

An aerial photograph of the RELLIS campus, showing a large, curved, light-colored area in the foreground, likely a parking lot or plaza, surrounded by various buildings and greenery. The image is overlaid with a dark red semi-transparent filter.

The Texas A&M University System RELLIS Campus Master Plan

February 2018

Revised September 2020



THE TEXAS A&M
UNIVERSITY SYSTEM





Adoption of the Master Plan Update



THE TEXAS A&M
UNIVERSITY SYSTEM



The September 2020 update to the 2018 RELLIS Campus Master Plan further expands upon the previously adopted vision and goals. The RELLIS Master Plan Executive Committee (Phase B) guided this effort in coordination with two consulting teams, System staff, RELLIS staff, Texas A&M University staff and three technical sub-committees.

The primary update to the Master Plan began in March 2019 adding the Campus Infrastructure Plan, including projected utility loads and preliminary capital planning recommendations. Drainage studies were updated and storm water management recommendations coordinated for the campus. Additional mapping services for the existing underground storm drainage system at the runways were authorized in September 2019.

Updates to the master plan included the addition:

- A Campus Grid Overlay for wayfinding and signage coordination.
- The formation of the RELLIS Plannign and Design Review Board (PDRB) along with the RELLIS Technical Review Sub-Council (TRSC) and RELLIS Design Review Sub-Council (DRSC).

Additional services were authorized in June 2020 for additional updates to images, maps, districts, and general updates throughout the master plan to reflect the campus evolution.

The final document reflects the additional study and development progress on the RELLIS Campus as of December 31, 2019. The document also reflects campus infrastructure and storm management coordination through June 2020.

Based upon the review and recommendation of the RELLIS Master Plan Executive Committee, the revised September 2020 RELLIS Master Plan is hereby adopted.

John Sharp

Chancellor of The Texas A&M University System

Kelly Templin

Director, RELLIS Campus

Message from the Chancellor



**THE TEXAS A&M
UNIVERSITY SYSTEM**

If you are reading this, you are probably asking yourself, “What is RELLIS?”

Frankly, the RELLIS vision depends on your point of view. To an educator, The Texas A&M University System’s RELLIS campus will be an alliance of universities, community colleges, and workforce training options offered at one site, a place where students are not restricted to the course offerings of just one program or one school. Everything from professional certifications to four-year degrees will be available for careers that are in demand today.

To a researcher, it is a collection of our best and brightest working on the technologies that are creating a better tomorrow – whether in robotics, autonomous vehicles, or cybersecurity, to name just a few.

To an executive, whether in the corporate world or a government agency, RELLIS is an opportunity to collaborate within this unique environment, to improve or create products and services by working side-by-side with our researchers.

Most of all, RELLIS is a reflection of the unique nature of the Texas A&M System. Where else would you find 11 universities *and* seven state agencies — a diverse group of individuals and missions — under one leadership, united with a focus on education, research, and service?

While this Master Plan represents our best attempt to foresee what RELLIS can become, I am particularly excited the RELLIS vision is flexible enough to pursue opportunities that we cannot predict today.

RELLIS is already off to a fast start and the Texas A&M System has the talent and resources to maintain our momentum. We are limited only by our imagination and our ability to attract partners who share our commitment to the values reflected in the name: **Respect, Excellence, Loyalty, Leadership, Integrity, and Selfless Service.**

John Sharp

Chancellor of The Texas A&M University System

Message from the Campus Director



The Texas A&M University System's REllIS Campus has a long history of living out the values its name symbolizes. And in so doing, for the past 75 years it has been a place where new technologies are created and innovated, where leaders are educated and trained, and where ideas that transform our world are born and tested. Building on its rich history as a former military training base that was critical to our nation's security, we are now recreating the REllIS Campus into a living-laboratory where research and discovery, education and training, and collaboration with public and private partners are encouraged and enabled by world-class, 21st century spaces, facilities, and technologies.

The 2018 REllIS Campus Master Plan defines this new vision by framing the concepts for the future use and development of the physical environment of the campus as well as the collaborative character and spirit it is intended to embody. A prime objective throughout this process has been to ensure that as the campus evolves over time it encourages and enables our students, faculty, and partners to reach higher levels of success as they embark on paths to new discoveries through Innovation, Education, and Transformation.

The 2018 Campus Master Plan will serve as the principal planning document for the ongoing near-term improvements as well as the future long-term development of the campus. This plan is also intended to serve as a foundation for this vision while enabling changes to the plan over time to allow us to capture future opportunities that we have yet to envision today.

I want to thank my colleagues, Mrs. Yvonne Bryant, Mr. James Bright, Mr. Kevin McGinnis, and Dr. James Nelson, for their support and engagement throughout this process. Likewise, I appreciate the invaluable input and thoughtfulness provided to this effort by the executive advisory committee as well as the nine focus groups that participated in the development of this plan. The members of these groups worked hard to ensure that we took into consideration the various activities and functions ongoing and planned at the REllIS campus, and integrated these disparate needs into a cohesive and collaborative framework supporting them all.

Finally, I want to thank and commend the leadership of Chancellor John Sharp, Chancellor of The Texas A&M University System, and Dr. M. Katherine Banks, Vice Chancellor and Dean of the College of

Engineering. Their vision, dedication, and support for this transformational effort were the foundation for the success we have enjoyed and the catalyst for our future successes to come. This new 2018 REllIS Campus Master Plan will enable us to embark on this exciting journey and will serve as our compass as we chart our path into the future.

John Barton

Associate Vice Chancellor and Executive Director of the REllIS Campus

Executive Summary

PURPOSE AND CONTEXT

The 2018 RELLIS Campus Master Plan is a planning effort that focuses on supporting The Texas A&M University System as a national leader in high-tech research, innovation, training, and technological development. Key aspects of this plan focus on supporting and guiding campus organization, build-out development, open space networks, facility programming, and improving social amenities located within the campus.

Issues considered in this 20-year planning horizon anticipate enrollment growth, increased teaching and research demands, future transportation needs, sustainability, and economic growth. A campus-wide advisory committee included multiple stakeholders which helped shape the strategic goals that will guide the physical development of the campus during the life of the 2018 master plan. The changes presented in this plan are intended to transform the largely undeveloped 1,877 acres of land into a multi-institutional research, testing, and workforce development campus that directly benefits society at large.

The 2020 update to this plan reflects additional study and progress on the campus as of December 31, 2019.

CAMPUS ORGANIZATION & DEVELOPMENT

In 2017, The Texas A&M University System developed a long-term vision 20-year conceptual plan for campus growth that accommodates its unique array of educational and research programs while meeting the needs of potential intensive investments.

Currently, RELLIS has approximately 500,000 gross square feet but may grow by up to eight million new

gross square feet to fully support the A&M System's growth needs. This vision shows a scenario of 4.9 million additional gross square feet that builds flexibility into the projected facilities as well as undetermined infill development. This master plan identifies five development districts with unique attributes to accommodate this anticipated growth. Each development district is defined in terms of maximum development potential. The districts are defined as:

- Central Core
- Perimeter
- Advanced Training/Testing
- Experimentation Testing & Training
- Flex Public/Secure Perimeter

The Central Core provides the highest intensity and diversity of uses and amenities. Other districts support more focused needs of the various research, training, and testing initiatives active on the campus.

SUPPORTING DOCUMENTATION

Design Guidelines are provided to outline design-related elements such as aesthetics or materiality and are intended to supplement the more technical Facility Design Guidelines that the A&M System has in place. Appendices outline supporting documentation that deliver the additional details and specifications to guide future development.

THE NEXT 20-YEARS

There will be many challenges but numerous unique opportunities to advance the standards of development that help guide RELLIS as a reputable institution throughout the 21st Century.





- Projected conditions of 20-year build out:**
- 1 Central Core District
 - 2 Academic Complex
 - 3 Perimeter Research Facilities
 - 4 Historic Commemoration Marker
 - 5 Training/Testing District
 - 6 Student Housing
 - 7 Data Center
 - 8 Experimentation and Testing Complex
 - 9 Flex/Secure Partnerships
 - 10 Secure Partnerships
 - 11 Advanced Testing and Training Area

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1

Introduction

- 1.1 Purpose
- 1.2 Process and Participants





1.1 PURPOSE

With the RELLIS Campus, The Texas A&M University System has identified the opportunity to create a new paradigm for the future of basic and applied research, technology, development, and education.

“It is a big idea and it is important that The Texas A&M University System nurture big ideas. It is only through big ideas like this that Texas can achieve its goals for higher education.”

JOHN SHARP
CHANCELLOR OF THE TEXAS A&M UNIVERSITY SYSTEM

FIGURE 1.1 Key of Birdseye View Facing West



Formerly known as the Riverside Campus, this 1,877-acre, largely undeveloped site is being transformed as the A&M System RELLIS Education and Research Campus (RELLIS Campus). Located just eight miles from the Texas A&M University (Texas A&M) College Station campus, the site has long been used by the university and system members as a site for world-class research, technology development, and workforce training. The long term development of the site offers an unparalleled opportunity to establish a unique, creative, collaborative, and sustainable campus for the future.

This RELLIS Campus Master Plan (hereafter referred to as the master plan) is intended to guide the A&M System's future development at RELLIS, defining the vision for immediate and long term development and for the supporting infrastructure that will be needed. The campus currently accommodates a wide range of uses such as research in agricultural and life sciences, veterinary medicine, and various engineering and training activities. The aircraft runways, a residual from the previous Bryan Army Air Field and Bryan Air Force Base, activated during World War II and the Korean War, respectively, provide facilities for vehicle and infrastructure testing as well as law enforcement and security training. Over time, some of these uses will be retained, while others will be replaced or augmented with academic programs and institutes, research entities, partner agencies and companies, and other collaborators.

BIRDSEYE VIEW FACING WEST

FIGURE 1.2





1.2 PLANNING PROCESS

In 2016, the A&M System decided to rename the Riverside campus RELLIS and began to prepare a new plan in response to growing pressure for new facilities and site development. This master plan was undertaken in response to the desire to bring the latest thinking on environments that will support collaboration and accommodation of the wide range of current and potential partners on the site.

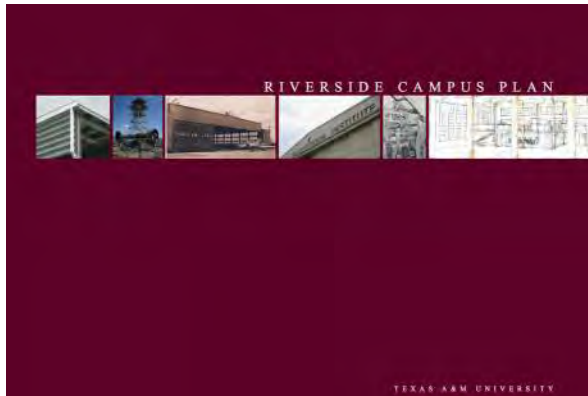


FIGURE 1.3 2004 Riverside Campus Plan

The first plan for the Riverside Campus was prepared in 1988, and was intended to provide guidance to transition this purpose built former military site into a modern master planned campus, focusing on the redevelopment of the eastern portion of the site. The 2004 Campus Master Plan for Texas A&M University, which was concerned with the lands on and contiguous to the College Station campus, noted regarding the Riverside Campus:

“The primary purpose of the land and facilities located at the Texas A&M University’s Riverside Campus is to support the mission of Texas A&M University and the A&M System components headquartered on the College Station campus.”

In 2013, in recognition of the unique resource that is the Riverside Campus, a new plan was prepared that envisioned a future of growth and innovation. This plan was particularly oriented to provide opportunities for teaching space, research, service, and training activities that could not be accommodated on the other College Station campus of Texas A&M due to the scale of space required or to uses not suited to more intensely populated sites. The plan also encouraged celebration of the rich history of the site and retention of original characteristics, where possible, in conjunction with long term redevelopment and renewal.

In 2016, the A&M System decided to rename the campus RELLIS and began to prepare a new plan in response to growing pressure for new facilities and site development. The A&M System supported a \$150 million investment in the site as part of an initiative to create a 21st Century research and learning environment. This master plan was undertaken in response to the desire to bring the latest thinking

on environments that will support collaboration and accommodation of the wide range of current and potential partners on the site.

The planning process included collaboration with multiple committees and stakeholders including a master plan executive committee. In addition, informational meetings and workshops were held with a variety of stakeholders including:

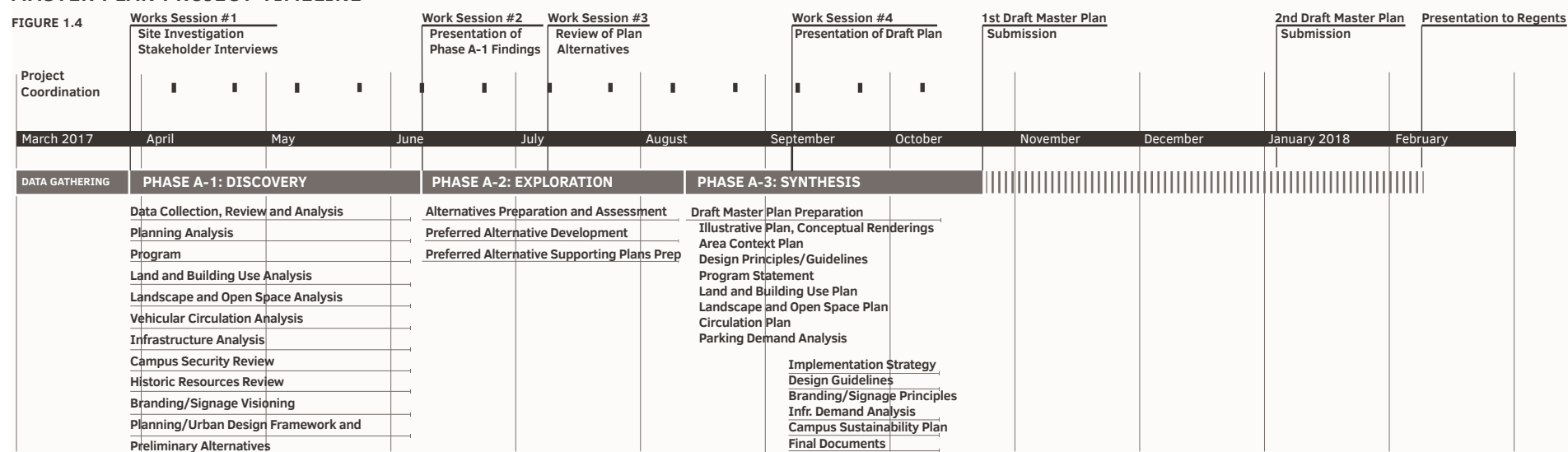
- Blinn College
- Texas A&M University
 - College of Agriculture & Life Sciences
 - College of Architecture
 - College of Veterinary Medicine
 - Industrial Distribution
- Joint Library Facility (The Texas A&M System and The University of Texas System)
- Texas A&M Engineering Extension Service (TEEX)
- Texas A&M Transportation Institute (TTI)
- Texas A&M Engineering Experiment Station (TEES)

The planning process involved extensive analysis of existing conditions, opportunities, and constraints ranging across relevant disciplines such as site utilities, transportation, and parking. Additional consideration included smart technology integration, site security, workforce training, sustainable development strategies, and resilience, such as potential flooding and stormwater management.

Multiple land use plan alternatives were prepared and reviewed, with final selection as documented in this report. The work occurred over approximately one year.

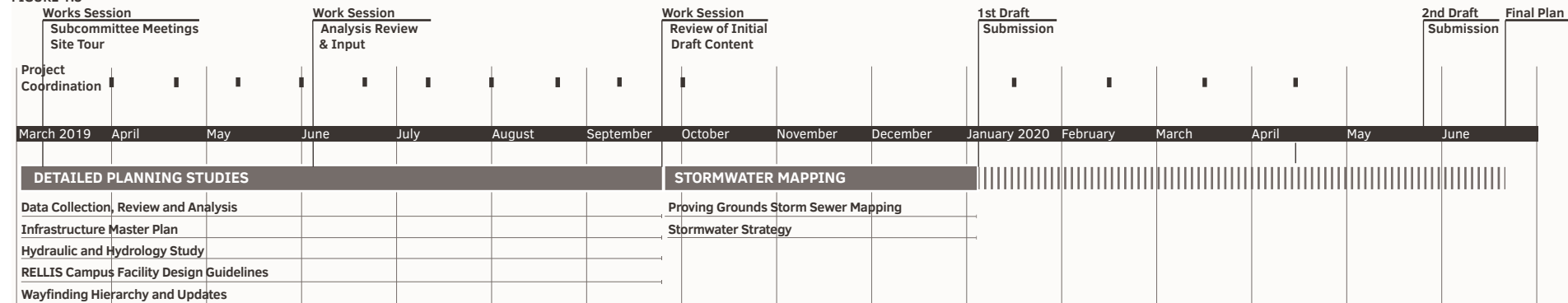
MASTER PLAN PROJECT TIMELINE

FIGURE 1.4



MASTER PLAN UPDATE TIMELINE

FIGURE 1.5



2

Background

- 2.1 Regional Context
- 2.2 Site Context
- 2.3 Campus History
- 2.4 Bryan Army Air Field Features
- 2.5 Current Programs and Facilities





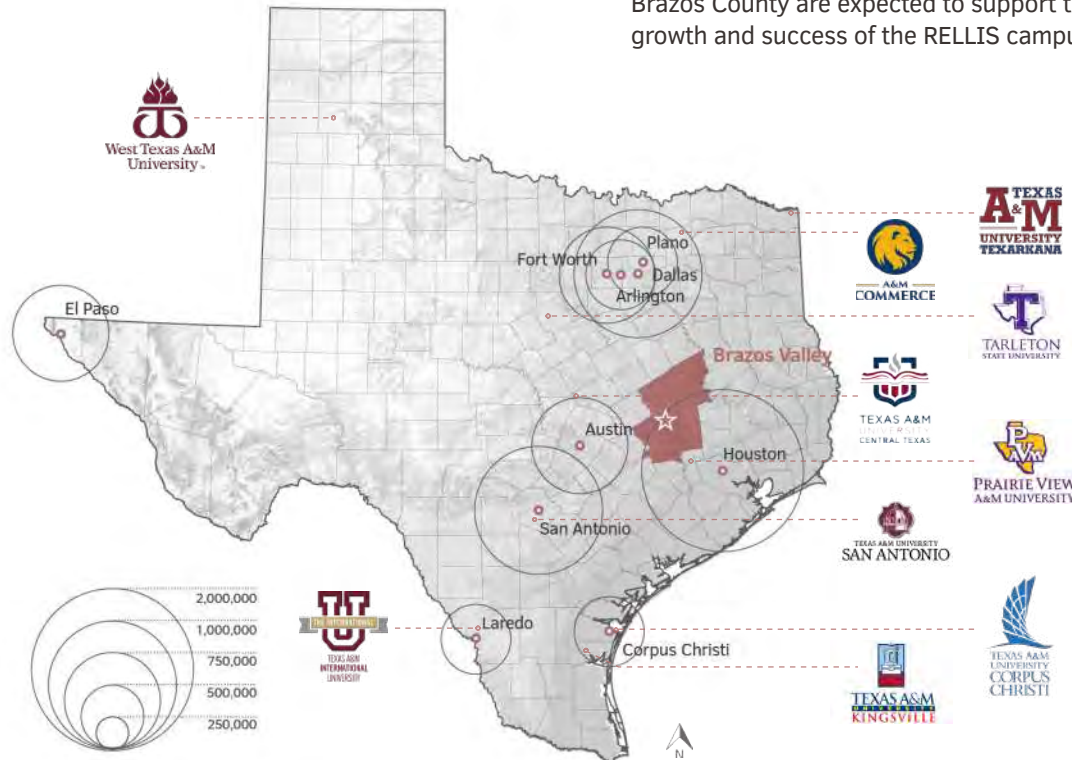
2.1 REGIONAL CONTEXT

The RELLIS campus lies in the Brazos Valley, midway between the four largest metropolitan areas of the state: Houston, Dallas-Fort Worth, Austin, and San Antonio.

The RELLIS campus sits at the intersection of State Highways 21 and 47 with primary access from State Highway 47. The campus immediately adjoins the western city limits of Bryan, a community with a population of about 76,000. The Texas A&M University campus is located in College Station, approximately eight miles away. Texas A&M is the largest employer in the area and has an enrollment of over 60,000 students. Growth of Texas A&M since its founding has played a major role in the continuing growth and prosperity of the county and nearby cities.

Various plans prepared for the City of Bryan and Brazos County are expected to support the long term growth and success of the RELLIS campus.

FIGURE 2.1 Brazos Valley in context within the State of Texas and A&M System Institutions



CITY OF BRYAN BLUEPRINT 2040 2016 COMPREHENSIVE PLAN

The plan highlights recommendations and actions pertaining to various city policies and programs including: Land Use, Municipal Services, Economy, Wellness, Education, Community Appearance, Transportation, Parks and Recreation. This is a guide for Bryan's future physical growth expressed through goals, objectives, and policies of relevance to RELLIS.

CITY OF BRYAN WEST AREA PLAN

A 4,546 acre sub-area plan calls for new residential/retail growth, trails/open space, and transportation improvements as part of a new urbanist mixed-use development plan.

BRAZOS COUNTY HIGHWAY EXPANSION

The plan shows what Brazos County's roadway network could look like in 2050 to handle the projected population growth of the metro area, including extension of State Highway 47 to the north.

The Texas Department of Transportation is also planning to upgrade US 190 to become Interstate 14, which would run through Brazos County.

TEXAS A&M HEALTH SCIENCE CENTER AND COLLEGE OF MEDICINE

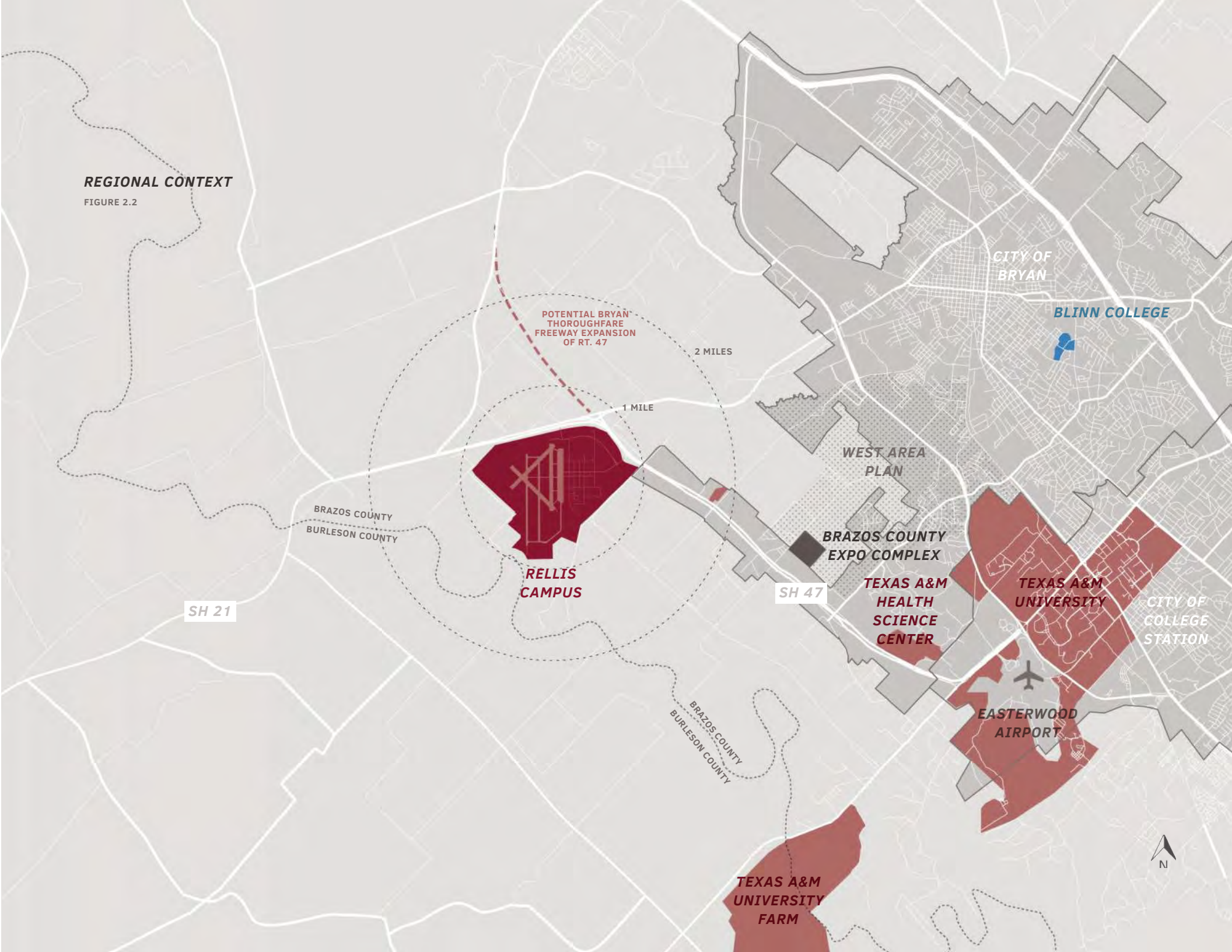
The Texas A&M Health Science Center (TAMHSC) merged with Texas A&M University on July 12, 2013. TAMHSC offers programs on a "distributed" (geographically dispersed) model with one such location down the road from the RELLIS Campus.

CITY OF BRYAN COUNTY EXPO EXPANSION

A \$3 million dollar expansion includes a greater capacity for large events and multiple events at one time.

REGIONAL CONTEXT

FIGURE 2.2



2.2 SITE CONTEXT

The RELLIS Campus is defined by State Highway 21 to the north, State Highway 47 to the east, Kuder Road and Pitts Road to the west, and Goodson Bend Road and the Brazos River to the south.

The 1,877-acre campus is located in the prairie grasslands of central Texas. The predominant natural features on the site include the Brazos River and large areas of vegetation. The site currently has nearly 900 acres of pasture. Within the core area of the campus, large oak trees surround an old baseball field and line streets such as Bryan Road, providing the campus with an existing mature tree canopy in some locations. Areas of thick brush exist on the southeast portion of campus, near a retention pond, and between runways of the original air field.

The built form of the campus is dominated by the air field, which consists of three 5,000-foot runways, two 7,000-foot runways, and a 4,500-foot apron that is approximately 500-feet wide. A partial grid of streets is situated to the east of the runways, with five north-south avenues and six east-west streets. Existing structures on campus comprise just under 500,000 square feet of area, with significant additional facilities in construction, design, or programming stages.

IMAGES OF EXISTING CONDITIONS





**AERIAL IMAGE OF CAMPUS
(NOVEMBER 2017)**

FIGURE 2.3

2.3 CAMPUS HISTORY

The RELIS Campus has a distinguished history and retains many reminders of its role in World War II and later as a facility supporting Texas A&M University. Many of its original features and remnant sites are worthy of retention and celebration going forward in the 21st Century.

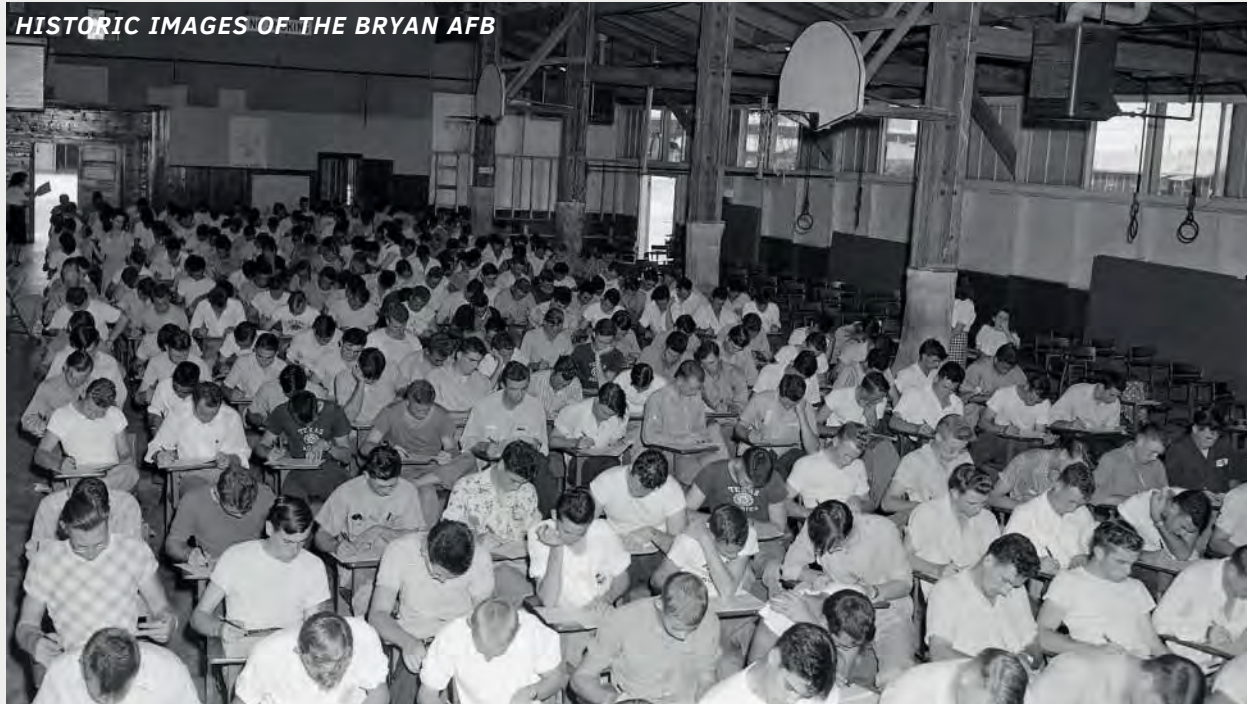
“As we embrace the future, it is important to remember the past and the role that the Bryan Army Air Field played in the history of our country and our community.”

JOHN SHARP
CHANCELLOR OF THE TEXAS A&M UNIVERSITY SYSTEM

In 1942, based on the recommendation of a Chamber of Commerce committee, a site of approximately 1,870 acres was acquired by the federal government to support the war effort. First known as the Army Air Force Flying School, and later as the Bryan Army Air Field (AAF), the base was used to train pilots and instructors for World War II. The base was mainly wood-frame structures on concrete slab or wall foundations built to last just a few years. The base included areas for administration offices, classrooms, housing, hangars, and recreational facilities. After the war ended, the base was listed as inactive and officially stopped flight training in 1947. As of 2016, 38 buildings and structures, in various states of repair, remained from the Bryan AAF.

In 1951, the newly reformed United States Air Force opened Bryan Air Force Base (AFB) at the decommissioned Bryan AAF. This time the focus was training pilots for the Korean War and later for the Berlin Crisis. During the war, the base was noted for not segregating African American officers at a time when most southern cities (including Bryan) were still segregated. The base used many existing buildings from the Bryan AAF and constructed another 33 to expand the facilities, including larger hangars, housing quarters, and education buildings. The base was closed in 1961, the land was declared surplus, and in 1962 the General Services Administration leased the property to the A&M College of Texas. In 1963 the College was renamed Texas A&M University. In 1982 the entire site became the property of the university system.

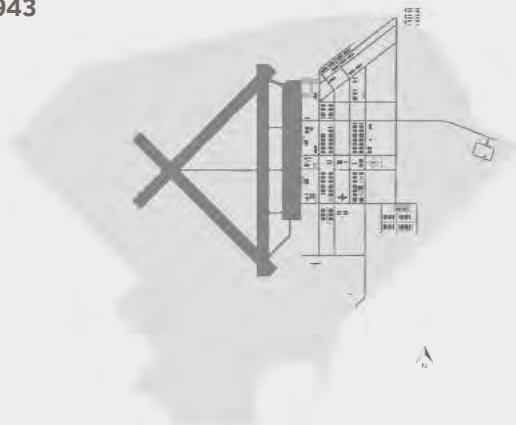
HISTORIC IMAGES OF THE BRYAN AFB



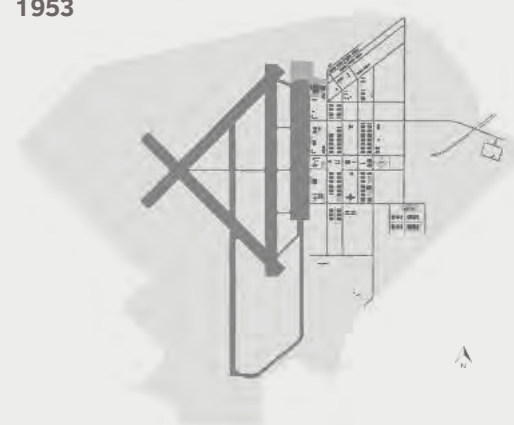
SMART CONNECTED CAMPUS

FIGURE 2.4 (All) Plan of the then Bryan AFB and AAF.

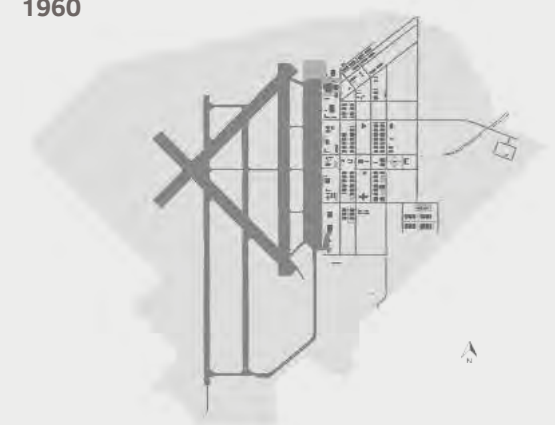
1943



1953



1960



2.4 BRYAN ARMY AIR FIELD FEATURES

After a complete building assessment by AmaTerra Environmental in 2016, and voluntary coordination with the Texas Historical Commission (THC), five properties are found to be eligible for listing in the National Register for Historic Places: the original headquarters, the aircraft engine shop, a hangar, and two cadet quarters.

BUILDING 6502 AIRCRAFT ENGINE SHOP

Built in 1955 as an engine shop, Building 6502 has a concrete foundation with CMU walls and large metal frame windows at various levels around the building. There are multiple wooden bay doors on the east and west façade. It is significant due to its associated military use and distinctive characteristics of a building type. Building 6502 is scheduled to receive a commemoration plaque as coordinated with THC.

BUILDING 8007 HEADQUARTERS

Building 8007 was constructed in 1943 as a U-shaped wood-frame building on a raised concrete foundation wall. It was originally the post headquarters for the Bryan AAF and later reused as the headquarters for the Bryan AFB. Building 8007 was removed in 2017 and is scheduled to receive a commemoration plaque as coordinated with THC.

BUILDING 8031 HANGAR

Built in 1953, Building 8031 is a large hangar with corrugated steel siding and a barrel vault roof. There are additions to the main building and some alterations to the original bay doors. It is significant due to its associated military use and distinctive characteristics of a building type.

BUILDINGS 8474/8475 CADET QUARTERS

Built in 1943, Buildings 8474 and 8475 were rectangular, wood-frame buildings on concrete foundations. With gabled roofs and fiberboard siding, the cadet quarters were simple buildings with noted military history. In addition to hundreds of residents during its wartime history, these quarters housed African American servicemen in the 1940s during the era of segregation of the armed forces. These buildings were removed in 2017 and are scheduled to receive commemoration plaques as coordinated with THC.

In addition to the five properties to be commemorated on the campus, the following three properties were identified as significant to the history of the campus and will each receive a commemorative plaque:

BUILDING 7006 CHAPEL

The campus' chapel will be renovated in recognition of the site's role of training pilots for World War II.

BUILDING 7077 CONTROL TOWER

The control tower is located next to the airfield apron and is a prominent and unique feature on campus.

BUILDING 7090 TTI HANGAR

A wood framed hangar with wood trusses, the facility originally had a large sliding fold up door that slid into two large door pockets. It has been renovated and reused by TTI for their proving grounds operations.

FIGURE 2.5 Key View of Bryan Army Air Field Buildings



BRYAN ARMY AIR FIELD BUILDINGS

FIGURE 2.6



2.5 CURRENT PROGRAM AND FACILITIES

The RELLIS Campus is currently home to a diverse group of users and facilities for research, training, test beds, and proving grounds. Among them are the following:

ACADEMIC COMPLEX - A&M SYSTEM

The multi-institutional center, the RELLIS Academic Alliance, provides space for A&M System institutions to offer a wide variety of curricula. TEES, TTI, TEEX and industry partners utilize the facility for continuing education, short courses and professional development programs. Students and faculty at this center have the opportunity to become involved in the research and technology development projects occurring at the RELLIS Campus.

ACADEMIC COMPLEX - BLINN COLLEGE

The local community college, Blinn College, expanded to a facility at the RELLIS Campus to allow students to learn cutting-edge, high-demand skills in an environment that encourages collaboration between public institutions and private companies. This co-location allows Blinn College students to transfer seamlessly to leading universities throughout the A&M System.

TEES/TTI CENTER FOR INFRASTRUCTURE RENEWAL (CIR)

The 135,573 square-foot CIR facility is a joint initiative of TTI and TEES and was completed in 2018. The facility includes laboratories to reduce cost and extend infrastructure safety, resiliency, and durability, as well as prepare for the introduction of connected and autonomous transportation.

TEXAS A&M AGRILIFE RESEARCH JANICE AND JOHN G. THOMAS HONEY BEE

FACILITY

The Janice and John G. Thomas Honey Bee Facility (Apiary Inspection Service) is one component of the Texas A&M University Agriculture program that focuses on research and teaching regarding honey bee biology and management. Research interests revolve around the behavioral ecology of honey bee colonies, as well as pollination and beekeeping practices.

TEXAS A&M UNIVERSITY COLLEGE OF AGRICULTURE AND LIFE SCIENCES INSTRUCTIONAL MATERIALS SERVICE (IMS)

During the past fifty years, IMS has developed standards-based agriculture curriculum covering a wide range of topics related to agriculture. IMS provides agricultural educators with quality, up-to-date, and customizable materials that can easily be used in the classroom and are aligned with Texas Essential Knowledge and Skills (TEKS) standards.

PASTURES

The pastures on the RELLIS Campus support teaching and research in selected departments within the College. The foci are animals (grazing) and pasture management (fire).

TEXAS A&M AGRILIFE EXTENSION SERVICE PHILIP J. HAMMAN TERMITE CONTROL TRAINING SCHOOL

This facility is one component of the The Philip J. Hamman Termite Control Training School that was developed to teach correct and proper treatments to termite control practitioners. The classes include lectures, field laboratories, and practical training with current termite control and inspection equipment. Students learn to apply appropriate technologies and proven methods that protect structures from termite invasion.



ON-SITE SEWAGE FACILITIES (OSSF)

The OSSF is an outdoor facility that provides training on technologies available for managing wastewater so practitioners can make informed decisions when selecting, operating, and maintaining their on-site wastewater treatment system.

TEXAS A&M UNIVERSITY COLLEGE OF ARCHITECTURE

AUTOMATED FABRICATION AND DESIGN LAB

The Automated Fabrication and Design Lab (also known as Architecture Ranch) is the College of Architecture's large-scale research and fabrication lab. It is dedicated to the advancement of student, faculty, and industry projects. The lab utilizes the latest industry and research driven technologies to provide a hands-on learning environment for its students. The lab also provides complete project fabrication and engineering services for all colleges within Texas A&M.

TEXAS A&M CENTER FOR MARITIME ARCHAEOLOGY AND CONSERVATION

The mission of the Center for Maritime Archaeology and Conservation (CMAC) is to keep Texas A&M in the forefront of nautical, maritime, and underwater archaeology research. Its areas of expertise are in artifact conservation and underwater mapping technology. CMAC has incorporated several varied laboratories specializing in various research areas and aspects of nautical archaeology.

TEXAS A&M ENGINEERING EXPERIMENT STATION (TEES)

ENERGY SYSTEMS LABORATORY

The Energy Systems Laboratory (ESL) focuses on energy-related research, energy efficiency, and emissions reduction. Some specialized areas are

optimization of commercial and industrial building operations, known as Continuous Commissioning®; enhancing overall energy efficiency in buildings through research, simulation, data analysis and outreach; conducting research and calibrated testing on HVAC systems; measurement and verification of energy savings for commercial buildings; and energy efficiency in industrial facilities.

