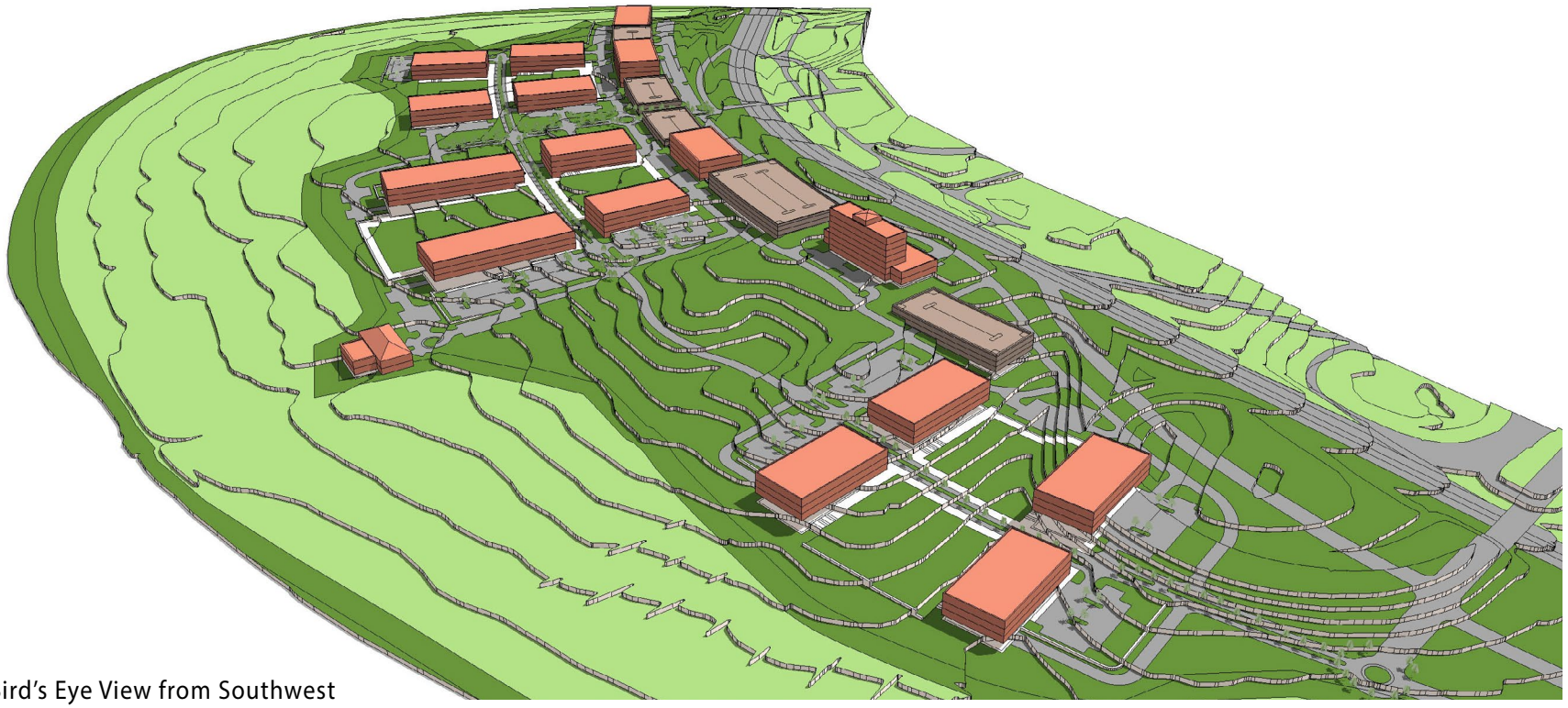
2.1.6 Materials and Colors

Materials and colors unify buildings in a campus setting and link the development to the natural landscape.

- Materials and colors should draw on regional examples and the natural environment.
- Public areas, building entrances, and ground floors should use durable, long lasting materials carefully detailed.
- Buildings should use materials such as brick, pre-cast concrete and large expanses of glass on elevations oriented toward the primary streets.
- Minimize the number of primary exterior building materials to three, with one serving as the dominant cladding.

Appropriate exterior wall materials are:

- Brick
- Natural or artificial stone
- Concrete: finish should be of architectural quality
- Metal panels: individual or systems of architectural quality



Bird's Eye View from Southwest

- Glass curtain wall systems

Appropriate materials for limited exterior accents are:

- Metal (galvanized, painted or ornamental)
- Concrete (pre-cast or unfinished exposed concrete)
- Tile

Inappropriate materials include:

- Applied stone
- Exposed concrete masonry units (full width)
- Mirrored glass
- Exterior insulation and finishing system (E.I.F.S.)

Sustainable Design:

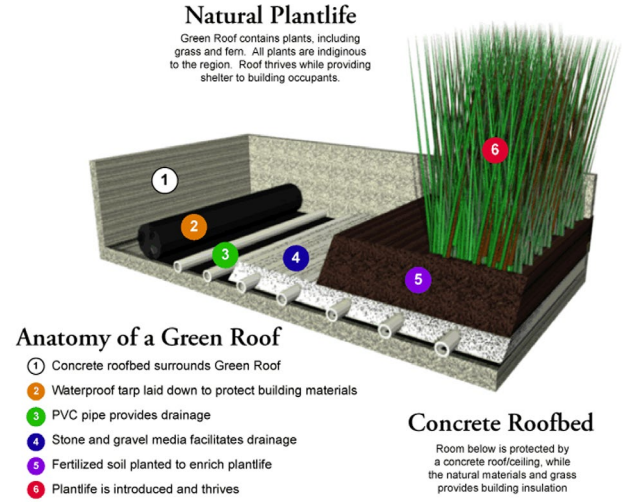
- *Buildings should utilize sustainable materials that are locally produced, indigenous to the region and high in recycled content.*
- *Where practical, all natural materials used in buildings should be of rapidly renewable origins.*
- *For wood building products, utilize Forest Stewardship Council (FSC) certified wood for a minimum of 50% of wood.*
- *Where practical, utilize salvaged or recycled materials in design and construction of new facilities.*

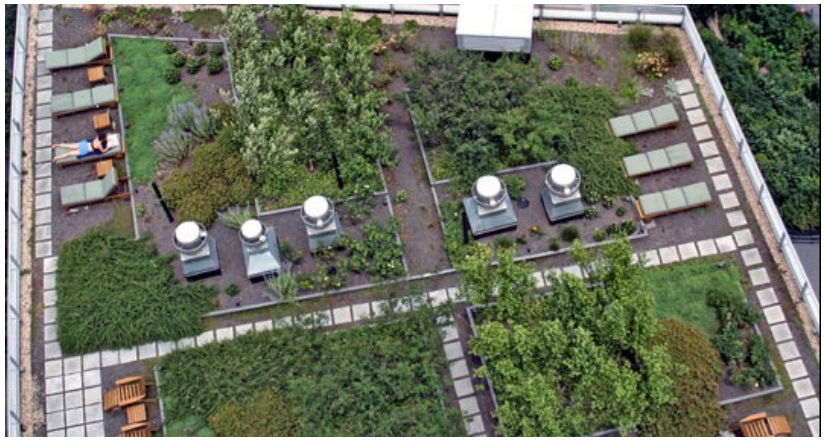
Reference: State of Tennessee Sustainable Design Guidelines, Section 1.02; D: Materials and Resource Use, (3.d), Sustainable Material Preference.

2.1.7 Roofs

Roofs should reinforce the building's composition, its shape, form, massing, façades and the exterior spaces it makes.

- Roofs may be flat provided that feature elements of the building are articulated by change in height of the parapet





Intensive Vegetated Roof

or incorporate vertical elements that engage or extend above the roofline.

- Rooflines should modulate or vary to prevent larger expanses of uninterrupted roofs.
- All mechanical equipment located on a roof should be incorporated in the overall composition of the building, either contained within roof forms or screened by parapet walls.
- To the extent possible, vegetated roofs, using drought resistant plants, are a preferred option to mitigate heat absorption and stormwater runoff and reduce energy costs and roof replacement costs.

Sustainable Design:

- *For low-sloped roofs (slope ≤ 2:12), finished roof surface should have a Solar Reflectance Index (SRI) of 78 or greater for a minimum of 75% of the roof surface.*
- *For steep-sloped roofs (slope ≥ 2:12), finished roof surface should have a minimum SRI of 29 or greater for a minimum of 75% of the roof surface.*
- *When utilizing vegetated roof surfaces, the vegetated space should cover at least 50% of the roof surface.*
- *When utilizing a combination of vegetated and high solar reflectance roof surfaces, install them such that the following equation is satisfied: (Area of SRI Roof / 0.75) + (Area of Vegetated Roof / 0.5) ≥ Total Roof Area.*

Reference: State of Tennessee Sustainable Design Guidelines, Section 1.02; A: Land Management, (5.b.), Roof Surfaces.

2.1.8 Exterior Building Lighting

Lighting is an important part of the campus environment for safety, wayfinding and aesthetics.

- Apply even levels of light to areas like parking lots and walkways and slightly higher levels of light to plazas, gathering spaces adjacent to buildings and building entrances.
- Recommended light level guidelines and uniformity ratios established by the Illumination Engineering Society of North America (IESNA), in the IESNA Lighting Handbook (current edition), should be considered when determining appropriate lighting design solutions.
- Lighting designs should minimize glare and light trespass, maximize energy conservation, and maintain dark skies. Lighting should utilize automatic controls systems to eliminate excessive light during non-active hours of site and building operation, while maintaining safety and security.
- Full cut-off fixtures, mounting heights, and shielding should be utilized to effectively control glare and light trespass on adjacent buildings and properties.
- Exterior lighting should complement the building's design and not spotlight individual features. Lighting of expansive wall planes, towers, and roofs or the use of architectural lighting that results in "hot spots" should be avoided.
- Light mounts to the roof parapet are not permitted. Wall mounted light fixtures used to illuminate parking lots are not permitted.
- Decorative lighting should be used at building entryways, along streets and public spaces, while more utilitarian fixtures are acceptable in parking and service areas.
- Exposed lamps are not allowed.