COASTAL ENGINEERING LABORATORY

The Coastal Engineering Laboratory brings ocean and estuarine environments into a laboratory setting where engineers, researchers, and educators can tackle the most challenging problems of near-shore, offshore, and estuarine regions.

CENTER FOR AUTONOMOUS VEHICLES AND SENSOR SYSTEMS' FLYING RANGE

The mission of the Center for Autonomous Vehicles and Sensor Systems (CANVASS) is to unify research and development of autonomous vehicles and systems for the purpose of better serving the state and nation. CANVASS is a joint venture of TEES and the Texas A&M University Dwight Look College of Engineering. CANVASS is a multi-laboratory center with investigators in various departments within the college administered through the aerospace engineering department. CANVASS facilitates engineering education and is a major conduit for the autonomous-systems engineering workforce of Texas. Its primary research interest is unmanned aircraft systems.

AUTONOMOUS VEHICLE SHOP

The Autonomous Vehicle Shop's mission interests of research include Model Based Control, Embedded Systems, and Software Engineering for Mechatronic Systems, Mechatronic System Safety, and Reliability

Modeling and control of roll-to-roll manufacturing systems and autonomous vehicles, robotics, and control of large-scale nonlinear dynamic systems.

TEXAS A&M ENGINEERING EXTENSION SERVICE (TEEX) INFRASTRUCTURE TRAINING & SAFETY INSTITUTE (ITSI)

CODE ENFORCEMENT

The Code Enforcement program provides both basic and advanced training to industry professionals covering the proper administration of local programs using best practices and guidelines established by the Texas Department of State Health Services. Training includes housing, construction, property maintenance, occupancy levels, electrical and fire safety, zoning codes, and proper signage regulations covering agricultural, residential, and industrial zones.

CERTIFIED SAFETY AND HEALTH OFFICIAL (CSHO)

The program serves the needs of industry professionals as a significant safety and health professional designation. CSHO program targets those industry professionals with responsibility for worksite safety and supervision to include related inspections and audits. The CSHO program is comprised of two tracks: construction and general industry. Certifications aid in safety and health career advancement.

CRITICAL INFRASTRUCTURE SAFETY

TEEX Infrastructure Training and Safety Institute and National Emergency Response and Rescue Training Center provide customized courses and technical assistance for critical infrastructure sectors. These prepare individual responders and jurisdictions to plan for and react collectively in the event of a terrorist act

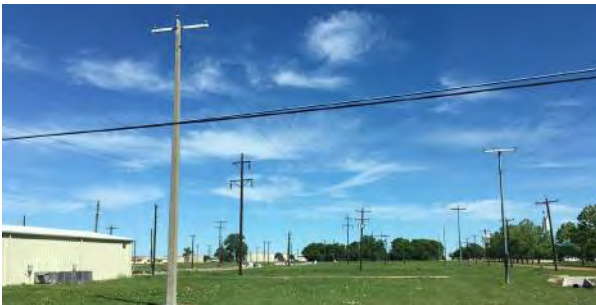
or natural disaster, as well as prepare for the recovery process following an incident.

ENVIRONMENTAL, HEALTH, AND SAFETY

Environmental, Health, and Safety (EHS) provides industry professionals training focused on current federal and state environmental laws. Courses include safety training for all related industries and continuing education opportunities specific to the EHS industry. TEEX EHS area covers several certificate programs, which include the Certified Safety and Health Official, Environmental Technician, Healthcare Workplace Safety, and Public Sector Safety & Health Fundamentals.

ELECTRIC POWER

The Electric Power program provides a complete set of technical courses and safety training for industry professionals ranging from entry level to seasoned professionals. Training is provided to private industry and local agencies covering fundamentals of electricity and introductory concepts to advanced training and leadership topics. Customized technical training is available covering safety and technical aspects of electrical power equipment.



HEALTH CARE

Protecting and monitoring the health and safety of the workplace during daily operations requires a full spectrum of programs. This broad range of specialized courses provides industry professionals with both technical training and continuing education, while meeting environmental, health, and safety training needs across all skill levels.

HEAVY EQUIPMENT

The Heavy Equipment program provides construction, utilities, and oil production industry personnel training for scraper, bulldozer, motor grader, front-end loader, excavator, dump truck, crane, or other heavy equipment. The program provides operators basic and advanced skills to safely operate machinery in all environments. It also provides hands-on training for all skill levels including work zone safety, excavation safety, confined space entry, and preventative maintenance.

OIL AND GAS/PETROCHEMICAL

This program provides industry professionals with high quality, business-relevant comprehensive topics ranging from wellhead operations and production to transportation of finished product. It provides the latest technical innovations to ever-changing regulatory requirements, all to support the world's energy production needs. It encompasses environmental laws and regulations, health and safety courses, heavy equipment operations, instructor development, leadership and supervision, and OSHA-authorized courses.

AUTHORIZED BY OSHA

The program provides the knowledge and skills necessary to create a safe workplace for employees

and to maintain voluntary compliance with OSHA regulations. Instructor expertise in construction, disaster management, general industry, hazardous materials, instructor development, leadership and supervision, maritime, oil and gas/petrochemical and safety. In addition, more advanced training and specialty courses are available.

SCHOOL BUS TRANSPORTATION

The TEEX School Bus Transportation program trains qualified school district drivers to serve as behind-the-wheel instructors. Candidate instructors demonstrate driver proficiency, receive best practices through instructor-led presentations, and perform practice teaching assignments. Hands-on training at the RELIS Campus includes bus safety inspections, field evaluations of driver competencies, parallel parking, and precision backing.

TELECOMMUNICATIONS

The Telecommunications program provides industry professionals current training in ever-changing advanced technology. Telecom professionals must be knowledgeable in fiber optics, cable splicing, telephony, and the deployment of telecommunication services, and need to stay current surrounding all industry-specific updates. Training covers not only introductory aspects but comprehensive technical topics: supervisory development and disaster management for electric power systems.

TRANSPORTATION AND HIGHWAY SAFETY

The program provides industry professionals working on or near Texas Department of Transportation roadways and Federal Highway Administration sponsored projects safety training, including work zone traffic control, traffic collision incident, school

bus operations, or continuing education provided to transportation engineers. Proper training helps ensure safe decisions are made regardless of the environment.

WATER AND WASTEWATER

The program provides basic and advanced technical training solutions to industry professionals across the State of Texas. Additionally, it provides basic and advanced licensing training and delivers federally funded Critical Infrastructure Safety technical training to plant personnel. As a result of TEEX industry expertise, many courses conducted at the RELLIS Campus are approved for credit and licensing by the Texas Commission on Environmental Quality.

OSHA-AUTHORIZED OUTREACH TRAINERS

The OSHA Outreach Training Program is an integral part of occupational safety and health training. Individuals completing a one-week OSHA trainer course are authorized to teach 10-hour and 30-hour courses in construction or general industry safety and health hazard recognition and prevention. Authorized trainers can receive OSHA course completion cards for their students.

NATIONAL UNMANNED AIRCRAFT SYSTEMS CREDENTIALING PROGRAM

The program is tailored for U.S. commercial service providers and public safety organizations utilizing small unmanned aircraft systems (UAS). Part 107/ Certificate of Authorization from the Federal Aviation Administration (FAA) is required to operate in the national airspace system. Completion enables companies to validate FAA regulations compliance for commercial UAS ventures and demonstrate safe flight and enhanced safety management systems.

TEXAS A&M ENGINEERING EXTENSION SERVICE (TEEX) LAW BUILDING AND TRAINING AREA LAW ENFORCEMENT

TEEX Law Enforcement program provides licensing by Texas Commission on Law Enforcement with the latest techniques and instructional training for crash reconstruction, forensic crime scene investigation, or police weapons and tactics training. Courses include: jail training, public safety telecommunications, forensic science, and security training for Texas Private Security Training for noncommissioned officers.

LAW ENFORCEMENT CORRECTION

TEEX Corrections Academy trains individuals to work successfully and effectively in a correctional setting. The program provides affordable learning experiences for aspiring and advancing correctional officers, and classes include physical skills training. Training provides knowledge and skills to effectively carry out duties and maintain control within a jail environment, including basic self-defense and inmate handling techniques.



FORENSICS

Criminal justice professionals seeking enhanced skills can select among several certificate programs offered through the Texas Forensic Science Academy. Forensic Technician, Forensic Investigator Levels I & II, Major Crimes Investigator, and Property and Evidence Management are approved by the International Association for Identification and the International Association of Bloodstain Pattern Analysts and accredited by the Texas Commission on Law Enforcement.

EXPLOSIVES AND ORDNANCE TRAINING (EOT)

Explosives training for Law Enforcement courses deliver specialized instruction for members of tactical response units, such as special weapons, tactics teams, and public safety bomb squads. Ordnance Removal and Remediation courses are the first and only civilian UXO Technician I course certified by the Department of Defense Explosive Safety Board.

EMERGENCY VEHICLE OPERATION

Proper operation of an emergency vehicle is critical for police officers and public safety. Participants become familiar with terminology, driving skills, and liability issues related to operating a police vehicle. Exercises enhance an officer's ability to operate a vehicle during an emergency situation by teaching personal and vehicle control limitations.

CRITICAL INFRASTRUCTURE PROTECTION

The program promotes readiness and disaster preparedness, safety, security, and community resilience in disaster situations through training to strengthen and maintain secure, functioning, and resilient critical infrastructures. Topics include threat and risk assessment, risk mitigation, resource

investment, preparedness planning, and other disaster management subjects, which prepares personnel in emergency and public services operations and critical infrastructure sectors.

EMERGENCY COMMUNICATIONS

Effective communication in stressful situations is vital for emergency responders. Courses prepare telecommunications personnel to effectively serve their departments and communities by teaching communication skills, call classification and procedures, strategies for handling difficult callers, stress management, and Spanish 9-1-1, among other topics. The program provides training requirements for the Texas Commission on Law Enforcement Basic Telecommunicator Proficiency Certificate.

SUPPORT SERVICES FOR ADMINISTRATORS, TEACHERS, AND STAFF

During an emergency on school campus – violence, terrorism, or an emergency event – the first actions taken by school administrators and teachers can minimize any potential loss of life. An effective emergency plan is critical to ensuring administration's actions are easily and correctly conveyed to emergency personnel improving response time and immediate students and employee protection.

SECURITY OFFICER TRAINING

The program provides training required for non-commissioned security officers in the State of Texas across a range of specialized areas. Certifications approved by the Texas Private Security Bureau include public safety supervisor, infrastructure protection, and school safety for managing critical incidents in higher education, such as violence prevention and sport event risk management.

SPORTS AND SPECIAL EVENTS MANAGEMENT

The program provides large-scale emergency event training for incident management, crowd and evacuation management, crisis information management, and developing capability to operate in multi-agency collaborations. Training is targeted to personnel in campus administration/emergency management; athletic department management; campus, local and state law enforcement and emergency management; local fire and emergency medical services; and large venue management/operations.

TEXAS A&M TRANSPORTATION INSTITUTE (TTI) TTI HEADQUARTERS BUILDINGS

The new 179,381 square-foot TTI headquarters houses research facilities and meeting, collaboration, and office spaces for approximately 450 College Station-based researchers, staff, and students. The building opened in Spring 2019.

TTI SEDIMENT AND EROSION CONTROL LABORATORY

TTI's Sediment and Erosion Control Laboratory (SEC Lab) provides the transportation industry with a research and performance evaluation program for roadside environmental management. The program includes stormwater quality improvement, erosion and sediment control, and vegetation establishment and management in this 19-acre, full scale, indoor/outdoor facility.

TTI PROVING GROUNDS RESEARCH FACILITY

The TTI Proving Grounds has long been a place where TTI has conducted world-class research, technology development, and testing in areas such as roadside safety, crash testing, traffic engineering, emissions,

sediment and erosion control, pavements and materials, structures, roadside signs and markings, and more recently, connected and automated vehicles.

TTI ROADSIDE SAFETY AND PHYSICAL SECURITY PROGRAM

At the TTI Proving Grounds, researchers in this program develop and test highway-safety devices, such as crash cushions, guardrails, breakaway signs, and barrier systems. Researchers in the program also test perimeter-security devices to prevent or control vehicles entering or exiting sensitive sites, such as U.S. embassies, power plants, refineries, and military installations.



TTI CENTER FOR COMPUTATIONAL MECHANICS

Researchers in this Federal Highway Administration-designated center, headquartered at the RELLIS Campus, use state-of-the-art analytical tools to accurately model crash tests on dedicated high-speed computers. These techniques enable researchers to design better, most cost-effective safety hardware at a lower cost to research sponsors by predicting how vehicles and safety devices will perform in collisions.



FEBRUARY 2018 CONDITIONS AND PROJECTS IN PLANNING, DESIGN, AND CONSTRUCTION*

FIGURE 2.7



***This map depicts the existing conditions and in progress projects on the RELLIS Campus at the time of the original planning process. The map in Figure 2.8 is an amended version to illustrate the existing conditions at the time of the plan's update.**

DECEMBER 2019 CONDITIONS AND PROJECTS IN
PLANNING, DESIGN, AND CONSTRUCTION

FIGURE 2.8



Current conditions and projects in planning,
design, or construction as of 2019

- 1 RELLIS Academic Complex
- 2 Workforce Training
- 3 Future TEES Complex
- 4 Bush Combat Development Complex
 - 4A Research Integration Center
 - 4B Ballistic, Aero-optics, and Materials
 - 4C Innovation Proving Grounds
- 5 Data Center
- 6 Central Utility Plant (CUP)
- 7 Advanced Testing and Training Area
- 8 Center for Infrastructure Renewal (CIR)
- 9 TTI Headquarters

3

The Vision for RELLIS

- 3.1 The Vision for RELLIS
- 3.2 Guiding Values and Principles
- 3.3 Campus Organizational Concepts





3.1 THE VISION FOR RELLIS

Located 15 minutes from the Texas A&M University campus in College Station, the RELLIS Campus builds upon, complements and supports the strengths of the A&M System with the goal of becoming one of the nation's leading "smart" collaborative innovation and research clusters.

"This investment could be a game-changer for the region. It will bring technology companies and major investment to our community as well as economic opportunity to our residents. We appreciate the chancellor's strategic vision and we look forward to assisting the A&M System with the implementation."

NANCY BERRY
MAYOR OF COLLEGE STATION, 2010-2016

The characteristics of an innovation campus are distinct and unique from conventional real estate development. Employees, researchers, and tenants today value connectedness and collaboration. In order for the campus to be competitive, RELLIS will provide not only superior research facilities, but also a healthy work environment, a sense of community, and the collegiality desired by today's faculty, researchers, and students. In addition to teaching and research facilities, student housing, training facilities, and testing grounds, the long term program will include other supporting uses: labs, studios, incubator space, flex spaces, retail, dining, conference and expo, and a variety of housing types.

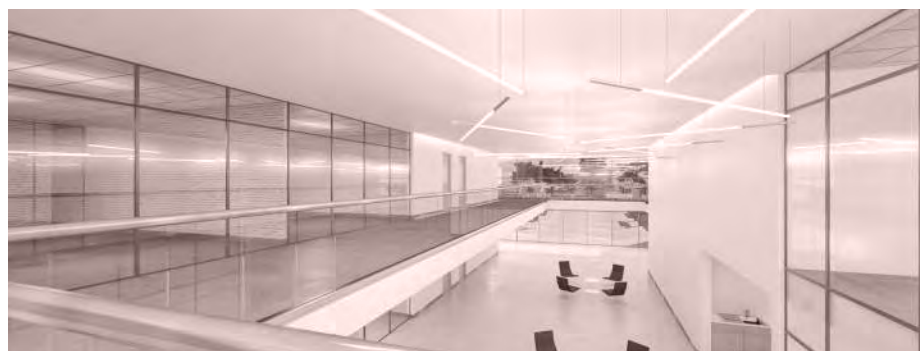
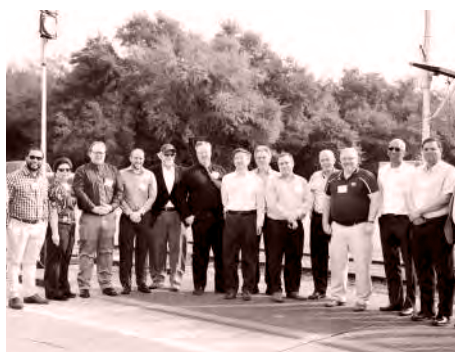
RELLIS will also be a model smart campus, where technologies are tested and utilized to benefit the campus and its efficient operations. A smart campus is a learning and research community that is maximizing the use of existing and emerging information and technology to contribute to the well-being of the community in significant and fundamental ways. A smart campus is, by definition, an innovative campus and one that will attract high quality partners.

To support this smart, collaborative, mixed use environment, the campus will feature a unified central area with a public realm that includes urban amenities such as a pedestrian oriented streetscapes, an ample and connected bicycle network, a variety of parks, plazas, and recreation fields. Public open space will be designed for use by students, faculty, staff, visitors, and neighbors, encouraging their activation and use

throughout the day beyond the hours of the normal workday. Students, staff, and faculty in particular will be able to enjoy a walk or jog through a connected open space network, or enjoy the outdoors taking a coffee break or having lunch on a park bench, open lawn area between Airfield Drive and 6th Street, or under a shade tree in a plaza. Cafés with outdoor seating are encouraged along primary streets and adjacent to open spaces to inspire informal gathering where people can share ideas.

In addition to supporting the livelihood and success of RELLIS through specific campus design principles, it will be equally important to execute that goal in a manner that is environmentally sustainable at the global, regional, and local level. RELLIS will also be developed with concepts of resiliency and sustainability in mind. This will encompass the use of the latest clean and renewable energy technologies, design of individual buildings, as well as outdoor spaces, and will extend to supporting infrastructure and operations.

EXISTING AND NEAR-TERM CAMPUS ACTIVITIES



3.2 GUIDING VALUES & PRINCIPLES

CAMPUS CORE VALUES

The RELLIS Campus is named for a set of six A&M System core values that guide the academic endeavor for an institution dedicated to serving the greater good, and that embrace the responsibility, traditions, and forward-thinking of the A&M System and those who are associated with it to advance innovation, transformation, and education.

THE RELLIS CAMPUS IS NAMED FOR A SET OF A&M SYSTEM CORE VALUES:

RESPECT

EXCELLENCE

LOYALTY

LEADERSHIP

INTEGRITY

SELFLESS SERVICE

DEVELOPMENT PRINCIPLES

Building from the six core values that define the name RELLIS, six development principles were established for the master plan that guide the decision-making process for future campus organization and development structures.

Flexibility

The development of RELLIS will occur over many years and while the core mission will remain, the specific tenants, users, and the focus of many activities may evolve. It is especially important to put in place a development framework that can adapt to changing facilities and operations while retaining the coherence and uniqueness of the campus environment.

Unique Image

The large RELLIS Campus still retains much of the character of its historic origins, with a grid street layout and several Bryan AAF and Bryan AFB buildings on a grassland prairie site. Capitalizing on this unique character while adding state-of-the-art new facilities will help to create a memorable environment that will be attractive to researchers, students, and staff and will aid in recruitment and retention.

Smart Campus

As RELLIS grows, it will have the opportunity to create a “smart” campus: one that utilizes smart technologies for buildings (e.g., low embodied carbon, advanced controls, low VOC), campus (e.g., smart grid, water efficiency, and recycling), and systems to operate and connect (e.g., autonomous shuttles, high tech security systems), and be a site for not only development but also testing and embodying emerging practices.

Innovation and Collaboration

The 21st century has seen the successful evolution of innovation environments based on collaboration and cooperation. Whether in urban environments or on a large campus site such as RELLIS, investing in elements that support these trends can support a special RELLIS Campus culture.

Connection to the A&M System

The RELLIS Campus has long been a location where Texas A&M has conducted world-class research, technology development, and workforce training in areas such as vehicle safety, traffic engineering, law enforcement training, biological materials processing, robotics, and unmanned aerial systems. In the future, this relationship will be strengthened and additional partners will benefit from this connection.

Sustainability and Resilience

The RELLIS Campus will embrace planning and design for sustainability and resilience. The long term development of the campus can model appropriate practices in energy, building design, site landscape, and stormwater management. The campus can also be an important learning environment for best practices to address environmental and economic needs.

RELLIS CAMPUS EXPANSION GROUND BREAKING



TIMOTHY HURST/THE EAGLE

3.3 CAMPUS ORGANIZATIONAL CONCEPTS

Four fundamental concepts establish the long term pattern for development of the RELLIS Campus. These concepts will ensure the functionality of some of the most valuable and intensively used parts of the campus and will affect the long term capacity and suitability of the entire site. These concepts are:

- Modifications to the proving and training grounds for efficiency
- Enhancing the grid of streets as a pattern for growth
- Focusing amenity and activity zones in areas with the highest concentration of facilities and population
- Using campus edges and entries to communicate the RELLIS brand.

EXPERIMENTATION TESTING & TRAINING GROUNDS MODIFICATIONS

To maximize the long term flexibility of the RELLIS site, proposed improvements to the existing runway system consist of strategic connections and enhancements to existing areas, and the addition of elements to consolidate the overall footprint, as shown in this diagram.

A. RUNWAY REMOVAL

B. ADD TRACK LOOP AND SAFETY AREA

C. ENHANCE/SECURE FLIGHT LINE ROAD

D. RELOCATE UXO PROGRAM

E. ADVANCED TESTING AND TRAINING AREA

- ADDITIONS
- ENHANCEMENTS
- EXISTING DEMO
- CAMPUS PERIMETER

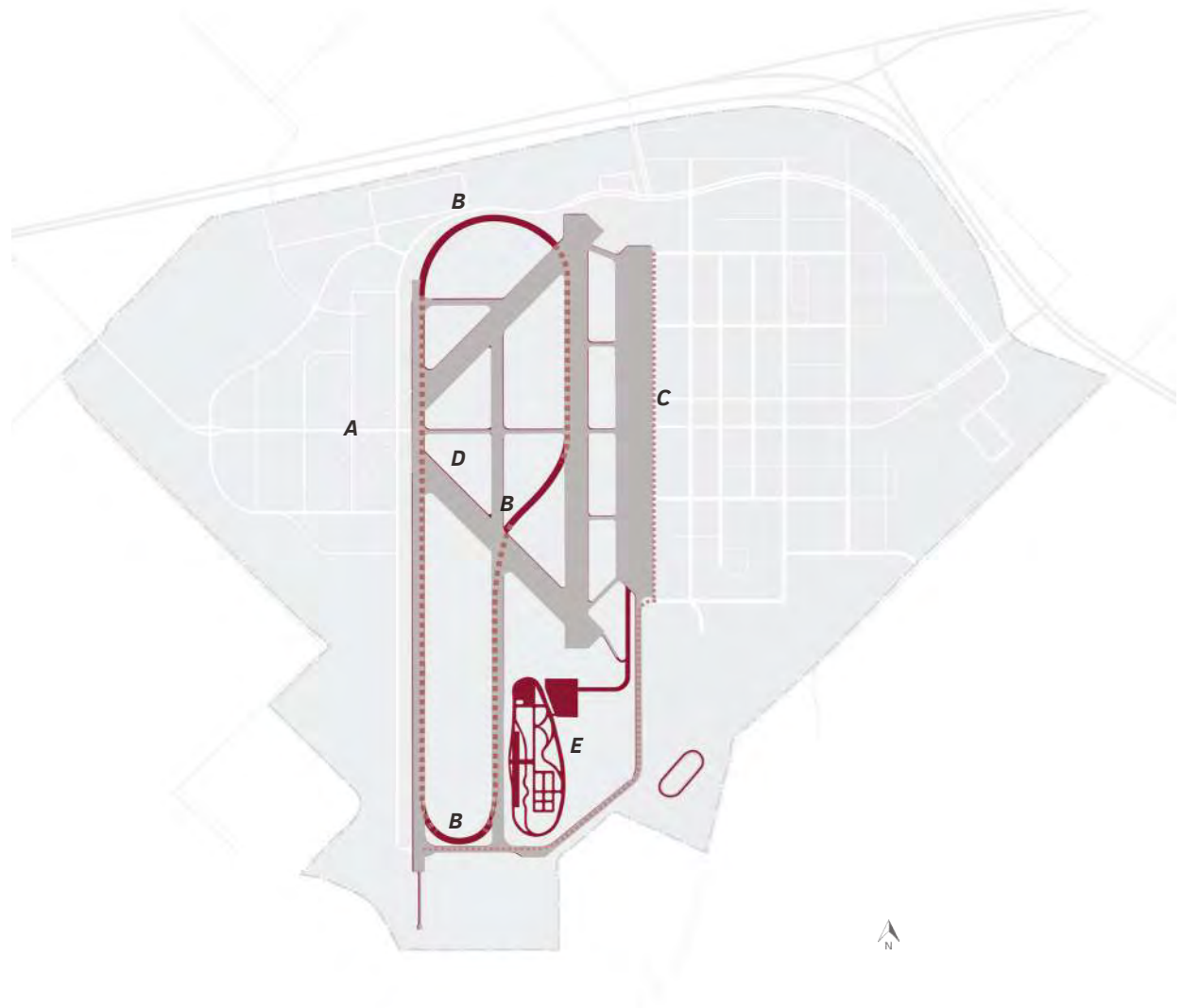


FIGURE 3.1

STREET GRID

The Bryan AAF and Bryan AFB facilities – administration, barracks, and other buildings – were organized in a traditional fashion around a grid of streets. This grid allowed easy access throughout the developed areas of the site by vehicle or on foot, and allowed for the efficient movement of equipment and supplies.

The remnant grid will be expanded as both a vehicular and a pedestrian/bicycle network, connecting destinations throughout the eastern portion of the site and allowing for flexibility in modes and means of access. Some portions of the grid may be limited to pedestrian or bicycle access while others may be multi-modal. The grid also provides a convenient framework for establishing larger parcels for development on the west side which can be further subdivided in response to specific program needs over time.

New streets will be provided as shown in the accompanying diagram:

A. PUBLIC STREET EXTENSION

B. SECURE STREET EXTENSION

C. PARKWAY STREET EXTENSION

D. NEW CAMPUS ENTRANCES

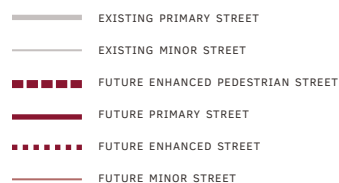


FIGURE 3.2

AMENITY AND ACTIVITY ZONES

Key components of innovative environments today are the amenities and activities that enhance the experience of the on-site population and encourage interaction and socializing. This is much more challenging on a large campus than in an urban environment. At RELLIS, these amenities and activity uses will need to be concentrated the Central Core but conveniently located to attract the entire campus population. Additional amenities will be strategically located in each district. They are intended to take the form of pedestrian streets, parks, plazas, and collections of active uses such as:

- Conference or event spaces for campus tenants or outside groups
- Food and coffee venues (including space for food trucks and other special events)
- Health, wellness and recreation facilities
- Performance or special event spaces, indoors and out, for campus-wide or regional events
- Cultural facilities such as museums or galleries

The accompanying diagram shows key amenity zones and uses:

- | | |
|-------------------------|--------------------------|
| A. CONFERENCING | D. EVENT SPACE |
| B. FOOD/BEVERAGE | E. CULTURE |
| C. RECREATION | F. MULTI-USE PATH |

- PRIMARY OPEN SPACE
- PRIMARY PEDESTRIAN REALM
- ENHANCED TRANSIT/PEDESTRIAN AREAS
- CAMPUS LOOP PATHWAY



FIGURE 3.3

EDGES AND ENTRIES

The natural prairie setting of RELLIS provides a compelling image for the campus, one which is juxtaposed with and yet complementary to the complex technologies and research that RELLIS is known for and will continue to accommodate.

The edges of the campus, retained in their natural, grassland and forested form, will be an important visual image for the campus to nurture. Vistas into the campus and views of the major facilities along the north edges of the site offer the contrasting research campus image.

Campus entries are prime locations for major campus signage and elements that celebrate the history of the site or point to the cutting edge research being done. Special treatments of these entries will be important investments for the campus.

An approach to treatments of the edges and entries are shown in this diagram:

A. MANICURED EDGES

B. MAINTAINED EDGES

C. NATURAL EDGES

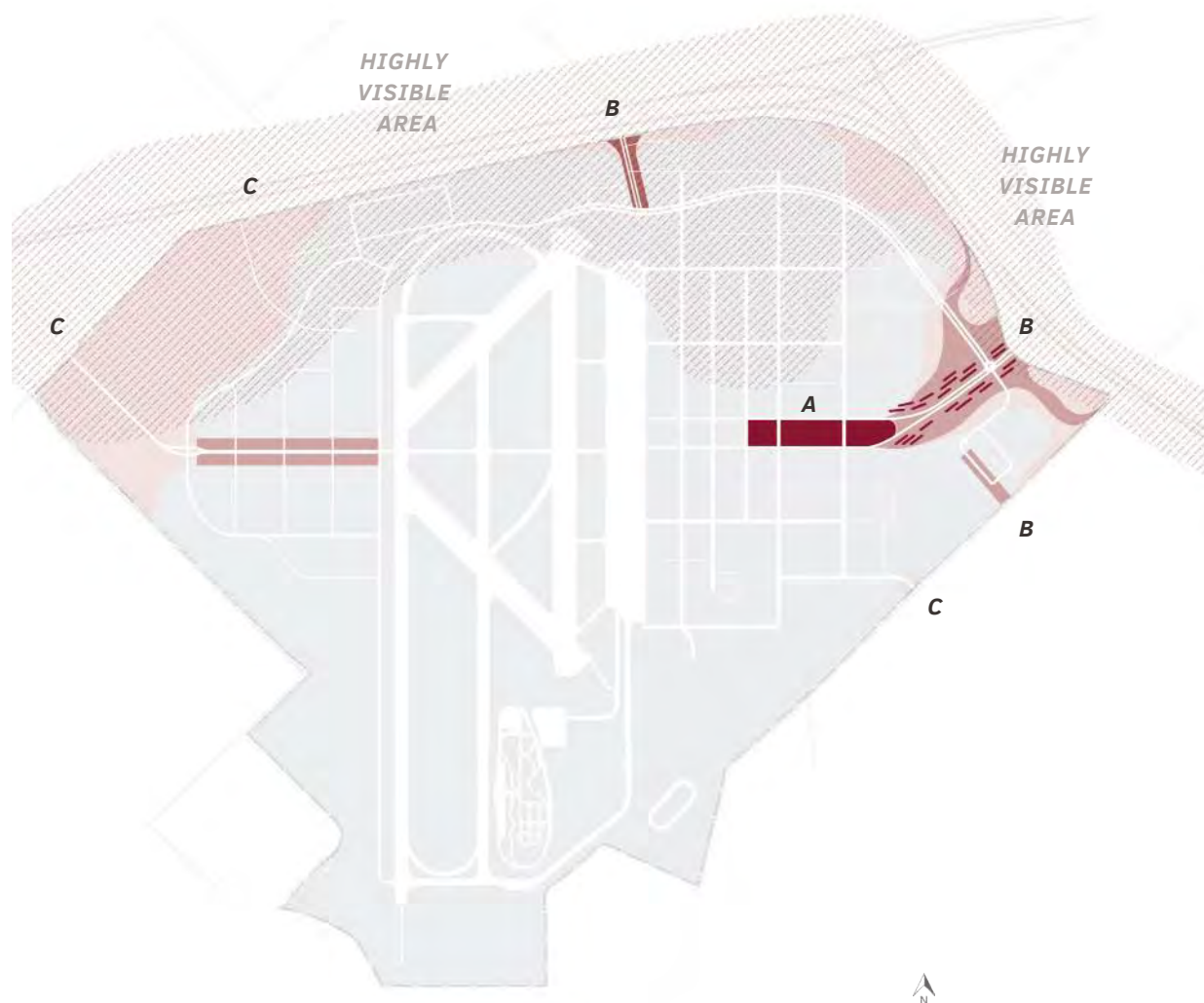
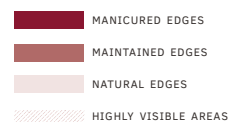


FIGURE 3.4

4

Plan Elements

- 4.1 Smart Campus Approach
- 4.2 Land Use and Development
- 4.3 Open Space
- 4.4 Transportation and Parking
- 4.5 Security





4.1 SMART CAMPUS APPROACH

The RELLIS smart campus will be an innovative research and teaching environment that makes a conscious effort to use information and technology to advance and improve the efficiency, productivity and well-being of The Texas A&M University System and larger society in significant and fundamental ways. As a testing, training, and research site, it will make a unique contribution to the evolution of campuses, cities, and environment.

APPROACH

Through its research activities as well as the implementation and management of its own campus, RELLIS will help drive the adoption of innovative practices, make optimal use of existing facilities and systems, integrate user-facing and back-end technologies, and engage researchers, organizations, and external partners to make informed and collaborative decisions in an increasingly interconnected world.

OBJECTIVES

RELLIS will be both a smart campus and a living laboratory, where technologies are tested and used to benefit the campus by creating educational opportunities in future curricula, for Agriculture and Life Sciences, Engineering Departments, Urban Planning, Architecture and Landscape Architecture, System Management, and Facility Operations. Collaborations through public, private, and dual partnerships will have the following objectives:

- Strengthen Interdisciplinary Collaboration
- Solicit Knowledge Transfer
- Enhance Opportunities for Implementation
- Enhance Campus Planning Capabilities
- Extend “Smart Campus” to Broader Community
- Test Emerging Technologies
- Incorporate New Technologies into Curriculum
- Advance Research Goals

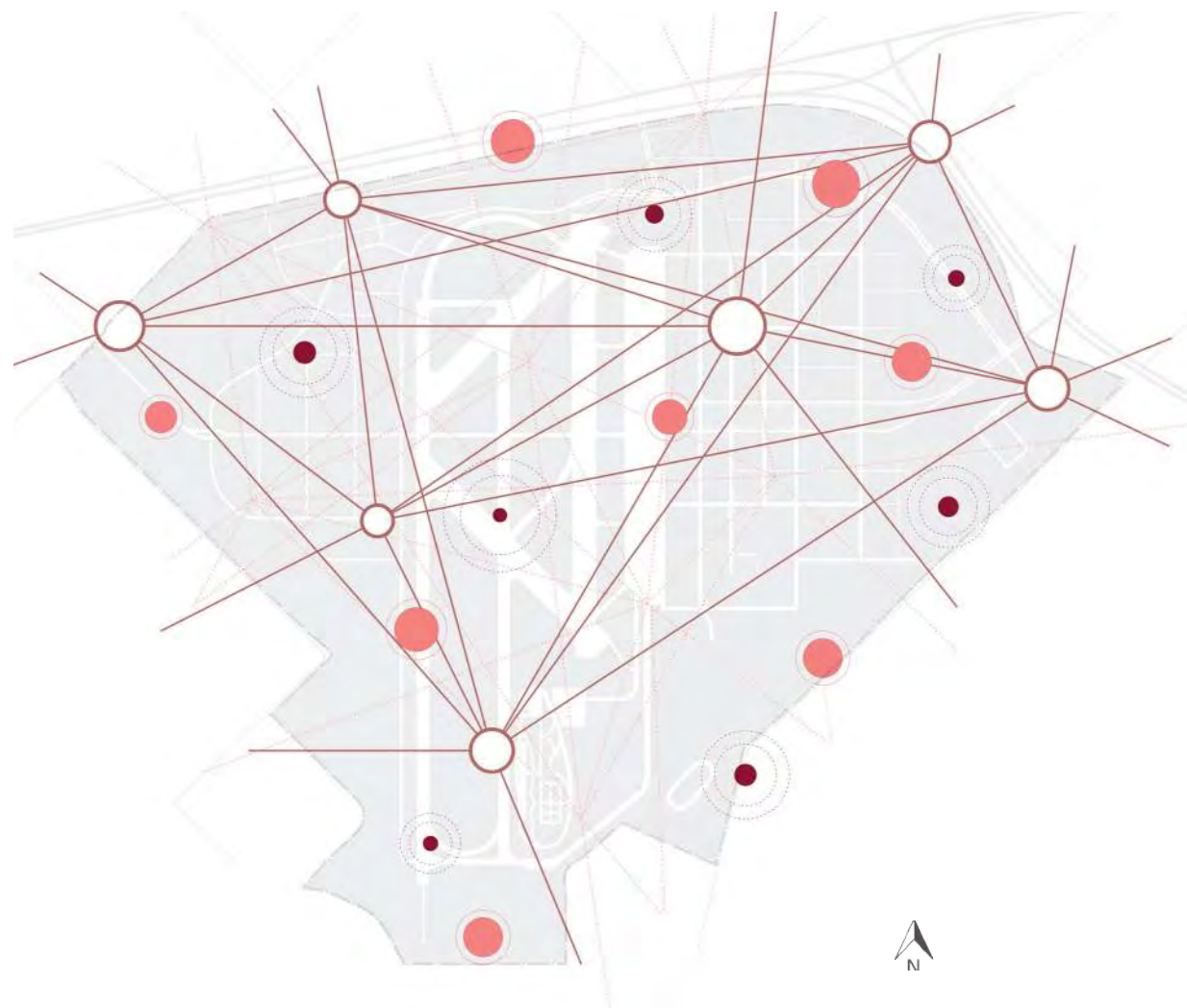
STRATEGIC FOCUS AREAS

Rapidly advancing technology offers numerous improvements and areas of opportunity. The following primary focus areas take into account the broader picture in how existing and planned assets at RELLIS can be used to positively impact the campus in far-reaching ways. Campus-wide focus areas include, but are not limited to:

- Energy Efficiency
- Information Technology
- Infrastructure & Mobility

SMART CONNECTED CAMPUS

FIGURE 4.1

**ANTICIPATED BENEFITS**

Anticipated benefits from smart innovations at RELLIS will capitalize on the opportunities afforded by advanced technologies and information management to support research while they also simultaneously:

- Reduce Operating Costs
- Increase Funding Opportunities
- Enable New Partnerships
- Develop Intellectual Property
- Enhance Regional Entrepreneur Ecosystem

A smart campus is also uniquely positioned to be a sustainable and resilient campus. Sustainability and smart technologies will be core considerations for all new site and facility developments.

One of the core goals for the RELLIS Campus is to develop into a smart campus at the forefront of new technology research and implementation. As projects are developed and programmed, integrated smart technology features should be incorporated into the overall campus network wherever possible.

A core component of developing a “smart campus” is to consider sustainable features in site improvements that provide future benefit in reducing dependencies and vulnerabilities while increasing the campus resilience. Due to the modest existing built footprint, the campus currently enjoys a relatively low heat island effect. As building density increases, new developments should strive to maintain this low heat island effect to limit the increased effect on building cooling systems and promote outdoor comfort. From a stormwater management standpoint, development should minimize impervious cover to assist in the infiltration of water and reduce excess runoff.

Smart campus opportunities extend beyond buildings to streets, utilities, open spaces, maintenance, and other campus components. Smart technologies provide opportunities for research on any of the components through data gathering and analysis. Non-secure data should be gathered at a central location for use as a research tool for the institution. If technology solutions are not incorporated from the onset of new projects, pathways should be integrated for ease of future implementation.

Innovative practices and new technologies should be incorporated in the public realm, such as smart lighting, digital parking systems, and stormwater drainage. Innovative, co-share office concepts can also be expanded to the public realm. This may include common, shared amenities that

encourage idea sharing and cross-pollination among disciplines, including dining areas, outdoor plazas, large presentation spaces, expo space, conference rooms, and fitness centers. Programming and events foster a research development atmosphere through speaker series, business development classes, patent assistance, and similar activities.

Smart campus development is also important at the district planning level. As buildings aggregate, designs should work toward the incremental development of district systems for stormwater, parking, low energy lighting, fiber, and energy. Car and bike share facilities and coordinated shuttle systems can reduce the vehicular trips and increase the efficiencies of movement throughout the campus. Lot and block patterns should be created that can be adapted to academic, research, office, retail, and residential uses to respond to market conditions over time.

Due to the rapid changes in technology development, it is difficult to predict the precise needs and specific components to be used on campus in the future. However, there are core elements that create the “backbone” for a smart campus:

- Central data facility to gather, store, analyze, monitor, and access “big data” from campus sensors.
- Flexible corridors for the connection to buildings and campus sensors and devices with the ability to add new connections as technologies change with low cost and low disruption. Empty conduits should be included with all underground installations.

Among the activities that will ensure RELLIS succeeds as a smart research and education campus are the following:

A. Keep Data Management Flexible

- Gather, store, analyze, monitor and access data from buildings, campus sensors, and devices.
- Promote the ability to add new connections as technologies change with low cost, low disruption methods.

B. Enhance Student Experience and Success

- Advance the usability and support for campus technologies.
- Promote transferability for education and research through hands on learning classrooms:
 - Create partnerships with business and government.
 - Promote student innovation and entrepreneurship.
- Engage the student community:
 - Students can be users, testers, designers, developers of future services while bringing their vision, creativity and skills.
 - Organize participatory hackathons.

C. Connect User Systems

- Use connected devices (Raspberry Pi, Arduino, etc.)
- Implement sensors (motion, access, distance, humidity, temperature)

D. Create Collaborative Teams

- Engage campus stakeholders through the CIO to share interests and visions for a smart campus.
- Create a facilities and IT partnership, monthly coordination calls, quarterly updates.
- Establish a smart campus seminar/conference to anticipate future needs:
 - Quality and efficiency of campus operations
 - Services for the academic life plus services for socializing, moving around, sharing events, signaling problems
 - Any service that makes students' lives easier

E. Advance Safety, Security, and Efficiency

- Identify vulnerabilities, configuration, and testing focusing on operations and security.
- Advance efficient monitoring of information.
- Create standards for risk management.
- Reduce campus operating costs.

F. Create Revenue Through Advanced Research

- Identify & define common infrastructure standards.
- Promote connected vehicles.
- Translate research into practical solutions that address the needs of the campus, local communities, the nation, and the world at large.

G. Market Research and Usage of Campus Experimentation Testing and Training Grounds

- Team up with videographers and storytellers to gain interest in research at RELLIS.

EXAMPLES OF SMART TECHNOLOGIES



CAMPUS/ENERGY EFFICIENCY

• Complete Building Documentation

- Building Information Modeling (BIM) : Design, contractor updates, BIM to Computerized Maintenance Management System (CMMS) support and condition assessment
- Gather and store data from all systems building sensors
- Building Management System
- Lighting & HVAC systems
- Building/room entry/exit
- Elevators
- Meters – electric, water, chilled water
- Exceed ASHRAE 90.1-2013 or 2015 IECC as adopted by the State Energy Conservation Office.
- Implement the TAMUS owned Continuous Commissioning® Process in all buildings
- Evaluate and include energy efficiency measures that minimize LCC with 4% discount rate
- Identify appropriate areas for Photovoltaic (PV) arrays
- On site power generation –
 - PV, wind, footfall panels, micro grid, peak offset
- Smart Grid – voltage regulation, distributed generation, metering and demand response
-

• Water Management

- Demand Metering
- Condensate – return for make-up, irrigation
- Greywater Plumbing - On site reuse
- Total Water Management, monitoring, condensate, potable, chilled, runoff

INFORMATION TECHNOLOGY

- **Stress Testing for Natural Disasters**
 - Measure preparation, impact, response, recovery, re-occurrence (tornado, flood, drought, extreme rain, wind)
 - Measure interaction of all systems, impacts to productivity
 - Create scenarios and alternative plan options
- **Energy**
 - Rooftop solar PV arrays
 - Battery banks
 - Innovative/electrochromic glazing
- **Geospatial Mapping**
 - Asset Management of Geographic Information System (GIS) of all infrastructure – Level B or A accuracy
- **Economic Analysis**
 - Measure Return of Investment (ROI), alternate solutions comparison
- **Health and Well-being**
 - Particulate monitoring for improved health and compliance to standards
 - Waste management, OpEx reductions, usage-based pricing
- **Campus Alert System**
 - Create message boards, mobile applications, sirens

MANUFACTURING & PROCESS ENGINEERING

- **Discrete Manufacturing R&D and Prototyping**
 - Automation and intelligence
 - Additive manufacturing
 - Analytics and sensors
 - Connected and collaborative operations
 - Integration with legacy systems and processes
 - Clean energy, high-efficiency manufacturing
 - Component prototype development and test
 - Pre-commercialization prototyping
 - Discrete manufacturing test beds
 - Flexible and responsive to industry
- **Process Engineering R&D**
 - Automation and intelligence
 - Additive manufacturing
 - Connected and collaborative operations
 - Waste and water processing
 - Fuel from waste
 - Food processing
 - Process development and prototyping
 - Integration with legacy systems and processes and process test beds
 - Clean processes
 - Flexible and responsive to industry
 - Build on existing capability and facility

TRANSPORTATION & MOBILITY

- **Complete Streets**
 - Measure pedestrian, bicycle, auto – green roads
 - Reduce wait times
- **Mobility/Traffic Flow Simulations**
 - Install mobile sensing of campus vehicles, road conditions, air quality, pipe leaks
 - Measure growth congestion, option analysis, mode choices
 - Parking location assistance
 - Install electric vehicle charging
 - Congestion reporting
 - Install and monitor bike share system
 - Parking, increased compliance and faster search times
 - Automated vehicle paths / shuttles

4.2 LAND USE AND DEVELOPMENT

The plan for RELLIS is intended to guide the future placement of buildings in areas that are compatible with their roles and with needed adjacencies and functional requirements. Despite having an extensive site available for long term development, there are particular constraints that will drive the campus configuration for the near future. These constraints are a combination of existing uses and infrastructure developed on the campus that continue to serve as key elements of ongoing robust research, testing, and training programs as well as the wide diversity of uses on the site. Some of these uses have clients or activities that require limiting access to casual visitors or those not associated with those activities.

The primary components of the RELLIS plan follow and include:

- Experimentation Testing and Training Grounds modifications
- Development districts
- Long term development capacity
- Illustrative development plan

EXPERIMENTATION TESTING & TRAINING GROUNDS MODIFICATIONS

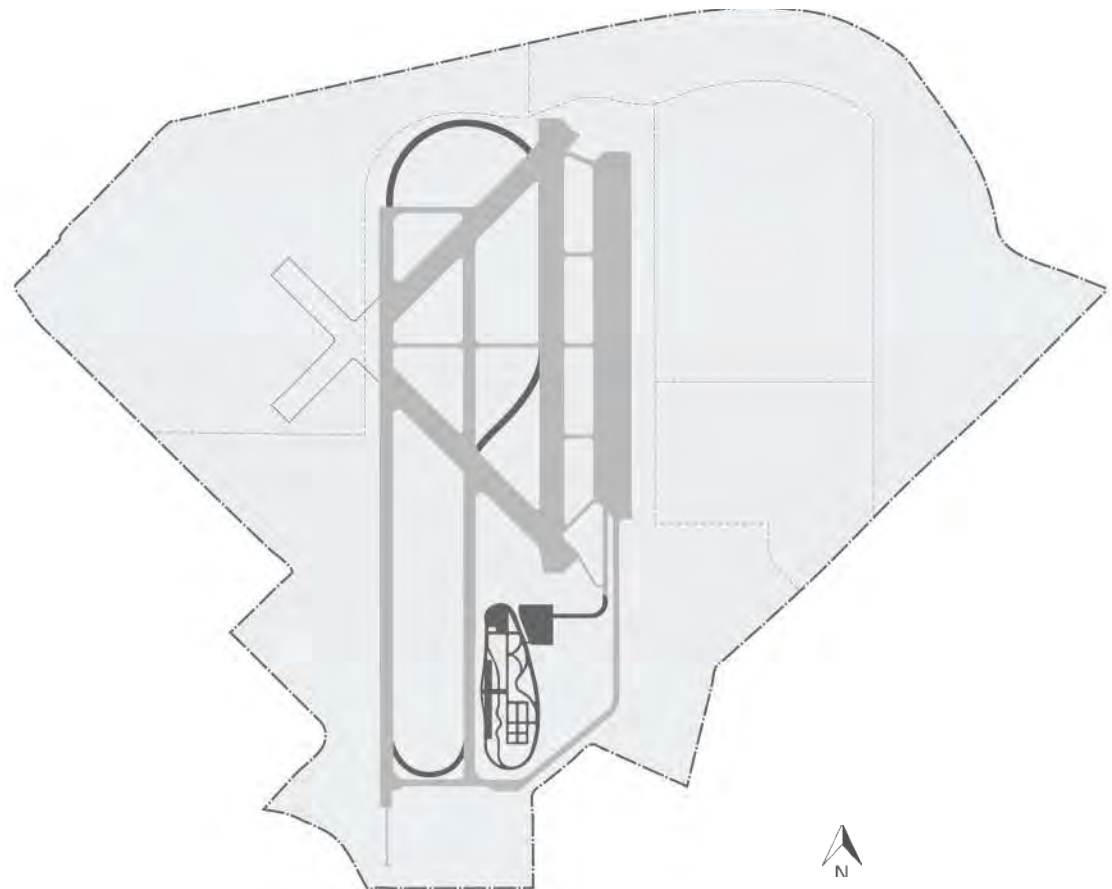
The runways and apron elements associated with the earlier Bryan AAF currently accommodate a wide range of testing, training, and research activities that contribute to the RELLIS brand and renown. Given the importance of this complex and the need to retain and improve these facilities, three alternative strategies to retaining the uses were explored. They included:

- Keeping the current configuration
- Optimizing the current layout with additional specialized components
- Significantly reconfiguring and reorienting the layout so as to consolidate it and maximize flexibility for the remainder of the RELLIS site.

SELECTED CONCEPT (CONCEPT 1 - ENHANCED)

FIGURE 4.2

The land use plan illustrates a combination of concepts 1 and 2. Much of the existing runways are retained, while strategic enhancements are included to create the necessary testing capabilities, such as a continuous driving loop and the relocation of the training course.

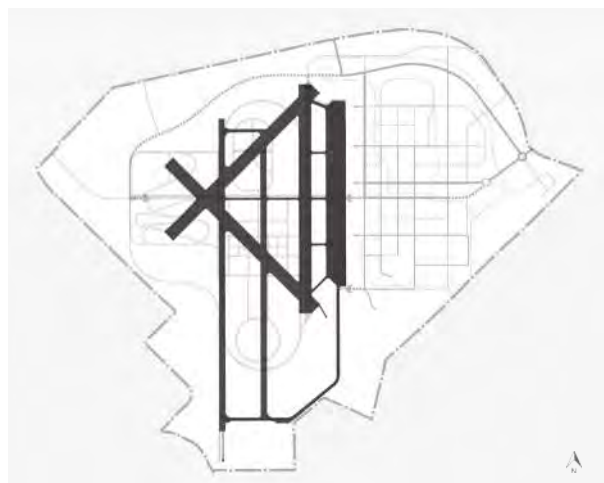


ALTERNATIVE CONCEPTS EXPLORED DURING PLANNING PROCESS

FIGURE 4.3

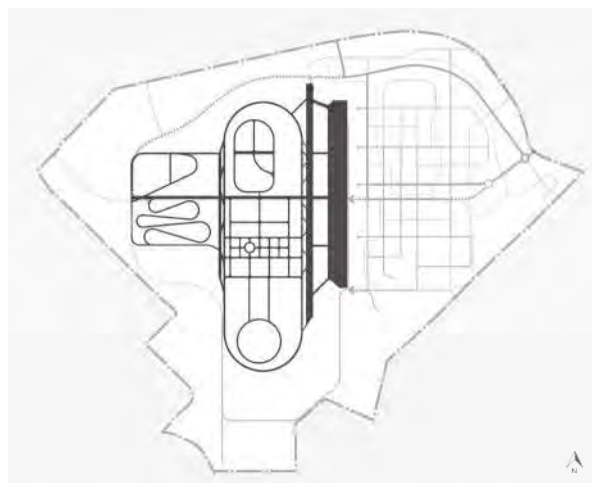
Three alternative strategies to retaining the use of the Experimentation Testing and Training Grounds were explored during the planning process. They include:

CONCEPT 1



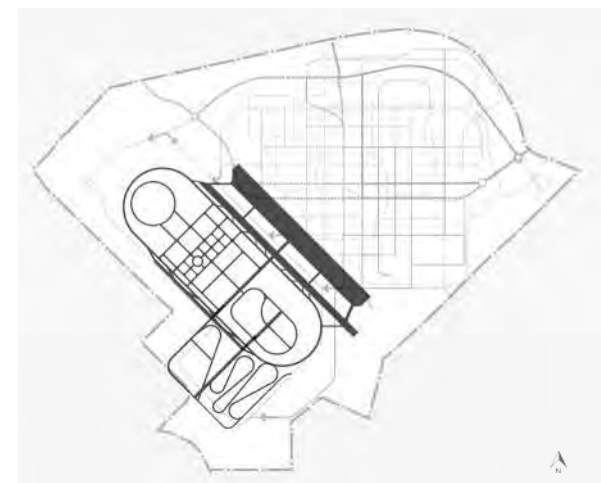
This option proposes retaining the runways and supporting uses as currently configured, with minor modifications. Since the runway complex extends quite far west on the site, this option means that most future development would be focused on the east side of the campus, with additional development possible around the periphery of the RELLIS site. This is the most cost effective option initially, but is the least flexible and least efficient over the long term.

CONCEPT 2

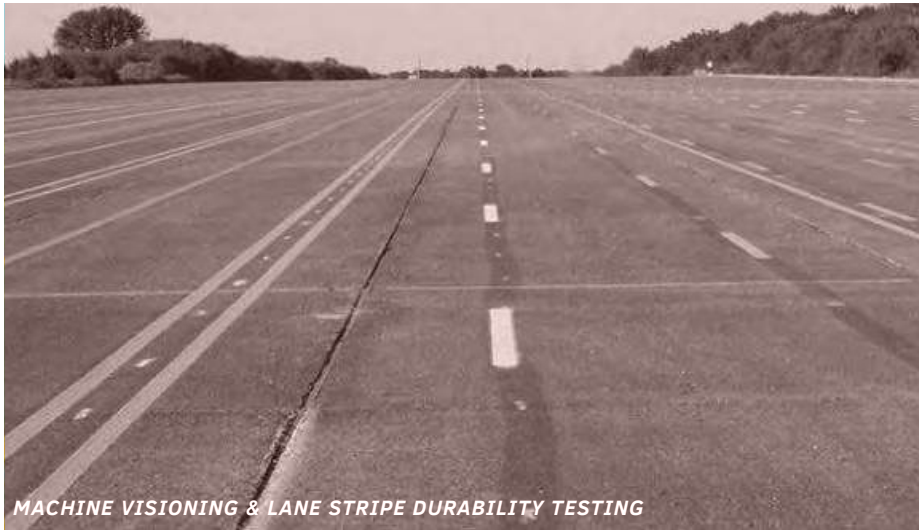
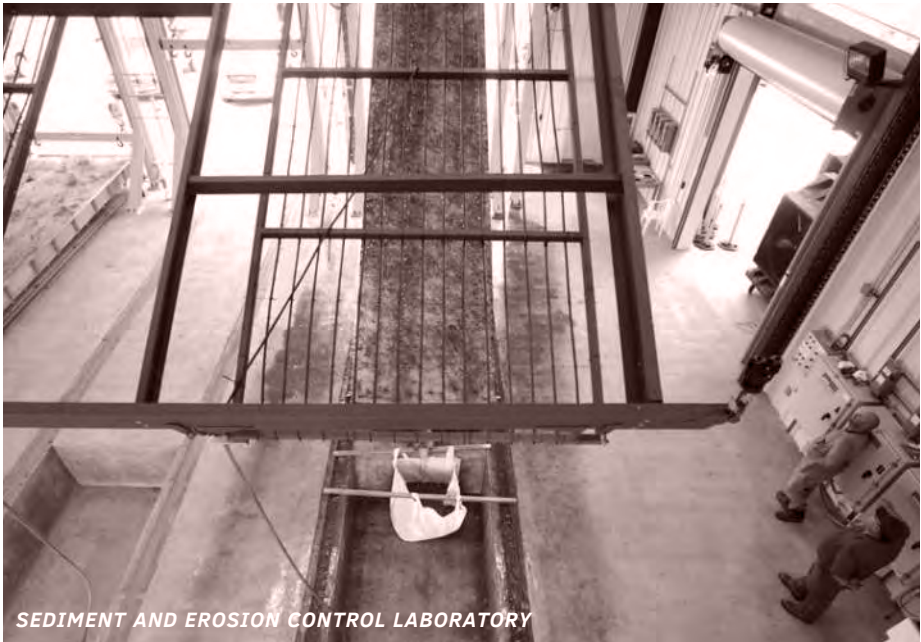


In this scenario the facility is significantly reconfigured to optimize its utility and somewhat reduce its footprint. The apron is retained, while the diagonal runway elements are removed. This option would also add paved surfaces that are particularly configured to meet test protocols. While this option improves the usability and versatility of the facility, it would prove costly and would still occupy a significant land area in the middle of the campus.

CONCEPT 3

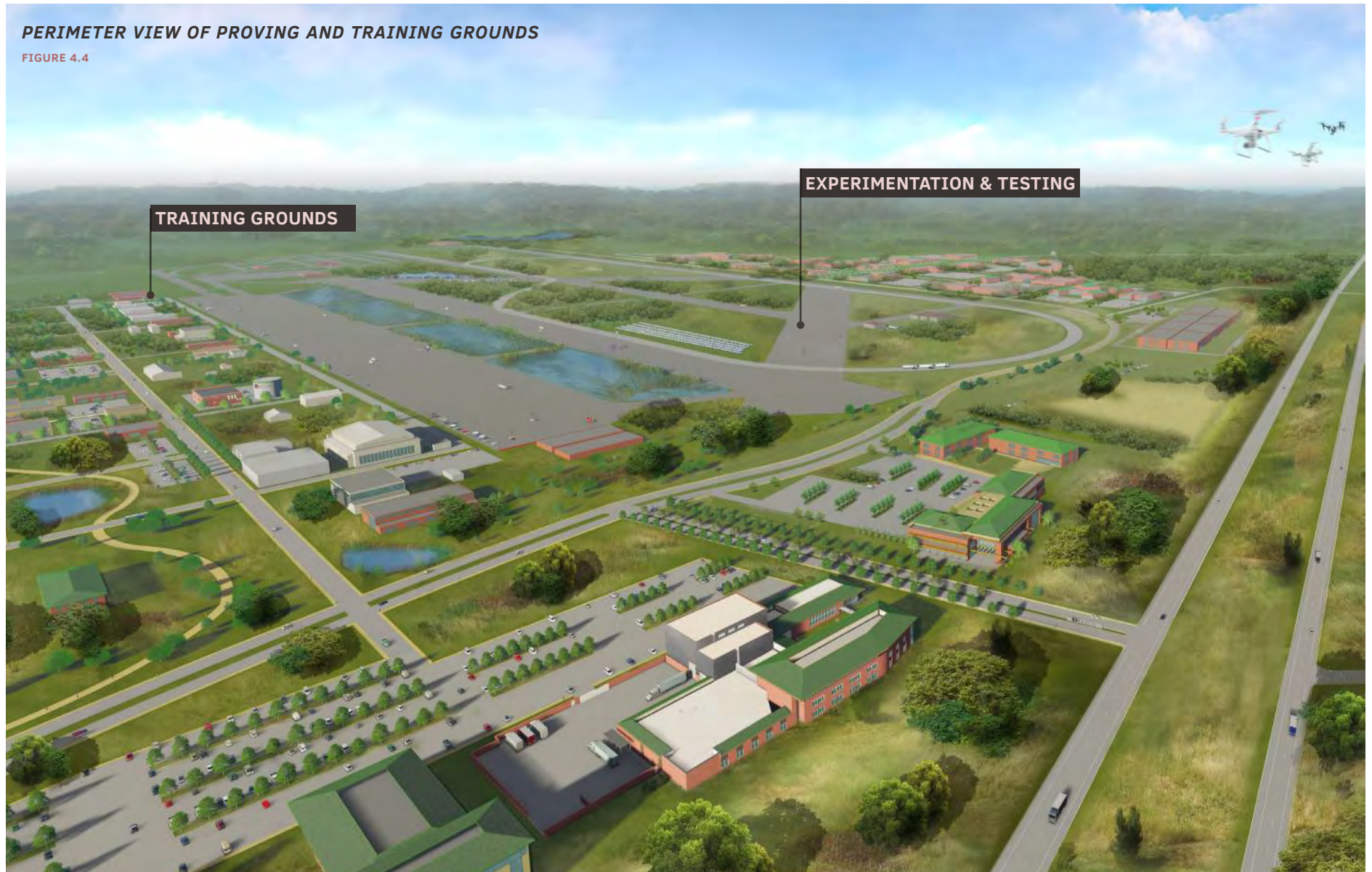


Option three relocates and reconstructs the track and testing areas to the southwest portion of the RELLIS site, and includes an optimally designed test track area and also has the advantage of relocating the facility out of the center of the site. The result is a much larger contiguous development area extending from the eastern grid area to the west, which would allow a more campus-like environment for more of the site. This would be the most expensive option explored.



PERIMETER VIEW OF PROVING AND TRAINING GROUNDS

FIGURE 4.4



DEVELOPMENT DISTRICTS

The unique layout of RELLIS and the various existing uses that will remain suggest a district approach to assigning locations for future land uses. While the districts are identified to guide the location of certain types of mutually compatible land uses, they are not intended to rigidly constrain site decision-making, although some uses will clearly benefit from co-location. The district approach also provides opportunities for varying levels of accessibility or security as needed to certain uses.

The five districts at the RELLIS Campus and their primary suitable uses are discussed below.

Central Core

The Central Core will be the most walkable area of the campus and will have the highest population concentrations and density of buildings. Included in this area are the academic campuses for Blinn College and the Texas A&M RELLIS Academic Alliance Complex, also referred to as the Academic Quadrant, which will include teaching and support facilities for both. It includes pedestrian-oriented streets that will also support multi-modal transportation options.

The expanded grid proposed for the Central Core provides a convenient and flexible way to organize this district. The grid also provides a logical way to distribute development parcels that can vary in size and location and respond to particular adjacency requirements. Parcels can be configured to include an entire block of the grid or smaller portions. The parcelization also suggests patterns for supplemental mid-block pedestrian connections that can connect nearby and related uses.

These connections also facilitate access to campus amenities such as food service or recreation by the entire campus population.

In addition to academic facilities, the Central Core may include compatible research uses, student housing, retail, recreation uses, and campus-wide amenities, creating a mixed use destination on the campus.

Perimeter

The Perimeter district lies at the edges of campus on the east and north. Today it accommodates research facilities, including the Center for Infrastructure Renewal, TTI Headquarters, and the future TEES Complex. This zone provides high visibility from State Highways 21 and 47. Accessible from both highways through major entries and via the RELLIS Parkway, it has proximity to the major academic facilities of Blinn College and the A&M System. It also allows convenient access to the amenities of the Central Core.

The Perimeter district is intended for collaborative research, private industry, and real estate opportunities on the campus. It is suitable for a range of support or related uses such as housing, recreation, or retail near the primary campus entrance, along with strategic partnership buildings or complexes.

Training/Testing

This district currently accommodates a variety of training facilities managed by TEEX and other institutional agencies. Remnants of the original grid of streets remain in this area, so its development pattern may be expanded. This will provide the district with good accessibility to the Central Core and its mix of amenities.

While some facilities within it are secure, the Training/Testing district does not require the more significant security features of other parts of campus. As a result, it can accommodate a wide range of training programs, workforce development, and research uses.

Experimentation Testing & Training

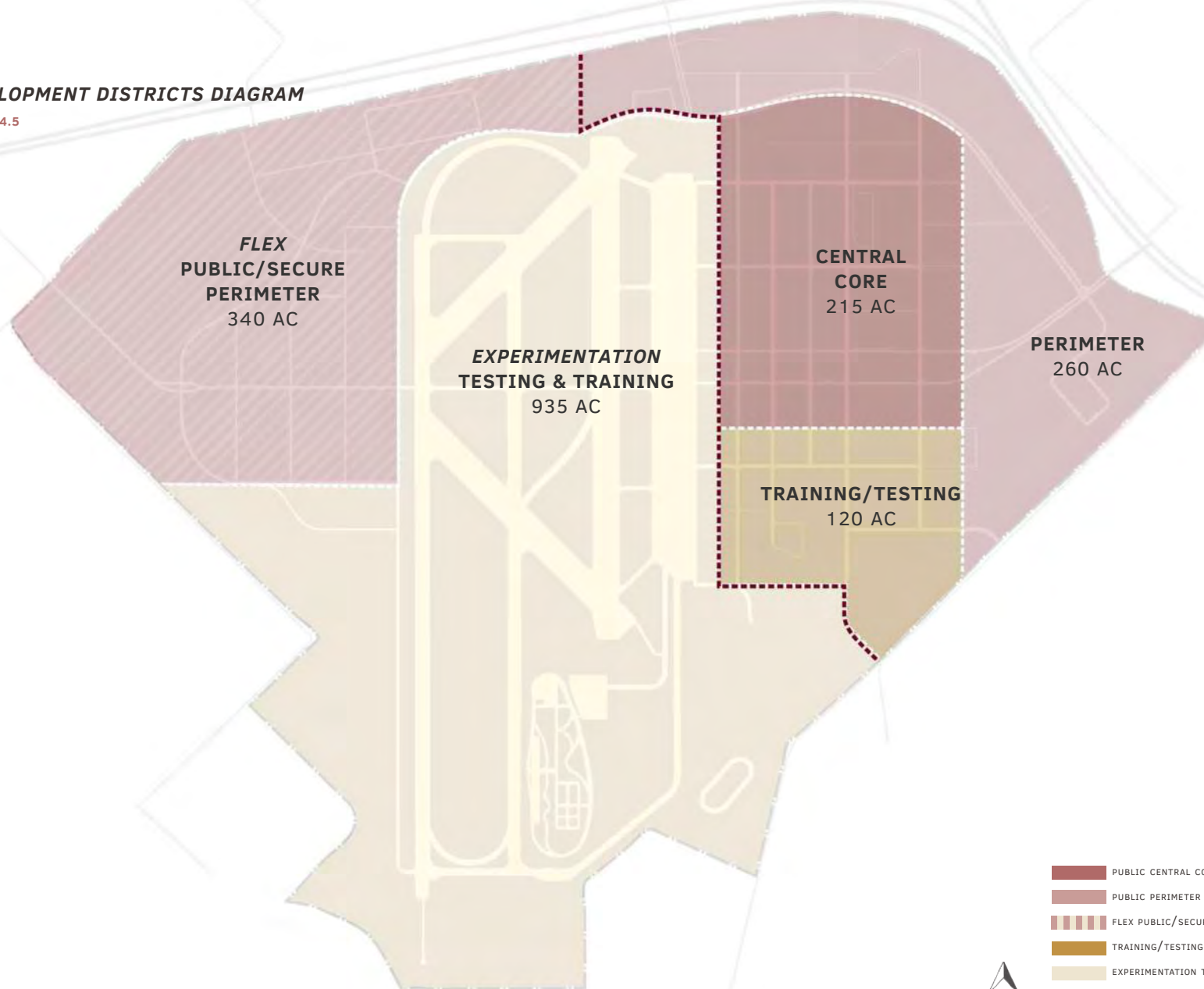
The Experimentation Testing & Training area is focused on the former airfield and test tracks as well as surrounding lands to the south and west. It provides a secure, relatively remote site where training, testing, or research can occur for emerging technologies, such as autonomous vehicles, or where expensive equipment can be secured. The area will be accessible from RELLIS Parkway on the north, as well as from a future entry road to the west. This zone shares an edge with the Flex Public/Secure Perimeter district, indicating that depending on demand, either zone can expand or contract to accommodate new users.

Flex Public/Secure Perimeter

The Flex Public/Secure Perimeter area provides land that can either be added to the Experimentation Testing & Training area or provide expansion for the Perimeter zone, based on long-term demand. Access to this area can be from a new entry at the western edge of campus at Kuder Road or from the northern entry, off State Highway 21. A secure perimeter can be adjusted as needed over time. In the near term, this district will be home to a new data center and the Bush Combat Development Complex.

DEVELOPMENT DISTRICTS DIAGRAM

FIGURE 4.5



LONG-TERM DEVELOPMENT CAPACITY

The RELIS Campus is a unique and valuable resource within the A&M System and will provide extensive capacity for development of research, training, and teaching facilities for decades to come. While it is difficult to precisely project the pace of interest in the campus and development, the development capacity of the site can be calculated.

As projects are realized in the short to medium term, there are many sites and a tremendous amount of land to consider as siting decisions are made. For the foreseeable future, surface parking will be used, and there will be little incentive to implement taller or more intensive developments.

Over the long term, as sites become scarce and the campus is successful in attracting the wide range of anticipated users, there will be more incentive to develop at higher densities. In the very long term, it is likely that some previously developed facilities, low in density and with surface parking, may be replaced or redeveloped at higher intensities. At that point it may become cost effective to construct parking structures, freeing up surface parking lots as additional development sites.

Although the campus is large enough to accommodate an enormous development program at low densities, there are several reasons to consider certain areas for higher densities and to plan for a long term future with more development:

- The framework of the campus should be planned to consider and support higher densities of development in the long term without compromising or requiring the replacement of infrastructure such as roads and utilities.
- Providing amenities such as food and recreation require adequate populations and accessibility to be

successful. Ensuring that access to amenity zones is easy and that long term development patterns will continue to support this accessibility is important.

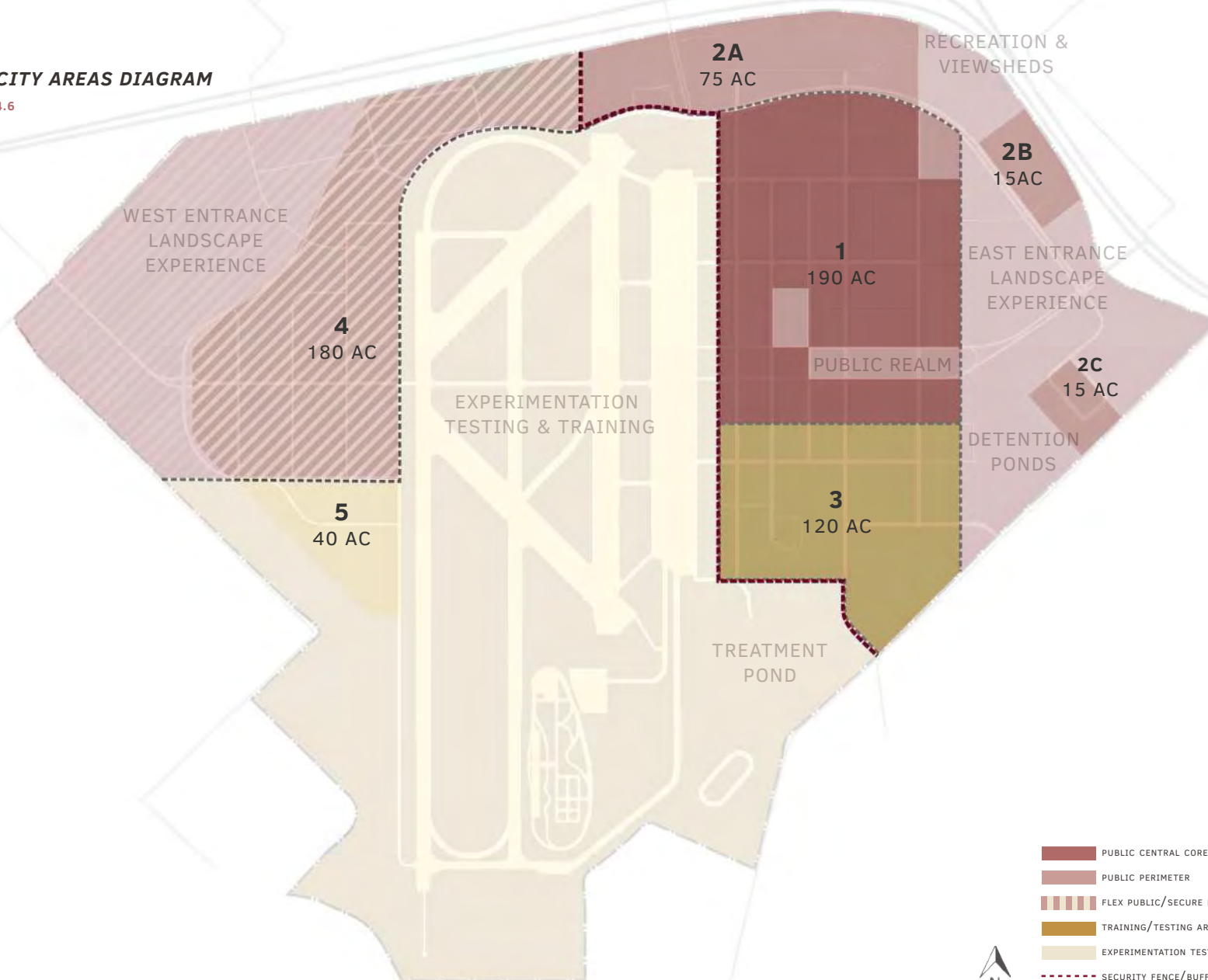
The plan shown in Figure 4.6 indicates the developable acreage of each district on the campus. As discussed earlier, each district has a purpose and a range of programs that are particularly suitable for it. Some are low in intensity, such as the proving and training grounds in the Experimentation Testing & Training area, where there will be few structures needed to serve the programs accommodated here. Conversely, the Central Core will include facilities for teaching and student housing, which are frequently developed at higher densities.

Limited development may occur outside the developable acreage noted in Figure 4.6. In particular, specialized research and testing facilities will be spread throughout the Experimentation Testing & Training area as appropriate for the specific area of focus and proximity to secure area infrastructure.

A variety of financing approaches will need to be explored to ensure that capital for infrastructure can be made available and that maintenance of this large, multi-user site can be achieved at a high standard.

CAPACITY AREAS DIAGRAM

FIGURE 4.6



- PUBLIC CENTRAL CORE AREA
- PUBLIC PERIMETER
- FLEX PUBLIC/SECURE PERIMETER
- TRAINING/TESTING AREA
- EXPERIMENTATION TESTING & TRAINING AREA
- SECURITY FENCE/BUFFER (MAY VARY DEPENDING ON FLEX AREA)



The projected 20-year build-out footprint of the RELLIS Campus is depicted in Figure 4.8. Based on proposed potential facilities and yet to be determined infill development, this scenario represents just under a .20 Floor Area Ratio. The Floor Area Ratio (FAR) is a representation of development density. This measure describes the ratio of development square footage against the square footage of site area. A 1.0 FAR means that on a one acre site (43,560 square feet) there would be 43,560 square feet of development. This could be implemented as a full site one story building or a four story building occupy ¼ of the site. A .25 FAR means that on a one acre site there would be one quarter, 25%, development program of the acreage of the site, or 10,890 square feet.

At lower densities, .20 to .50 FAR, surface parking lots are typically provided, since there is ample ground area, and buildings are typically only one or two floors in height. Above .50 FAR, buildings tend to be higher and parking is often provided in structures.

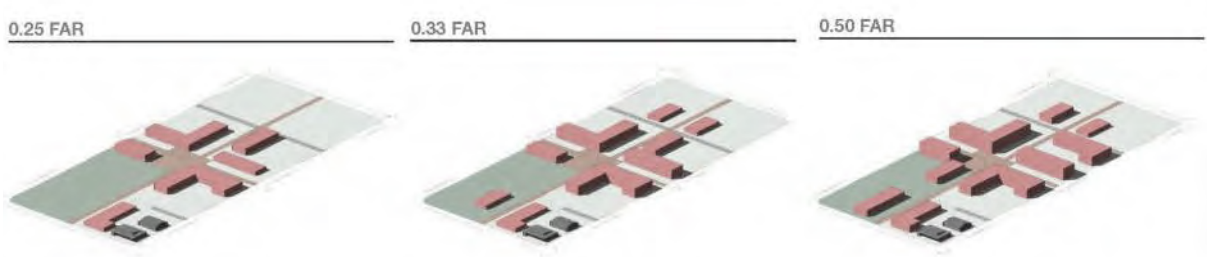
Research campuses typically increase their densities over time. Often beginning with lower density

buildings, as they become more successful and attract more tenants, land becomes more scarce and development intensifies. In some cases, such as Stanford Research Park and Research Triangle Park, growth after many decades can evolve to include uses never previously anticipated, such as employee housing or extensive retail and conference facilities. University campuses tend to be of a higher density than research parks, especially as demands for enrollment growth occur without land for acquisition. For reference, the Texas A&M College Station main campus has a density over twice that of its Research Campus.

Table 4.1 utilizes the developable acreages of each district and projects a possible development capacity in gross square feet of built space beyond that represented in the 20-year plan. As shown in the table, a baseline or moderate estimate of the amount of future development on the RELLIS Campus could easily result in an additional 2-8 million square feet of additional facilities. In the long term, the campus has a capacity that could easily exceed 8 million or more square feet with 0.5 FAR.

FLOOR-AREA-RATIO BUILD-OUT DIAGRAM

FIGURE 4.7



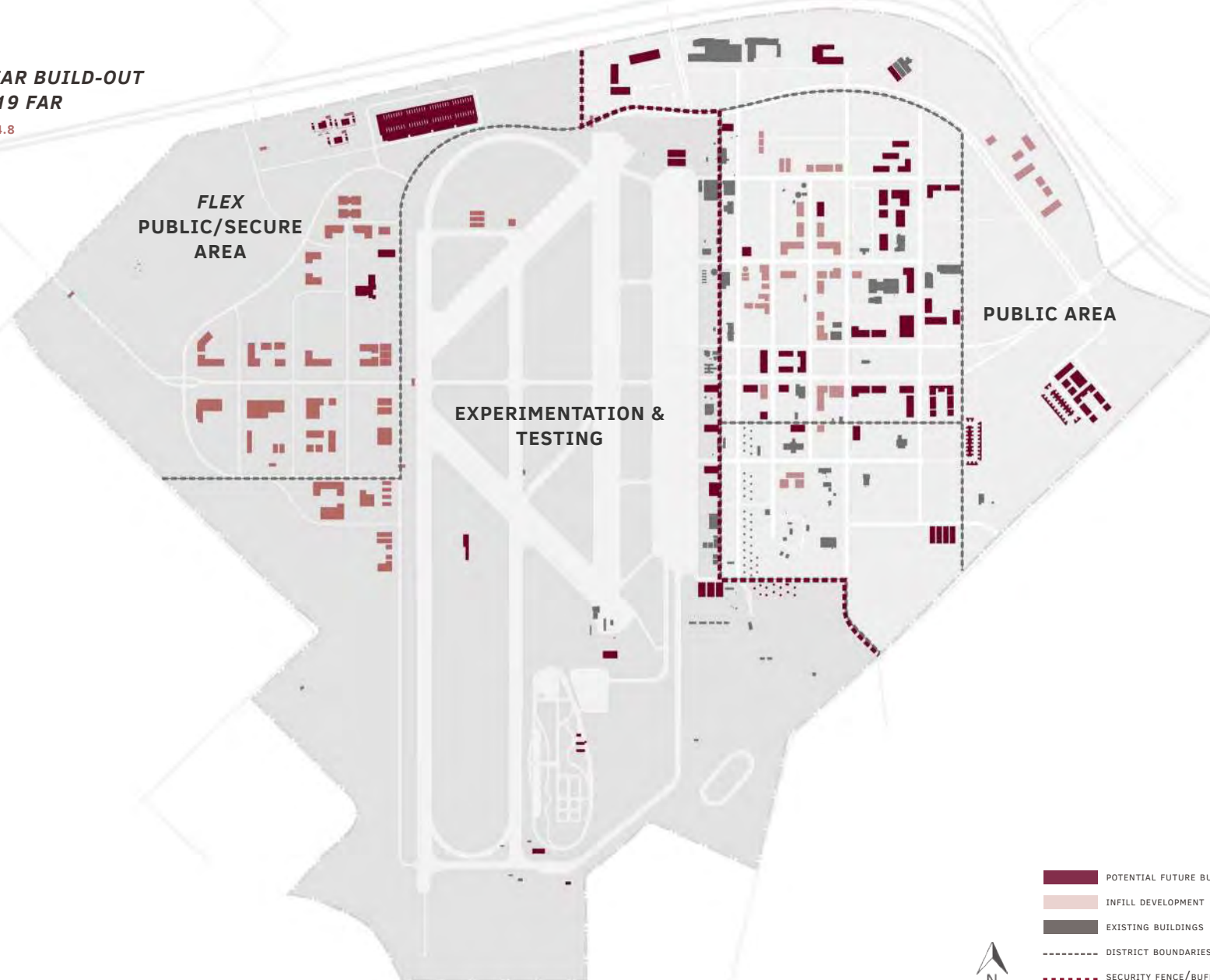
CAPACITY TABLE

TABLE 4.1

AREA	0.25 FAR (GSF)	0.33 FAR (GSF)	0.50 FAR (GSF)
1	+100,000	+765,000	+2,170,000
2A	+625,000	+885,000	+1,440,000
2B	+65,000	+115,000	+230,000
2C	+40,000	+90,000	+200,000
3	+680,000	+1,095,000	+1,985,000
4	+0	+600,000	+1,930,000
5	+185,000	+325,000	+620,000
TOTAL	1,695,000	3,875,000	8,575,000

**20-YEAR BUILD-OUT
AT 0.19 FAR**

FIGURE 4.8



ILLUSTRATIVE PLAN

The Illustrative Development Plan shows a future for the campus where approximately 5 million gross square feet of development have been implemented. This development scenario, while only illustrative, suggests ways in which growth could be guided to create a coherent image and critical mass that will help make RELLIS a preferred destination for innovation.