Sustainable Design:

- *Design building façade and site lighting with lighting power densities that promote safety but minimize light pollution from the building site.*
- *Design exterior area lighting power densities to be 20% less than lighting power densities defined in ASHRAE 90.1-2007, Exterior Lighting Section.*
- *Design building façade lighting to be 50% less than the lighting power densities defined in ASHRAE 90.1-2007, Exterior Lighting Section.*
- *Design the placement and fixture styles of site lighting to minimize illumination above the horizontal plane and to minimize light trespass at the site boundary.*
- *Use fixture types designed as "cutoff" and "full-cutoff" styles to minimize fixture lumens emitted at 90 degrees or higher from straight down.*
- *Select exterior fixtures and locate them on the site to minimize light trespass at the site boundary. Document the foot-candle levels at the site boundary with a site illumination model.*

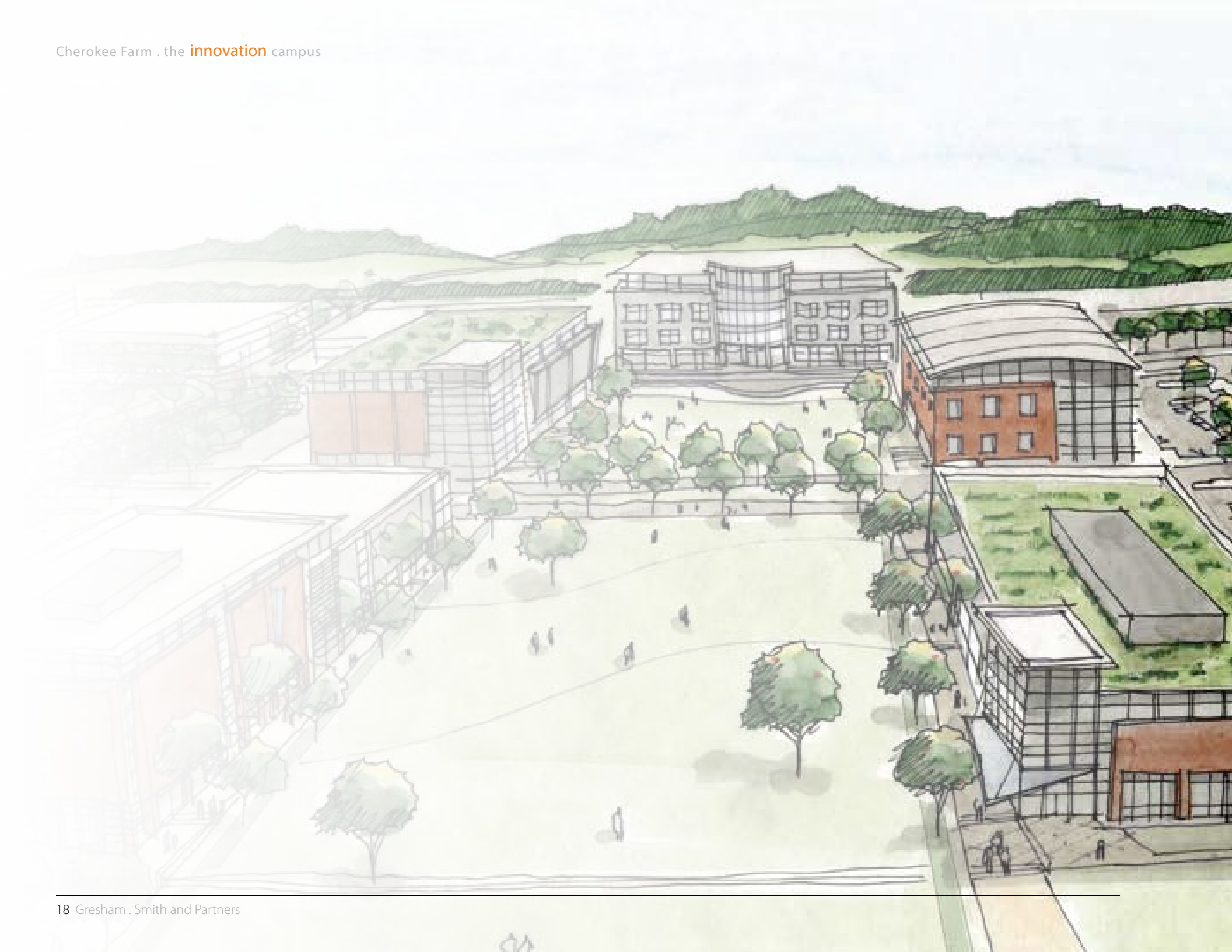
Reference: State of Tennessee Sustainable Design Guidelines, section 1.02; (A.7), Exterior Site Lighting.

2.1.9 Exterior Building Signage

- Signs should be constructed with high quality, durable materials appropriate to the physical demands of an urban setting.
- Buildings should be designed with locations to accommodate signage that is complementary to the building architecture, detailing, and materials.
- Sign colors, materials, sizes, shapes and lighting should complement the other elements of the façade and landscape design.
- No signage should be painted directly on a building façade.
- Signs should not project above the roofline of a building, or floor line for a ground floor establishment.
- Signs should not be oriented toward the Tennessee River/ Ft. Loudon Lake.
- One wall sign shall be permitted per building street frontage up to a maximum of two signs per building. The maximum size per sign shall be 100 square feet up to a total maximum of 150 square feet of wall signage per building.
- Signs should serve to identify a tenant rather than advertise it.
- No advertising devices, slogans, symbols or marks other than the company logo or word mark should be used.
- Signs should be consistent with the surrounding signs in scale, format, materials, colors, illumination and legibility. Neon signs are prohibited.
- Signs should be illuminated by a steady, stationary, shielded light source, directed solely at the sign or internal to it, without causing glare for motorists, pedestrians or neighboring premises.
- Signage plans shall be reviewed prior to implementation for consistency with existing signage on the campus.

2.1.10 Interior Building Systems

- Daylighting:
  - Provide a connection between indoor and the outdoor spaces through the introduction of daylight and views into regularly occupied areas of the building.
  - Demonstrate that a minimum daylight illumination level of 25 footcandles has been achieved in at least 75% of the regularly occupied spaces.
  - Design the building to maximize the interior daylighting by considering the use of floor plates with minimum widths, building orientation, increased building perimeter, exterior and interior shading devices, high performance glazing, and light shelves to project light deeper into the spaces.
  - Daylighting strategies should address color schemes, integrated lighting systems and direct beam penetration into spaces.
- Mechanical, Plumbing and Electrical Systems:
  - Select refrigerants and HVAC that minimize or eliminate the emission of compounds that contribute to ozone depletion.
  - Utilize fire suppression systems that do not contain HCFCs or Halons.
  - Raised flooring systems are encouraged. This system provides conditioned air at the level of the occupants while allowing flexibility in locations for outlets and vents.
  - Specify high-efficiency fixtures and dry fixtures such as waterless urinals.
  - Consider using rainwater or gray water systems for irrigation, flushing toilets and urinals and process water needs.
  - Maintain consistent lighting levels through the use of photo-responsive controls.
  - Appliances should be Energy Star rated.
  - Verify that the buildings energy related systems are installed, calibrated and perform according to basis of design and construction documents through a commissioning process.
  - Evaluate the project site for on-site renewable energy opportunities, including solar photovoltaic, solar heating, wind generated electricity and geothermal.



Energy Conservation

2.2

2.2 ENERGY CONSERVATION

Opportunities to conserve energy exist in all aspects of campus development, including energy sources, building systems and materials, landscape design and transportation.

2.2.1 Goals

- Maximize the use of renewable energy sources across the campus.
- Design all new buildings to be as energy efficient as possible.
- Minimize the embodied energy in all building products.
- Develop landscape plans that minimize the demand for irrigation and potable water, reduce heat island effects and respond to seasonal temperatures.
- Provide convenient and cost-effective transportation alternatives.

2.2.2 Energy Sources

- *Evaluate the project site for on-site renewable energy opportunities, including solar photovoltaic, solar heating, wind generated electricity and geothermal.*
- *Provide 35% electrical power usage over at least a 2 year period from grid source renewable energy technology (purchase renewable energy certificates), or provide 10% electrical power usage on an ongoing basis through TVA's Green Power Switch program.*

2.2.3 Buildings

- *Select the building orientation (north, south, east, west) that best suits the site's solar attributes (solar energy, heat gain and daylighting) and topography.*
- Canopies, recessed windows and other shading devices are encouraged to create visual interest and scale and to respond to solar heat gain and daylight harvesting.
- Façade treatment should reflect solar orientation. To reduce solar heat gain and glare, designers are encouraged to utilize vegetation, screens, louvers, roof overhangs, recessed windows, light shelves and/or high efficiency glazing.
- *Buildings should utilize sustainable materials that are locally produced, indigenous to the region and high in recycled content.*
- *Where practical, all natural materials used in buildings should be of rapidly renewable origins.*
- *For wood building products, utilize Forest Stewardship Council (FSC) certified wood for a minimum of 50% of wood.*
- *Where practical, utilize salvaged or recycled materials in design and construction of new facilities.*
- Through life cycle cost analysis, evaluate the embodied energy of building systems and materials, accounting for how products are harvested, manufactured, and transported through the life of the product's use as well the disposal of products.
- To the extent possible, vegetated roofs, using drought resistant plants, are a preferred option to mitigate heat absorption and stormwater runoff and reduce energy costs and roof replacement costs.
- *For low-sloped roofs (slope ≤ 2:12), finished roof surface should have an SRI of 78 or greater for a minimum of 75% of the roof surface.*
- *For steep-sloped roofs (slope ≥ 2:12), finished roof surface should have a minimum SRI of 29 or greater for a minimum of 75% of the roof surface.*
- *When utilizing vegetated roof surfaces, the vegetated space should cover at least 50% of the roof surface.*