10 Year Potential Build-out

The Illustrative Development Plan is depicted in two time ranges, a 10-year build-out and a 20-year build-out. In the 10-year plan, it is anticipated that the majority of development will occur in the northeast quadrant of the campus. This includes several buildings within the Central Core as well as developments along the Perimeter area.

Focusing academic facilities around the intersection of 4th Street and Bryan Road begins to establish a cohesive and walkable core for students, faculty, and researches to activate and collaborate. The creation of the TEES Complex in the Perimeter provides high-visibility for this important facility and bookends the new State Highway 21 entrance with the recently-completed Center for Infrastructure Renewal.

Outside of the northeast quadrant, limited specialized facilities will be developed in other areas of the campus. These include buildings such as a new data center occupying the western portion of the State Highway 21 frontage, and research improvements such as the Advanced Testing and Training area along the southern edge of the Experimentation Testing and Training Grounds. Only limited developments are anticipated west of the Experimentation Testing and Training Grounds in the 10-year build-out, though specific or new needs may accelerate such

10 YEAR BUILD-OUT TABLE

TABLE 4.2

AREA	ACRES (AC)	NEW BUILT AREA (%)	PLANNED NEW (FAR)	COMBINED NEW (GSF)
1	190	8%	0.12	1,020,000
2A	75	4%	0.06	190,000
2B	15	0%	0.00	0
2C	15	0%	0.00	0
3	120	2%	0.02	120,000
4	180	13%	0.14	1,130,000
5*	40	0%	0.00	0
TOTAL	635	4%	0.09	2,460,000

*Facilities built outside of the “developable acreage” within the Experimentation Testing & Training Area are not included in the table. In the 10-year build-out, the total area of such facilities is estimated to be 35,000 SF.

ILLUSTRATIVE DEVELOPMENT PLAN - 10 YEAR VISION

FIGURE 4.9



development.

20 Year Potential Build-out

The Illustrative Development Plan demonstrates how this significant amount of development still represents a fraction of what the campus could accommodate. Although a significant number of buildings are shown, much of the developable area remains in open space, and all parking is shown in surface lots. Improvements to open space, road and utility infrastructure, thresholds, and signage systems will be required throughout the development timeline in order to support campus functionality and to attract future partners and entities. Strategies to identify appropriate implementation approaches and timing will be important to campus success.

Managing the development pattern in the Central Core will be particularly important. This is where the majority of the supporting amenities and active uses should be located near students, researchers, and visitors. Special events, conferences, and recreation can enliven this area and attract all campus users as well as outside parties.

Establishing a coherent development pattern on the west side of the campus is important as well. While unlikely to support the same density of use or activity as the mixed use Central Core, this zone can accommodate major research partners and can

include significant usable open space for tenants.

LONG-TERM VISION

To realize the master plan, the A&M System will need to be proactive in pursuing partnerships with private owners, developers, agencies, and other private and public entities.

The A&M System will need to establish an array of financial and district management tools, and identify the risk with private developers by making strategic capital investments. Innovative finance tools and partnerships represent a new type of public-private partnership for academic institutions beyond what may be considered traditional practices.

The master plan defines goals, program needs, public realm improvements, and the associated requirements of accommodating public-private partnerships, commercial/retail, student housing, and other community benefits. The next steps toward realizing this plan involve exploring funding options, including, but not limited to: City, Regional, State, and Federal contributions. At the time that development begins to take shape, each district will be evaluated separately.

Because campus needs are constantly changing, the exact phasing of developments are not explicitly shown. However, a broader framework has been set into place to create a path towards responsible and innovative growth. Adopting the master plan is a critical step, though not the final step, to achieving a successful vision. Each step will require its own approvals, with checks and balances along the way.

20 YEAR BUILD-OUT TABLE

TABLE 4.3

AREA	ACRES (AC)	NEW BUILT AREA (%)	PLANNED NEW (FAR)	COMBINED NEW (GSF)
1	190	15%	0.24	1,970,000
2A	75	4%	0.06	190,000
2B	15	8%	0.15	100,000
2C	15	10%	0.19	125,000
3	120	11%	0.12	630,000
4	180	22%	0.25	1,990,000
5*	40	7%	0.14	250,000
TOTAL	635	12%	0.19	5,255,000

*Facilities built outside of the “developable acreage” within the Experimentation Testing & Training Area are not included in the table. In the 20-year build-out, the total area of such facilities is estimated to be 220,000 SF.

“We think there is a lot of potential collaboration being in an engineering-centric campus—particularly when you’ve got world-class leaders like the Texas A&M Transportation Institute, the Texas A&M Engineering Extension Service, the College of Engineering and all these different folks out there.”

PHILLIP RAY
VICE CHANCELLOR FOR BUSINESS AFFAIRS

ILLUSTRATIVE DEVELOPMENT PLAN - 20 YEAR VISION

FIGURE 4.10



4.3 OPEN SPACE

The RELLIS Campus occupies a classic central Texas prairie grasslands location. Extensive grasslands dominate the site, punctuated by stands of large oaks. The Brazos River adjoins the campus, and the site slopes gently to meet it and its tributary streams. Some street trees and other vegetation screening has been added at various times in the history of the site, particularly in the eastern area and adjoining the runways.

The RELLIS open space plan builds on this context by retaining important or memorable vegetation, particularly tree stands, and by locating land uses and site development in such a way as to respect the site's prairie character while also introducing a more campus-like environment to what are planned to be the most heavily populated areas.

The plan for RELLIS takes some cues from surrounding communities. Bryan-College Station has its own unique character that offers a unique palette that begin to include easier access to public transit and a more comfortable, attractive pedestrian environment. In order to create a pedestrian focused RELLIS Campus in the Central Core Area, the plan includes a variety of social amenities and services including recreation fields and opportunities for small-scale retail and office spaces, shared-startup spaces, and a wellness center. The land use strategy for RELLIS intends to provide places for social interaction around key district spaces within a comfortable walking distance of all facilities in order to encourage people to engage and inhabit the public realm and to enjoy neighborhood serving amenities and services without needing to use their cars.

The open space framework consists of several parts:

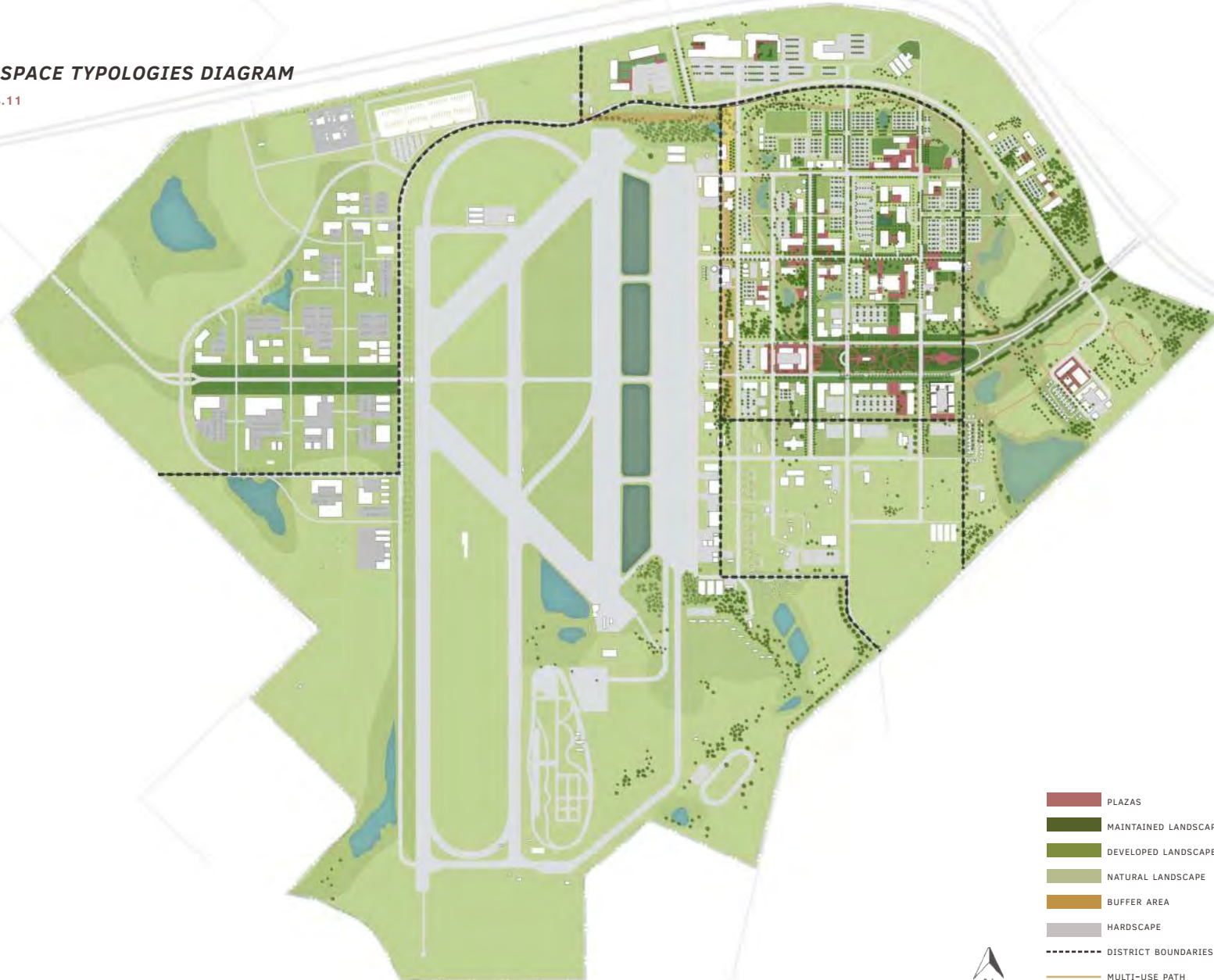
- Central Core pedestrian realm improvements will create an attractive walkable environment focused in the heart of the campus.
- Developed landscapes in the Central Core and elsewhere will provide outdoor opportunities for gathering, casual conversation, and recreation.
- The prairie grasslands will remain in less developed areas and between development zones and will include drainage courses and stormwater detention ponds as features and multi-modal trails for recreation and connections between districts.
- Entry landscapes will provide an enhanced visual experience and wayfinding for visitors and all RELLIS users.
- Circulation and parking related landscapes will include street trees and landscaped setbacks.

EXISTING SITE ASSETS



OPEN SPACE TYPOLOGIES DIAGRAM

FIGURE 4.11



CENTRAL CORE PUBLIC REALM IMPROVEMENTS

Treatment of the public realm will be particularly important in establishing the character of the RELLIS Campus. The most intensively used outdoor public realm spaces will be located in the Central Core, but additional special places should occur in other development districts.

Pedestrian Malls

Avenue C and 4th Street in the Central Core will be the primary campus pedestrian circulation routes. They will connect the academic buildings of Blinn and the A&M System with other facilities in the area, which may be additional academic, institutional, or industry partners. They will also include amenities such as conference, food and drink, event, and recreation facilities, uses that are particularly suited to a higher density pedestrian-oriented zone.

As illustrated in Figure 4.12, the 4th Street Mall is envisioned to be designed for pedestrian use while allowing emergency and limited service access. With intensive plantings of trees for shade and with seating and gathering spaces, it will be a place to meet, have lunch outdoors, or study throughout the day. Activities such as food truck events can occur on or adjoining the mall. It can also be a location for other special events and gatherings. Lined with active uses such as food, retail, and recreation, such as a wellness center, it will become an attractive destination for the entire campus population.

Elements of the design of these two pedestrian malls can include:

- Special lighting
- Unique seating including seating areas, seat walls, and grassy areas
- Building frontages that are transparent, providing visibility to dining, and active destinations such as wellness
- Durable and attractive paving, different from that of standard streets, that signals the pedestrian priority of the corridor
- Special plantings for seasonal color and ornament, while retaining a preference for native plantings where possible.

FIGURE 4.12 Key View of 4th Street





DEVELOPED LANDSCAPES

Developed landscapes in the Central Core and elsewhere will include parks and plazas, recreation fields, and usable spaces between or connecting buildings. In general, buildings set back from the streets just enough to allow planting along the pedestrian sidewalks, while maintaining street-focused entries to buildings. Street trees throughout the area and in parking lots will help provide shade for pedestrians.

FIGURE 4.14 Key view of RELLIS Plaza



RELLIS Plaza

Figure 4.15 illustrates a possible treatment of a plaza located between Airfield Drive and 6th Street. This plaza would lie in front of a major retail/dining complex located in the Central Core. As shown, the plaza fronts a grassy park surrounding the campus chapel, providing space for informal recreation or lawn seating that could be the location for an informal concert. The plaza would provide outdoor seating for adjoining food or coffee establishments, bookstore, or other campus amenities. With special lighting, art, or commemorative materials, the plaza would be a unique gathering space for all campus users.

Academic Complex

As shown in Figure 4.16, the Central Core would include a wide variety of developed landscapes. The Academic Complex with both A&M System and Blinn College facilities will include plazas and open spaces connecting buildings, with another plaza at the intersection of Avenue C and 4th Street. These spaces will provide seating and opportunities for studying and gathering outside of the academic buildings themselves.

Central Core Park

Across the core to the west and adjoining Avenue C, a park is provided in the location of the old baseball field. This park would serve an important infrastructure use by providing a natural setting for stormwater detention while incorporating a multi-use trail, connecting uses to the north of the Central Core and other destinations to the south and east.



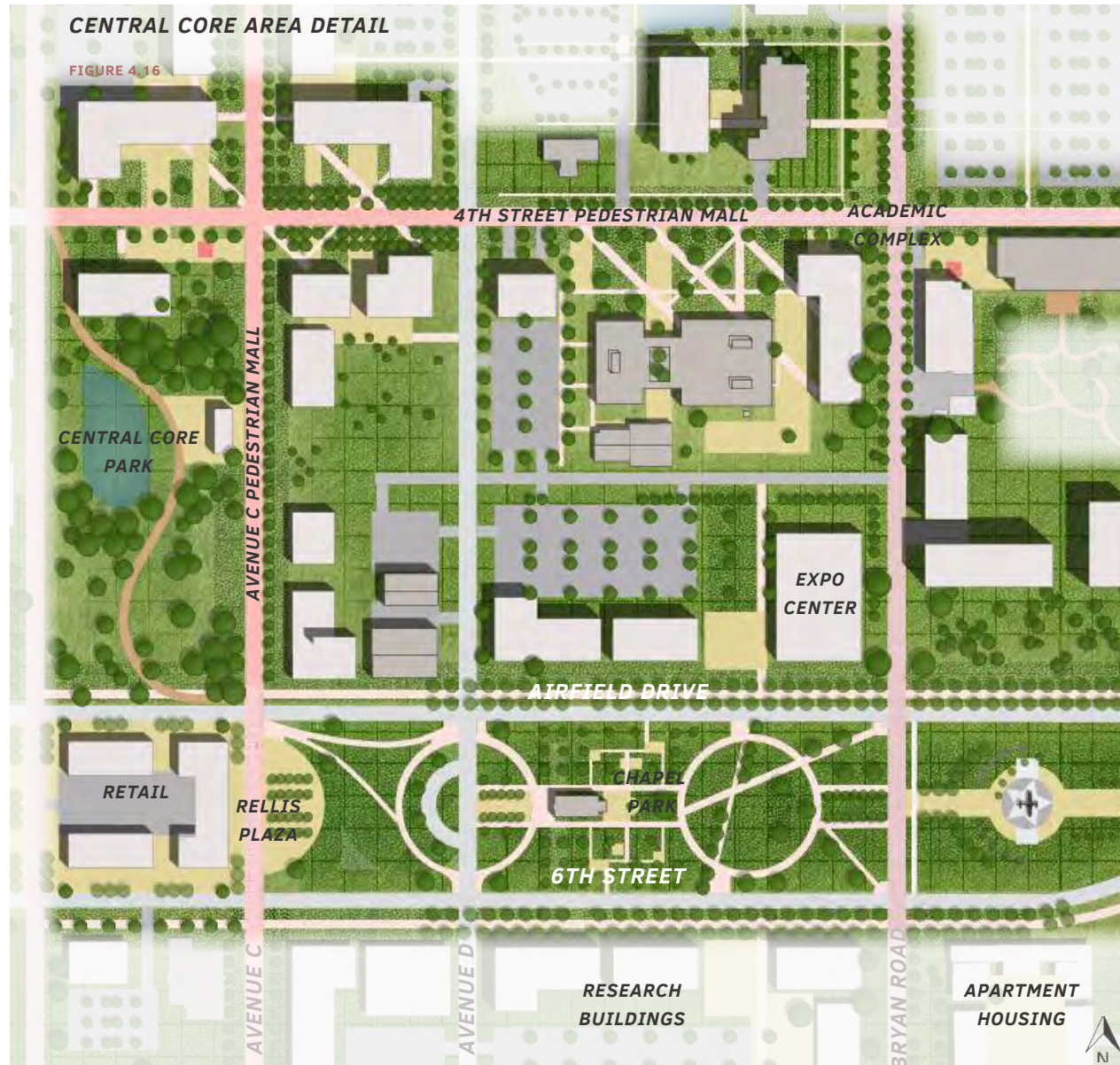


FIGURE 4.17 Key view of Central Core detail area



STUDENT HOUSING

The design of student housing and their sites will be a particularly important consideration at RELLIS. Since the growth of on campus housing is likely to be incremental, it will be important to provide an attractive environment from the beginning that will support student success in this atypical academic setting.

Undergraduate Housing Area

The underlying goal of the illustrative student housing diagram of buildings and open space, Figure 4.17, is to show a living/learning environment that supports undergraduate students academically and socially. By clustering a network of common open spaces at the ground level, there are alternative venues for students' daily living activities (dining, studying, exercising, socializing, etc.) - giving each resident a choice of

venue. Collectively, this should generate chance encounters among the community's residents that help to build a stronger sense of community.

Buildings are located close to the street to create more of a contiguous, semi-urban neighborhood out of the two blocks of housing that will fit in with the active Central Core. Drop-off areas are provided for shuttle vans, ride-sharing, and car-sharing. Street trees should be provided which can extend into the site, as well as be used in adjoining parking lots. Seating would be provided at covered entries for waiting and a secured entrance to accommodate multiple gatekeeping technologies.

Ground level common open spaces wrap central gardens to create a sense of enclosure and identity for the complex. The ground level plan creates an open,

casual atmosphere where rooms, circulation, and garden spaces can be open or closed to each other as desired - establishing a strong relationship between indoor and outdoor spaces. Loggia-like corridors can be wide enough to furnish, and together with common spaces and gardens, can be open to each other.

The residential buildings are laid out to optimize site density and to maintain visual privacy between buildings, while offering extended views of the campus at large from the residential levels. Residential buildings are envisioned as four or five stories accommodating at least 150 beds per building.

STUDENT HOUSING AREA DETAIL





TABLE 4.4 Snapshot of graduate/guest housing information.

BY THE NUMBERS

Site Area	25 AC
Parking Ratio/Bed	0.65/Bed
Number of Apartment Bldgs.	6
TOTAL BEDS	+/-1,500

FIGURE 4.19 Key view of Central Core detail area



Upper-Division/Guest/Visitor

A secondary residential opportunity is provided southeast of the Central Core, envisioned as an academic community for upper-division and graduate students, visiting faculty or researchers, and institutional guests. The location provides a proximity to the campus' primary functions while allowing options for retreat. Both apartment-style and townhouse options are portrayed in the conceptual layout.

Apartments and townhouses are shown situated at the edge of the campus grid along Bryan Road and to the east of an expanded retention area. The location along Bryan Road allows an opportunity for a presence on a primary campus green space. Each block provides

easy access to recreational space such as a multi-purpose trail and a stormwater retention area provides a visual amenity for the area.

For this type of housing, more privacy is typically desired. Units intended for families or older student might include a yard or porch. Shared outdoor space can be provided adjacent to lounge, laundry, or study areas. Informal recreation – basketball courts or grass fields – can also be provided depending on the intended desires of the target population.

Depending on the ultimate program for this type of housing and the demand for additional campus amenities, a retail or other mixed use site might be

provided off Goodson Bend Road to the east of the housing area. This could be used for short stay housing, convenience retail, school, child care, or other uses and could be integrated with the housing as a small village.

REFERENCE PHOTOS





TABLE 4.5 Snapshot of graduate/guest housing information.

BY THE NUMBERS	
Site 1 Area	15 AC
Site 2 Area	9 AC
Total Site Area	24 AC
Parking Ratio/Bed	0.65/Bed
Number of Apt. Bldgs.	2
Number of Townhouse Bldgs.	60
TOTAL BEDS	+/-500

FIGURE 4.21 Key view of Central Core detail area



TEES COMPLEX

There are opportunities throughout the campus where developed open space will provide needed usable space for the RELLIS population. As an example, the TEES Complex, located in the Perimeter zone along State Highway 21, provides a new hub for the Texas A&M Engineering Experiment Station and some of its RELLIS functions. The complex is anchored by a new TEES State Headquarters building that pairs with the Center for Infrastructure Renewal to frame an important campus threshold from the highway. This complex as a whole will house research, academic, and administrative functions for the agency.

Though not located directly in the campus core, the site has an opportunity to form a mini-campus with both interior and exterior gathering spaces and a strong sense of place for the TEES agency. The plan shows an arrangement of two industrial distribution buildings and an infill site along the entry road from State Highway 21, just south of the headquarters. This presents a glimpse of the institution's activity to visitors entering the campus, while the clustering of the facilities creates semi-enclosed plazas for outdoor functions and a formal entry to the headquarters building. An infill building site for future TEES use is located at the northwest corner of the complex. This building site provides another high-visibility location along State Highway 21 and buffers the internal pedestrian-oriented spaces from the highway itself.

INDUSTRIAL DISTRIBUTION BUILDING





TABLE 4.6 Snapshot of graduate/guest housing information.

BY THE NUMBERS

Site Area	15 AC
POTENTIAL GSF	175,000 GSF

FIGURE 4.23 Key view of Central Core detail area

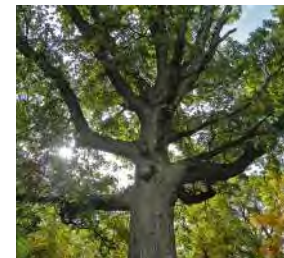


SECURE PARTNERSHIP AREAS

The area west of the Experimentation Testing and Training Grounds presents a large zone for a variety of partnership opportunity sites. This area may be secure or open, depending on demand from specific users. Site access may be via RELLIS Parkway or from new entries from State Highway 21 and from Kuder Road.

In order to establish a sense of identity for this development area, a central boulevard is suggested which will provide clear addressing for these sites. Generous landscaping on the boulevard will establish a corporate campus style identify. Setbacks may be generous but should include trails and walkways to support movements between sites and for recreation. A central dining or recreation site might be provided in this area. Development on each site should include shaded and generously landscaped outdoor spaces and connections suitable to the Brazos Valley climate.

Parcels in this area can be larger than those in the Central Core and can vary in size to suit many needs. The secure campus may to be the location of a future data center partnership for the campus. This may be a phased facility with a significant long-term build-out potential. Sites near the proving and training grounds will provide quick and easy access to this important research and testing amenity, and some facilities may be afforded direct access from inside RELLIS Parkway. A new BTU substation is proposed at the west entry, which will provide additional electrical capacity for the campus build-out, particularly for functions such as the data center.



EXAMPLES OF COMMONS IN SECURE AREA



TABLE 4.7 Snapshot of graduate/guest housing information.

BY THE NUMBERS	
Site Area	200 AC
Smallest Parcel Size	5 AC
Largest Parcel Size	30 AC
Average Parcel Size	18 AC
POTENTIAL CAPACITY	1,250,000 GSF

FIGURE 4.25 Key view of Central Core detail area



PRAIRIE GRASSLANDS AND ENTRY LANDSCAPES

Areas outside of the Central Core and other more intensively developed areas will continue to be visually defined by the native prairie grasslands of central Texas.

This landscape approach will involve minimal intervention and a reliance on native species wherever feasible. Once established, the grassland areas will be:

FIGURE 4.26 Key view of Landscape Entry (East Entrance)



EXAMPLES OF ENTRY LANDSCAPE



- Low maintenance
- Allow for efficient stormwater management
- A learning and research environment for the habitat and ecology of the central Texas prairie
- Contribute to the unique image of RELLIS while contrasting with the smart technologies and innovative research occurring on site

The grasslands will be merged with a naturalistic stormwater management strategy, with drainage flowing naturally to the south and southwest through the RELLIS site, restricted periodically by stormwater detention ponds.

Multi-use trails will be integrated into the grassland environment, winding throughout the RELLIS site and

providing a recreational amenity for all site users. These trails will also connect to the Central Core and other parts of campus and will provide an opportunity for circulation throughout campus by bicycle as well as walking.

At the primary RELLIS entries from State Highways 21 and 47, the entry roads will be enhanced with more intensive vegetation and special signage. The entry from State Highway 47 will be the primary visitor entry as a divided boulevard: Airfield Drive. As it approaches the developed parts of campus it diverges to align with and provide view of the green mall that includes the Chapel. Street trees will enhance the pair of roadways. Other entries will receive special treatment but at a less extensive level, and all entries should maintain the focus on the prairie appropriate landscape while introducing elements that increase their visibility to passers-by.



GENERAL STREET AND PARKING LANDSCAPE

Where appropriate, streets should include street trees and sidewalks to allow pedestrian access. Ideally sidewalks are set back from the roadway to buffer pedestrians from passing traffic.

Parking lots should include trees for shade and should avoid large, uninterrupted areas of asphalt paving. Larger lots should be subdivided by smaller-scaled bioswales and pedestrian pathways every two parking bays. Larger collector bioswale elements should be incorporated at the block-scale between multiple parking areas

EXAMPLES OF PARKING AREAS

4.4 TRANSPORTATION AND PARKING

The RELLIS Campus has a unique opportunity to integrate many of the “smart” technologies that it researches and tests into its everyday operations, especially as it relates to transportation and parking. Autonomous vehicles – including private vehicles and transit – will likely be a part of the near term RELLIS future. In addition, providing multi-modal transportation at RELLIS will be increasingly important as the campus expands and students and others value the use of alternate modes. A good framework exists as a foundation for that growth.

Early in its history, a basic street grid was imposed on much of the RELLIS site. This street grid is relatively intact in the eastern portion of the site, west of Bryan Road and south of 3rd Street. Between 3rd Street and RELLIS Parkway, the secondary (diagonal) street grid was removed due to the demolition of warehouse buildings and various infrastructure improvements. A campus loop road, RELLIS Parkway, and related infrastructure is being implemented that will provide convenient access around the east and north perimeter of the campus.

Today, few facilities exist for pedestrians or bicyclists to move around the campus. Few sidewalks exist and bicyclists must utilize the relatively narrow roadways. Although the RELLIS site is quite flat and conducive to these modes, few walk or bicycle to destinations.

Parking at RELLIS is currently provided entirely in surface lots scattered throughout the site. The abundance of land has made it easy to provide parking directly adjacent to existing and new buildings, often prioritized over pedestrian circulation.

In support of this rapidly changing transportation

future, the campus is planned to support a flexible, multi-modal transportation network that will provide safe and comfortable access for pedestrians, bicyclists, transit riders, and the full range of vehicle types. The open space and street network will be designed to allow for safe, comfortable bicycle and pedestrian connections to existing open space facilities and set the stage for future connections beyond the campus borders. The electronic infrastructure that will support emerging transit technologies will expand even more and become integral to life at RELLIS.

STREET NETWORK

A fundamental strategy for RELLIS is to create an urban framework that encourages a walkable and multi-modal development pattern closely integrated with the open space system. This system consists of a street hierarchy that includes:

- Primary and secondary vehicular streets
 - Pedestrian priority streets or malls
 - Loop or perimeter circulation connecting with primary campus entries
 - Limited access roads that serve the secure districts of the site
- Wherever possible, the roadway network will be extended in a grid pattern. There are numerous advantages to the grid:
- The street grid reduces driving speeds; vehicles do not have the opportunity to reach high speeds if intersections are within approximately 300-600 feet of each other, slowing traffic at conflict points.
 - The alignment of a street grid reduces opportunity

for merging and weaving.

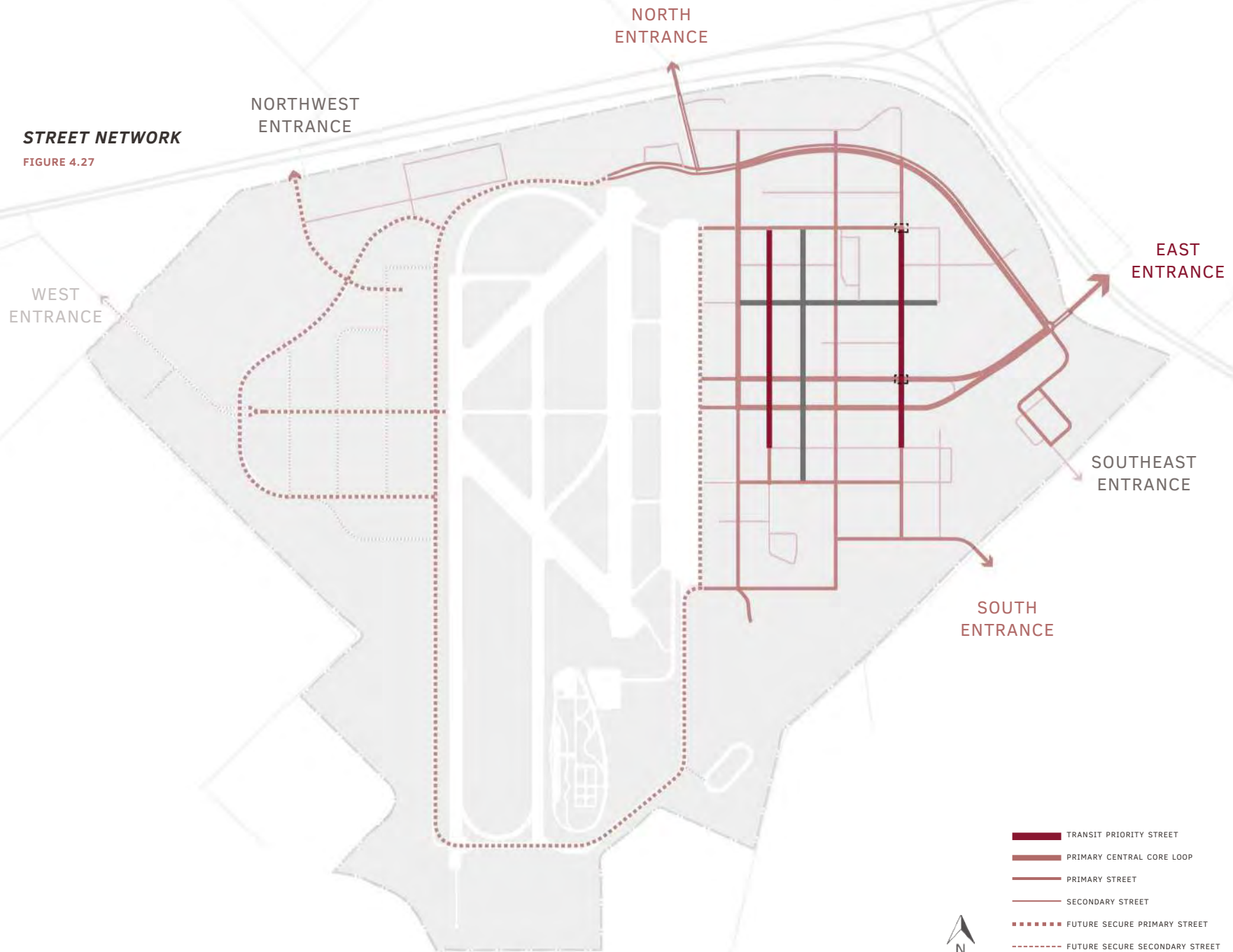
- The grid provides more driving options in terms of travel paths, thus dispersing traffic better and reducing traffic “loaded” streets.
- The ease of understanding and navigating a grid street network aids in traffic flow.
- Aligning streets in a grid pattern makes it easier to get to the same place via various optional paths.
- The alignment with the cardinal direction makes it easier to know which direction you are traveling.
- The grid can improve visibility of cyclists and pedestrians, particularly near intersections.

Transportation improvements required of institutional and partner developments will include:

- Providing public streets, sidewalks, curb and gutter, and roadway drainage that complies with all RELLIS Campus Facility Design Guidelines (FDG) design criteria.
- Extending and connecting existing public streets, sidewalks, and where applicable, trails, with existing or proposed streets, sidewalks, and trails.
- Providing all necessary property interests, including rights-of-way, and where necessary, easements and drainage ways, for proposed public streets, sidewalks, and trails.
- Providing the expansion or extension of public streets, sidewalks, and trails, as shown in the master plan, to serve future development.
- Complying with all requirements of UES with respect to utilities located adjacent to, or within, the public right-of-way.

STREET NETWORK

FIGURE 4.27



- TRANSIT PRIORITY STREET
- PRIMARY CENTRAL CORE LOOP
- PRIMARY STREET
- SECONDARY STREET
- FUTURE SECURE PRIMARY STREET
- FUTURE SECURE SECONDARY STREET
- PEDESTRIAN PRIORITY STREET
- AUTO GATE



More specific requirements for street types are included in Table 4.8 and in the Chapter 6 Design Guidelines.

Primary and Secondary Streets

Primary and secondary streets will include wide sidewalks, pedestrian scale materials and street lighting, generous landscape zones, and shade trees to create safe, comfortable pedestrian connections.

CENTRAL CORE PEDESTRIAN REALM

The Central Core, which will accommodate students, retail uses, and other higher intensity land uses, will have a correspondingly higher level density of population and pedestrian activity. Characteristics of this area will include:

- A block pattern - approximately 400'x400' and 400'x800' - that facilitates pedestrian movements with its walkable scale
- An active pedestrian network that will connect academic, residential, retail, and recreational destinations
- An environment that will encourage people to walk between destinations and enjoy the surrounding environment

The 4th Street pedestrian mall plays a major function as part of the pedestrian and open space system with an emphasis on bringing people through the site, connecting Blinn, the RELLIS Academic Alliance Complex, research, and commercial areas within the Central Core. Upon implementation of the shuttle system, a significant number of students are expected to arrive via shuttle from Bryan, the Texas A&M campus, and other parts of College Station. Shuttle

bus stops will be included in the Central Core and will become a primary pedestrian entrance to the campus.

RELLIS PARKWAY

The loop perimeter road will be extended further west and may ultimately connect as many as four entrances to the campus from the surrounding highway system, providing easy access and keeping many vehicles out of the pedestrian priority zones.

LIMITED ACCESS ROADS

Certain areas of the campus on the west and south will have activities that will not be accessible by the general public. The perimeter of these areas will be fenced and entry will be secured at a limited number of entry points.

MULTI-MODAL TRAILS

Complementing the street network will be pedestrian and bicycle trails and walkways in the open spaces of the campus that will provide informal connections and recreation. The campus bicycle network capitalizes on proximity to residential, commercial, recreational, and academic uses by providing a multi-modal loop around campus. The multi-modal campus loop path is incorporated into the perimeter landscape, creating a safe and continuous bicycle connection that links students, faculty, staff, and visitors to the campus core and transit/shuttle systems. It also highlights that RELLIS values a healthy and sustainable lifestyle. Future parking structures should include dedicated areas for both long-term and short-term bicycle parking to keep them out of the weather whenever possible. On campus trails will ultimately be connected to the regional bicycle system.

SHUTTLE

It is important to plan for shuttle access to-and-from the campus once students begin to regularly attend classes at RELLIS. Space for shuttle stops and shelters should be designed into the streetscape along shuttle routes.

- The A&M System should work with Texas A&M Transportation Services and regional jurisdictions to bring future shuttle routes through RELLIS.
- Provide opportunities to integrate bus systems.
- The Brazos Transit District serves the Bryan – College Station area.
- A detailed transit needs study should be conducted to determine desire orientation and destination points on campus.
- Using TTI's expertise, there is an opportunity to explore using smaller (10 passenger) autonomous shuttle buses that continuously circulate in the core campus.

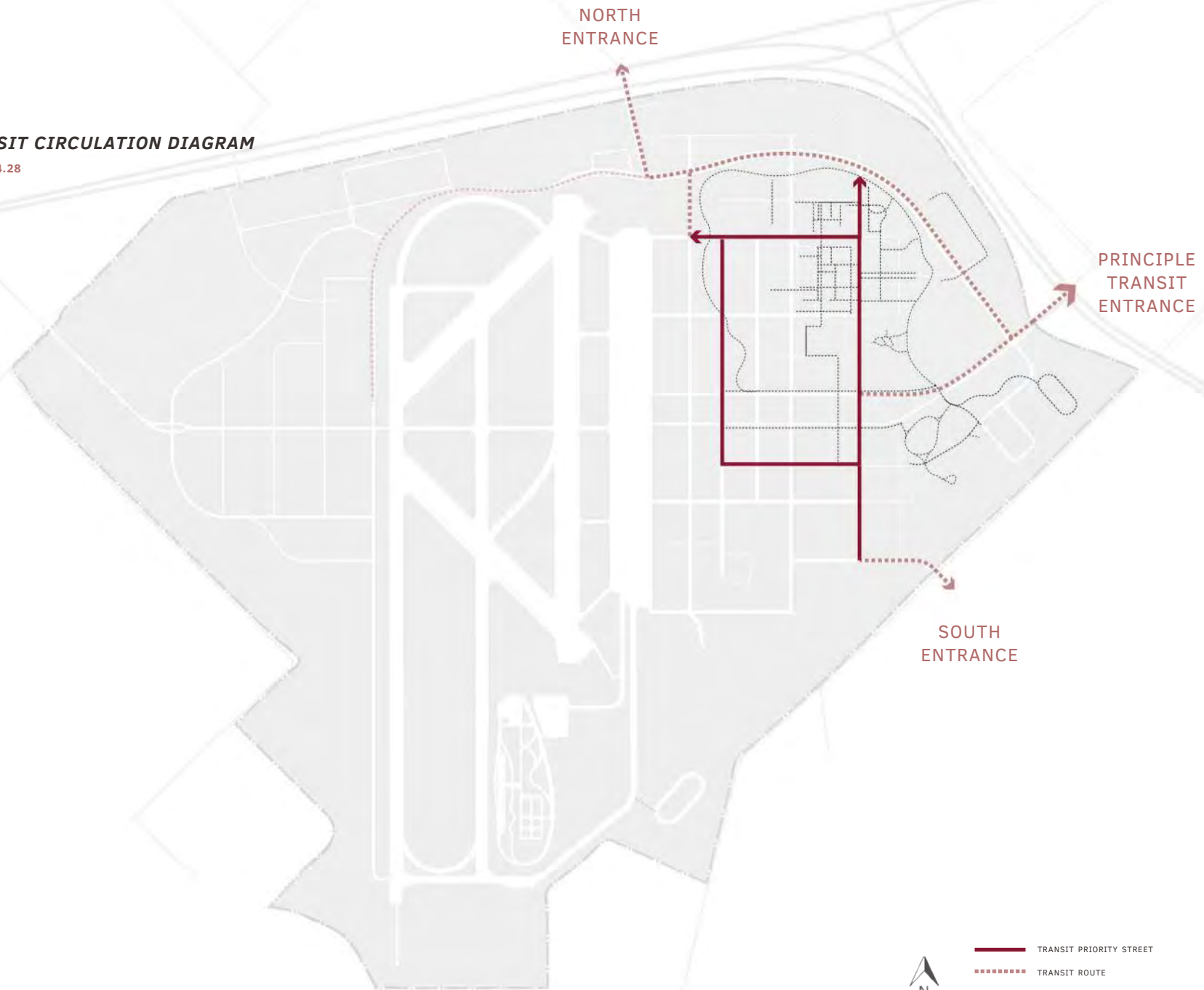
PARKING

In the future, surface parking should be consolidated whenever possible into lots shared among multiple uses. These lots should not be located along or accessed from pedestrian streets or malls. They should also be screened to minimize the visual impact of vehicles. Parking supply should be carefully measured to not greatly exceed demand so that paved surfaces, which can be heat islands and produce unnecessary stormwater runoff, are minimized.