- *When utilizing a combination of vegetated and high solar reflectance roof surfaces, install them such that the following equation is satisfied: (Area of SRI Roof / 0.75) + (Area of Vegetated Roof / 0.5) ≥ Total Roof Area.*
- *Design building façade and site lighting with lighting power densities that promote safety but minimize light pollution from the building site.*
- *Design exterior area lighting power densities to be 20% less than lighting power densities defined in ASHRAE 90.1-2007, Exterior Lighting Section. Design building façade lighting to be 50% less than the lighting power densities defined in ASHRAE 90.1-2007, Exterior Lighting Section.*
- *Design the placement and fixture styles of site lighting to minimize illumination above the horizontal plane and to minimize light trespass at the site boundary.*
- *Use fixture types designed as "cutoff" and "full-cutoff" styles to minimize fixture lumens emitted at 90 degrees or higher from straight down.*
- *Select exterior fixtures and locate them on the site to minimize light trespass at the site boundary. Document the foot-candle levels at the site boundary with a site illumination model.*
- *Provide a connection between indoor and the outdoor spaces through the introduction of daylight and views into regularly occupied areas of the building.*
- *Demonstrate that a minimum daylight illumination level of 25 footcandles has been achieved in at least 75% of the regularly occupied spaces.*
- *Design the building to maximize the interior daylighting by considering the use of floor plates with minimum widths, building orientation, increased building perimeter, exterior and interior shading devices, high performance glazing, and light shelves to project light deeper into the spaces.*
- *Daylighting strategies should address color schemes, integrated lighting systems and direct beam penetration into spaces.*
- *Raised flooring systems are encouraged. This system provides conditioned air at the level of the occupants while allowing flexibility in locations for outlets and vents.*
- *Specify high-efficiency fixtures and dry fixtures such as waterless urinals.*
- *Consider using rainwater or gray water systems for irrigation, flushing toilets and urinals and process water needs.*
- *Maintain consistent lighting levels through the use of photo-responsive controls.*
- *Appliances should be Energy Star rated.*
- *Verify that the buildings energy related systems are installed, calibrated and perform according to basis of design and construction documents through a commissioning process.*
- *At a minimum, the following systems and equipment should function per the design intent and be verified through a commissioning process: heating, ventilating, air conditioning, and refrigeration systems and equipment; lighting controls; domestic hot water.*

Reference: State of Tennessee Sustainable Design Guidelines.

2.2.4 Landscape

- The campus plan and individual building site plans should utilize the plant palettes of both: *Landscaping with Native Plants* (East Tennessee), *Tennessee Department of Environment and Conservation*; *Site Design Guidelines, University of Tennessee, Knoxville* (July 2008).
- Trees should be generally grouped to mimic naturally occurring forest type groups specific to soil, aspect, and water requirements, with a variety of types, sizes and species.
- Plantings should be supported, to the greatest extent possible, by rain harvesting features, and through drought resistant and native planting principles.
- *Plant tree types that will shade paved surfaces within 5 years to reduce urban heat islands.*

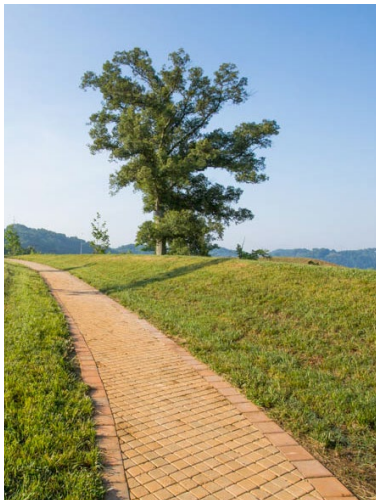
- *Use light colored paving surfaces with a Solar Reflectance Index greater than 29 to limit heat island effect.*

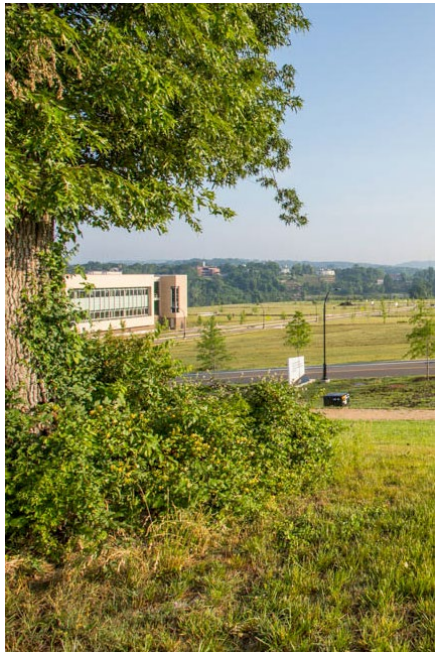
Reference: State of Tennessee Sustainable Design Guidelines.

2.2.5 Transportation

- Support transportation demand management (TDM) strategies, such as carpooling, park and ride lots, transit passes and bicycle and pedestrian facilities to minimize energy consumption associated with transportation.
- Promote pedestrian and bicycle safety within the campus, by limiting automobile traffic speed and maintaining existing sidewalks throughout the campus, existing bicycle lanes on the two north-south streets through the campus, and existing connections to the city's greenway system.
- Evaluate the economic feasibility of shuttle service between the main University of Tennessee/Knoxville campus and the Cherokee Farm campus as development occurs and potential ridership warrants.
- *Use light colored paving surfaces with a Solar Reflectance Index greater than 29 to limit heat island effect. For reference, typical new white concrete has an SRI of 86; typical new grey concrete has an SRI of 36; and typical new asphalt has an SRI of zero.*
- Lighting should be planned at the minimum level required for security of parking areas used only during peak hours (e.g., upper decks).
- Parking structures should be easily able to support electric plug-in vehicle receptacles and recharging services.
- The upper deck of parking structures should be planned for the installation of solar panels as a renewable energy source, following acceptable standards as they develop.
- *Consider parking decks to reduce the area of asphalt contributing to heat islands.*

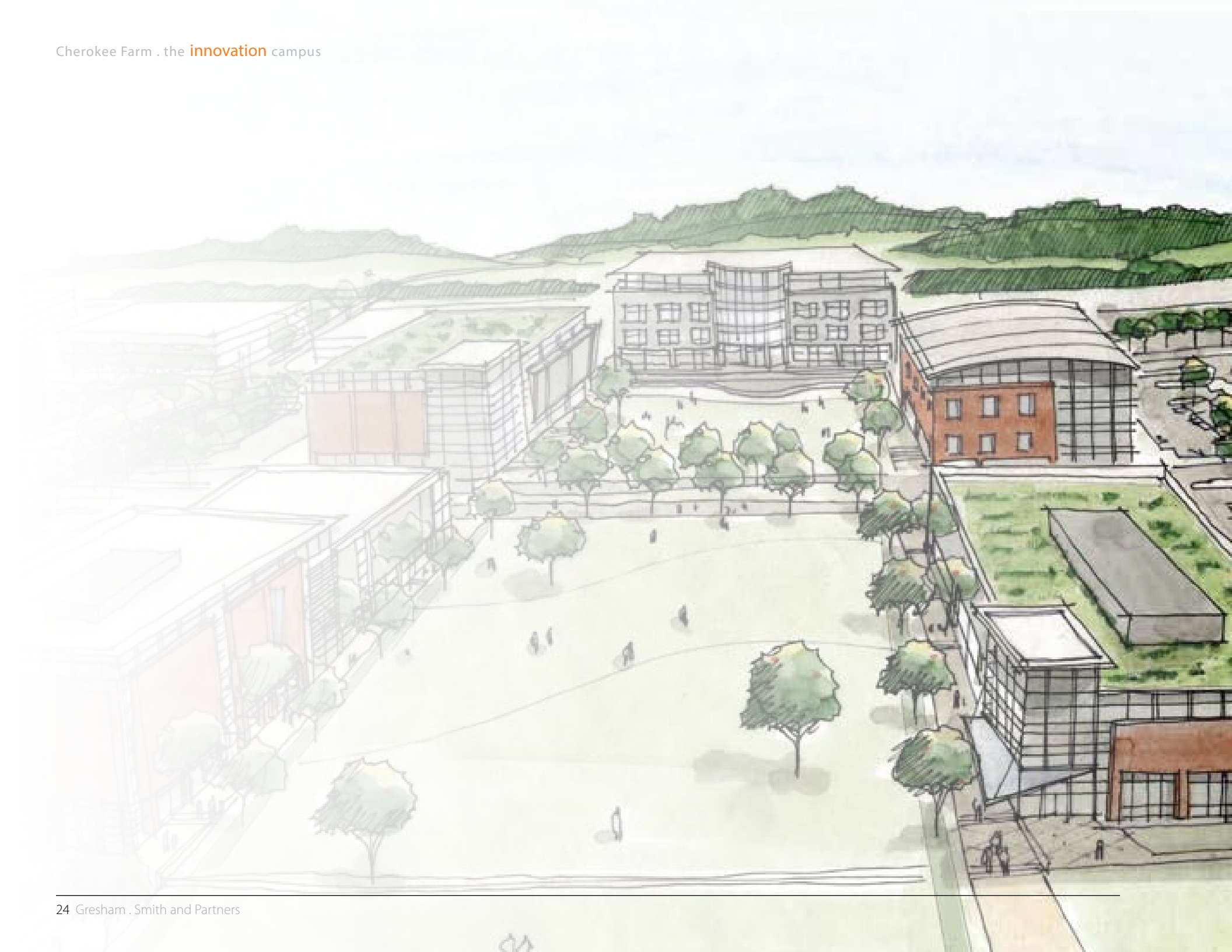
Reference: State of Tennessee Sustainable Design Guidelines.





Cherokee Farm Innovation Campus

ALTERNATIVE TRANSPORTATION MODES



Parking . Access . Utilities

2.3

2.3 PARKING · ACCESS · UTILITIES

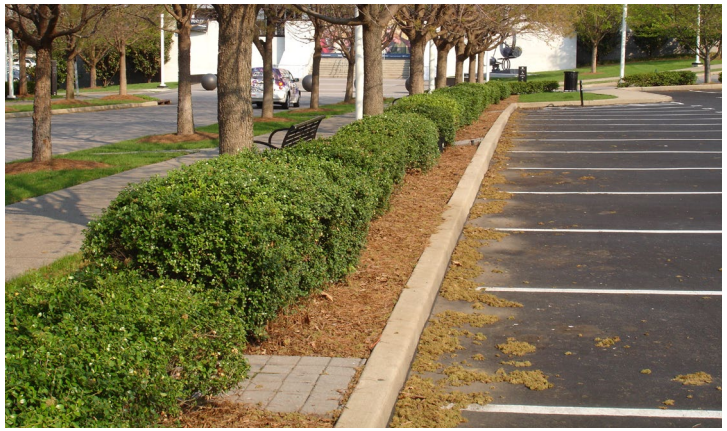
2.3.1 Goals

- Provide convenient and coordinated auto, transit, pedestrian and bicycle circulation within the campus.
- Support transportation demand management (TDM) strategies, such as carpooling, park and ride lots, transit passes and bicycle and pedestrian facilities to minimize parking demand on campus.
- Encourage comprehensive, multiple building site parking strategies that minimize redundant access and maximize public space.
- Promote pedestrian and bicycle safety within the site, by limiting automobile traffic speed and designating bicycle lane networks throughout the campus.