In the long term, as development densities increase in various portions of the campus, parking structures may become feasible and desirable. They should be designed to be minimally visually intrusive, generally

TRANSIT CIRCULATION DIAGRAM

FIGURE 4.28



- TRANSIT PRIORITY STREET
- TRANSIT ROUTE
- POTENTIAL TRANSIT ROUTE

located behind or adjacent to buildings and buffered with vegetation. Structures should contain shared car parking and charging stations.

Each parking structure or surface parking area should be strategically located to encourage people to walk along the streets before entering their intended destination, thereby activating the public realm.

TRANSPORTATION DEMAND MANAGEMENT

Though the RELLIS Campus today has ample space to develop parking facilities and accommodations for single-occupant vehicles, opportunities to implement transportation demand management (TDM) strategies in the near-term can provide efficiencies and potential cost savings for the campus as it builds out and the population increases. TDM strategies are those that increase the overall transportation system efficiency by shifting movement from single occupant vehicles (SOV) modes to other forms of transportation or that shift trips out of peak periods.

TDM includes various programs, both for the campus transportation system as well as the physical organization of the campus. These strategies are used to encourage pedestrian and bicycle activity, use of shuttle services, car share/rideshare use, or off-peak travel times. Users are influenced by many factors, but some key themes are the length of travel time, incentives, convenience, and cost.

The size of the RELLIS Campus, coupled with the types of research spaces, will require some vehicular movement around the campus. However, the plan adopts a number of land use strategies that will encourage walking and bicycling:

- The clustering of buildings within the Central Core and along dedicated pedestrian routes will encourage users to walk between buildings rather than getting in a vehicle. Prioritizing the adjacency of primary building entries to each other over the adjacency to parking facilities provides additional incentive.
- Dedicated bicycle lanes on transit streets within the core and on multi-use paths to connect various campus zones outside of the core will link many campus destinations, create better bicycle safety and comfort, and will encourage bicycle use for movement around the campus. Trees along bikeways will provide additional shading and cooling comfort for these paths, which is beneficial during the extreme heat of the Texas summers.

The following TDM strategies may be used on the campus to encourage alternate forms of movement to and around the campus for certain users:

- As the campus population grows, pedestrian streets can be given priority at intersections with transit and vehicular streets. For these pedestrian streets, crossings should be maintained at the elevation of the pedestrian zone. This will cause vehicles to slow at these intersections and may further encourage pedestrian activity around the core area.
- Implementing a bike share program on the campus can provide users with an opportunity to use a bicycle without the need to own, maintain, or store

it. The Texas A&M College Station campus operates a bike share program that allows users to pick up bicycles from various locations. Riders can pay either by the hour or join the program through annual memberships. Bike share locations on the RELLIS Campus should be placed in easily accessible areas with high concentrations of campus population, such as the Blinn and RELLIS Academic Complex area in the Central Core or the TEES Complex and CIR in the Perimeter zone.

- In the future, incorporation of transit streets within the Central Core will provide shuttles with a dedicated route to avoid delays from other vehicles and maintain a predictable schedule. Transit stops for campus shuttles should be placed at convenient locations near campus population centers and given prioritized over parking facilities.
- The Texas A&M College Station campus provides options for car share and rideshare and may be a model for RELLIS. Like bike share, car share provides services to utilize a car only when needed and pick it up from a convenient location on campus. Rideshare offers a social network platform pairing users that can benefit from riding together to between common points.
- Education and incentives programs can be implemented to highlight the benefits of alternate transportation such as car share or rideshare. These may include options such as reduced costs or priority parking locations.

STREET TYPOLOGIES

TABLE 4.8

Street	Street Type	Planned Road Width*	Speed**	Requirements***
RELLIS Parkway	Primary Loop	31' (each half)	35 mph	Major utility corridor, street lighting, street trees
3rd Street	Secondary	25'	30 mph	Sidewalks, minor utility corridor, street lighting, street trees
4th Street	Pedestrian	25'	N/A	Pedestrian realm, major utility corridor, street lighting, street trees
Airfield Drive	Primary	31'	30 mph	Sidewalks, bicycle lane, major utility corridor, street lighting, street trees
6th Street	Primary	31'	30 mph	Sidewalks, bicycle lane, major utility corridor, street lighting, street trees
7th Street	Secondary	31'	30 mph	Sidewalks, major utility corridor, street lighting, street trees
8th Street	Secondary	31'	30 mph	Sidewalks, minor utility corridor, street lighting, street trees
Flight Line Road	Secure	31'	30 mph	Access control, street lighting
Avenue A	Primary	31'	30 mph	Sidewalks, major utility corridor, street lighting, street trees
Avenue B	Transit (Bus/Bicycle)	25'	30 mph	Access control, sidewalks, bicycle lane, minor utility corridor, street lighting, street trees
Avenue C	Pedestrian	25'	N/A	Pedestrian realm, major utility corridor, street lighting, street trees
Avenue D	Primary	25'-31'	30 mph	Sidewalks, drainage corridor, street lighting, street trees
Bryan Road	Transit (Bus/Bicycle)	31'	30 mph	Access control, sidewalks, bicycle lane, major utility corridor, street lighting, street trees
South Entrance	Secondary	31'	30 mph	Street lighting, street trees
West Entrance	Secure	31'	30 mph	Sidewalks, bicycle lane, major utility corridor, street lighting, street trees
Future Streets	To be determined at time of implementation based on master plan diagrams (Figure 4.27).			

*Road widths are measured from back-of-curb to back-of-curb.

**For ease of implementation, the campus may employ signs only at campus entrances indicating a campus-wide speed limit of 30 mph for all roads except RELLIS Parkway.

***Major Utility Corridors, such as those along Bryan Road, may include 5 or more separate utilities plus drainage channels. These corridors will require up to 60' and will be placed outside the driving surface of the road. In some instances, such as along 4th Street, this may be split into two sections of approximately 30' on either side of the road. Minor Utility Corridors will include 3 or fewer utilities and will require no more than 30' of width. Sidewalks, fire lanes, and landscape may overlap utility corridors but not buildings.

SERVICE AND EMERGENCY ACCESS

Proper emergency vehicle access throughout campus is essential. While emergency vehicles can use all streets throughout the campus, they will also need to be able to access the pedestrian malls and other lanes or secure roadways. In the case of pedestrian malls, emergency access must be provided at a minimum of 20' wide and located 15 - 30' away from a building's edge for ladder access. The emergency lane/pedestrian walkway can be constructed of concrete or concrete pavers or to lessen their visual impact can be gravel, grass, or pavers, but they must be able to carry an emergency vehicle load.

Service Vehicles will be guaranteed access necessary to maintain campus buildings, landscapes, and amenities. The pathways within the pedestrian realm will be wide enough and have pavement strength sufficient to carry vehicle loads. Service areas for adjacent buildings should be consolidated to the extent possible to minimize the distribution of vehicles within the pedestrian zone. Service vehicles should intrude on the pedestrian malls as little as possible and avoid class changes and other high traffic times.

Transitioning the service vehicle fleet from pickup trucks to electric golf carts for most activities would promote safety and sustainability, as smaller service vehicles are less obstructive in the denser areas of campus. Larger vehicles may be retained for heavy duty or equipment-intensive tasks.

EXAMPLE OF FIRE LANE

CENTRAL CORE SERVICE/ACCESS

FIGURE 4.29



4.5 SECURITY

EXISTING SECURITY

RELLIS has a challenging combination of functions with competing demands in terms of access, safety, and security.

PROPOSED SECURITY

Based on the takeaways from workshops, preliminary recommendations regarding security have been developed.

The RELLIS Campus will require segregation, or at least separation, of several activities for security and safety reasons. This can be achieved through relocation or through access control. In general, there are three areas that will require increasing levels of access control and security as the campus develops. Those areas can be described as follows:

- 24/7 Public Access Areas to the north of 7th Street and Along State Highway 21 (Central Core)
- Safety Restricted Areas to the south of 7th Street (Training/Testing)
- Secure and Restricted Areas to the west of Avenue A (Experimentation Testing & Training)

Future classified or secure government or commercial facilities would be best suited for the Secure and Restricted Areas. For location in the 24/7 Public Access Areas, adequate building access control to restrict public access to the facilities would be required.

RELLIS SECURE OPERATIONS AREA POLICY

The RELLIS and A&M System administration have developed guidance for the Secure and Restricted Areas called the RELLIS Secure Operations Area Policy. The policy will help ensure security and safety in campus operations. The policies applicability and scope is the following:

- The policy is designed to mitigate potential risk of injury to the RELLIS Campus community by outlining access procedures to the Secure Operations Area and further restricted areas within.
- The policy applies to all Texas A&M System and System Member employees, students, contractors, and visitors on the RELLIS Campus.

The Secure Operations Area includes most areas of the campus west of Avenue A, with some exceptions along State Highway 21. The exact boundary may adjust overtime as the campus builds out and requirements are reassessed.

Additional temporary restricted areas may be determined using a grid system that has been established to organize the full campus. Details of the grid are depicted in Chapter 7.

BARRIERS

There are three types of barriers to be considered at RELLIS: pedestrian, vehicle, and visual/sound. These may be used individually or in combination. Pedestrian barriers will be required in areas where students, staff, or visitors may accidentally or deliberately walk into areas that require protection, such as along Avenue A. The extent of fencing for the Secure Operations Area is shown in Figure 4.30, with additional potential areas indicated by the dashed line.

EXISTING & PROPOSED FLIGHT LINE ROAD BARRIERS EXAMPLES



The barrier for the Secure Operations Area between Avenue A and Flight Line Road will consist of a fence and gates as depicted in the top images. A more decorative barrier of wrought iron, similar to the bottom image, will be implemented along RELLIS Parkway at a height of 8'.

A fence is symbolic in its pedestrian control at a six-foot height, but is effective in pedestrian control at or above eight feet. In areas adjacent to roadways or at gated entrances where accidental incursion would jeopardize the safety of drivers, vehicle barriers such as landscape barriers or impact resistant fences and gates, may be incorporated.

Landscape barriers provide a good choice for a linear, continuous security barrier where the goal is vehicle interdiction. To be effective, barriers need to be approximately three feet high and, depending on material and anchorage, about six feet wide. Fences can also have vehicle interdiction capabilities incorporated into either their structure or through the addition of cables hidden in fence rails at lower heights.

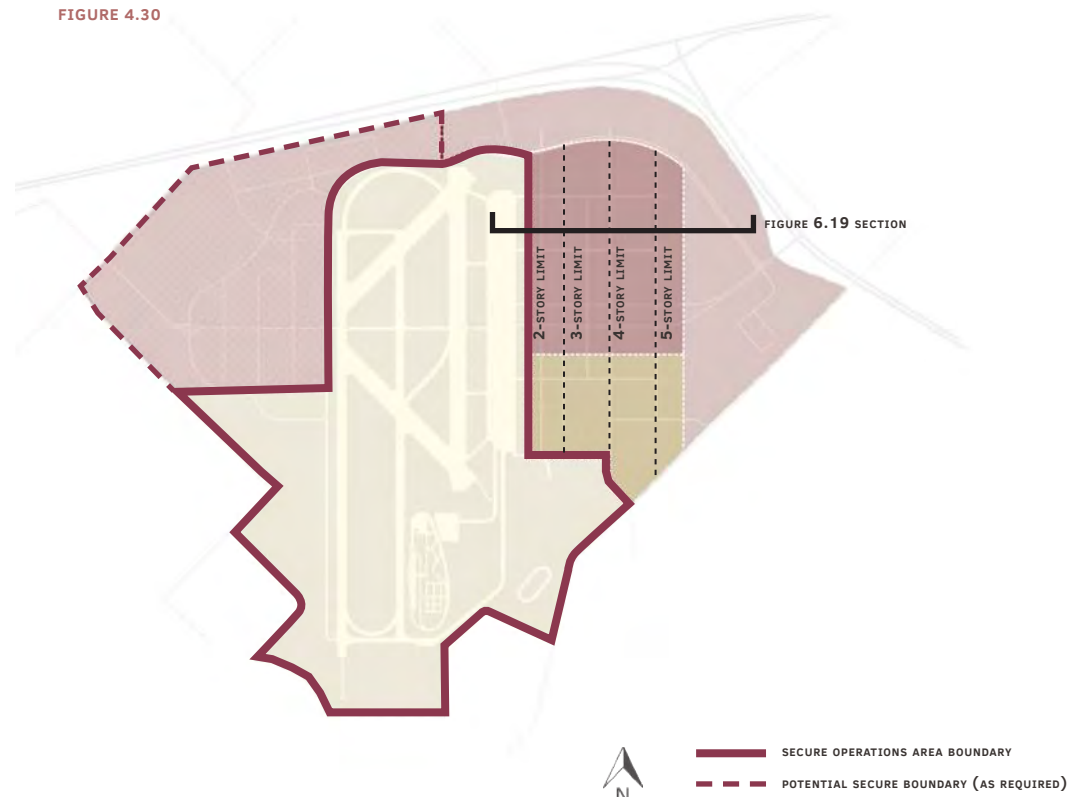
Obscuration of secure areas may be important. Building heights will be limited based on the proximity to the secure area, as indicated in Figure 4.30 and further in Chapter 6, Figure 6.19. Vegetation should be used for obscuration of ground level views. Layers of vegetation can also help with sound control.

In areas where pedestrians and vehicles mix, particularly within the Central Core, low landscape barriers should be considered to help prevent accidental or intentional conflict between people and vehicles.

Barriers are also needed in other areas of the proving and training grounds. TTI performs high-speed (65 mi/h) crash testing of passenger and commercial vehicles into bridge rails off of the end of runway 17C and other locations. For safety, a recommended

SECURITY AREAS

FIGURE 4.30



minimum distance of 100 yards should be maintained from the end of the existing bridge rails to any public roadways. In the event a safe zone of 100 yards cannot be maintained then a ditch and berm combination should be constructed to separate the roadway from the testing site. A suggested configuration would be a four foot ditch with a 4:1 fore-slope and back-slope going into a six foot (above

the normal grade) 4:1 berm. The 4:1 slopes are to permit landscape management to mow and maintain. If a ditch and berm configuration cannot be provided then traffic could be temporarily stopped while a test is being performed.

5

Infrastructure Plan

- 5.1 Introduction
- 5.2 Stormwater
- 5.3 Domestic Water and Wastewater
- 5.4 Thermal Utilities
- 5.5 Electrical Utilities
- 5.6 Technology





5.1 INTRODUCTION

The RELLIS Campus infrastructure plan provides an outline for the future development of utilities on the campus and their associated phasing. Utility runs are projected to align with the currently anticipated build-out program detailed in Appendix D.

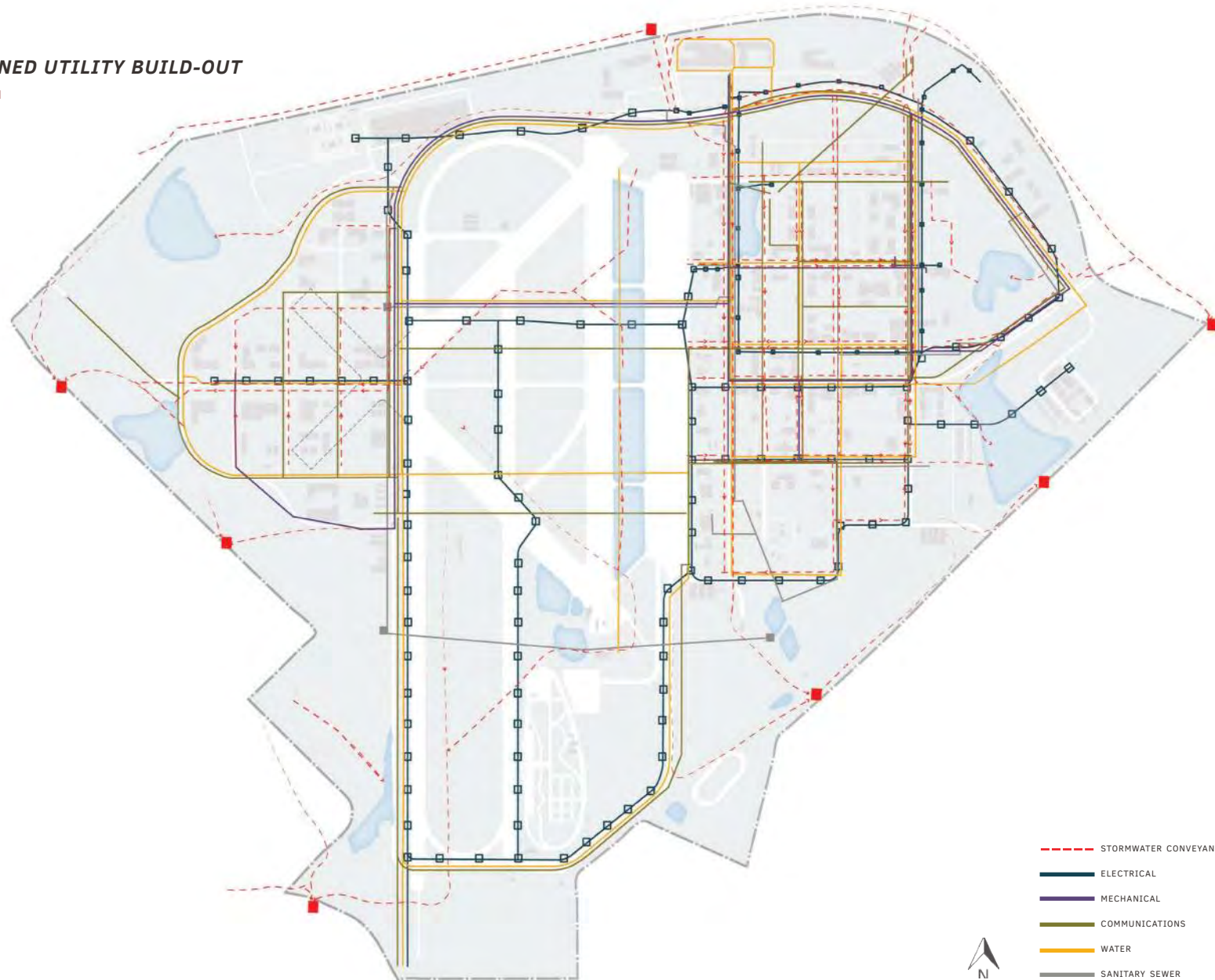
The following sections detail the projected routing, phasing, and capacity for various campus systems, including stormwater, domestic water, wastewater, thermal utilities, electrical utilities, and technology. Figure 5.1 reflects a composite diagram of these systems in their complete, 20-year build-out condition. Additional details of these systems can be found in Appendix I.

Wherever possible, utility corridors are coordinated for multiple systems to minimize periods of disruption as construction occurs. Adequate right-of-way for these corridors should be factored as new building projects are designed on adjacent sites. Where utilities are proposed to cross the runways of the Experimentation Testing & Training Grounds, they are to be consolidated into a limited number of crossings. Provisions should be made to allow for additional capacity so that construction is only required to occur one time.

Utilities in the following sections are projected in three phases. The first phase includes projects anticipated between 2019 and 2024. The second is the six- to 10-year period from 2024-2029. The third phase projects the 20-year build-out of the campus from 2029-2039. Given the 20-year projection, it is likely that some factors may change and order of development will be impacted. If this occurs, new projects will need to review the infrastructure build-out to determine if necessary utilities are available at a given project site. If not, the project will need to include extension of the required utilities in the base scope of work and make provisions for additional capacity and expansion in the future to accommodate other projects.

COMBINED UTILITY BUILD-OUT

FIGURE 5.1



5.2 STORMWATER

FLOOD PLAINS

Almost all of the site is located outside of the 100-year flood plain of the Brazos River and its local tributaries, including the Little Brazos River and Thompson’s Creek. The flood plain limits shown correspond to an elevation range of about 240 to 242 feet above sea level. The overall campus ranges in elevation from 238 to 272 feet, with the predominant area of existing development between elevation 260 and 270.

The 100-year flood plain represents the potential flooding impact of a storm event with a 1% chance of occurring in any year. A higher standard of design is recommended for the construction of structures and other flood sensitive improvements which should be placed above elevation 247. Every foot higher than this elevation will provide a greater degree of site resiliency.

Although a large portion of the southwest and south sides of the campus are located below elevation 247, the existing runway pavement and structures contained within the campus are above this elevation.

WATERSHEDS

The existing site has been divided into five watersheds for planning purposes described as follows:

Watershed A (37.2 acres) consists of some of the higher elevations on the campus, which includes the entrance to the site on State Highway 47 and includes mostly undeveloped area within the eastern portion of the campus. The northern portion of Watershed A collects off-site drainage from SH 47’s roadside ditch and combines with on-site runoff at a small culvert under the northeastern portion of Goodson Bend Road, just a short distance northeast of the Watershed B’s pond outfall. Stormwater discharges into a tributary of Thompson’s Creek and ultimately into the Brazos River a few miles south of the campus.

The majority of the campus’ existing development (buildings, streets, and drainage facilities) resides within the Central Core and is encompassed by the next two watersheds, Watersheds B and C. These two drainage areas define over a third of the campus’ drainage. The natural topography of Watersheds B and C lend themselves to a north-south drainage conveyance pattern, thus the basis for future developments planned within them.

Watershed B (366.4 acres) consists of the Blinn College and RELLIS Academic Alliance buildings, which utilize two of the campus’ stormwater management detention pond facilities for channel flow and site discharge control purposes. Further details of the existing ponds and their planned improvements are provided later within the appendices of this document. Watershed B discharges its stormwater runoff on the southeast perimeter of the campus through a large diameter culvert under Goodson Bend Road and into

a tributary of Thompson’s Creek. Similar to Watershed A, it eventually discharges into the Brazos River.

Watershed C (350.1 acres) includes the western half of the Central Core’s grid street system, including a small slice of the northern portion of the site encompassing the new buildings and new entrance along State Highway 21. Also included in this drainage area are the rifle/shooting ranges and current wastewater treatment facility located southeast of the Experimentation Testing & Training Grounds where a small amount of flood plain exists near the natural formed channel. This drainage area currently does not possess a detention pond best management practices (BMP) and has a third point of discharge through another culvert under Goodson Bend Road into a tributary of Thompson’s Creek and ultimately to the Brazos River.

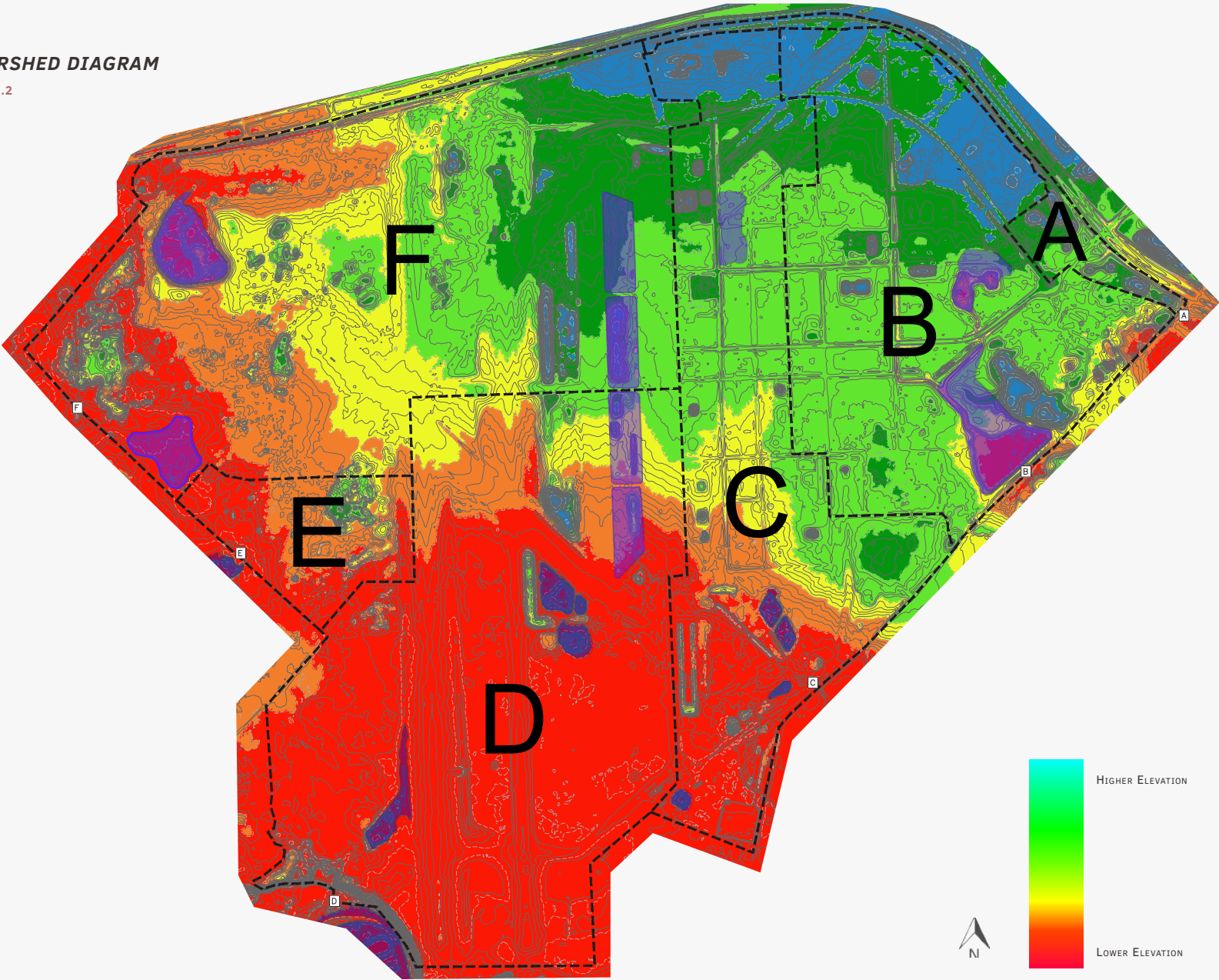
WATERSHED AREAS

TABLE 5.1

WATERSHED	AREA (SF)	AREA (ACRE)
A	1,620,432	37.2
B	15,960,384	366.4
C	15,250,356	350.1
D	23,836,032	547.2
E	3,123,252	71.7
F	25,517,448	585.8
TOTAL	85,307,904	1,958.4

WATERSHED DIAGRAM

FIGURE 5.2



Watershed D (547.2 acres) consists of the southern portion of the Experimentation Testing & Training Grounds. It is the lowest (in elevation) watershed on campus and contains the largest amount of flood plain within it. The flood plain resides at the southeast portion of the watershed and is the point of discharge directly into the Brazos River.

Watershed E (71.7 acres) is the smallest watershed on campus and consists of the southern portion of the 4-10 Cross and is primarily undeveloped with respect to the runways. The watershed discharges to the southwest to the Little Brazos River, which conveys runoff to the Brazos River.

Watershed F (585.8 acres) consists of the northern portion of the Experimentation Testing & Training Grounds as well as the western most area, which includes the last of the three areas of flood plain within the campus. The stormwater drainage flows west into an existing pond before releasing into a tributary of the Little Brazos River and conveyed to the Brazos River.

Watershed's D, E, and F are uniquely tied together as they have an existing underground storm sewer system that is a remnant of the initial construction of the air field. This system collects stormwater runoff throughout these Watersheds and conveys the respective discharge to multiple outfall points. The existing system ranges in sizes from 6" to

60" concrete pipes and is comprised of a intrinsic collection of grate inlets ranging from single 20"x30" grates to 4-20"x30" grates set in square concrete inlet boxes. Through the detailed mapping of this system it was determined that the existing system is overburdened by the contributing drainage areas it serves. Coupled with sediment deposits, differential settlement of pipes, and the lack of available capacity, this system is not a reliable resource for stormsewer conveyance measures for future development of the Master Plan, unless acceptable enhancements are made to it in order to provide the adequate capacities needed at that time.

Additional detail on the watersheds can be found in Appendix K.

SOILS, RAINFALL

Poorly draining soils predominate within the campus boundary. Therefore, infiltration of stormwater runoff is impractical and underdrains must be installed in bio-retention cells, bioswales, or under permeable pavements. With these soils, the volume of runoff resulting from rainfall events is a very high percentage of the total rainfall volume. The 24-hour, 1% chance per year storm event (the "100-Year Storm") is about 12 inches. About 75-80% of this rainfall will runoff from undeveloped areas. Developed areas will increase the rate of runoff to 85-90% of the total rainfall.

STORMWATER DETENTION

Redevelopment of the RELLIS Campus will result in an increase in impervious surfaces which will increase stormwater runoff rates above the existing site condition. Stormwater detention needs to be provided in a volume sufficient to reduce the proposed stormwater runoff rates to be less than the existing conditions runoff rates.

Watersheds that discharge directly into the Brazos River may be exempted from this requirement. The rationale for the exemption is that there are no other property owners between the RELLIS Campus and the river that will be impacted by an increase in site runoff rates.

Detention provided near the source of new runoff from building roofs and pavements including within bio-retention cells, bioswales, or beneath permeable pavements will reduce the size of the detention ponds located near the campus stormwater outlets. Providing storage in small, widely distributed locations near the sources of runoff also reduces the size of the stormwater conveyance system (pipes and channels) required between the new development and the outlet detention ponds.

STORMWATER ASSUMPTIONS

TABLE 5.2

ASSUMPTION	
100-Year, 24-Hour Rainfall	12 Inches
Runoff Rate Undeveloped	9 Inches
Runoff Rate Developed	10.8 Inches
Detention Storage Rate	0.25 Ac-Ft/Acre

WATERSHED RUNOFF AND DETENTION

TABLE 5.3

WATERSHED Area	100-YR, 24-HR RUNOFF (AC-FT)		DETENTION (AC-FT)
	Existing	Proposed	
A	193.4	113.7	(See Note 1)
B	667.6	367.8	205.19
C	1,740.9	1,020.6	24.80
D	833.3	504.4	196.60 (See Note 2)
E	423.8	270.4	(See Note 1)
F	1,090.9	741.1	79.21

Note 1: Divert proposed development in Watersheds A & E to Watershed B & F's pond system, respectively.

Note 2: Detention may not be required for portions of Area D that directly discharge into the Brazos River. Full detention is planned to provide proper conveyance for future improvements in the immediate area.

STORMWATER MANAGEMENT

All watersheds (A through F) will manage stormwater runoff by implementing a regional pond approach to its stormwater management and best practices. The regional ponds will be strategically located within each watershed to provide detention storage relative to the contributing drainage basin and its impervious cover increase. These ponds will reduce the peak flows from the ultimate development back to existing conditions at critical locations throughout the drainage basins, thus providing an efficient stormwater conveyance system.

The regional ponds will work in series with the campus' planned infrastructure improvements and incorporate existing ponds into the overall detention and conveyance system by implementing the following improvements:

- Connect ponds through the use of channels and culvert piping;
- Convert constant water surface ponds to dry bed ponds;
- Control pond outfalls with engineered outlet structures;
- Expand existing pond footprints, and;
- Decrease direct runoff areas by diverting future developed areas to the regional pond system.

The new detention storage must be sufficient to not increase runoff rates to downstream areas. Normally, this would require about 0.35 to 0.50 acre feet of storage per acre of new development. About one third of this storage should be located adjacent to newly developed areas within bioswales, bio-retention cells, or other storage cells that contribute about an inch of the detention storage (0.08 acre-feet per acre). The remaining storage would be in the new and expanded ponds at the other site outlets.

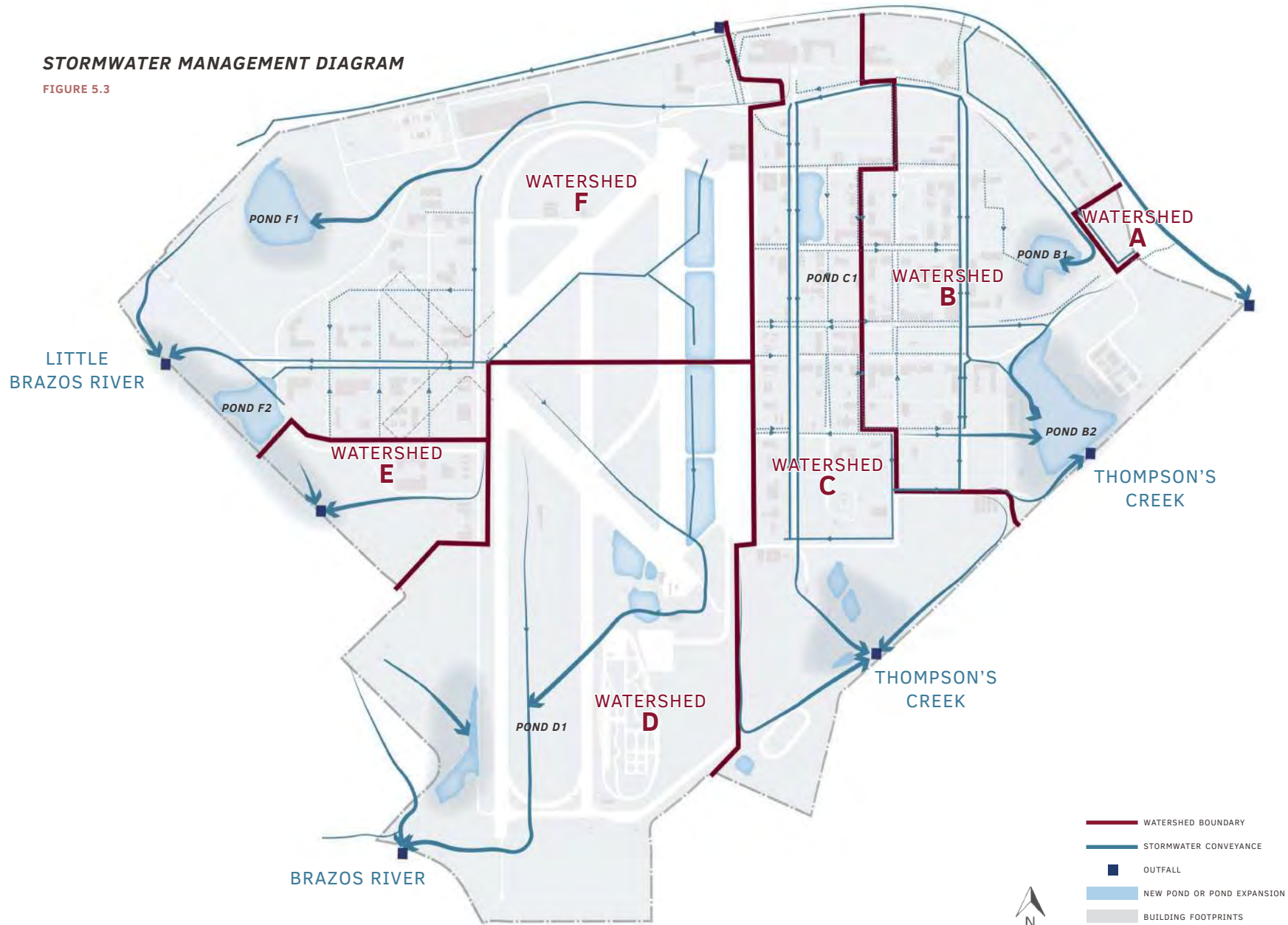
Rainwater, stormwater, and air conditioning condensate should be integrated into the district-wide water management concept. Rainwater and condensate are collected and stored to irrigate green roofs and district right-of-ways and open space. Stormwater is diverted to green infrastructure in the right-of-way where it can be filtered before reaching designated detention ponds and eventual outflow into Thompson's Creek, Little Brazos River, and Brazos River.

Systems are created to develop a networked, district-level drainage and stormwater quality plan. The following green infrastructure techniques are recommended to be incorporated into both public and private property development. All green infrastructure areas are designed to detain and cleanse stormwater of pollutants, heavy metals and suspended solids, infiltrate water back into the soil, replenish

groundwater and aquifers, minimize trash floating into water bodies, and provide dual uses as district amenities.

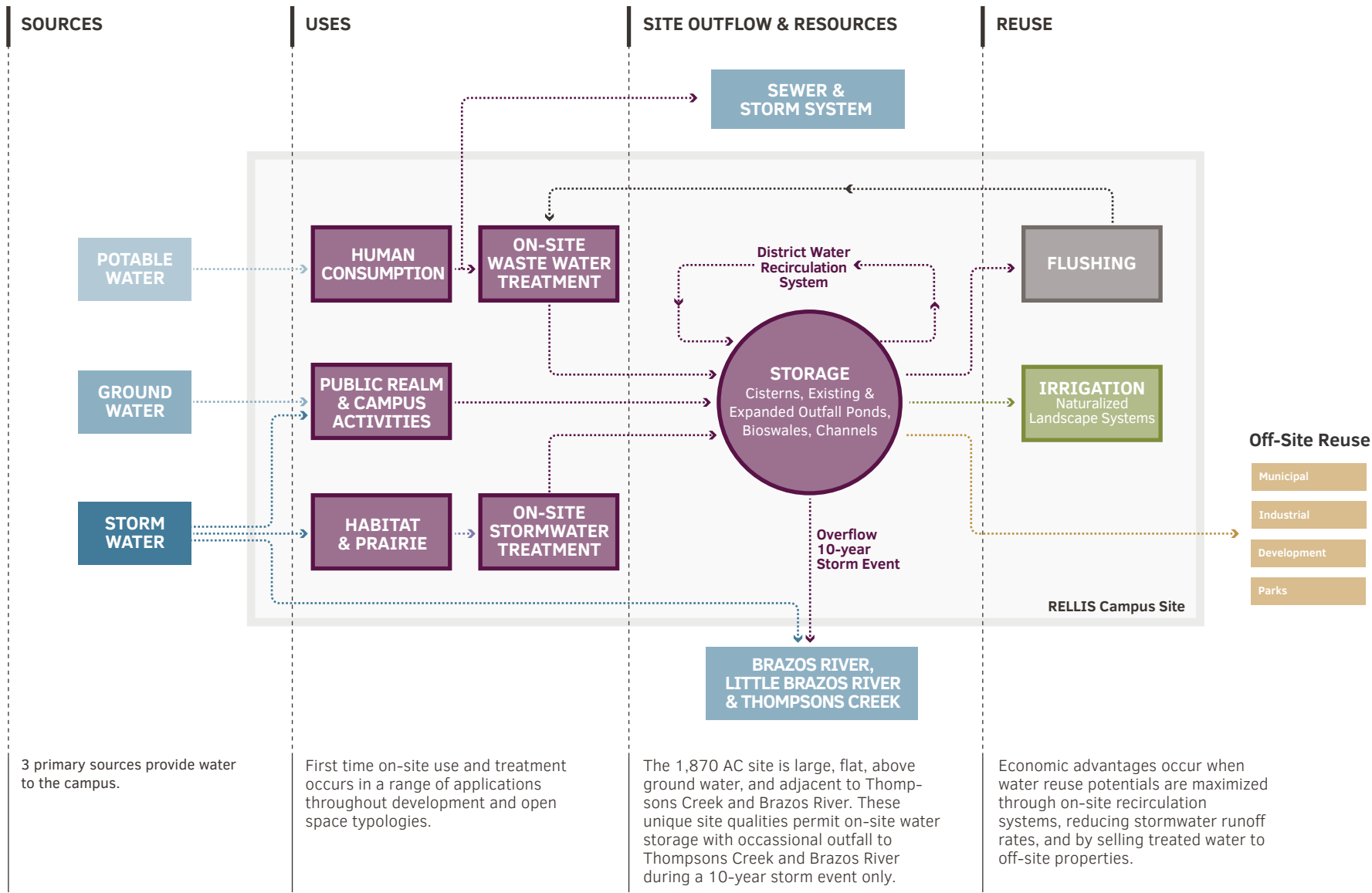
STORMWATER MANAGEMENT DIAGRAM

FIGURE 5.3



PROPOSED HYDROLOGY PLAN

FIGURE 5.4



GREEN INFRASTRUCTURE AND DISTRICT SCALE WATER MANAGEMENT SYSTEMS

It is recommended that the RELLIS Campus develop a plan for an interconnected district-level green infrastructure (GI) network for stormwater management including provision for stormwater quality, harvesting, conveyance, and storage. A variety of GI methods are recommended to be used within both public and private property areas. GI elements will briefly detain and cleanse stormwater of pollutants including sediment, excess nutrients, toxic metals, and floatable trash before exiting the site. These areas will provide a dual land use as district aesthetic amenities when associated with open space and recreational trails.

A variety of methods used singly or in series with other methods include landscaped systems: filter strips, bioswales, bio-retention, and rain gardens; permeable pavements with or without subsurface storage; and open water or wetland ponds. Vegetated roofs are also recommended when the cost or availability of land justifies the cost.

- Locate bioswale or bio-retention storage elements adjacent to new building roofs and direct the downspout flows into these treatment and storage elements. The storage volume provided in each element should be equal to one inch of runoff over the tributary drainage area with the overflow set at an elevation that will contain this volume. The treatment system shall use landscape vegetation designed to complete the treatment process within 24 hours and restore the pond to the normal design condition, dry bottom or open water.
- Parking lot bioswales should be placed to intercept sheet drainage flows from pavement areas not

greater than 125 feet per side. The swales should be designed to contain one inch of runoff from the contributing drainage area with the overflow set at an elevation to contain this volume. The treatment system shall use landscape vegetation as described for bioswales.

- Bioswale or bio-retention storage elements should be designed as a site amenity with appropriate vegetation adapted to short-term inundation. Maintenance of these areas must be programmed into future budgets.
- Stormwater volumes stored within GI elements have a major additional benefit of reducing the size and cost of downstream conveyance channels and pipes. The district-wide plan will outline how the many widely distributed systems will be combined to serve the needs of proposed new areas of development.
- The total volume of required detention storage for a developed area is stored in the combination of GI elements and the outlet ponds. This requirement is established during the final design of this area in conjunction with the district-wide plan. An approximate storage volume for planning purposes can be estimated as follows: multiply the acreage to be developed (or redeveloped) by 0.3. The result is the total detention storage volume in acre-feet. Subtract the volume provided in the GI elements to determine the net remaining volume required in the outlet pond. The site area required to store this volume depends upon the depth of the outfall pipe, ditch, or pond that the developed area will drain into and the depth available for detention storage within the pond. With the GI elements storing one inch upstream, the net remaining detention volume can usually be stored using 4% to 6% of the overall development area.

- Detention may not be required for Watershed D if a conveyance route can be established within the RELLIS Campus directly into the Brazos River. The GI elements for this watershed will be required for water quality and amenity benefits and will reduce the size of the downstream conveyance systems.

5.3 DOMESTIC WATER AND WASTEWATER

DOMESTIC WATER

The current water distribution system at the RELLIS Campus consists of a 500,000 gallon elevated storage tank, an original distribution system, and a new distribution system that operate on a static pressure between 51-55 psi. The original distribution system consists of cast iron and PVC water lines installed between 1942 and the early 2000s. The new distribution system was installed with the first phase of the RELLIS Campus Infrastructure project and consists of HDPE piping. The distribution is currently fed through an altitude valve, which regulates the water surface elevation in the elevated storage tank, via an on-site well, cooling tower, ground storage tank, and pump station. The system is also fed through an 18" transmission line from the TAMU well field located north of Highway 21.

The original distribution will be phased out as the new distribution system is expanded through various phases outlined in this master plan. The new distribution system currently consists of a loop around the existing water tower with a leg east along 4th street to the RELLIS Academic Complex, south toward the CUP, and North to CIR and the TTI State Headquarters. A loop to the west side of the existing runways is currently under design for the Innovative Technologies Development Complex project with construction beginning in late 2019.

In the first phase, from 2019-2024, the campus is expected to expand with project to the north of RELLIS Parkway and South of Airfield Drive. During this period, several projects are scheduled to expand and loop the new water distribution system, including a large loop around the southern portion of the runways/proving grounds. Looping of the water distribution system is a

vital aspect of a resilient an efficient water distribution system. This phase also includes projects to remove existing areas of campus off of the original distribution system including the TTI hanger complex and several existing buildings along Avenue A south of Airfield Drive. The proposed water lines will also allow for infill development in the core of the campus (North of Airfield Drive) with the completion of all major routes. A new water tower is also proposed with this phase and is discussed below.

The second phase, from 2024-2029, primarily completes all major routes south of Airfield Drive. Several proposed buildings are expected in this area. This phase also includes 8-inch water lines running North and South along 35R to support research projects.

EXISTING DOMESTIC WATER

FIGURE 5.5



DOMESTIC WATER UNDER CONSTRUCTION (2019)

FIGURE 5.6



DOMESTIC WATER 2024 BUILD-OUT

FIGURE 5.7



DOMESTIC WATER 2029 BUILD-OUT

FIGURE 5.8



The final phase, from 2029-2039, proposes a water loop along the East end of RELLIS Parkway to support development along Highway 47, and water lines/ loops west of the runways to support secure research growth.

Water Tower

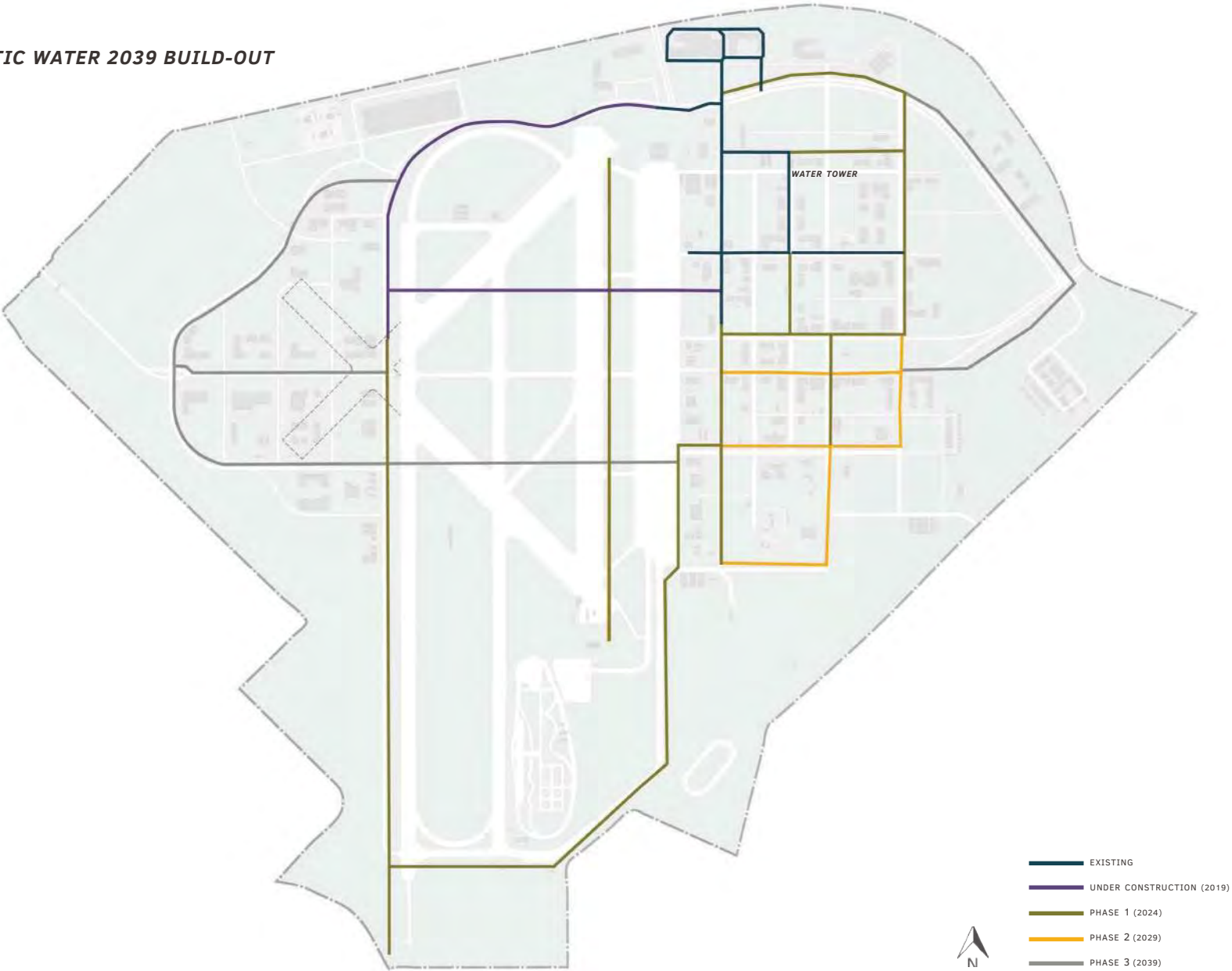
As previously mentioned, the existing water tower at RELLIS Campus has a storage volume of 500,000 gallons and a water surface elevation of approximately 384 feet (120 feet in height from the base of the tower) which produces a static pressure of 51-55 psi in the distribution system. Through model iterations out to the 2039 phase, the distribution system was able to supply the required volume to meet demands and maintain TCEQ minimum pressure of 35 psi during normal operations and 20 psi during emergency operations. Along with pressure requirements, the TCEQ has capacity requirements for public water systems in the state of Texas. The TAMU flag ship campus in College Station and the RELLIS Campus operate under the same CCN and permit which designate the system as a Non-Transient and Non-Community Water System. It should be noted though, that the system follows Community Water System requirements. TCEQ requirements under TAC 290.45 (b)(1)(D)(iv) requires an elevated storage capacity of 100 gallons per connection. Anticipated connections were calculated based on 3 persons per connection which resulted in 2994, 7734, and 12,285 connections for the 2024, 2029, and 2039 phases respectively. These connections require that a new elevated storage tank be constructed in the 2024-2029 time frame. The ultimate planned build out in the 2039 phase requires an elevated storage of 1,228,500 gallons. Operationally, it is typical for the elevated storage tank to be sized so that half of the tank volume is

able to provide 30% of the peak hour demand for 4 hours, with the other half of the tank volume reserved for fire volume and operational changes. During the 2039 phase, the full tank volume was calculated to be 372,336 gallons. Because the system static pressure ranges from 51-55 psi based on the water surface elevation in the water tower, all of the new buildings on campus with multiple floors have required fire pumps to meet sprinkler demand on the upper floors. The static pressure has also caused irrigation issues because most irrigation systems are designed around a 50 psi residual pressure which the existing water tower and new distribution system cannot meet. Based on model iterations, it is recommended that when a new water tower is constructed, the water surface elevation should be approximately 448 feet (184 feet in height from the base of the tower) which will produce a static pressure of 80 psi in the distribution system. The 2039 Max Day fire flow model run, showed a system residual of 72.8 psi in the distribution system when a demand of 2,000 GPM was required at the TTI State Headquarters. The headquarters is one of the tallest buildings on campus to date and is located on a portion of campus with the highest elevation, giving this scenario a current worst case. Because of the pressure issues, it has been requested and is recommended to incorporate a new water tower project as early as possible.

It is recommended that the water tower be part of the 2019-2024 projects, that the water tower be able to provide a minimum of 80 psi static pressure (448 ft water surface elevation), and have a total storage volume of 1,500,000 gallons.

DOMESTIC WATER 2039 BUILD-OUT

FIGURE 5.9



WASTEWATER

The current wastewater collection system at the RELLIS Campus consists of a 100,000 gallon per day wastewater treatment lagoons and a sanitary collection system consisting of original sections and sections constructed during the RELLIS Campus Infrastructure project. The original sections consist of Clay tile pipe and PVC with portions of the system that have been in service for over 70 years. The recently installed section consist of HDPE and are 12" and 16" in diameter to meet slope requirements. Prior to the construction of new sections of the collection system, which removed large portions of the original collection system from operation, the campus experienced high wet weather flows from Inflow & Infiltration (I&I) during and immediately after storm events. Because most of the existing sections were removed from service, I&I at the treatment plant has reduced. A large section of the original collection system remains between 7th Street and 2nd Street, following a route between Avenue C and Avenue D. Currently, the Joint Library, the water pump building, the Blinn College Health Sciences Office, the Architecture Fabrication and Design Lab, and the chapel and assembly hall are served by this section of line. A new sanitary sewer main and lift station with a force main are currently under design for the Innovative Technologies Development Complex with construction beginning in late 2019.

Because the first phase of the RELLIS Campus Infrastructure Project replaced large sections of the collection system, additional extensions of the collections system will be minimal compared to the water distribution system.

In the first phase, from 2019-2024, two projects are anticipated. The first project will extend a 12" main

from 4th Street up to RELLIS Parkway. This main will serve future buildings expected North of the Blinn building and can also serve to remove the Joint Library. This project, will allow for the abandonment of a large section of the existing section between Avenue C and Avenue D north of 4th street. The second project includes the replacement of an existing 15" Clay tile pipe with a proposed 16" HDPE sewer main. This project also includes the conversion of several buildings in the area to the new HDPE collection system.

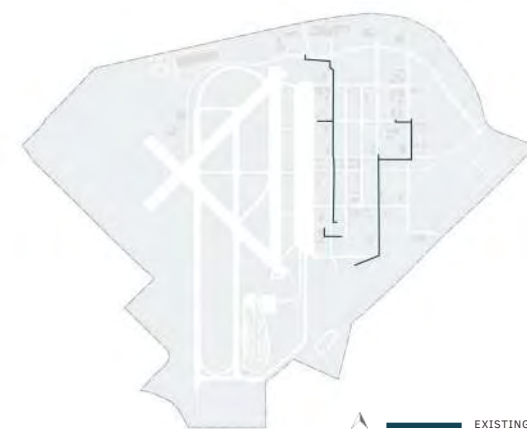
The second phase, from 2024-2029, also includes 2 collection system projects. The first Project extends a 12" main North along Avenue D from 4th Street to RELLIS Parkway. This main will serve future buildings anticipated around the existing pump/water tower yard and will also remove additional buildings from the original collection system. The second project includes an extension of a 12" main east along 7th Street from Avenue D. This extension will serve anticipated growth South of Airfield Drive and East of Avenue D including dormitory/housing developments. This main extension will also remove buildings from the original collection System.

The final phase, from 2029-2039, includes 1 collection system project that will extend a 12" main East along Airfield Drive and North along RELLIS Parkway to support development along Highway 47.

As previously mentioned, RELLIS is served by a 100,000 gallon per day permitted wastewater treatment lagoon that is located on the South East portion of the campus. From June 2016 to May 2019, the effluent flow rate from the treatment lagoons has ranged from 10,500 GPD (March 2019) to 13,800 GPD (August 2017, Hurricane Harvey). The range

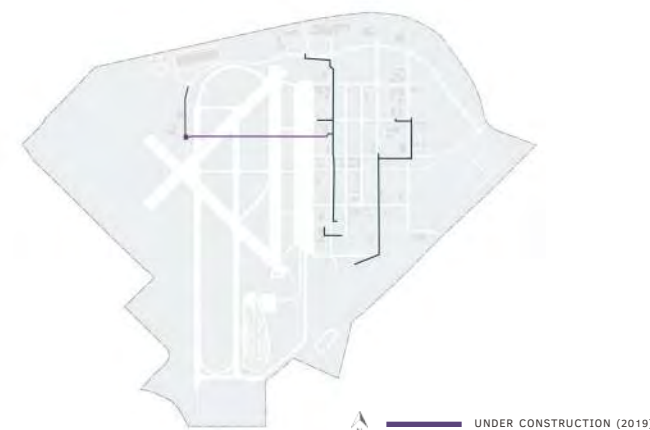
EXISTING WASTEWATER

FIGURE 5.10



WASTEWATER UNDER CONSTRUCTION (2019)

FIGURE 5.11



of flows can be contributed to the high I&I from the original collection system. TCEQ regulations under TAC 205.126 (a) require that when a facility reached 75% of the permitted average daily flow, the permittee must initiate engineering and financial planning for expansion and/or upgrading of the wastewater treatment facilities. Based on monthly effluent flows, the treatment lagoons have not exceeded the 3-month requirement. Anticipated max day flows were calculated for expected developments for existing conditions and each of the three phase periods. The resulted flows were 137,000 GPD, 169,000 GPD, 501,000 GPD, and 916,000 GPD for the existing, 2024, 2029, and 2039 periods. It should be noted that these conditions are based on full build out of those periods and full occupancy loads in order to determine anticipated capacities. Based on these loadings to the collection system, the existing treatment lagoon is undersized. It is recommended that the effluent rate be monitored and provisions for a new WWTP occur when the system exceeds the average daily flow rate for 3 consecutive months or during the 2024-2029 phase, which ever comes first. The 2024-2029 phase was selected based on increased anticipated development with high sanitary sewer loadings (dormitory/housing and conference center).

Because of natural grades, only the area East of the runway/aprons can gravity flow to the lagoons. The areas west of the runways, will require a lift station and force main in order to get the sewage to the treatment lagoons. The existing lagoons outfall to Brazos River Tributary 8 that routes South East off of TAMU property, onto private property, and eventually outfalls into the Brazos River. The existing lagoons are located in close proximity to the core of campus which has raised questions in regard to visual and odor issues. Because of this, an alternate location for a proposed

WWTP has been chosen at the southwest corner of the campus.

Three options for a future WWTP and lift station were evaluated. Options included a new WWTP adjacent to the existing lagoons, a new WWTP on the west side of the runways, and a combination of both these alternatives. Of these, the second option was determined to be the preferred solution and consists of the following approach:

Construct a new 0.6 MGD WWTP on the West side of the runways, a new 16" sewer main to the new WWTP from the ITDC development, and a new 0.5 MGD lift station with force main adjacent to the existing Lagoons in the 10 year (2024-2029) phase. As development/ sanitary sewer loadings increase, the WWTP will need be expanded by 0.4 MGD (1.0 MGD Total) and the lift station will need to be expanded by 0.3 MGD (0.8 MGD Total) in the 20 year (2029-2039) phase.

WASTEWATER 2024 BUILD-OUT

FIGURE 5.12



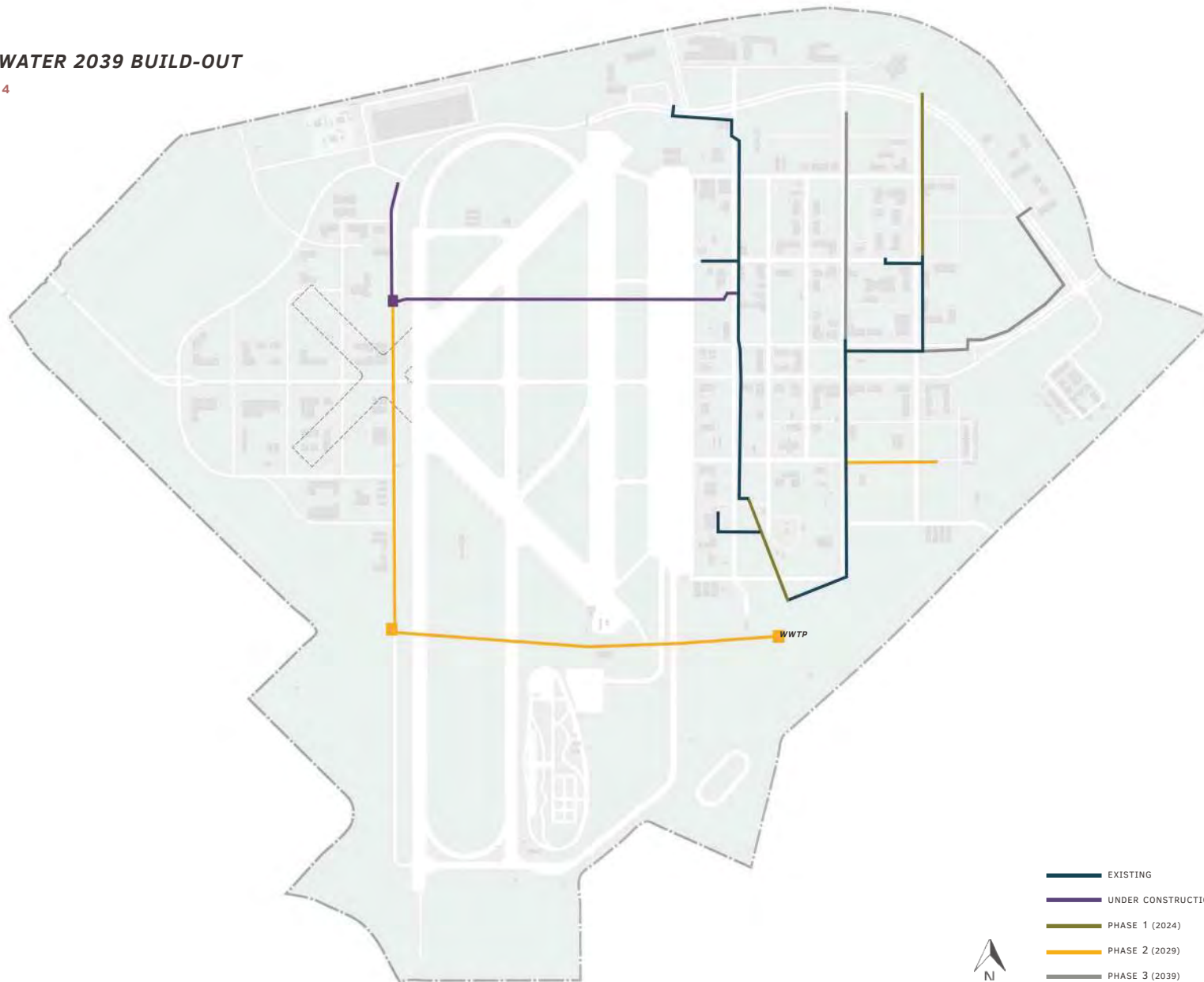
WASTEWATER 2029 BUILD-OUT

FIGURE 5.13



WASTEWATER 2039 BUILD-OUT

FIGURE 5.14



- EXISTING
- UNDER CONSTRUCTION (2019)
- PHASE 1 (2024)
- PHASE 2 (2029)
- PHASE 3 (2039)

5.4 THERMAL UTILITIES

THERMAL UTILITIES SUMMARY

The campus is currently expanding to include new administrative buildings, office buildings, academic and research buildings, and additional parking. The purpose of this thermal utility analysis is to identify the future campus peak loads and determine the future expansion requirements of the utility production facilities and distribution systems to support the planned growth as described in the master plan report.

Phase 1 construction includes the addition of 1,084,700 square feet of office, lab, and academic buildings. The peak demand load increases associated with phase 1 is 1,742 tons of cooling and 10,853 MBH of heating. The existing Central Utility Plant (CUP) will be expanded to add 800 tons of cooling capacity and 3,000 MBH of heating capacity. Total CUP firm capacity will be 3,200 tons of cooling and 18,000 MBH of heating in reaction to the increased demand load from phase 1.

CENTRAL UTILITY PLANT (CUP) BUILDING



Phase 2 construction includes the addition of 872,500 square feet of residential, retail, office, academic, data center, wellness, and lab. The demand load increases associated with phase 2 is 1,794 tons of cooling and 10,700 MBH of heating. The existing CUP capacity will be expanded to add 3,200 tons of cooling capacity and 18,000 MBH of heating capacity in reaction to the increased demand load. This will require the expansion of the CUP facility to accommodate space needed for equipment and maintenance clearances. Total CUP firm capacity will be 6,500 tons of cooling and 30,000 MBH of heating in reaction to the increased demand load from phase 2.

Phase 3 construction includes the addition of 1,862,700 square feet of academic, laboratory, administrative, storage, retail, manufacturing, wellness, conference center, and residential program. The demand load increases associated to phase 3 construction is 6,241 tons of cooling and 38,766 MBH of heating. The existing CUP capacity will be expanded to add 4,800 tons of cooling capacity and 18,000 MBH of heating capacity in reaction to the increased demand load. Total CUP firm capacity will be 11,500 tons of cooling and 69,000 MBH of heating in reaction to the increased demand load from phase 3.

EXISTING CAMPUS

Facilities on the current campus total 500,000 gross square feet and are utilized for educational, training, and research purposes. Most of the existing facilities on the RELLIS Campus have standalone utilities to serve the building. Facilities that are not standalone are served by the campus CUP. The current peak demand load on the RELLIS Campus is approximately 1,000 tons of cooling and 7,700 MBH of heating.

Existing facilities and buried distribution piping can be seen on M-1 in Appendix I.

The CUP has a firm cooling capacity of 2,400 tons and a firm heating capacity of 15,000 MBH. A thermal storage tank is installed in the CUP and has 12,800 tons/hour of usable thermal storage and has a tank volume of 1,540,000 gallons. Future space for expansion has been allocated in the existing CUP for hot water and chilled water equipment. Chilled water production equipment includes (4) water cooled chillers, (4) cooling towers, (4) primary chilled water pumps, (3) secondary pumps, and (4) condenser water pumps. Heating water production equipment includes (6) boilers and (2) hot water pumps. Existing equipment is summarized in table 5.4 below.

EXISTING CUP EQUIPMENT

TABLE 5.4

EQUIPMENT	QUANTITY	CAPACITY
Chilled Water System		
Water Cooled Chiller	4	800 tons
Cooling Tower	4	2,400 GPM
Chilled Water Primary Pump	4	1,600 GPM
Chilled Water Secondary Pump	3	2,800 GPM
Condenser Water Pump	4	2,400 GPM
Heating Water System		
Boiler	6	3,000 MBH
Pump	2	1,100 GPM

EXISTING THERMAL LINES

FIGURE 5.15



THERMAL DESIGN GUIDELINES

All new buildings being constructed during phase 1, 2, and 3 of the RELLIS campus will conform to the latest ASHRAE 90.1 edition as adopted by the State.

The chilled water supply temperature is currently 42°F from the existing chillers. Current chillers are sized to handle a 14°F ΔT . Distribution piping mains for CHS and CHR are 24" across campus. Construction phases will require the expansion of the 24" CHS and 24" CHR distribution mains to accommodate new construction of the campus.

The heating hot water supply temperature is currently 150°F with campus buildings being designed for a 30°F ΔT .

CAMPUS EXPANSION

Heating, cooling, and electrical loads for the future campus buildings have been projected to align with the overall master plan. The cooling square foot per ton and heating BTU per square foot values were estimated based on building type and application. Different load profiles based on previous experience with TAMU facilities and similar campuses were considered. Appendix G summarizes the projected building loads and campus chilled water and hot water peak and diversified loads by phase.

Future build-out of the RELLIS campus is identified in 3 phases with phase 1 encompassing a construction period of 1 – 5 years, phase 2 encompassing a construction period of 6 – 10 years following phase 1, and phase 3 encompassing 11 – 20 years after phase 2. Additional chilled water supply (CHS), chilled water return (CHR), hot water supply (HWS), and hot water

return (HWR) piping will be necessary for every phase of new construction to distribute thermal utilities across campus.

Phase 1 (2019 - 2024)

The RELLIS Campus will expand its campus facilities 1,084,700 square feet in phase 1. The phase 1 expansion to the RELLIS Campus will have a peak cooling demand of 1,742 tons and a peak heating demand of 10,853 MBH. Phase 1 expansion will bring the total campus peak cooling load to 2,845 tons and peak heating load to 18,013 MBH. Refer to Appendix G for the projected loads calculation.

The existing campus CUP will be utilized to provide heating and cooling generation to the campus expansion to phase 1. To meet the demand load additions of phase 1, the existing CUP will have to increase its cooling and heating capacity. For chilled water systems, the CUP expansion will include new equipment addition of (1) 800 ton chiller and (1) 2,400 GPM cooling tower. For heating hot water systems, the CUP expansion will include the addition of (1) 3,000 MBH condensing water boiler. Total CUP firm capacity will be 3,200 tons of cooling and 18,000 MBH of heating in reaction to the increased demand load from phase 1.

New direct buried 24" chilled water and 12" hot water distribution will be extended off the existing loop to serve the new 1,084,700 square foot expansion. Refer to M-2 for the phase 1 thermal utility distribution plan in the appendix showing the thermal distribution extension and pipe route.

Phase 2 (2024 - 2029)

In phase 2, the RELLIS Campus will expand its campus facilities an additional 872,500 square feet. Phase 2 expansion to the RELLIS Campus will have a peak cooling demand of 1,794 tons and a peak heating demand of 10,700 MBH. The phase 2 expansion will bring the total campus peak cooling load to 4,639 tons and peak heating load to 28,713 MBH. Refer to Appendix G for the projected loads calculation.

An expansion of the existing CUP will be required during phase 2 to provide necessary space and clearances of new equipment. For chilled water systems, the CUP expansion will include the addition of (1) 800 ton chiller, (1) 2,400 ton chiller, (1) 2,400 GPM cooling tower, and (1) 7,200 GPM cooling tower. For heating hot water systems, the CUP expansion will include the addition of (4) 3,000 MBH condensing water boiler. Total CUP firm capacity will be 6,500 tons of cooling and 30,000 MBH of heating in reaction to the increased demand load from phase 2. New direct buried 24" chilled water and 12" hot water distribution will be extended off the existing loop to serve the new 872,500 square foot expansion. Expansion of the distribution piping it so start construction before building construction of phase 2. Refer to M-3 for the phase 2 thermal utility distribution plan in the appendix showing the thermal distribution extension and pipe route.

Phase 3 (2029 - 2039)

The final phase will expand the RELLIS Campus facilities 1,862,700 square feet. Phase 3 expansion to the RELLIS Campus will have a peak cooling demand of 6,341 tons and a peak heating demand of 39,766 MBH. The phase 3 expansion will bring the total campus peak cooling load to 10,980 tons and peak heating load to 68,479 MBH. Refer to Appendix G for the projected loads calculation.

The existing CUP, expanded during phase 2, will be utilized to provide heating and cooling generation to the campus expansion to phase 2. For chilled water systems, the CUP expansion will include the addition of (2) 2,400 ton chillers and (2) 7,200 GPM cooling towers. For heating hot water systems, the CUP expansion will include the addition of (13) 3,000 MBH condensing water boiler. Total CUP firm capacity will be 11,500 tons of cooling and 69,000 MBH of heating in reaction to the increased demand load from phase 3.

New direct buried 24" chilled water and 12" hot water distribution will be extended off the existing loop to serve the new 872,500 square foot expansion. Expansion of the distribution piping it so start construction before building construction of phase 3. Refer to M-4 for the phase 3 thermal utility distribution plan in the appendix showing the thermal distribution extension and pipe route.

Additional details are provided in the Appendix G and K.

THERMAL LINES 2024 BUILD-OUT

FIGURE 5.16



THERMAL LINES 2029 BUILD-OUT

FIGURE 5.17



THERMAL LINES 2039 BUILD-OUT

FIGURE 5.18



- EXISTING
- UNDER CONSTRUCTION
- PHASE 1 (2024)
- PHASE 2 (2029)
- PHASE 3 (2039)

Campus Expansion Recommendations

Tables 5.5 and 5.6 reflect the recommended utility production equipment to be provided during the planning periods indicated.

RECOMMENDED COOLING PRODUCTION EQUIPMENT

TABLE 5.5

PRODUCTION EQUIPMENT	PRESENT	PHASE 1 (2019-2024)	PHASE 2 (2024-2029)	PHASE 3 (2029-2039)
Cooling Capacity by Phase (Tons)				
Chiller 1	800			
Chiller 2	800			
Chiller 3	800			
Chiller 4	800			
Chiller 5		800		
Chiller 6			800	
Chiller 7			2,400	
Chiller 8				2,400
Chiller 9				2,400
Cumulative Cooling Capacity (Tons)				
Total Campus Firm Capacity	2,400	3,200	6,400	11,200
Cumulative Peak Cooling Load	1,000	2,845	4,639	10,880
DIFFERENCE BETWEEN FIRM CAPACITY AND CAMPUS LOAD	1,400	355	1,761	320

RECOMMENDED HEATING PRODUCTION EQUIPMENT

TABLE 5.6

PRODUCTION EQUIPMENT	PRESENT	PHASE 1 (2019-2024)	PHASE 2 (2024-2029)	PHASE 3 (2029-2039)
Heating Capacity by Phase (MBH)				
Boiler 1	3,000			
Boiler 2	3,000			
Boiler 3	3,000			
Boiler 4	3,000			
Boiler 5	3,000			
Boiler 6	3,000			
Boiler 7		3,000		
Boiler 8			3,000	
Boiler 9			3,000	
Boiler 10			3,000	
Boiler 11			3,000	
Boiler 12				3,000
Boiler 13				3,000
Boiler 14				3,000
Boiler 15				3,000

PRODUCTION EQUIPMENT (CONT.)	PRESENT	PHASE 1 (2019-2024)	PHASE 2 (2024-2029)	PHASE 3 (2029-2039)
Boiler 16				3,000
Boiler 17				3,000
Boiler 18				3,000
Boiler 19				3,000
Boiler 20				3,000
Boiler 21				3,000
Boiler 22				3,000
Boiler 23				3,000
Boiler 24				3,000

Cumulative Heating Capacity (Tons)

Total Campus Firm Capacity	15,000	18,000	30,000	69,000
Cumulative Peak Cooling Load	7,700	18,013	28,713	68,479
DIFFERENCE BETWEEN FIRM CAPACITY AND CAMPUS LOAD	7,300	-13	1,287	521

5.5 ELECTRICAL UTILITIES

The purpose of the electrical utilities plan is to identify the future campus peak utility loads and determine the future expansion requirements of the utility production facilities and distribution systems to support the planned growth described below.

ELECTRICAL UTILITIES

The site is currently being fed from a City of Bryan (CoB) overhead distribution system at 12.47kV, located on the northeast side of the campus. An underground service from the CoB terminal pole consists of a duct bank with (2) sets of 15kV, 750kcmil AL conductors in 6”C extends to a 2000A switchgear line-up at the new Central Utility Plant (CUP). The available capacity in the incoming line is approximately 12MVA.

The CUP switchgear is designed as main-tie-main with provisions for two (2) main incoming feeds and two (2) distribution loops. The first loop is under construction to encompass a majority of the Central Core of buildings. A second loop is proposed to pick up the balance of future construction. Refer to the site plan for existing and proposed loop configurations.

A second CoB 12.47kV substation, located on the west side of the campus, is proposed as the second feed into the CUP switchgear. The addition of the second campus loop will coincide with addition of the second feed. Refer to the electrical site plan for proposed routing of the new duct banks.

The RELLIS Campus build-out is programmed at 4,300,000 gross square foot. Refer to the enclosed campus load analysis for a breakdown of building electrical loads.

Projected building loads are:

- Phase 1 8,500kW (400A @ 12.47kV)
- Phase 2 13,600kW (630A @ 12.47kV)
- Phase 3 32,400kW (1500A @ 12.47kV)

Projected CUP loads are:

- Existing 2,400kW (120A @ 12.47kV)
- Phase 1 3,200kW (150A @ 12.47kV)
- Phase 2 6,500kW (300A @ 12.47kV)
- Phase 3 11,500kW (5300A @ 12.47kV)

These loads do not include the Data Center, which will have its own medium voltage service and Central Utility Plant.

Electrical Infrastructure Expansion

In addition to installation of the second feeder into the CUP, a second distribution loop is proposed to accommodate expansion beyond the core buildings. This loop will consist of new 15kV 600A feeder cables in concrete-encased duct banks with new manhole infrastructure.

New 4- or 5-way 15kV loop switches will be provided at each major facility or group of buildings to feed new pad-mounted transformers and to provide sectionalized points along the loop.

Pad-mounted transformers shall be provided for each facility, sized for the calculated demand load (plus 30% spare capacity) for future load growth. All new pad-mounted transformers will be provided with dual-feed primary bushing to accommodate loops where switchgear is not practical. Building service will

predominantly be at 480/277V, 3-phase, 4-wire unless otherwise determined.

ELECTRICAL DESIGN GUIDELINES

The electrical underground infrastructure shall be built using the following design criteria:

All medium voltage cables shall be installed in schedule 40 PVC. Duct banks shall be encased in red-dyed, steel-reinforced, concrete. The minimum duct size shall be 6” with a minimum of 33% spare ducts per run. Metallic (detectable) warning tapes shall be installed on top of all duct banks.

Manholes shall be provided at approximately every 400’ of run and at every 90 degree horizontal change in direction. The minimum size of manholes shall be 8’ high by 10’ long by 8’ wide to accommodate mainline 600A feeders (and/or 5-way 15kV submersible vacuum interrupter switches). All manholes shall have (2) supporting racks on each wall to allow cables to be wrapped 360 degrees before exiting. The minimum chimney opening shall be 42”.

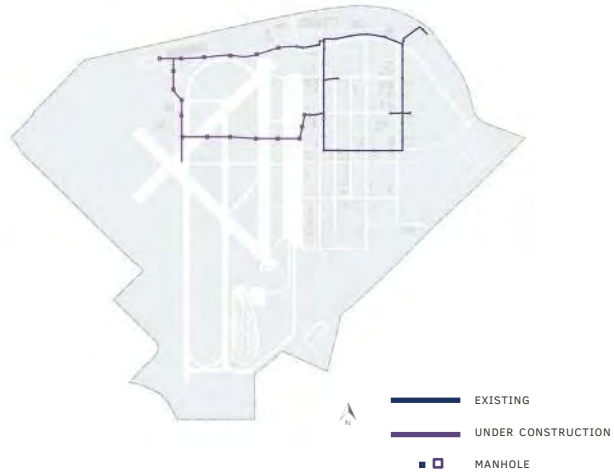
All medium voltage distribution cables shall be drain wire type, 15kV, copper conductor, ethylene propylene rubber (EPR) with 133%, 220mil insulation and MV105 thermal rating.

Switchgear shall be 15kV pad-mounted or submersible, solid dielectric, vacuum interrupter type with visible disconnects, as manufactured by Innovative Switchgear Solutions.

Existing facilities, which are currently served overhead, will be converted to underground service with pad-mounted transformers as they are renovated.

EXISTING ELECTRICAL LINES

FIGURE 5.19



ELECTRICAL LINES 2039 BUILD-OUT

FIGURE 5.20



5.6 TECHNOLOGY

TECHNOLOGY PATHWAYS

The master plan represents the direction for the eventual build-out and development of the campus. The telecommunications master plan supports that effort by presenting a strategy for the phased expansion of the telecommunications duct bank system which will provide both redundancy and resiliency to the future buildings.

The two initial goals of the telecommunications duct bank system are:

- Provide both campus and quadrant service loops which would therefore provide each building the opportunity to have redundant service entry points.
- Utilize the campus Data Center as the hub of distribution and connectivity for the RELLIS network.

Currently, Frontier Communications is the primary fiber service provider for the campus, with the primary circuit entering the campus from the south via Goodson Bend Road. Once the Data Center project comes online, it is anticipated that additional fiber service will be added to the campus from State Highway 21 as well as service from two to three additional providers. To support these efforts, a concrete encased duct bank with (8) 4" conduits is planned for the primary loop. For all secondary loops, which would serve the phased development, (6) 4" conduits are planned. This affords each phased area with a smaller loop of (4) 4" conduits and ultimately results in diverse 4" services to each building.

For each respective loop the conduit allocation is as follows:

- Dedicated conduit for RELLIS/TAMUS
- Service Provider 1
- Service Provider 2
- Distributed Antenna Service
- Smart Campus/future technologies
- Spare(s)

The quantity of conduits will vary based on location and area being served.

To complete the respective loops, there are key junctures of the duct bank system that will cross the existing runways. Due to the associated cost of trenching or boring across these areas, these utility corridors are to be coordinated with other wet and dry utilities.