2.3.2 Surface Parking

Surface parking should offer convenience and access to buildings and reinforce public spaces throughout the campus.

- Individual parking lots should be part of a strategic system of campus entrances, driveways, pedestrian circulation and buildings.
- Parking lots should generally be located to the side or rear of buildings to promote the public character of streets and buildings, according to the design intent of the Master Plan.
- Accessible parking spaces shall be provided according to the Americans with Disabilities Act Accessibility Guidelines (ADAAG) for Buildings and Facilities.
- Driveways and curb cuts should have minimum widths at the sidewalk for pedestrian safety and comfort. One-way driveway entrances should be no more than 15 feet. Two-way driveway entrances should be no more than 24 feet.



Sustainable Design:

- *Consider light colored paving surfaces with a SRI greater than 29 to limit heat island effect. For reference, typical new white concrete has an SRI of 86; typical new grey concrete has an SRI of 36; and typical new asphalt has an SRI of 0.*

Reference: State of Tennessee Sustainable Design Guidelines, section 1.02; (A.5.iii), Design to Reduce Heat Islands.

2.3.3 Surface Parking: Perimeter and Interior Landscaping

- Parking lots shall include perimeter landscape strips in accordance with Section 2.1.3, Building Location and Orientation.
- Interior landscaping islands should include 1 tree per every 12 parking spaces.

Sustainable Design:

- *Plant tree types that will shade paved surfaces within 5 years to reduce urban heat islands.*

Reference: State of Tennessee Sustainable Design Guidelines, section 1.02; (A.5.iv), Design to Reduce Heat Islands.

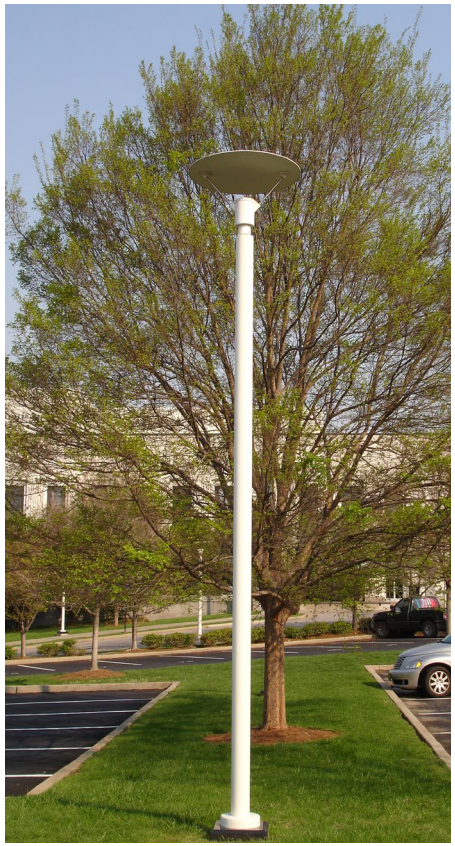
2.3.4 Surface Parking: Lighting

- The lighting style for parking lots should be consistent throughout the campus.
- Recommended light level guidelines and uniformity ratios established by the Illumination Engineering Society of North America (IESNA), in the IESNA Lighting Handbook (current edition), should be considered when determining appropriate lighting design solutions.
- Lighting should utilize automatic controls systems to eliminate excessive light during non-active hours of site and building operation, while maintaining safety and security.
- Full cut-off fixtures, mounting heights, and shielding should be utilized to effectively control glare and light trespass on adjacent buildings and properties.

2.3.5 Structured Parking

Structured parking plays a key role in achieving the public spaces identified in the Master Plan. Limiting the presence of surface lots, structured parking allows buildings and active uses to frame public spaces.

- To minimize surface parking, each building should contain a minimum of one level of structured parking where feasible.
- Wherever parking structures front streets and public spaces, walls should be consistent with surrounding buildings in materials, colors and patterns of openings.
- Sloping floors of parking structures should not be visible to public view from outside the structure.
- Parking structures should be compatible with adjacent buildings in form, proportion, massing, and articulation.
- Stand alone parking structures may allow pedestrian friendly, ground level retail/commercial uses consistent with the Master Plan, as well as facilities such as fitness centers and bike lockers and showering facilities for bicycle commuters.
- Pole mounted light fixtures on upper decks of parking structures shall use full cut-off fixtures, have a maximum



height of 16 feet and be located between internal parking rows rather than at the structure's perimeter.

- Lighting should be planned at the minimum level required for security of areas used only during peak hours (e.g., upper decks).
- Parking structure walls facing residential areas should minimize openings to avoid noise and light impacts. This may be accomplished by the following:
  - Square openings, rather than horizontal
  - Louvers
  - Decorative metal grills
- Parking structures should be easily able to support electric plug-in vehicle receptacles and recharging services.
- The upper deck of parking structures should be planned for the installation of solar panels as a renewable energy source, following acceptable standards as they develop.

Sustainable Design:

- *Consider parking decks to reduce the area of asphalt contributing to heat islands and to reduce the overall impervious area contributing to runoff.*

Reference: State of Tennessee Sustainable Design Guidelines, section 1.02; (A.5.ii), Design to Reduce Heat Islands.

2.3.6 Loading, Service and Storage

- Buildings should locate loading bays, service areas and trash storage at a single point oriented away from public spaces, and typically accessed from secondary roads and parking areas.

- Screen loading, service and storage facilities with landscaping and/or well-designed vertical structures consistent with the architecture of the buildings.

2.3.7 Utilities

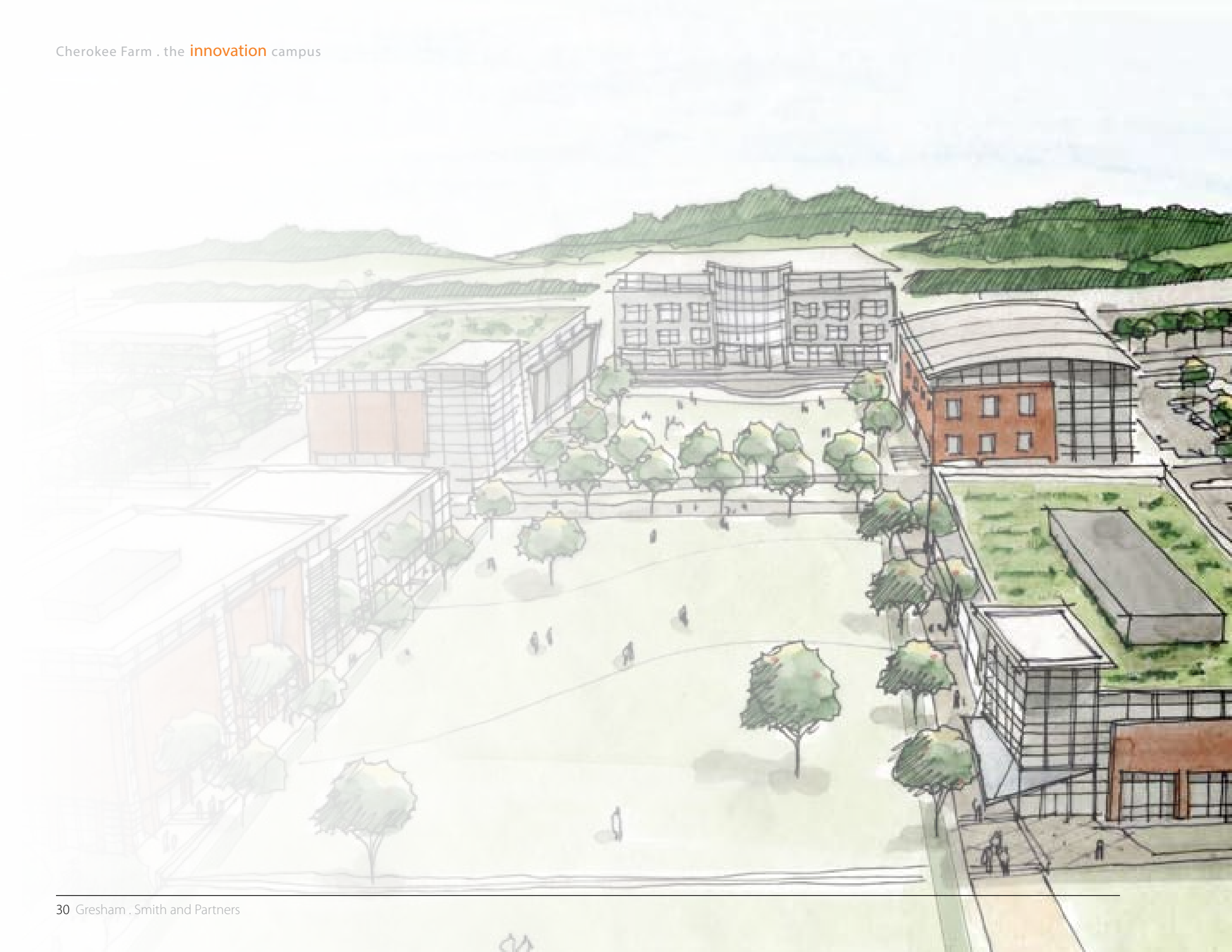
Utilities include all systems and equipment providing mechanical, electrical, plumbing and drainage for a building or site area.

- Equipment such as meters, electrical cabinets, transformers and switchgear should be located within the building they serve to the extent possible.
- Any equipment located outside building enclosures should be screened with landscaping and/or well-designed vertical structures consistent with the architecture of the building.
- Building systems equipment and distribution systems should be incorporated in the overall composition of the building or be visually seamless.