Duct bank specifications will be as follows:

- Schedule 40 PVC, concrete encased, stacked with the electrical service distribution
- A series of dedicated telecommunication manholes located adjacent to electrical manholes
- Telecommunication conduits shall break out from the duct bank to access the telecommunications manholes; conduits will reconvene with the main duct bank after connecting to the telecommunications manhole

- Distances between manholes or pull boxes should be no greater than 600 feet

Single mode fiber optic cable is the medium of choice and shall be deployed for all backbone connectivity throughout the campus. Copper cable deployment is currently not planned. Strand counts and splicing locations will vary on campus.

Campus development and expansion, including the individual projects, will require smaller diameter conduits to support additional technologies, including site security surveillance cameras, exterior 802.11 wireless access points, emergency call stations, Distributed Antenna System locations, and future smart technology solutions. The supporting conduit infrastructure solutions for these technologies will be separate from the telecommunications distribution duct banks and manholes and should be routed directly to the nearest available building.

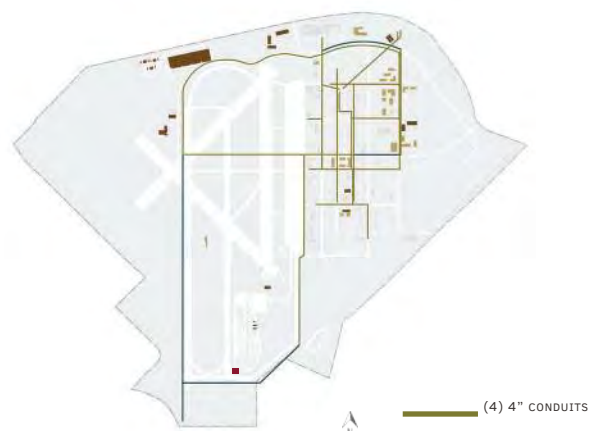
TECHNOLOGY 2024 BUILD-OUT

FIGURE 5.21



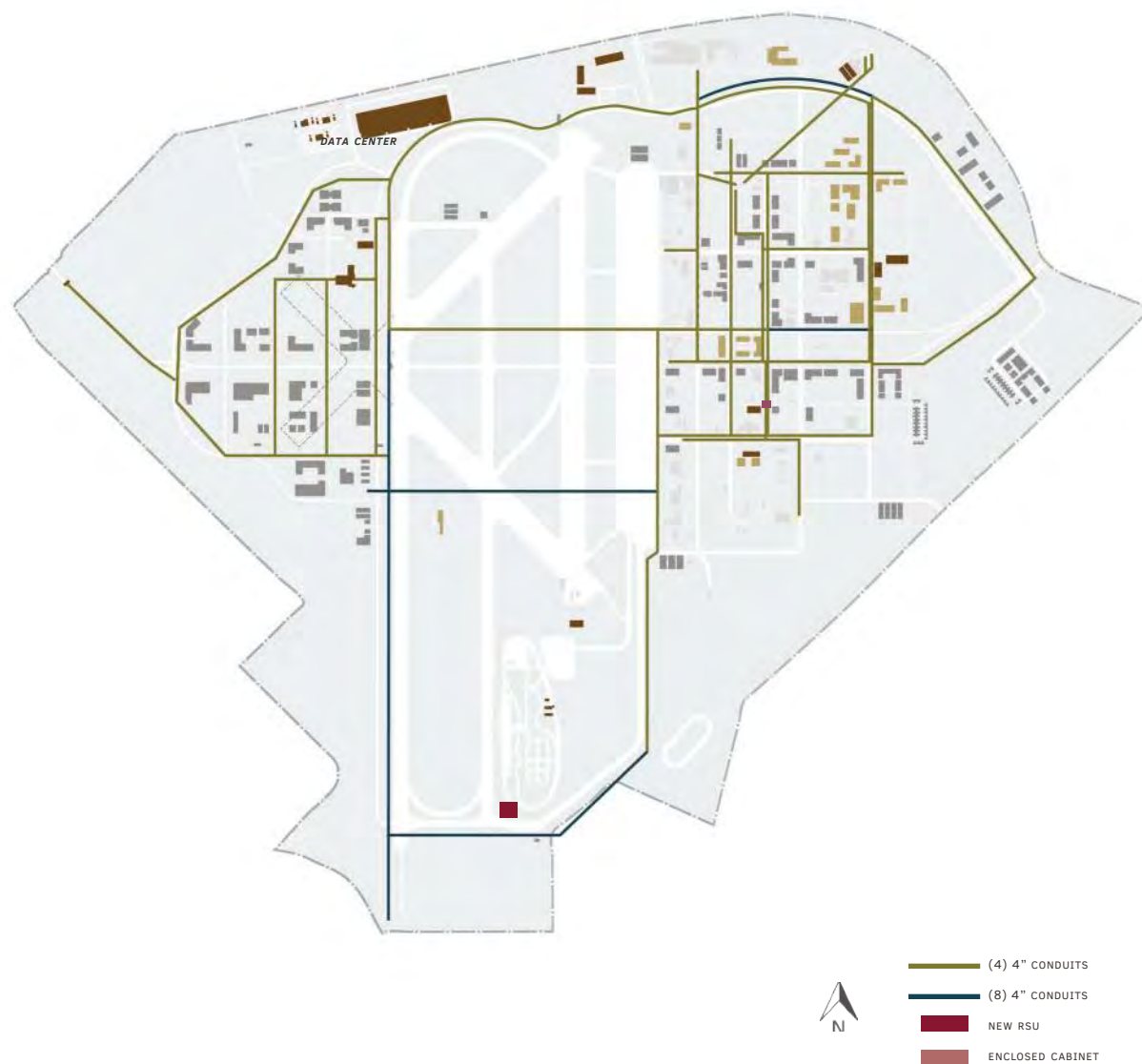
TECHNOLOGY 2029 BUILD-OUT

FIGURE 5.22



TECHNOLOGY 2039 BUILD-OUT

FIGURE 5.23



6

Guidelines

- 6.1 Purpose
- 6.2 Campus Design
- 6.3 Architectural
- 6.4 Landscape and Open Space
- 6.5 District Supplements
- 6.6 Review and Compliance





6.1 PURPOSE

The RELLIS Campus Design Guidelines provide a set of principles intended to foster a cohesive and functional setting that will aid in the advancement of the institution's academic and research goals. The guidelines present direction on design decisions for buildings and open spaces. The RELLIS Campus Facility Design Guidelines (FDG) should be referenced for more specific construction and building systems requirements. In the instance of any discrepancy, the FDG will govern.

These design guidelines are arranged into four primary categories to correspond to specific project types or components:

- Campus Design Guidelines
- Architectural Guidelines
- Landscape and Open Space Guidelines
- Signage and Wayfinding Guidelines

An outline of each category is presented at the beginning of each section to provide an overview for the general reader, while more specific provisions are defined under the subsequent principles.

Two additional sections are included along with the four categories of guidelines. A section of district specific provisions are provided to outline additional or relaxed conditions for areas outside the Central Core. The guidelines review and compliance procedures are also outlined in the final section of the chapter.

6.2 CAMPUS DESIGN GUIDELINES

Campus design guidelines set forth overarching principles for the organization of the campus on at the macro scale. These guidelines should be reviewed at the conception of a project as part of its programming. They help guide decisions such as building site selection, open space organization, and the location or reorganization of transit networks.

The campus guidelines include the following principles:

- Social and collaborative spaces
- Thresholds
- Connectivity and walkability
- Commemoration

SOCIAL AND COLLABORATIVE SPACES

New buildings should be sited to reinforce collaborative clustering while preserving land for research and future development.

The RELLIS Campus currently has ample building site opportunities due to the large area and relatively small existing built footprint. When new building projects are determined, consideration should be given to appropriate adjacencies to existing facilities or other planned projects. This clustering creates a cohesive identity as the 'place' where innovation occurs, for academic research, and other training purposes. This also limits the necessity for excessive infrastructure investment in the near term by concentrating the areas of development.

Within a cluster, the active edges of buildings should be placed toward primary pedestrian spines or plazas to foster connectivity between buildings. This increases the opportunity for chance encounters and collaboration that fuels innovation.

As various clusters develop, pedestrian streets or paths can be used to create a network of smaller, connected spaces that weave through the campus. These social spaces become a cohesive public realm that provides an opportunity to showcase innovation. This also increases the potential of attracting partner relationships to the campus through startup or tech companies that prefer collaborative interior and exterior environments.

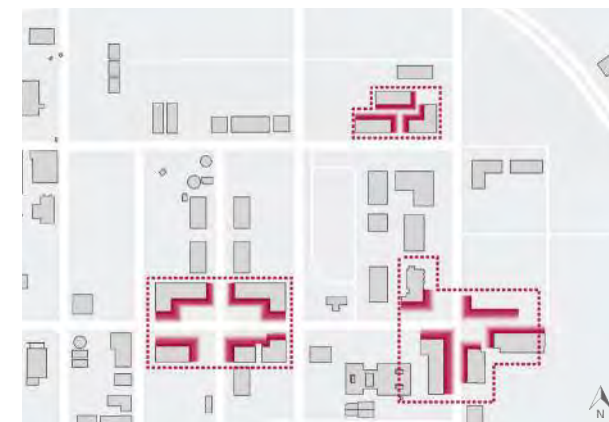


FIGURE 6.1 Sample Building Clusters

- ACTIVE EDGE
- - CLUSTER

THRESHOLDS

Campus thresholds, or entries, should be strengthened through significant landscape features or noteworthy building framing.

The RELIS Campus contains two primary vehicular thresholds, one from State Highway 21 and the other from State Highway 47 at Airfield Drive. As the campus grows and population increases, additional entries will be necessary from the western and southern areas of the campus. New thresholds are proposed on the south from Avenue D along Goodson Bend Road, from the northwest at State Highway 21 across from Fazzino Lane, and from the west at Kuder Road.

The State Highway 47 entrance at Airfield Drive is the existing entrance to the entire campus. It is envisioned to remain the primary formal entry, as it provides the most visible and direct link to other institutional functions in Bryan and College Station. Because of its prominence and significance to the campus, this entry should feature a landscape gesture that relates to the overall scale and importance of the campus. Users should move through this extended natural threshold prior to arriving at campus buildings, evoking a sense of relevance and stature for the campus.

The State Highway 21 entrance provides a secondary and highly visible entry. It should be highlighted by the framing of significant campus buildings coupled with prominent landscape features. At this threshold, users may gain a quicker sense of the specific activities occupying the campus.

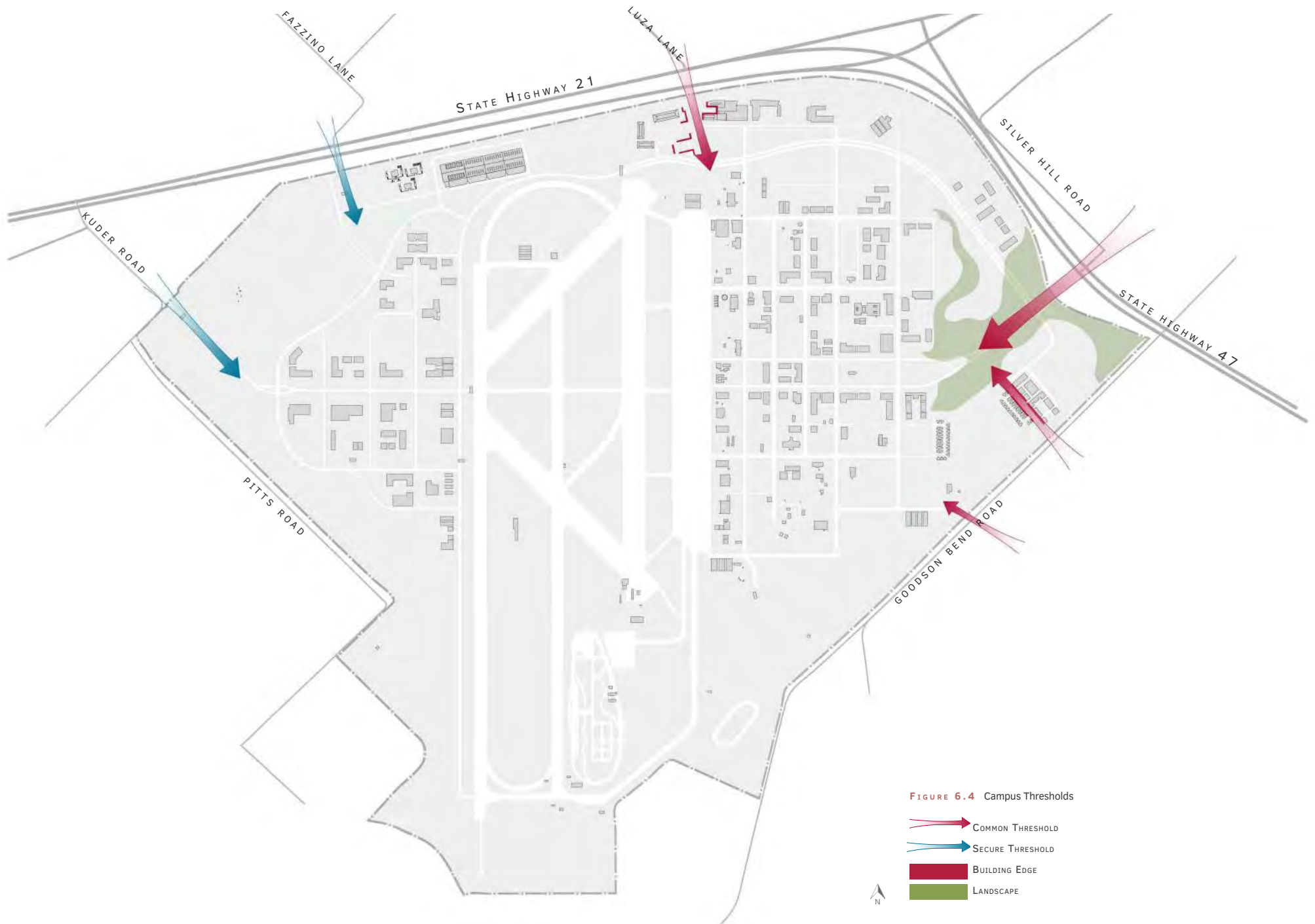
Future tertiary campus entries may employ smaller buildings or scaled landscape components that relate back to the larger campus aesthetic. These entries will be used primarily by individuals familiar with the campus and its organization.



FIGURE 6.2 The entry landscape should be routed in the local ecology and create a sense of arrival for the vehicle as well as integrate pedestrian recreational opportunities.



FIGURE 6.3 The campus threshold should present a strong image based in the native East Texas vegetation.



CONNECTIVITY AND WALKABILITY

Safe and efficient mobility should be reinforced throughout the site through multiple modes of transportation, including pedestrian, bicycle, bus, driverless vehicles, and standard vehicles.

The large scale of the RELLIS Campus requires several modes of traversing the site. The street network may use both shared and segregated facilities depending on the location. Several street typologies exist within the master plan to accommodate these needs:

- Pedestrian street
- Recreational path (pedestrian and bicycle)
- Transit street (bus, bicycle, and autonomous vehicle)
- Common-use vehicular street
- Service and access alley
- Secure campus vehicular street

The Central Core should be established with a compact and interconnected network. The character of streets and public spaces should build upon and extend the Bryan AAF grid. This zone should develop a higher degree of segregated use streets to avoid conflicts between modes and to promote safety in the most densely populated district of the campus. Specific transit streets provide opportunities for buses, bicycles, and autonomous vehicles to move freely from common-use vehicular routes that may contain a higher volume of traffic and individuals unfamiliar with the campus. Dedicated service and access

streets afford easy connections to loading areas and parking facilities that are internal to the existing block structure.

The campus should incorporate specific walking paths to facilitate pedestrian movement through the site. The core should utilize building types that connect internal public areas with external spaces, leading to a neighborhood fabric of networked open spaces.

Discrete pedestrian focus opportunities within the core should be incorporated in the form of pedestrian streets that concentrate the flow of site occupants. Secondary paths through landscaped areas provide opportunities for recreation and pedestrian circulation through the broader campus. Development areas outside the core should implement pedestrian connectivity within the specific development with the consideration for links back to the broader campus network.



FIGURE 6.5 Pedestrian Circulation

— PEDESTRIAN STREET
- - - PEDESTRIAN/BICYCLE RECREATIONAL PATH

As new projects are developed, they will be required to create pedestrian pathways to adjacent properties, consistent with the objectives of the master plan. If adjacent parcels are not yet developed, the project should create pedestrian pathways that anticipate connectivity at the edge of the designated parcel. If an appropriate strategy is not obvious within the master plan, compliance will be determined by the RELLIS Planning and Design Review Board outlined in section 6.6.

Connectivity extends beyond physical links between buildings and districts. The campus should create a culture that fosters professional networks and business connections. It should establish an open network, technologically connected district through the implementation of fiber optics, Wi-Fi, or future connections.



FIGURE 6.6 Transit Routes

— TRANSIT-ONLY STREET
- - TRANSIT ROUTE



FIGURE 6.7 Vehicular Routes

— COMMON-USE STREET
- - SERVICE/ACCESS STREET



FIGURE 6.8 Secure Access

— SECURE STREET
- - SECURE/FLEX STREET

COMMEMORATION

The RELIS Campus has the unique opportunity to develop a site that reflects its rich military history. Moving forward, the RELIS Campus will grow with memories of the past visible throughout the former base. From buildings to structures to landscapes, RELIS has a history to proudly display and honor.

A. Recreation

Establish a heritage trail at or near the recreation pond or Brazos River. A hiking/biking trail can include kiosks or historical markers to educate visitors of the significance of a specific site. It could tell about life on the base, important events, and people.

B. Street System

In 1954, General Orders Number 12 issued on June 30, re-designates streets after prominent air force servicemen. This order has never been implemented and could help RELIS Campus honor fallen military leadership while creating a memorable street system. Streets may also be named to reflect the site's history more generally. The campus has taken such steps with the renaming of 5th Street as Airfield Drive.

C. Rehabilitation

Where opportunity arises, rehabilitate Bryan AAF and Bryan AFB structures for new uses. Buildings that are conducive to this include hangars, chapel, engine shops, and cadet quarters. These can be converted into new uses or restored as tangible reminders for the community.

D. Arts Program

Create an arts program for interior and exterior display that ties back to local history and regional context. New buildings can develop a program with local artists to honor Bryan's and Texas A&M's military history. Outdoor art installations can be included in recreation areas or in proper relation to new buildings.

E. Monuments/Memorials/Museum

Create an air service memorial and or museum exhibit that is in a historic or prominent location to note the history of the site. A combination of existing structures, including the air control tower and water tower, could be enhanced with historic relics such as airplanes, helicopters, or other military equipment. This could tie in with a larger arts and recreation program. It also presents an opportunity for landmarks near the new Academic Alliance Complex area.

F. New Buildings

New buildings should respect context and heritage of the existing buildings and site. The character of the RELIS Campus is derived from Bryan Army Air Field and Bryan Air Force Base. As a unique resource, the site's runways and gridded base should serve as a determinate for future growth.

G. Marketing/Programming

Create RELIS identity and programming that relates back to its air service roots; examples include a military walk/run, website, or brochures. This campaign could be comprised of recreation, arts program, memorials, and other opportunity areas for RELIS to honor its history.



FIGURE 6.9 George Bush Library



FIGURE 6.10 JFK Mural



FIGURE 6.11 National Park Planner Shiloh / Steven Markos



FIGURE 6.12 Silent Wings Museum in Lubbock, TX / David Kozlowski-Flickr



FIGURE 6.13 Street Sign Commemoration, New York, NY



FIGURE 6.14 Plaza in Lowry, CO



FIGURE 6.15 Silent Wings Museum in Lubbock, TX



FIGURE 6.16 Plaza/Sculptural Commemoration

6.3 ARCHITECTURAL

Architectural guidelines establish a design framework for building projects. Ten principles outline categories to provoke innovative solutions to design problems while maintaining a connective fabric and campus architectural identity. Within each principle, varying degrees of specificity are provided while not prescribing a singular outcome. All of these require the trained professional to use ingenuity to develop solutions and demonstrate adherence through the design review process.

The ten architectural principles include:

- Building massing and type
- Fabric and focus
- Reinforcing the public realm
- Facade activation
- Character-defining material palette
- Natural light
- Historic character
- Building economy and sustainability
- Integrated parking
- Screened service areas



FIGURE 6.17 The Research Integration Center under construction in 2020 is the first building to expand the RELLIS architectural style west of the Experimentation Testing and Training Grounds.

BUILDING MASSING AND TYPE

A building's massing should respond to the human scale and its surrounding context. Multiple building types should be employed to create variety throughout the campus.

As buildings grow in height and floor plate size, their massing should remain responsive to the human scale. Volumetric elements or shifts that break down the overall massing, such as stepbacks, are appropriate to provide for pedestrian comfort. Long, singular facades should be varied through changes in edge configuration or materials.

As the campus builds out and contains clusters of buildings, new structures should relate to the massing of adjacent facilities. Taller buildings should be responsive and avoid overpowering the nearby context.

Within the Central Core, building heights are constrained by their distance from the Experimentation Testing & Training Grounds, in order to control views into sensitive testing activities. This is further illustrated in Figure 6.20.

BUILDING HEIGHT SECTION

FIGURE 6.20

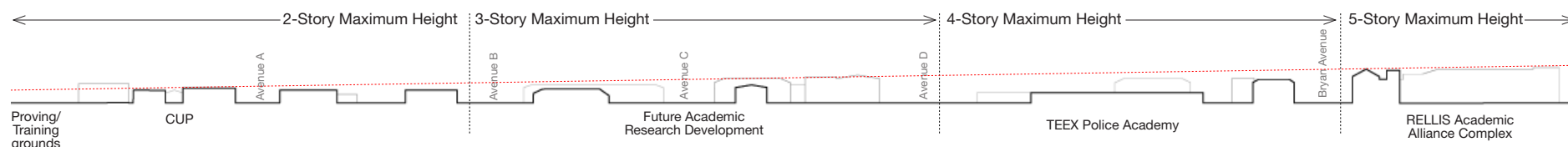


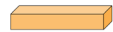
FIGURE 6.18 This north facade of the CIR uses a material shift in elevation to step down the overall massing of the structure. Plane shifts and volumetric changes along the facade of the building break up its overall length while maintaining a consistent street edge.



FIGURE 6.19 The south facade of the RELLIS Academic Alliance Complex Phase 1a building utilizes human-scaled elements and volume recesses to respond to the pedestrian scale at grade.

A variety of building typologies are appropriate for the campus to respond to programmatic needs. This provides differentiation and intrigue for the campus as a whole. The existing RELLIS Campus contains primarily warehouse (hangar) buildings and smaller residential-scale structures. Recent construction has begun to expand these typologies with bar and courtyard structures. Continued expansion of these typologies should be encouraged as the campus grows. Typologies may include the following:

- Bar building



- L-shaped building



- Courtyard building (open or closed)



- Pavilion



- Large-plate or long-span structures (warehouse)



- Tower



Figure 6.21 reflects the existing campus building typologies. Figure 6.22 represents a potential scenario for future building typologies and variation. Exact typologies for future buildings will be determined during the programming and design phases to best suit the needs of the given facility.

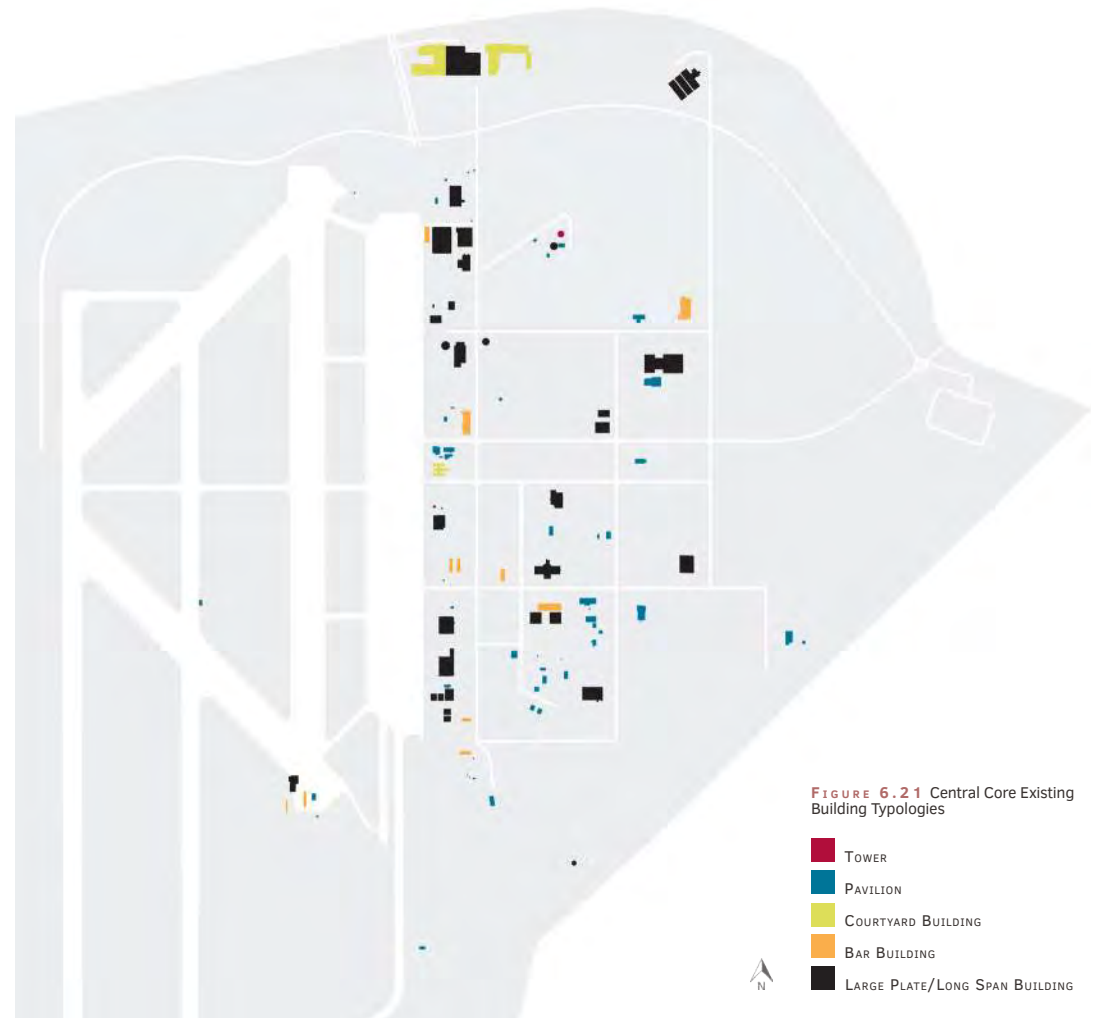




FIGURE 6.22 Illustrative Future Building Typologies

- TOWER
- PAVILION
- COURTYARD BUILDING
- BAR BUILDING
- LARGE PLATE/LONG SPAN BUILDING
- L-SHAPED BUILDING

FABRIC AND FOCUS

The RELIS Campus should be composed of buildings that provide a cohesive building aesthetic, or “fabric”, occasionally tempered by district focus or campus focus landmarks that provide intrigue and identity for the institution.

Buildings on the campus should be categorized as campus focus, district focus, or fabric buildings. The decision of whether a building should be a fabric or focus should be made early in the design process and based on both the location and function of the facility.

The majority of structures on the campus should be designed as fabric buildings that play an important role in reinforcing a cohesive campus character. Fabric buildings create the connective building tissue that unites the campus.

District focus buildings are useful to reinforce a section of the campus or threshold. They can be used to frame views or thresholds to the campus. Though the material palette will remain consistent with the campus fabric, limited distinct features may be utilized to create the focal nature of the structure.

Campus focus buildings provide a presence and image for the campus as a whole. They will be the least common type employed throughout the campus. These structures may be the most architectural distinctive while maintaining material connectivity to the campus fabric.



FIGURE 6.23 The existing RELIS Campus chapel will be renovated and presents an opportunity for a district focus building at the center of the future park between Airfield Drive and 6th Street.



FIGURE 6.24 The proposed Workforce Training building provides a sensible use of the campus material palette to create a valuable fabric building.

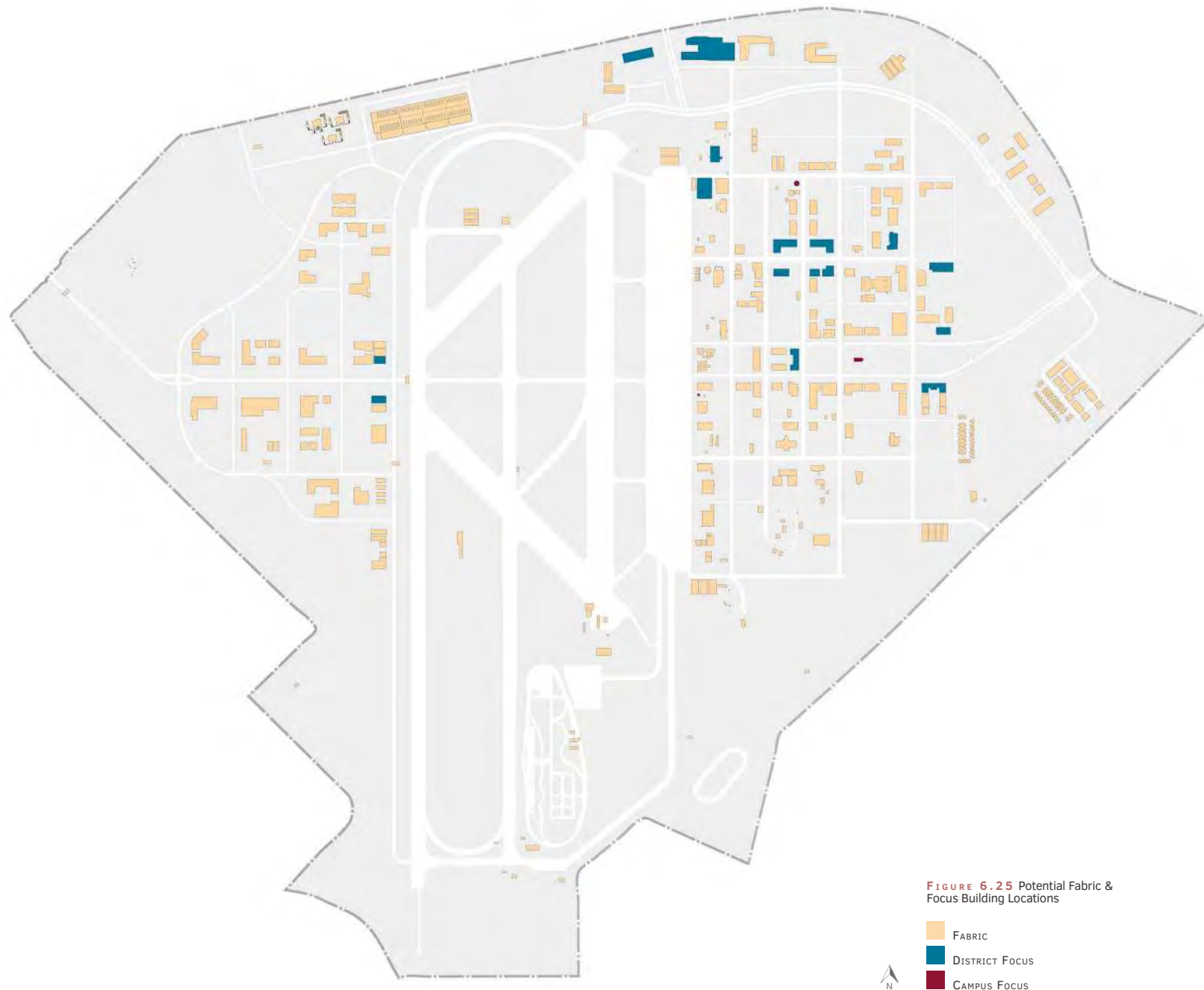


FIGURE 6.25 Potential Fabric & Focus Building Locations

- FABRIC
- DISTRICT FOCUS
- CAMPUS FOCUS

REINFORCING THE PUBLIC REALM

Building edges should be used to reinforce the public realm along significant campus spaces such as plazas and pedestrian streets.

As the RELIS Campus develops, significant public spaces will be created for a variety of outdoor functions. Building edges should help to define the perimeter of these spaces, creating outdoor 'rooms'. Though adjacent building facades may not align precisely, they should create a consistent and sustained edge condition that reinforces these spaces.

The organization of a building's ground level should be used to activate the public realm. Where applicable, primary entrances should be located along pedestrian streets or plazas. The clustering of buildings around these spaces will help to create well-defined civic spaces that are enlivened with campus use.



FIGURE 6.26 The RELIS Academic Alliance Phase 1a building defines a public gathering space that will be paired with the Phase 1b building. The Phase 1a building sets a strong edge for the future 4th Street pedestrian mall.



FIGURE 6.27 The TEES Complex Industrial Distribution buildings form a common plaza space for this zone of the campus.



FIGURE 6.28 Public Realm

FACADE ACTIVATION

Active uses should be placed on the ground floor to help reinforce the indoor-outdoor connectivity of the campus buildings to the landscape and open spaces.

The street-level of campus buildings should contain public-oriented programs wherever possible. Such uses may include lobbies, classrooms, conference and event areas, laboratories, food service, student services, and other spaces that provide regular activity or pedestrian flow. If a building program allows, the unique active research and innovative technologies studied on the RELLIS Campus should be highlighted on the building's exterior or in public spaces.

Building entrances should be located along primary pedestrian routes. They should prioritize pedestrian over vehicular access. The entrance should be highly visible and easily accessible.

A porous building facade at the street helps to enliven the exterior space and draw connections between inside and out. The use of elements such as transparent glazing at social edges or pedestrian elements such as arcades creates intrigue and further strengthens this relationship.



FIGURE 6.29 Exterior canopies at a residence hall on the Texas A&M University campus in College Station provide shaded areas that activate the facade and help connect indoor and outdoor spaces.



FIGURE 6.30 The Workforce Development building creates an engaging facade that highlights the hands-on training students engage in on the RELLIS Campus and matches the campus material palette.

CHARACTER-DEFINING MATERIAL PALETTE

The RELIS Campus utilizes a limited palette of character-defining materials to draw a consistent built fabric that is identifiable at the campus scale.

Materials for the campus are selected to create a unifying aesthetic theme. The predominant facade material for solid areas is the Acme RELIS Red brick. The deployment of the brick is exclusive of glazed areas such as windows or curtain wall.

Complementary accent materials for feature facade elements are appropriate using wood or stone. Stone shall be Lueders limestone. Additional materials such as metal panel may be used, particularly for larger research or warehouse facilities.

The use of sloped roofs provides a connective element to unify the campus from a broader vantage point. These roofs shall be standing seam metal roofs using the Antique Copper-Cote color. Roofs may also incorporate deep overhangs with wood soffits to provide a softer aesthetic from the ground-level vantage point. Long space spaces (such as high-bay testing facilities) need not incorporate sloped roofs, as the scale increases and burdens projects with unnecessary costs.

The absence of strong color hues is preferred in glazing selection to avoid conflict with the predominant building materials. Grey or clear glass substrates and coatings present a neutral facade that more easily relates to the red brick or the green roofs. Glazing should also avoid excessive reflectance or mirroring that creates unnatural visual conditions and limits indoor-outdoor connectivity.



FIGURE 6.31 The first Blinn College building on the RELIS Campus demonstrates a predominant field of RELIS Red brick with a strong accent element of stone and wood.



FIGURE 6.32 The new Central Utility Plant and Thermal Energy Storage tank portray the campus material palette in an economical manner suitable for this utilitarian function.

NATURAL LIGHT

Buildings should incorporate ample natural light to provide improved indoor conditions and to reduce energy consumption.

Buildings should allow ample opportunities for natural light throughout the structure to enhance the learning and working environment. Access to natural light provides views to the exterior and reduces the reliance on artificial light sources. The latter limits the requirement for expending electricity on light fixtures during daylight hours.

Thin floor plates should be employed wherever possible for structures that house regular office or educational functions. This limits the distance of occupants from exterior windows. Fenestration should be maximized in regularly occupied spaces to provide visual connection. Interior borrowed light elements may be employed to draw natural light further into the center of a structure.

The maximization of ground-level glazing provides connectivity between interior and exterior activities. This assists in achieving the goals of the “facade activation” principle outlined previously.

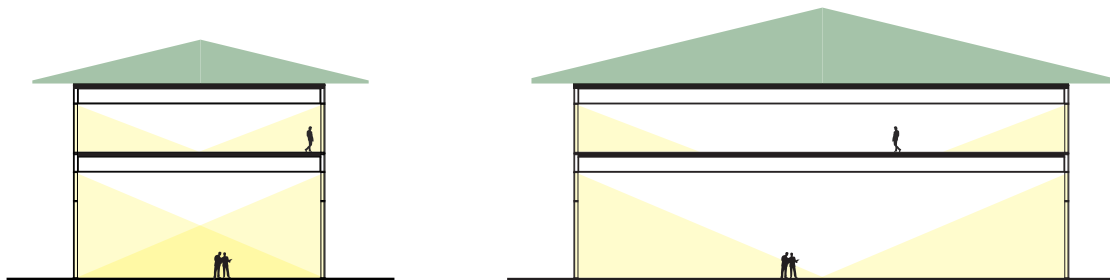


FIGURE 6.33 A narrow building floor plate allows light to penetrate to the middle of the structure while deep floor plates force the need for artificial illumination at the center of the building.



FIGURE 6.34 The RELLIS Academic Alliance Complex Phase 1a building incorporates ample glazing on the north facade and utilizes interior glazed partitions to allow natural light to penetrate the space.



FIGURE 6.35 The Industrial Distribution Building utilizes exterior glazing and clerestory windows to pull natural light deep into the building's interior spaces.

HISTORIC CHARACTER

Original Bryan Army Air Field and Bryan Air Force Base features on the campus provide a tie to the site's rich past and may be features as key components of the site.

A number of structures exist on the RELLIS Campus from its origins as the Bryan Army Air Field and Bryan Air Force Base. Though some of these are no longer functional and may be removed or commemorated, significant structures, such as the chapel, can provide new and useful programmatic space for the future. These original buildings should be rehabilitated for active campus functions where possible. The most significant of these buildings are outlined in section 2.4 of the master plan.

New construction may take cues from the original structures in certain instances. Examples may include the use of industrial building forms that reflect the functional nature of the program. New buildings may also employ the new campus material palette in patterns or shapes that are reminiscent of the original wooden structures or hangars.



FIGURE 6.36 The TTI Hangar at RELLIS showcases the functional repurposing of an original campus hangar for contemporary research needs.



FIGURE 6.37 The form and exterior metal cladding of the high-bay portion of the CIR building is reminiscent of the hangars and warehouses from the original air field on the site.

BUILDING ECONOMY AND SUSTAINABILITY

Buildings should be constructed of good value and practicality of contemporary construction methods to ensure the longevity of institutional structural. Sustainability should be a primary consideration in limiting the long-term maintenance and energy requirements of a facility.

Institutional buildings on the RELIS Campus are intended to last many decades, far beyond the use of the initial occupants. Design and construction decisions should be made to ensure the long-term usefulness of these structures. Structures should be designed for long-term durability and sustainability while utilizing assemblies that minimize required maintenance. This should be a driver of architectural character and can help to avoid spending institutional resources on unnecessary ornamentation.

Where possible, buildings should be sited in the east-west direction to maximize solar orientation. This allows for one long facade to face north and minimizes the amount of facade to the west, where the hot Texas sun is the strongest. These decisions can limit solar heat gain and reduce the demand on cooling systems. Additional solar shading or deep overhangs should be designed in accordance with building orientation and incorporated to mitigate the local climate.

A front porch or cover should be integrated over building entries to prevent rainwater from infiltrating the interior. Glazing placed low or at grade should be carefully considered and limited to avoid future maintenance concerns.

Opportunities for vegetated roofs may be explored to reduce the heat island effect of new structures and maximize the insulation of horizontal surfaces. When designing such a roof, a maintenance endowment should be considered to assure the long-term success of the plantings. Where plantings are incorporated that go dormant during winter months, educational components may be added to help users unfamiliar with these systems identify the intent and function.



FIGURE 6.38 Horizontal louvers and roof overhangs at the CIR protect large areas of glazing to mitigate solar heat gain.



FIGURE 6.39 A deep overhang at the lobby of the TTI Headquarters partially shields glazing from direct sun exposure and keeps water away from the building entrance.