Sustainable Design:

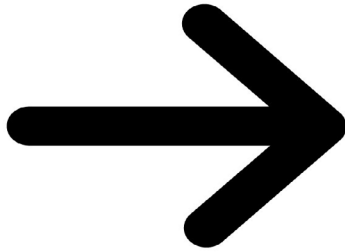
- *At a minimum, the following systems and equipment should function per the design intent and be verified through a commissioning process: heating, ventilating, air conditioning, and refrigeration systems and equipment; lighting controls; domestic hot water.*

Reference: State of Tennessee Sustainable Design Guidelines, section 1.02; (C.1.), Energy Efficiency and Building Systems.



Site Signage

2.4



2.4 SITE SIGNAGE

2.4.1 Goals

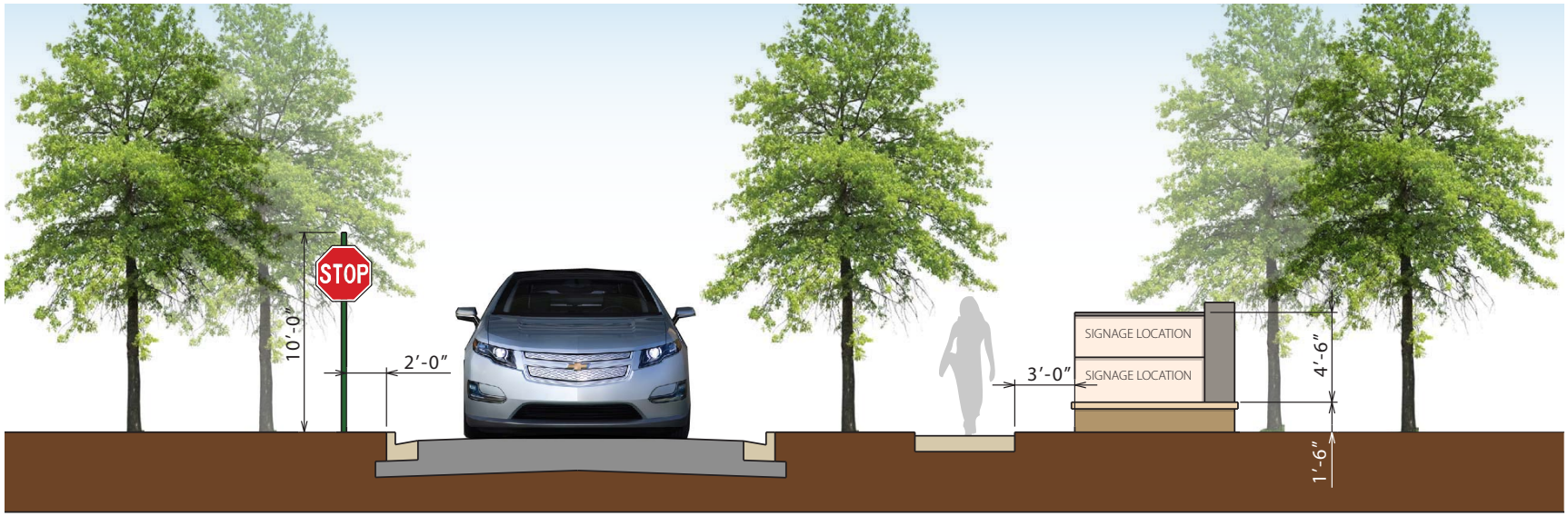
- Signage should express the campus identity, capturing the spirit of innovation and creativity in a consistent and uniform manner.
- Signage plays an important role in wayfinding and should balance the need for legibility for vehicles with quality public spaces for pedestrians.

2.4.2 Design and Materials

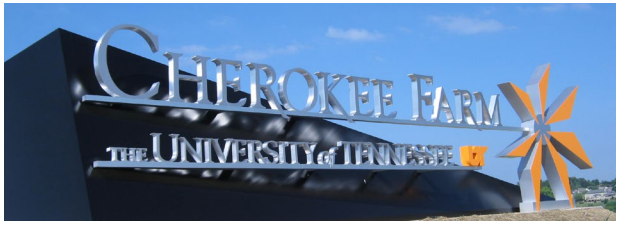
- Signs should be compatible with the character and architecture of the surrounding area with regard to scale, color, materials, and lighting levels.
- Signs should be constructed with high quality, durable materials.
- Campus gateways from Alcoa Highway and secondary entrances from the greenway and walking trails should be marked with entry walls, piers, or signage appropriate to the context.
- Access from Alcoa Highway should convey the significance of the Cherokee Farm Campus, especially as one approaches the city from the south.
- Signage should be consistently positioned in front of buildings, adjacent to parking lots or in prominent locations. Major and minor building identification signage should be setback a minimum of 3 feet from the back of sidewalk.
- All directional signage should provide clear, logical and consistent directional information, promote an orderly traffic pattern and flow, be legible from moving vehicles, and located to allow motorists sufficient time to make decisions.
- Major vehicular directional signage and parking identification signage located in planting strips should be setback a minimum of 2 feet from roadway and sidewalk and 2 feet from roadway and edge of parking pavement, respectively.
- Building identification monument signs shall be limited to one sign per street frontage with a maximum of two signs per lot. The maximum height per sign shall be 6 feet with a maximum display surface of 30 square feet.
- Major and minor building identification, parking identification, and pedestrian directional signage should range from 3 to 7 feet in height.
- Major vehicular directional signage should be a maximum height of 8 feet.
- Street signage should not exceed 10 feet in height.
- Parking restriction signage should not exceed 8 feet in height.
- Signage should minimize visual clutter.
- Infrastructure design and construction will establish many sign standards, and future development will have to comply with those standards.

2.4.3 Lighting

- Signs should be illuminated by a steady, stationary, shielded light source, directed solely at the sign or internal to it, without causing glare for motorists, pedestrians or neighboring premises.

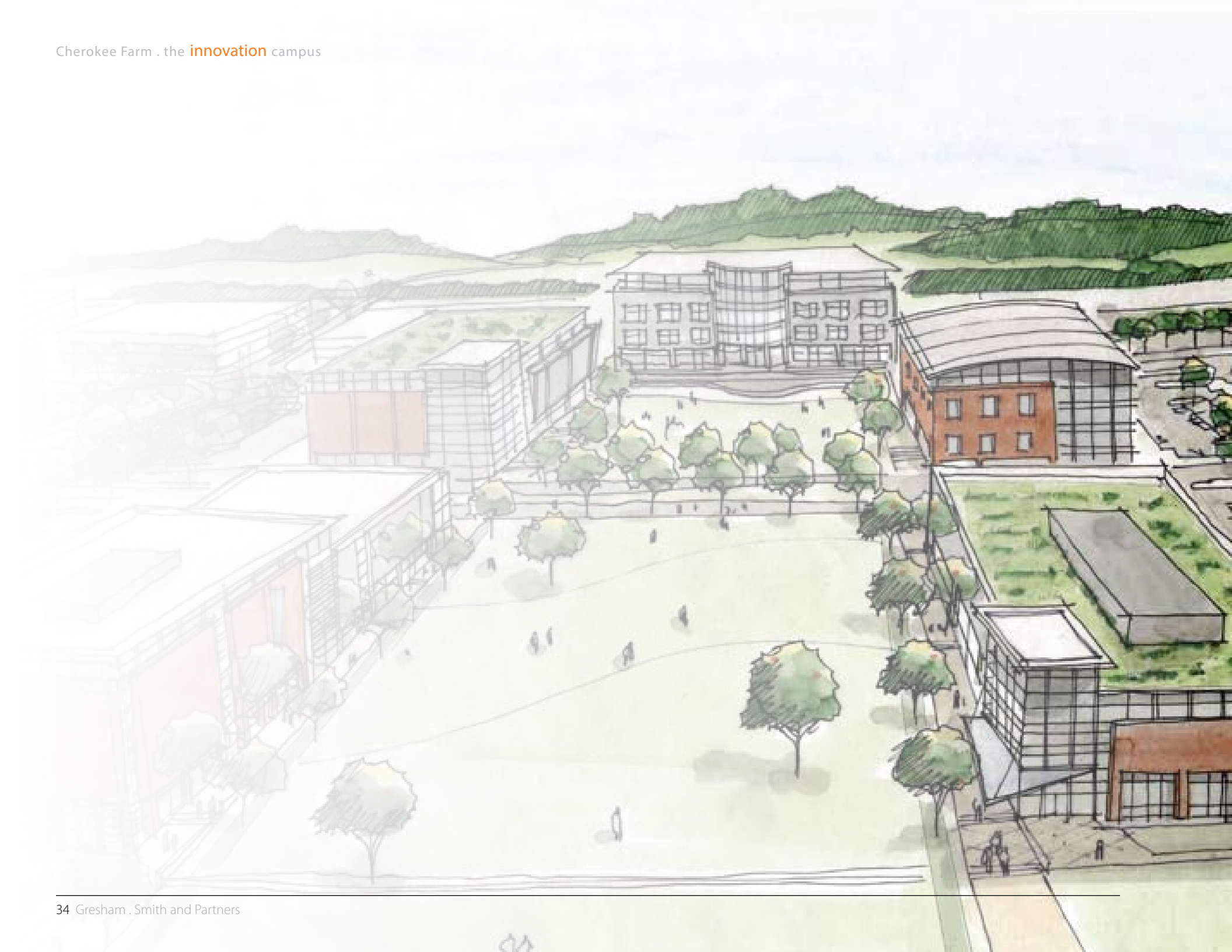


Signage Diagram



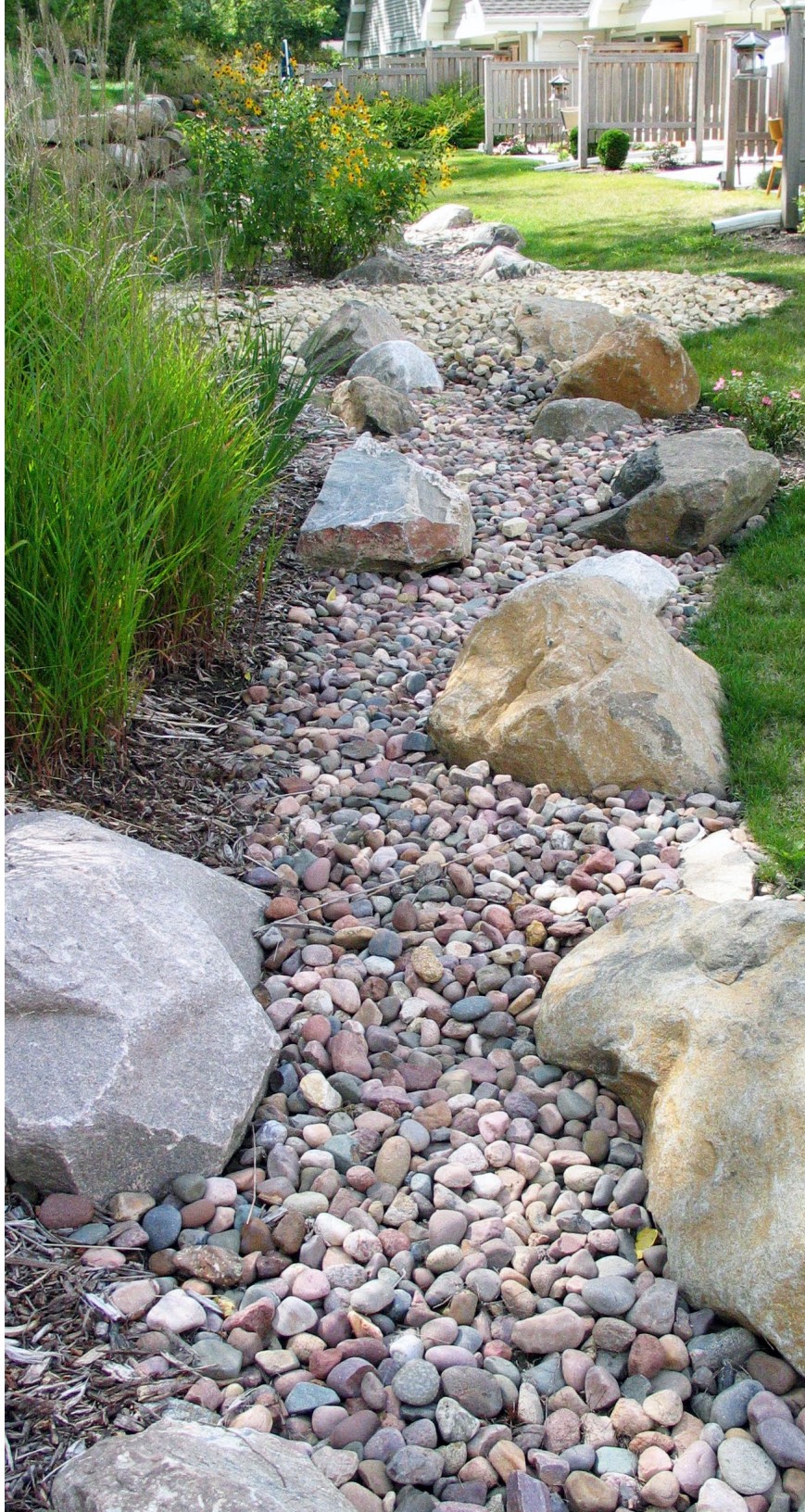
CHEROKEE FARM

exterior site signage



Landscape and Streetscape Design

2.5



2.5 LANDSCAPE AND STREETSCAPE DESIGN

2.5.1 Goals

- Landscape and streetscape design should unify the campus and help establish a distinct identity.
- Develop streets and public spaces that are pedestrian and bicycle friendly, environmentally responsible and aesthetically pleasing.
- The campus landscape plan should mimic natural systems to manage water quantity and quality, reduce heat island effects, respond to seasonal temperatures and support wildlife habitat.
- All landscape elements should provide for and reinforce the function of each specific space: vehicular-oriented streets, pedestrian-oriented streets, other pedestrian spaces, areas that frame views and vistas, stormwater management, wildlife habitat.

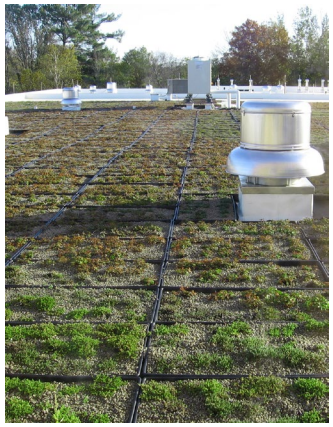
2.5.2 Planting

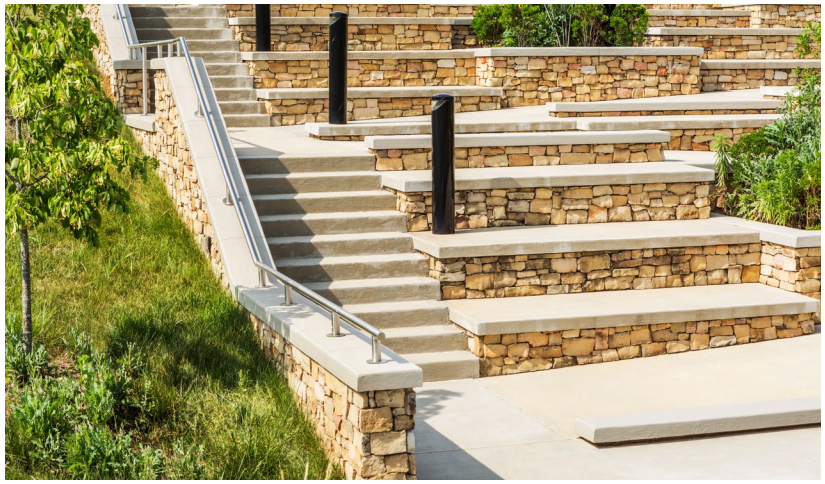
- Landscaped areas should be continuous from one lot to another and should use landscape materials that are compatible with adjacent lots, streets, drainage corridors, and landscape easements.
- Landscape areas should be an integral part of the site stormwater management strategy, including vegetated swales and tree planting to support water quality and minimize runoff.
- The campus plan and individual building site plans should utilize the plant palettes of both: Landscaping with Native Plants (East Tennessee), Tennessee Department of Environment and Conservation; Site Design Guidelines, University of Tennessee, Knoxville (July, 2008).
- Trees should be generally grouped to mimic naturally occurring forest type groups specific to soil, aspect, and water requirements, with a variety of types, sizes and species.
- Rows of trees should appropriately parallel and reinforce street corridors. The use of a variety of types, sizes and species, however, is encouraged to emphasize different micro-climates, building entrances, roadway intersections, walkway locations, and other functional variations.
- Shrubs and understory or small flowering trees should be used, along with flower beds, to provide seasonal color, visual emphasis and a comfortable scale for human interaction.

Sustainable Design:

- *Utilize native and adapted vegetation that are climate-tolerant to Tennessee and applicable to sustainable design.*

Reference: State of Tennessee Sustainable Design Guidelines (Draft), section 1.02; (A.4.b.i), Design to Reduce Heat Islands.





2.5.3 Sidewalks and Pavement

- Sidewalks should have a minimum width of 5 feet.
- In public right-of-way and quads, sidewalks should be brick on a sand base with brick edging. Within a lot, sidewalks providing access to a building shall be concrete.

Sustainable Design:

- *Seek to design no less than 50% of site area as highly reflective or non-absorptive (excluding building footprint).*
- *Use light colored paving surfaces with a Solar Reflectance Index greater than 29 to limit heat island effect.*

Reference: State of Tennessee Sustainable Design Guidelines (Draft), section 1.02; (A.5.), Design to Reduce Heat Islands.

2.5.4 Furnishings

Amenities such as outdoor seating and plaza areas for meetings and gatherings are encouraged throughout the campus (See Appendix A). Selected furnishings will add character as well as create environments for community interaction. The degree to which site furnishings vary among building sites and campus spaces should be minimal.

- A single style of streetscape and landscape furnishings should be used to establish a distinct and unified campus.
- High quality, durable material such as metal should be selected to minimize maintenance.

Benches

- Benches should be located in courtyards and along major pedestrian paths, associated with landscaping and shading, and shielded from vehicles.
- Benches with armrests should be 6 feet in length, solid steel frame, powder coated, finish color to be determined.
- Backless benches with armrests should be positioned at appropriate locations for multi-directional seating.

Table Sets

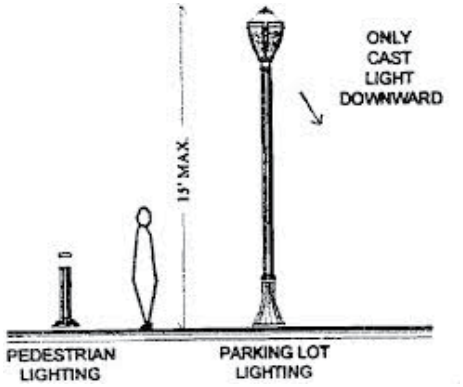
- Table sets, all steel components with powder coated finish, finish color to be determined, should be located throughout the campus in outdoor seating areas and plazas.

Seat Walls

- Seat walls should be used throughout the campus to provide convenient sitting opportunities and define landscaping, especially in outdoor gathering spaces and along major pedestrian paths.
- Seat walls should have smooth cut stone, precast or brick caps.
- Seat walls should be consistent with surrounding buildings in materials, patterns, and colors.
- Seat wall heights should range from 12 to 20 inches, and the width should be no less than 16 inches.

Trash Receptacles

- Trash containers should be placed unobtrusively throughout the campus at logical gathering areas such as building entries, outdoor seating locations, intersections of walkways, bus stops and parking lots.
- Receptacles should be setback 3 feet from walkways.
- Use 24 gallon receptacle with dome lid and 10 inch stainless steel ashtray.
- All steel components should have powder coated finish, color to be determined. Lid attached via vinyl-coated aircraft cable, high density plastic. Liner, rubber tipped leveling feet.



Bicycle Racks

- Recommended bicycle parking guidelines established by the Association of Bicycle and Pedestrian Professionals (APBP) should be referenced when determining appropriate bicycle racks and rack area design.
- Bicycle rack areas should be immediately adjacent to the entrance it serves, preferably within 50 feet, and clearly visible, without impeding pedestrian movement in and out of the building.
- Rack elements (such as an inverted 'U') should support the bicycle upright by its frame in two places, prevent the wheel of the bicycle from tipping over, and enable the frame and one or both wheels to be secured.
- Comb, toast, schoolyard, and other wheel bending racks that provide no support for the bicycle frame are not recommended.

Bollards

- Bollards should be used to reinforce street curbs in the absence of planting strips to provide additional pedestrian safety, especially adjacent to the main lawns.
- Bollards should not interfere with loading areas, including bus stops.
- Bollards must accommodate emergency fire access.

Additional Furnishings

- Planting containers or planters should be limited to priority locations such as building entrances, courtyards and plazas.
- Newspaper boxes and kiosks should be limited to major building entries, parking areas, and transit stops.
- All additional furnishings should be consistent in style with the overall streetscape design and avoid the appearance of visual clutter.

2.5.5 Retaining Walls

The design and materials for retaining walls should complement the principal buildings with regard to color, quality, scale and detail.

2.5.6 Lighting

Lighting is an integral component of the overall campus design, helping to establish campus identity, support wayfinding, contributing to safety and security, and highlighting important nodes, public spaces and building entries.

- Recommended light level guidelines and uniformity ratios established by the Illumination Engineering Society of North America (IESNA), in the IESNA Lighting Handbook (current edition), should be considered when determining appropriate lighting design solutions.
- All exterior lighting should incorporate LED fixtures whenever possible while maintaining required light levels.
- Lighting should minimize glare and light trespass, maximize energy conservation, and maintain dark skies.
- Street lighting should have a uniform height and be a maximum 25 feet high above the street.
- Pedestrian lighting should have a uniform height and be a maximum 15 feet above the walkway.
- Lighting should be coordinated with tree locations, proposed landscaping, buildings, driveways, on-street parking, street furnishings, signage, and sub-street structures.
- Step or bollard lighting should be used to clearly illuminate level changes and handrails for stairs and ramps. Bollard height shall not exceed 42 inches and should only be used where a pole light fixture is not appropriate.

Sustainable Design:

- *Design building façade and site lighting with lighting power densities that promote safety but, minimize light pollution from the building site.*
- *Design exterior area lighting power densities to be 20% less than lighting power densities defined in ASHRAE 90.1-2007, Exterior Lighting Section.*
- *Design building façade lighting to be 50% less than the lighting power densities defined in ASHRAE 90.1-2007, Exterior Lighting Section.*
- *Design the placement and fixture styles of site lighting to minimize illumination above the horizontal plane and to minimize light trespass at the site boundary.*
- *Use fixture types designed as "cutoff" and "full-cutoff" styles to minimize fixture lumens emitted at 90 degrees or higher from straight down.*
- *Select exterior fixtures and locate them on the site to minimize light trespass at the site boundary. Document the foot-candle levels at the site boundary with a site illumination model.*

Reference: State of Tennessee Sustainable Design Guidelines, section 1.02; (A.7), Exterior Site Lighting.

2.5.7 Stormwater

Stormwater management offers a twofold opportunity: addressing water quantity and quality from the site while enhancing public spaces and wildlife habitat.

- Stormwater management elements such as vegetated swales, tree planting, and rain harvesting features should be integrated into the campus and building site design.
- Stormwater management, grading design and planting selection and location should be fully coordinated to slow

the conveyance and discharge of water from the site, and provide for groundwater recharge and planting irrigation.

- Plantings should be supported, to the greatest extent possible, by vegetated swales, and through drought resistant and native planting principles. Supplemental irrigation should be confined to building entry areas.
- To minimize erosion, planting designs should be fully coordinated with the grading of walkways, parking lots/ islands, lawns, pedestrian plazas/terraces and streets.
- Fine surface grading in the archaeological site should slow and reduce sheet flows. Groupings of trees should be planted to further reduce run-off.

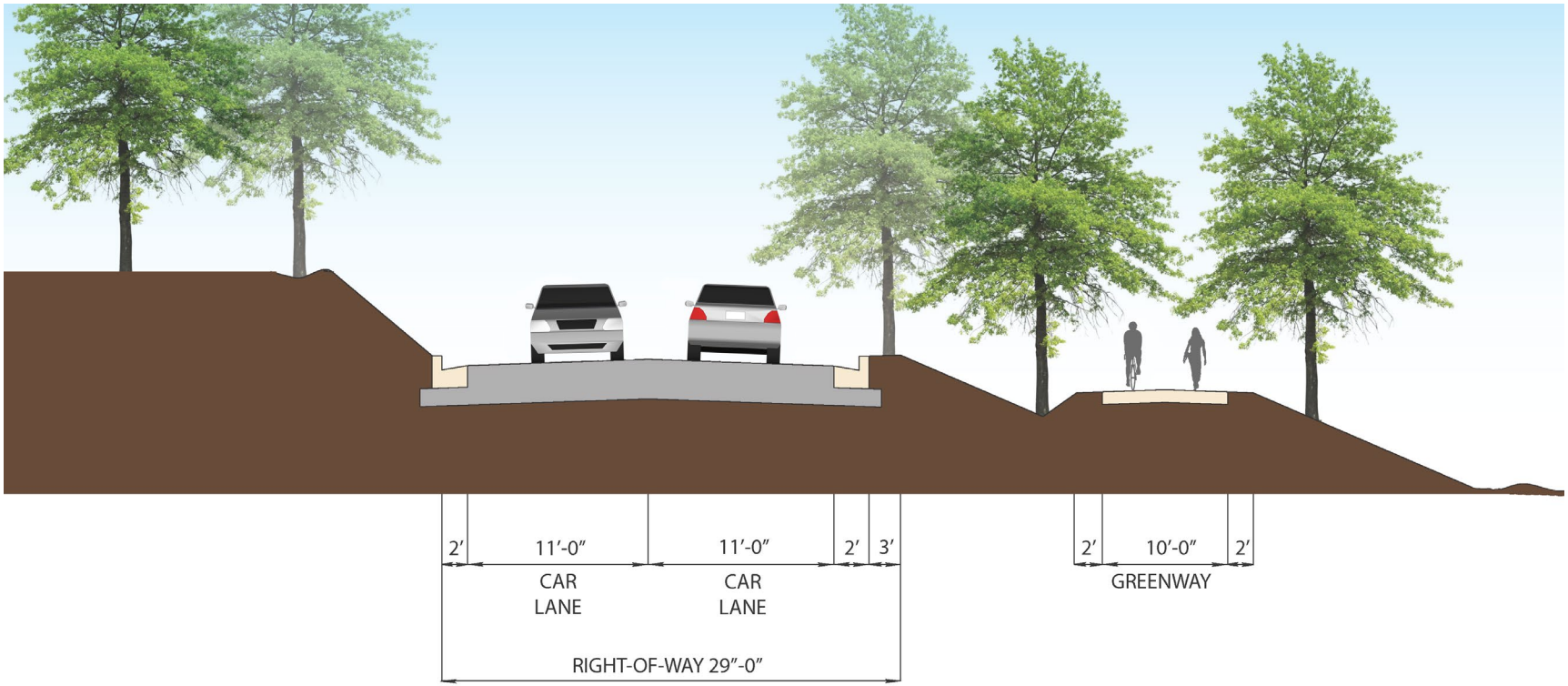
Sustainable Design:

- *On previously undeveloped sites, design the stormwater management for post-development site discharge rate and volume not to exceed pre-development discharge rate and volume.*
- *Design to remove 80% of total suspended solids from first inch of rain for each rainfall event.*

Reference: State of Tennessee Sustainable Design Guidelines, section 1.02; (A.6.), Stormwater Design Considerations.

Street Cross Section

Main Street Through "The Preserve"



Project Development Compliance Review Process

3.0

3.0 PROJECT DEVELOPMENT COMPLIANCE REVIEW PROCESS

In order to maintain compliance with the University of Tennessee Cherokee Farm Master Plan and Development Guidelines, the University administration has established a Project Review Process for private partner development proposals.

Private development partners must submit development plans to the University for review by a Project Review Committee. This Committee is composed of the President of the University of Tennessee, a member of the University of Tennessee Board of Trustees, the University of Tennessee Chief Research Officer, the Chancellor of the Knoxville Campus, and the State of Tennessee State Architect. At least three of the five members must vote in favor of a proposal for it to be approved.

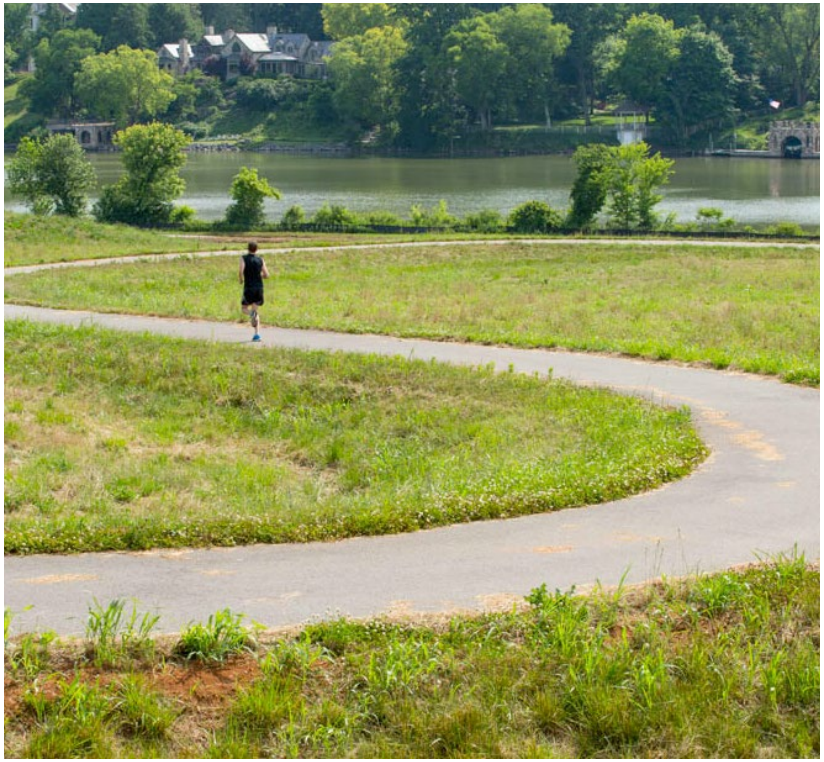
The University of Tennessee Division of Facilities Planning will serve as staff for the Project Review Committee and will provide comment and recommendation to the Project Review Committee relative to a proposed project's compliance with the Development Guidelines.

Development Plans must be submitted to the University of Tennessee Division of Facilities Planning at the completion of each of the following design phases:

1. Schematic Design
2. Design Development
3. Construction Documents

The Division of Facilities Planning will timely review and provide comment and recommendations to the Project Review Committee for each of the above phases of design. The Project Review Committee will at its discretion, approve the development plans as submitted, approve the design with stipulations, or reject the design with stipulations for revision and resubmittal.

Private partner developers should not proceed with the project beyond the approved phase. In addition to coordinating with The University of Tennessee's Division of Facilities Planning, privately developed commercial buildings must meet all requirements contained in Knoxville-Knox County development codes and regulations, including the project development review process established by the Knoxville-Knox County Planning Commission, City Engineering Department, and City Building Codes, Permits and Inspections Department.



Appendix A

4.0

4.0 APPENDIX A

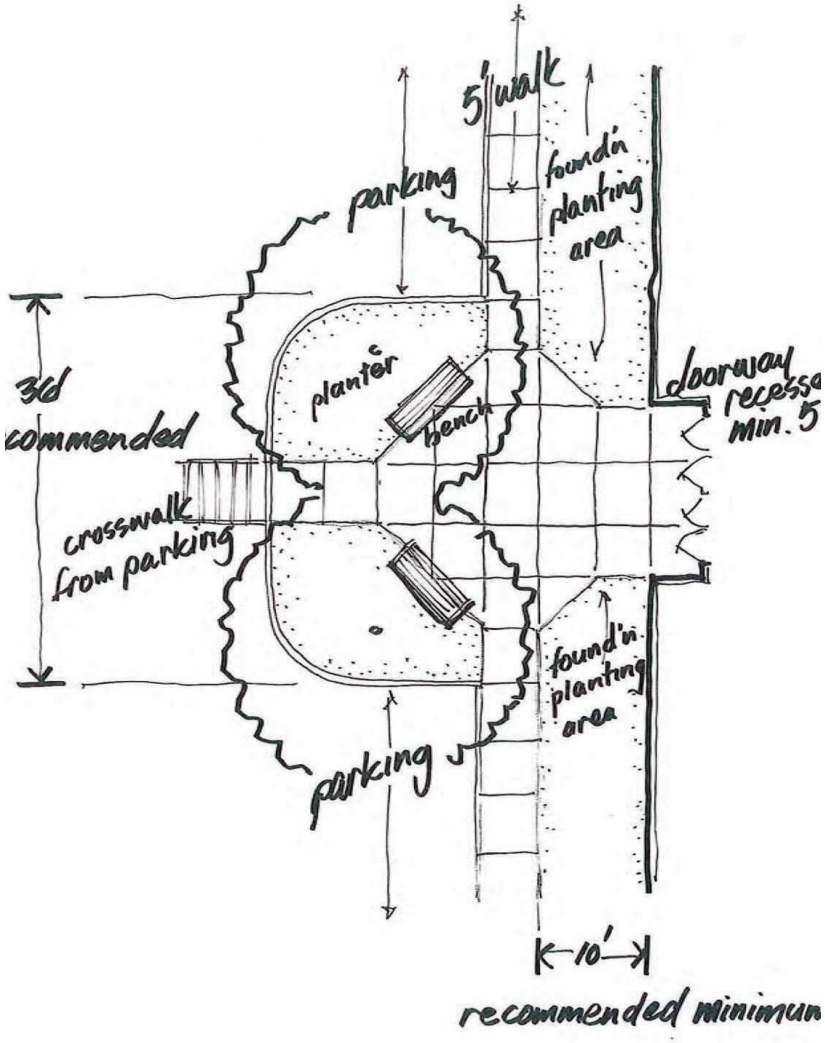
Entrance Plazas

At all of the pedestrian building entrances, but primarily at those from the parking lots and those that access the Quads, there shall be constructed as part of the building contract a hardscape gathering space. The plazas will not be of a standard design but will each reflect and be compatible with the building design. Each will utilize the standard project palette of colors and materials and will fulfill a similar functional program:

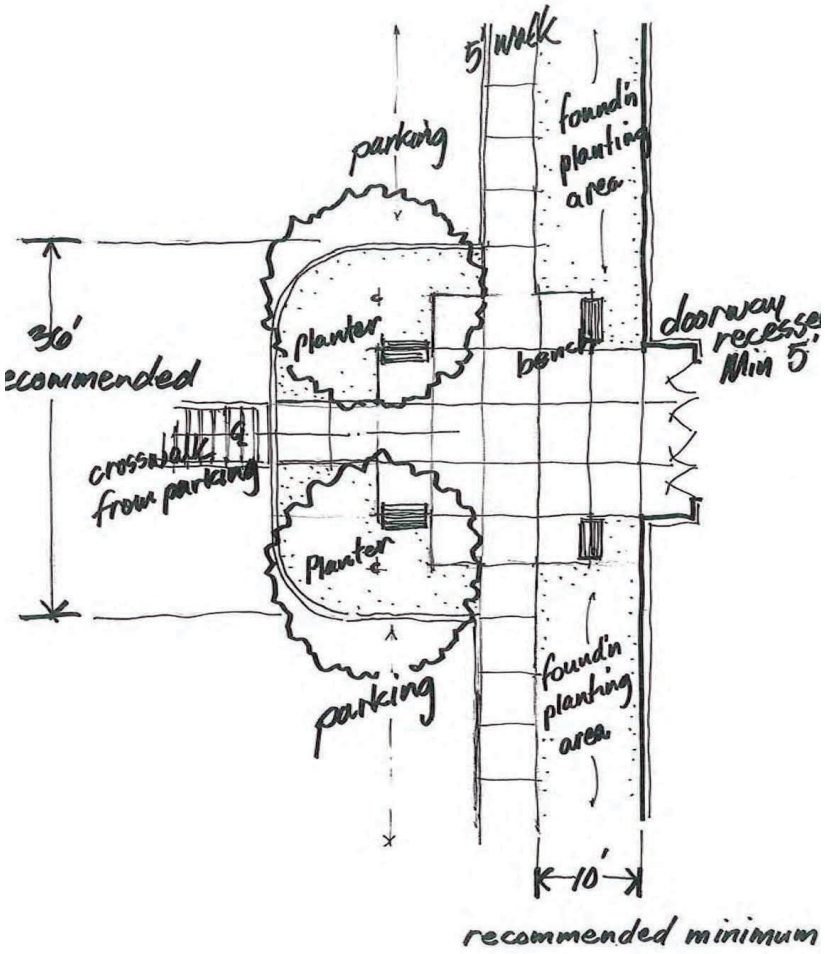
- Where walkways come together at the dooryard, the plaza shall widen to provide for both people standing in conversational groups and people passing through.
- The plaza shall provide seating for those waiting for others, as well as for those enjoying the outdoors.
- Shading of at least some of the seating with deciduous canopy trees or a structural trellis, or similar feature, is required.
- Bicycle racks are required.
- Low shrubs, perennial and annual flowers and small patio trees shall be included in a pleasing composition to enhance the user's experience.

On the parking side, the plazas will provide for ADA accessibility. Conceptual sketches follow.

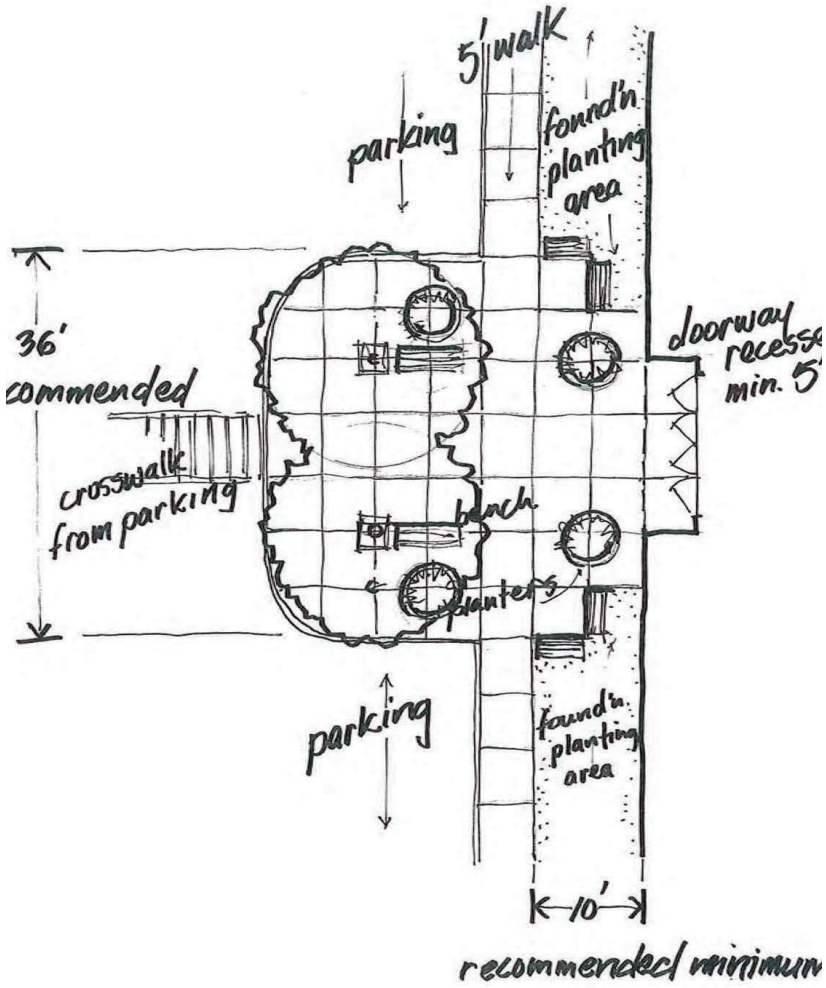
Parking Lot Entrance Plaza:
CONCEPT A



Parking Lot Entrance Plaza:
CONCEPT B



Parking Lot Entrance Plaza:
CONCEPT C



Parking Lot Entrance Plaza:
CONCEPT D