INTEGRATED PARKING

Parking facilities should be designed to seamlessly integrate into the overall campus aesthetic and reduce the visual impact to the pedestrian.

In the near term, the majority of parking facilities on the RELIS Campus will be constructed as surface lots. When located adjacent to buildings, lots should be positioned behind the primary facade, allowing for better collaborative connections between clustered programs.

As the campus grows and densifies, particularly within the Central Core, parking garages may become necessary to minimize space requirements and preserve valuable building sites or landscape opportunities. These future garages may be part of a larger building or standalone structures. When constructed as part of a larger building, garages should be integrated into the aesthetic of the overall structure and avoid drawing a distinction between the two. Standalone parking garages should not be located along primary pedestrian routes, but rather along common-use vehicular roads for ease of traffic flow. Exterior materials of parking garages should be consistent with the overall campus material palette.

Any future parking garages should be designed so that they can be repurposed into functional buildings when there is an increase in autonomous vehicles and public transportation supporting the campus.



FIGURE 6.40 A parking garage at Texas A&M University-Corpus Christi utilizes materials and articulation that help the structure fit into the overall campus aesthetic.



FIGURE 6.41 The architecture of the University Center Garage on the Texas A&M University campus integrates with the aesthetic and material palette of the adjoining building.

SCREENED SERVICE AREAS

Service areas should be adequately screened through integrated architectural elements.

Necessary building components such as loading docks and mechanical equipment can detract from the aesthetic appearance of the campus and impact the pedestrian experience. At the ground level, the placement of mechanical equipment should be minimized where possible. Loading areas should be screened and utilize a consistent building articulation to the rest of the structure to reduce its impact on the surrounding area. They should be accessed from primarily vehicular streets or service alleys rather than significant pedestrian ways.

Roof areas can often become large mechanical spaces. Effort should be taken to limit the visibility of these elements from the ground or adjacent buildings.

Since the RELLIS Campus is occupied by many unique research and academic programs, an exception to this principle may be made when there is a key research or academic function of a given facility. In certain instances, it may be appropriate to strategically expose a building system or component for educational purposes or demonstration.



FIGURE 6.42 The service and loading dock for the Blinn College building uses a consistent material palette as the overall building to limit its visibility at the ground level.



FIGURE 6.43 Mechanical components on the roof of the CIR will be shielded from view at the ground level by partial-height pitched roofs to fit with the campus aesthetic. The loading dock and service yard (at rear) are integrated into the building form and screened by a perimeter wall with the consistent campus brick.



FIGURE 6.44 Service Areas

- EXISTING SERVICE
- POTENTIAL FUTURE SERVICE
- SERVICE/ACCESS STREET
- - - SERVICE ROUTE



6.4 LANDSCAPE AND OPEN SPACE

Landscape and Open Space guidelines provide a series of typologies that exist throughout the campus master plan. These cover aspects of hardscape and softscape treatments from existing habitats to constructed pedestrian environments. Each typology contains an associated plant palette and a schematic section that outlines the high-level design intent for that zone. These guidelines also demonstrate the integration of campus stormwater management strategies into the network of open spaces.

The landscape and open space principles include:

- Low maintenance
- Efficient stormwater management
- Natural ecology and balanced habitat
- Experiential qualities
- Parking

This section establishes design guidelines for the RELLIS Campus open spaces and a methodology for the implementation of these designs.

The design for the different area types described by the Landscape Typologies Matrix should meet these criteria:

- Provide visual connectivity and continuity
- Suitable for high levels of social activity
- Facilitate movement through the space.

While each of the area types are unique, there should be a strong 'RELLIS Campus' bond between each of the spaces. In order to achieve consistency in design implementation, each project should meet these following standards and requirements:

- Establish a hardscape materials palette, to be approved by Facilities Planning and Construction
- Utilize a defined vocabulary of site furniture and lighting fixtures
- Create landscapes that reinforce and enhance the intended use of the space through the use of the approved Landscape Planting Palette

AREA TYPES

1. Maintained Areas

- a. Building perimeters and the perimeter of pedestrian connectivity

2. Natural Areas

- a. Areas identified as part of the tree preservation, but not falling within a Park/Campus Green
- b. Low-Maintenance

3. Undisturbed

- a. All other green areas, including those adjacent to stormwater management and those forming an undisturbed Buffer area

	Cost	ROI	Maintenance	Stormwater	Social Activities	Hard/Softscape	Plant Complexity
1. Pedestrian Streets/Plazas	High	High	High	High	High	60/40	Moderate
1. Campus Green/Rec Areas	High/Moderate	High	High	Moderate	High	30/70	High/Moderate
2. Open Space	Moderate	High	Moderate	Moderate	Moderate	20/80	Moderate/Low
3. Frontage / Open Space / Prairie	Moderate	Moderate	Low	Moderate	Low	5/95	Low
3. Security Buffer	Moderate	Moderate	Moderate	Minimal	Minimal	Moderate	Moderate
X. Hardscape	Moderate	Moderate	Moderate	Moderate	Minimal	5/95	Moderate



FIGURE 6.45 AREA TYPES

- AREAS
- DISTRICT BOUNDARIES
- CAPACITY AREAS

FRONTAGE/OPEN SPACE/PRAIRIE

Frontage, open space, and prairie areas make up the majority of the RELLIS Campus perimeter.

The concrete pedestrian pathway, 6' width minimum, paralleling the primary campus Loop Road, and those pathways linking from the campus interior, will be the only hardscape elements in these spaces. Existing mature Live Oak and Pecan trees are found throughout these spaces, and all measures should be taken to preserve them, including the alignment of pathways. Planting along the Loop Road has been established as Live Oak trees, 50' on center. The RELLIS Campus street light fixture spacing along the initial Loop Road section (100' on center) should be continued throughout the remainder of the Loop Road. Along the Loop Road, low-water use grass species (ex. 'Thunder-Turf') are recommended. In transition zones between the frontage, open space, and the prairie parcels, lower growing grass mixes and wildflower species should be seeded for the first 50', and then transition to taller wildflowers and grasses.

- Mass grading across these areas should be employed to facilitate absorption as overland drainage flows through the watershed to designated detention basins.
- Mowing throughout the warmer months along the frontage areas will maintain a well-kept campus appearance. As the spaces transition to open space and then to prairie, mowing should only occur after grasses and wildflowers have gone to seed. The wildflower mix will be used for disturbed natural areas of the campus.



	50' Minimum	60' Minimum	+/- 30'	60' Minimum	50' Minimum	
Prairie Transition to taller native grasses and wildflowers	Frontage Transition to low-growing wildflower mix and grasses	Mown Edge Adjacent to Roadway (Irrigated)	Roadway	Mown Edge Adjacent to Roadway (Irrigated)*	Frontage Transition to low-growing wildflower mix and grasses	Open Space Transition
				Varies (30-60') Utility Corridor		

**Where applicable, campus utility corridors should be run in the zone adjacent to the roadway for ease of access and maintenance.*

A Preserved Existing Trees (Primarily Live Oak and Pecan)

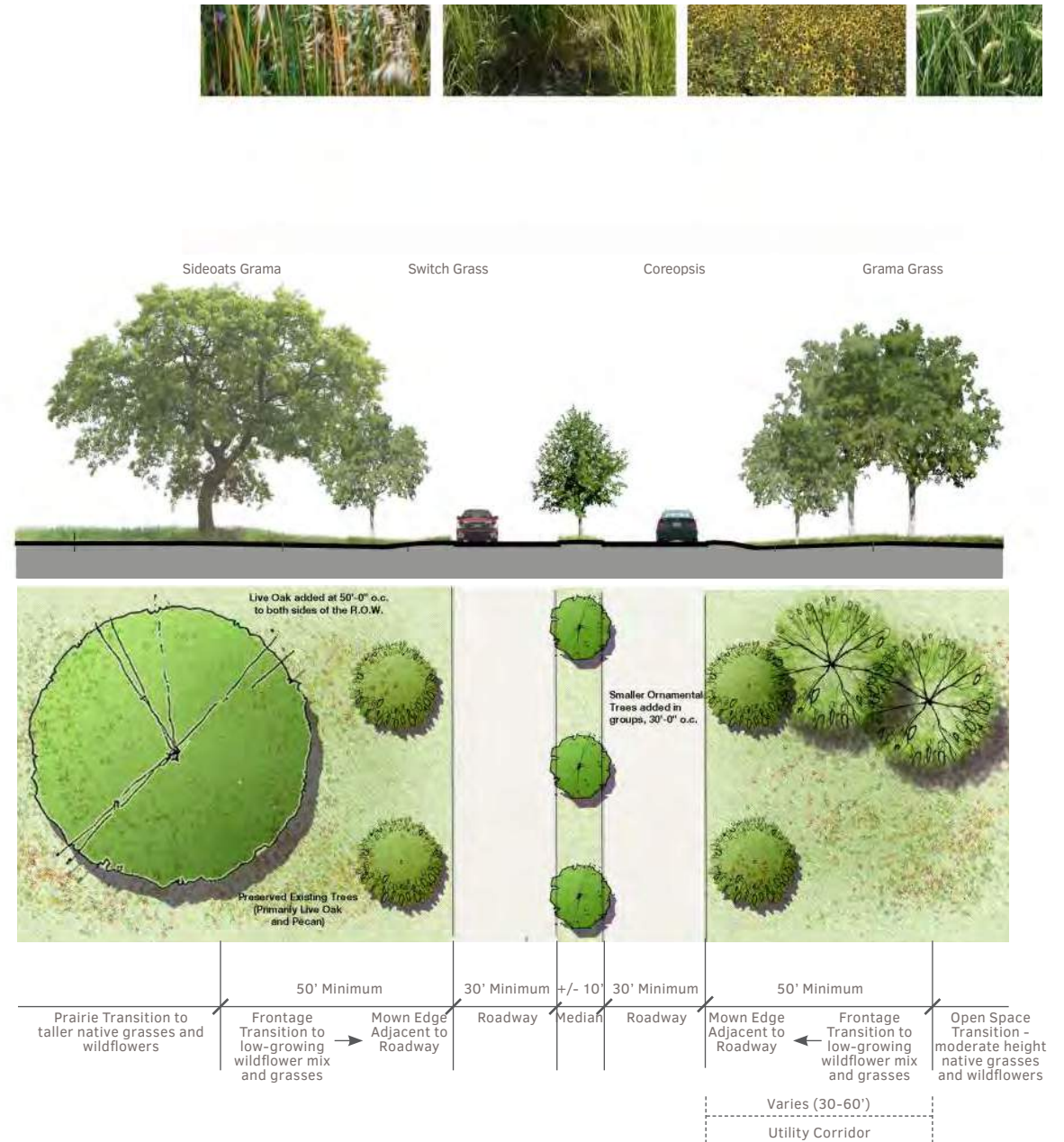
The frontage / open space meadow is an area of transition. Along the vehicular corridors of the RELLIS Campus, such as RELLIS Parkway, clear lines of sight to buildings remain open and unobstructed by re-planting many of the original prairie species native to the Brazos Valley. A swath of mown grass is maintained adjacent to the roadway, and as distance increases from the road, so does the variety and grass / wildflower mix.

Primary Street Tree:

- Live Oak

Native Species Seeding/Planting:

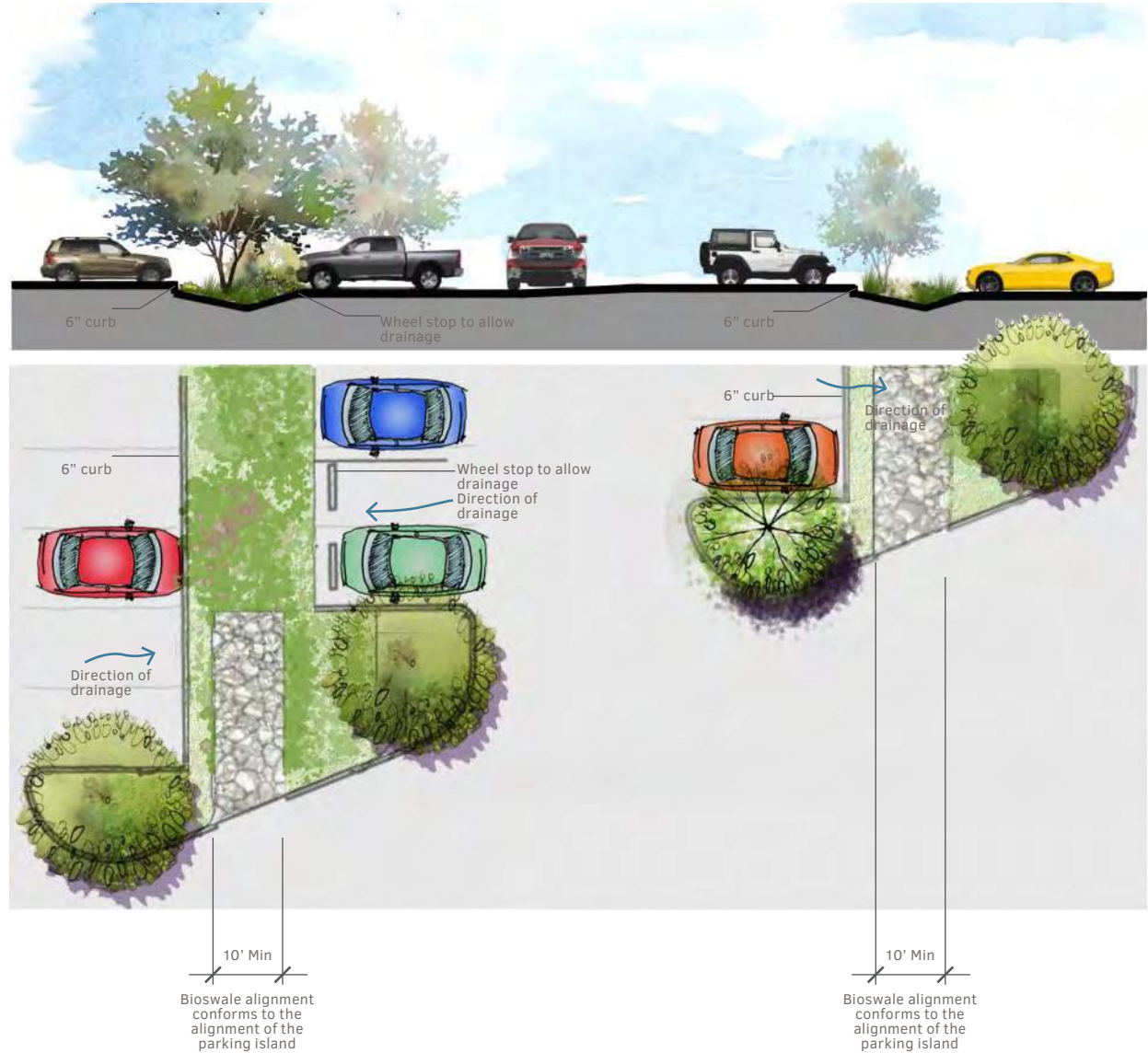
- Big Bluestem
- Eastern Gamagrass
- Indiangrass
- Little bluestem
- Sideoats Grama
- Switch Grass Purpletop
- Standing Cypress
- Butterfly Weed
- Lemon Mint
- Black-eyed Susan
- Coreopsis



GREEN PARKING AREAS

Parking areas designed with 'green-parking' principles are preferred for RELLIS Campus. As a whole, the parking configuration should provide for the safe passage of users from vehicles to destinations on campus. Every third 'parking tray' within the lot should contain an island wide enough to accommodate a 5' concrete walk, with 5' of clear space on at least one side. Every parking bay should terminate in a planted island, minimally 9' x 18', containing at least one shade tree.

- Rather than depending solely upon surface flow to inlets within the parking lot, the design of alternating planting islands with bioswale islands is preferable. Bioswale islands utilize a wheel-stop along one side, rather than a curb edge, and take in directed water flow at this point.
- Shade tree species for the parking areas should be selected for clearance for head height and taller vehicles clearances. Tree and shrub planting within the islands should be inset a minimum of 18" to accommodate truck bumper overhang. Bioswale and rain garden species selected from the plant materials list are varied and will require moderate maintenance.



Green Parking areas differ from standard parking areas in three ways:

- Space is given to planting strategies for shade and heat reduction
- Space is dedicated to drainage and within the parking area through the use of bioswales
- Shade Trees may be located throughout wider parking islands that occur in every third 'parking tray'.

Bioswales and drainage within the islands are achieved (in this illustration) by installing a 6" curb on one side of the parking island and a curb stop for parking on the other, allowing water to sheet flow through into the bioswale and permeate.

Primary Trees:

- All large and medium shade trees from the plant guidelines, providing sufficient clearance is achieved.

Rain Garden Planting:

- Butterfly Weed
- Spider Lily
- Inland Sea Oats
- Big Muhly
- Gulf Muhly
- Horsetail Reed
- Louisiana Iris

Turf:

- Thunder Turf (Buffalo Grass, Curly Mesquite, and Blue Grama)

PEDESTRIAN MALLS AND PLAZAS

The pedestrian malls and plazas will be active pedestrian spaces, confined to foot traffic, bicycles, and smaller campus carts.

The pedestrian mall is an uninterrupted 30' paving section, oriented east to west on 4th Street and north to south on Avenue C, and collecting pedestrian traffic from building courtyards and parking walkways. Permeable pavers, in simple herringbone patterns, are the preferred paving surface for the pedestrian mall, with the paver underdrain system carrying water to detention basins. Street trees in grates, forming an allee, add to the character of the mall, as do the seating opportunities provided by the benches below the tree canopy. Lighting should be spaced in concert with the street trees to provide adequate illumination during evening hours. Most buildings will have open and well-lit first floors, and this should be taken into account when calculating illumination levels.



Pedestrian mall plazas occur at the major intersections of vehicular streets. For those streets, operable key-card gates will be required for vehicular passage. The pedestrian malls provide an opportunity for special paver 'destination' patterning and combinations. Additional shade trees and ornamental trees may be added to the planting palette, along with planting bed areas to reinforce the design. Seating, in linear and group configurations, is encouraged. Drainage throughout the plazas should also be below grade, either through the use of permeable pavers or sheet flow to area grates. As distance from the vehicular intersections increases, well-maintained and manicured rain gardens may be employed to handle drainage. These rain garden sections are 350' minimum distance from any intersection, 15' width maximum (outside the perimeter of the pedestrian street), with the plant selection from the Landscape Planting Palette.

The pedestrian mall will be used for as a fire access lane wherever required. In such instances, building facades will be located nearer to the street edge as required for fire department access, and trees should also be positioned as required. Where other fire lanes exist on the sides or rear of a building, the primary facade along the pedestrian street may be located farther back, as indicated in the section.

The pedestrian street planting will be defined by a Cedar Elm allee located at the perimeter of the street right-of-way. The Cedar Elms also anchor the edges of the rain-garden and bioswale plantings, creating an envelope for a shaded pedestrian walkway.

The area benefits from a deciduous tree canopy, and a plant palette suited to higher pedestrian use. Maintenance, as well as visual coherence and unity, are the primary objectives of the plant selection for this area.

Primary Street Tree:

- Cedar Elm

Rain Garden Planting:

- Butterfly Weed
- Spider Lily
- Inland Sea Oats
- Silver Pony Foot
- Horsetail Reed
- Louisiana Iris
- Gulf Coast Muhly
- Dwarf Yaupon Holly



Cedar Elm



Louisiana Iris



Horsetail Reed



Gulf Coast Muhly

RECREATION FIELDS AND OPEN SPACE

Recreation fields and open spaces contain both the campus-wide recreational pathway and serve as a transition areas, providing a buffer zone between active, interior campus spaces and perimeter campus circulation.

The campus-wide, concrete pathway will be used for cross-campus circulation, and also for recreation activities, such as cycling and jogging. As such, the width should be sufficient to accommodate all potential users, and should have a minimum centerline radius of 100'. Site furnishing locations will be organized near play fields and at selected intervals along the recreation pathway. Lighting along the recreation pathway should be at intervals sufficient to illuminate the ground plane and imply direction.

Mature Live Oaks and Pecans are found throughout the designated recreation field and open space parcels, and all measures should be taken to preserve them, including altering the layout and alignment of pathways and playfields. Additional large shade trees may be required at gathering spaces near play fields, but the overall effect of added material should preserve clear sight lines across the fields. Planting in transition zones between the open space parcels and the Perimeter parcels should utilize lower growing grass mixes and wildflower species.

Mass grading across these areas should be employed to facilitate absorption, as overland drainage flows through the watershed to designated bioswales and basins. Bioswale and rain garden species selected from the plant materials list are varied, and will require less maintenance than rain gardens in active areas.

Maintenance during warmer months will focus on the upkeep of recreation field areas, based on frequency of use. Bioswales will require fall removal of undesirable plant material.

Open space and recreation planting occurs throughout the RELLIS Campus in specific areas, such as ballfields, and alongside the pedestrian recreation corridors. The planting variety is minimal in this area, with the exception of the bioswales, provided for drainage. Visibility and safety are balanced with shade and the comfort of users.

Primary Trees:

- Live Oak, and the preservation of existing trees in these areas

Shrubs and Ornamental Grasses:

Bioswale Planting:

- Butterfly Weed
- Spider Lily
- Inland Sea Oats
- Big Muhly
- Gulf Muhly
- Horsetail Reed
- Louisiana Iris

Turf:

- Thunder Turf (Buffalo Grass, Curly Mesquite, and Blue Grama)



CAMPUS GREENS AND COURTYARDS

These areas are the community ‘heart’ of the RELLIS Campus. The designs for campus greens, such as around the historic chapel or between avenues B and C, and building courtyard spaces should acknowledge the high level of social interaction occurring within these frameworks. Walks and courtyard users are primarily pedestrians, bicycles, and smaller campus carts, and the surfaces should be designed to accommodate these with walk width, materials, and material color and patterning in mind.

Site furniture within the building courtyards, including benches, tables and chairs, and litter receptacles, should be placed for large as well as small group interaction. Light placement should work for these group interactions. Light spill from adjacent buildings should be taken into account when calculating light levels, since most buildings will have a ‘transparent’ lower level.

Planting in these areas offers a higher level of complexity, interest, and color. Since these areas function as outdoor living spaces, the plant selection should reinforce comfort and relaxation. Where turf grasses are desired, low-water usage species (ex. ‘Thunder-Turf’) are recommended.

Several types of drainage features may be combined to provide complete area coverage. In paved courtyards, sheet flow should be directed to area grates. Large turf areas should be gently graded to direct water flow to ‘maintained’ rain gardens, while also allowing percolation into the subgrade.

Maintenance will focus equally on the upkeep of the hardscape and the landscape materials.

The campus green/garden has the appearance of a well-maintained and tidy park, by virtue of the plant palette selections. Since these are areas of multiple pedestrian crossings and activities, clear sight lines are needed. High tree canopies and lower shrub and groundcover provide the bulk of the plant material. In the areas where drainage is required, a ‘manicured’ bioswale is desired, with cleaner lines and more compact plant life.

Primary Street Tree:

- Mexican Sycamores
- Cedar Elms

Low Shrubs/Groundcover

- Boxwood
- Dwarf Wax Myrtle
- Dwarf Yaupon
- Plumbago
- Firecracker Fern

Rain Garden Planting:

- Butterfly Weed
- Spider Lily
- Inland Sea Oats
- Big Muhly
- Gulf Muhly
- Horsetail Reed
- Louisiana Iris

Turf:

- Thunder Turf (Buffalo Grass, Curly Mesquite, and Blue Grama)





SECURITY BUFFER

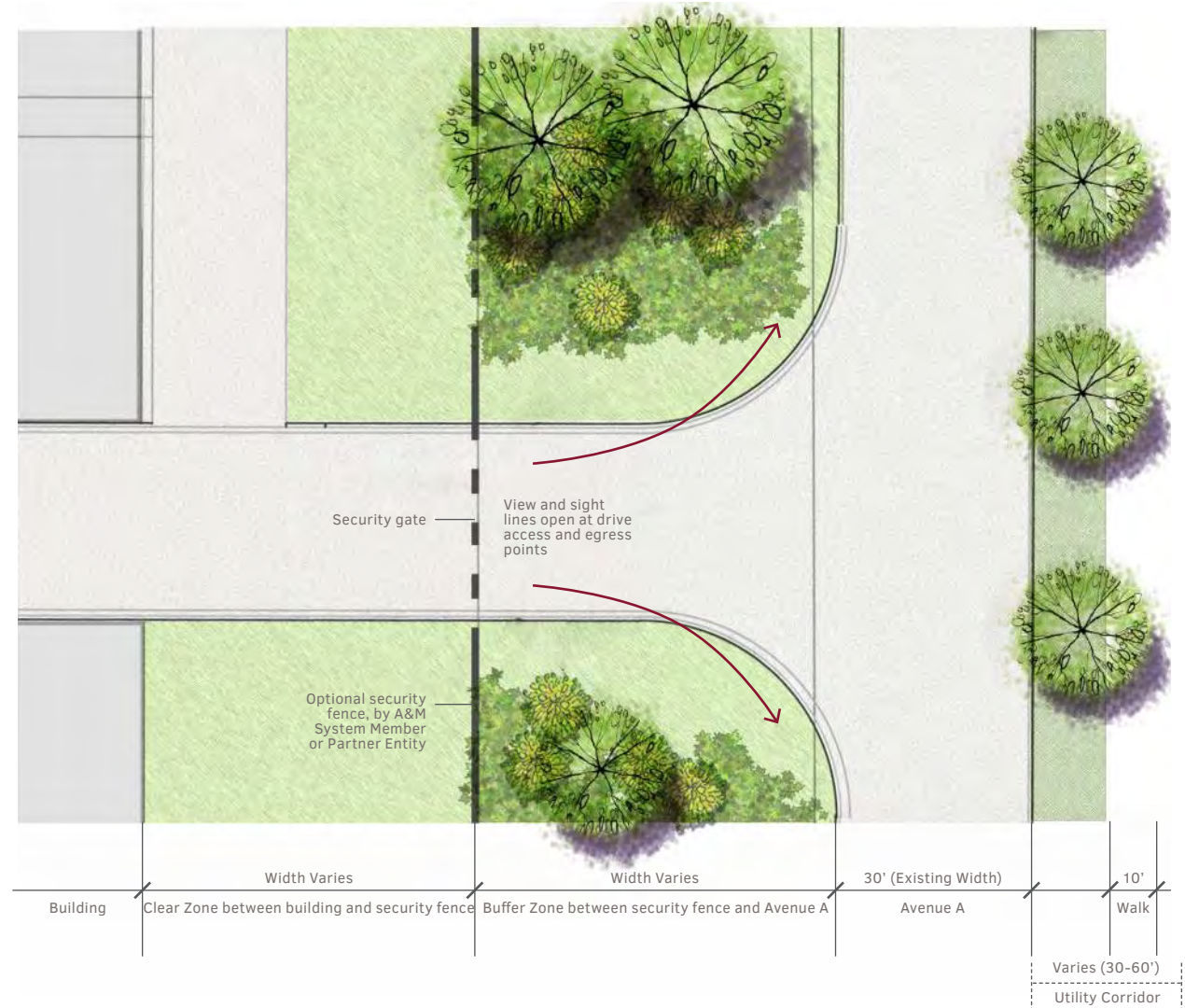
The security buffer is located primarily along the west edge of Avenue A, a security fence on the east in the vicinity of the apiary, and varies in depth and configuration. With the exception of the optional fence, there are no hardscape materials.

The function of the security buffer is to create a green delineation between the public portion of the RELLIS Campus and the secure portion of the campus. The plant palette used in the buffer is moderately complex, providing upper, middle, and lower canopy coverage at dense plant spacings. A clear view of sight at access/egress drives should be maintained with the use of turf grasses. Low-water use species, such as 'Thunder-Turf', are recommended.

The security buffer area should be graded to drain away from the optional security fence and into the drainage swales along the west edge of Avenue A.

Plant material should be selected for minimal maintenance requirements. Mowing throughout the warmer months along Avenue A will maintain a well-kept campus appearance.

Buffer zones around the apiary should coordinate with the Best Management Practices guidelines as defined by the Texas Apiary Inspection Service (www.txbeeinspection.tamu.edu/best-management-practices/). For development within 200 feet of the apiary, a dense vegetative barrier should be used to redirect the bees' flight pattern and prevent a direct line of flight from the hives into neighboring properties. The flyaway barrier should start at grade, be a minimum of six feet in height, and should extend beyond the direct line of sight from the entrance of the hive to the neighboring or adjacent parcel.



Optional security buffer planting occurs only in the north-south area dividing the public and private sectors of the RELLIS Campus. Though it is the 'rarest' zone, it may include the widest variety of planting. There are areas where visual clear zones are required at drive entries, where only turf and groundcover are appropriate. In most other areas, dense vegetation in front of the optional barrier fencing is encouraged.

Primary Trees:

- All large and medium shade trees from the plant guidelines, providing sufficient clearance is provided.

Shrubs and Ornamental Grasses:

- All Shrubs and Ornamental Grasses from the plant guidelines, providing sufficient visual clearance is provided where needed.

Turf:

- Thunder Turf (Buffalo Grass, Curly Mesquite, and Blue Grama)

SHADE TREES



Water Oak,
Quercus nigra



Bur Oak,
Quercus macrocarpa



Cedar Elm,
Ulmus crassifolia



Chinkapin Oak,
Quercus muehlenbergii



Common Bald Cypress,
Taxodium distichum



Live Oak,
Quercus virginiana



Mexican Sycamore,
Platanus mexicana



Monterrey Oak,
Quercus polymorpha



Montezuma Cypress,
Taxodium distichum var. *mexicanum*



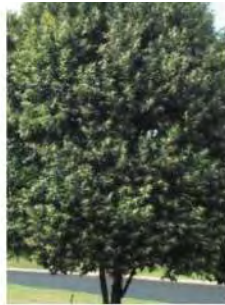
Willow Oak,
Quercus phellos

*Refer to RELLIS Facility Design Guidelines Division 32 for preferred (dry) location for the Monterrey Oak.

MEDIUM TREES



Eagleston Holly,
Ilex x attenuata 'Eagleston'



Cherry Laurel,
Prunus caroliniana spp.



Chinese Pistache,
Pistacia chinensis



Eastern Red Cedar,
Juniperus virginiana



Japanese Blueberry Tree,
Elaeocarpus decipiens



Lacebark Elm,
Ulmus parvifolia



Mesquite,
Prosopis glandulosa



River Birch 'Duraheat',
Betula nigra 'Duraheat'



Texas Ash,
Fraxinus texensis

ORNAMENTAL TREES



Common Crapemyrtle,
Lagerstroemia indica



Vitex
Vitex agnus-castus



Evergreen Sumac,
Rhus virens



Forest Pansy Redbud,
Cercis canadensis



Tree Yaupon,
Ilex vomitoria



Mexican Plum,
Prunus mexicana



Southern Waxmyrtle,
Myrica cerifera



Possumhaw Holly,
Ilex decidua



Prairie Flameleaf Sumac,
Rhus lanceolata



Purple Leaf Plum,
Prunus cerasifera

EVERGREEN SHRUBS



Boxwood,
Buxus microphylla



Dwarf Palmetto Palm,
Sabal minor



Chinese Fringe Flower,
Loropetalum chinense



Dwarf Burford Holly,
Ilex cornuta "Dwarf Burford"



Gray Cotoneaster
Cotoneaster glaucophyllus



Dwarf Waxmyrtle
Myrica cerifera



Dwarf Yaupon,
Ilex vomitoria



Glossy Abelia,
Abelia x grandiflora



Indian Hawthorn,
Raphiolepis spp.



Japanese Pittosporum,
Pittosporum tobira



Japanese Yew,
Podocarpus macrophyllus



Mahonia,
Mahonia bealei



Nandina,
Nandina domestica



Nellie R. Stevens Holly,
Ilex cornuta



Primrose Jasmine,
Jasminum mesnyi



Rosemary,
Rosmarinus officinalis

PERENNIALS & OTHER SHRUBS



Artemisia,
Artemisia x 'Powis Castle'



American Beautyberry,
Callicarpa americana



Blue Plumbago,
Plumbago auriculata



Bulbine,
Bulbine frutescens



Daylily,
Hemerocallis spp.



Dwarf Pomegranate,
Punica granatum



Firebush,
Hamelia patens



Firecracker Fern,
Russelia equisetiformis



Flame Acanthus,
Anisacanthus quadrifidus



Fragrant Sumac,
Rhus aromatica



Gaura,
Gaura lindheimeri



Giant Hesperaloe,
Hesperaloe funifera



Giant Turk's Cap,
Malvaviscus arboreus var. drummondii



Inland Sea Oats,
Chasmanthium latifolium



Jerusalem Sage,
Phlomis fruticosa



Lily-Of-The-Nile,
Agapanthus africanus



Louisiana Hybrid Iris,
Iris x 'Louisiana Hybrids'



Mexican Heather,
Cuphea hyssopifolia



Mexican Mint Marigold,
Tagetes lucida



Neomarica gracilis
Walking Iris

PERENNIALS & OTHER SHRUBS



Oakleaf Hydrangea,
Hydrangea quercifolia



Pride-Of-Barbados,
Caesalpinia pulcherrima



Red Yucca,
Hesperaloe parviflora



Russian Sage,
Perovskia atriplicifolia



Rusty Blackhaw Viburnum,
Viburnum rufidulum



Knock-out Rose,
Rosa x 'Knock-out'



Texas Lantana,
Lantana urticoides



Texas Sage,
Leucophyllum frutescens 'varieties'



Texas Sotol,
Dasylirion texanum



Trailing Lantana,
Lantana montevidensis



Turk's Cap,
Malvaviscus arboreus var. mexicanus



Variegated Ginger,
Alpinia zerumbet



Yellow Bells,
Tecoma stans var. angustata



White Butterfly Iris,
Dietes indioides



Yellow Bicolor Iris,
Dietes bicolor



Yellow Yucca,
Hesperaloe parviflora

ORNAMENTAL GRASSES



Bamboo Muhly,
Muhlenbergia dumosa



Deergass,
Muhlenbergia rigens



Gulf Muhly,
Muhlenbergia capillaris 'Regal Mist'



Lindheimer Muhly,
Muhlenbergia lindheimeri

NATIVE SEED MIXES / WILDFLOWERS (NATIVE AMERICAN SEED)

Blackland Prairie Mix		South East Recovery Mix (Post Oak Savannah)		
American Basketflower	Pink Evening Primrose	Little Bluestem native Colorado County*	Lanceleaf Coreopsis*	Texas Cupgrass
Annual Winecup	Pitcher Sage	American Aloe*	Lemon Mint	Texas Yellow Star
Big Bluestem	Prairie Agalinis	Balsamscale*	Longspike Tridens*	Three-Awn*
Black-eyed Susan	Plains Bristlegrass	Big Bluestem*	Marsh Elder*	Vervain*
Broomsedge Bluestem	Plains Coreopsis	Black-Eyed Susan	Native Sedge*	Maximilian Sunflower
Buffalograss	Purple Prairie Clover	Broomsedge Bluestem*	Partridge Pea*	White Prairie Clover
Butterflyweed	Purpletop	Brownseed Paspalum*	Plains Coreopsis	Red Lovegrass
Cane Bluestem	Prairie Verbena	Bushy Bluestem*	Prairie Agalinis*	Purple Lovegrass
Common Milkweed	Prairie Wildrye	Cane Bluestem	Prairie Verbena	
Clasping Coneflower	Rattlesnake Master	Clasping Coneflower	Prairie Wildrye	* seed from prairie remnant
Croton	Rose Milkweed	Common Sunflower*	Purple Prairie Clover	conservancy harvest
Cutleaf Daisy	Sand Dropseed	Croton*	Purpletop*	
Eastern Gamagrass	Sand Lovegrass	Cutleaf Daisy	Ragweed Annual*	
Florida Paspalum	Showy Milkweed	Epazote*	Rattlesnake Master*	
Foxglove	Sideoats Grama	Florida Paspalum*	Red Lovegrass*	
Gayfeather	Spiderwort	Gayfeather*	Rough Buttonweed*	
Green Sprangletop	Standing Cypress	Giant Coneflower*	Sand Dropseed	
Hooded Windmill Grass	Switchgrass	Green Sprangletop	Sand Lovegrass	
Illinois Bundleflower	Tall Goldenrod	Gulf Coast Muhly	Sideoats Grama	
Indian Blanket	Texas Cupgrass	Gumweed*	Slim Tridens*	
Indiangrass	Texas Yellow Star	Hairawn Muhlygrass*	Smartweed*	
Inland Seaoats	Virginia Wildrye	Hooded Windmill Grass	Splitbeard Bluestem*	
Lemon Mint	White Tridens	Horned Beaksedge*	Sumpweed*	
Little Bluestem	Winecup	Illinois Bundleflower	Switchgrass*	
Maximilian Sunflower	White Rosinweed	Indian Blanket	Tall Dropseed**	
Partridge Pea		Indiangrass*	Tall Goldenrod*	
		Knotroot Bristlegrass*	Texas Bluebonnet	

EXAMPLES OF SEASONAL PLANT/GRASS PALETTES



6.5 DISTRICT SUPPLEMENTS

The RELLIS Campus is comprised of four general districts: Central Core, Perimeter, Public Training/Testing, and Experimentation Testing & Training areas. The design guidelines laid out in this chapter fully apply to any project undertaken within the Central Core. However, certain elements of the guidelines may be relaxed within the other three zones. Those supplementary provisions are outlined here.

PERIMETER DISTRICT

The campus consists of parcels located along the State Highway 21 and State Highway 47 frontage. These sites are planned to be occupied by the A&M System agencies and partnership opportunities that desire a higher degree of visibility from the highway.

- These sites may not be directly connected for pedestrian circulation to the core campus. However, they are encouraged to be designed to accommodate ease of pedestrian flow internal to the site and to seek opportunities for linking into the larger campus recreational path network.
- Within the Perimeter, building massing is still encouraged to respond to the human scale, though longer lengths of buildings may be appropriate when adjacent to the highway or accommodating a necessary programmatic element.
- Certain sites within the Perimeter district may be more auto-centric than the core campus. These buildings are not required to place parking lots at the rear of the site. Parking lots along the perimeter should be carefully sited to allow for convenience while not giving an excessive prominence to surface parking as the outward image of the institution.

TRAINING/TESTING AREA

The Training/Testing area is situated adjacent to the Central Core, largely sited within the Bryan AAF grid south of 6th Street. Though in close proximity to the core, this area requires a more utilitarian, functional treatment and the incorporation of appropriately designed buildings.

- Building massing may incorporate larger floor plates and longer spans to accommodate large research or industrial training or storage functions.
- Building materials should respond to the palette prescribed for the campus as a whole, but the extent of more expensive materials may be limited to particular feature elements that provide a link to the overall RELLIS aesthetic. For warehouse or industrial type buildings, tilt-up or metal walls may be appropriate for building projects with limited budgets.
- The natural light provision can be loosened for buildings in this zone that require large floor plates. Though natural light is always encouraged for regularly occupied spaces, some building designs may prohibit large amounts of glazing toward the center of the floor plate.

EXPERIMENTATION TESTING & TRAINING AREA

The Experimentation Testing & Training area consists of the proving grounds, training facilities, and private partnership sites generally located west of Avenue A and south of RELLIS Parkway. This zone will be occupied by large training and research functions, warehouses, and test areas. It will also house secure partnership opportunity sites west of the proving grounds.

- Due to the large distances between facilities in the secure campus, pedestrian connectivity to the rest of the campus may not be directly feasible. Sites are encouraged to promote pedestrian connectivity within buildings of the same complex and to seek opportunities to link into a large campus recreational network for bicycles or pedestrians.

- Many buildings in the Experimentation Testing & Training area will require large floor plates for testing, research, and storage functions. These buildings need not respond directly to the human scale, though regularly occupied spaces and building areas adjacent to common outdoor spaces should still strive to do so.
- The majority of buildings in the Experimentation Testing & Training area need not reinforce a public realm specifically. Facilities with multiple buildings should still seek to create well-defined exterior spaces for site users. Additionally, sites located along the primary circulation drive should create a defined street edge to provide a sense of place for the larger secure district.
- Building materials for sites in the secure district may vary somewhat from the overall campus palette. While buildings should still contain feature elements that highlight the campus aesthetic, the RELLIS Red Brick may not be the predominant material for many of these facilities when cost is a significant factor. Complementary materials such as concrete, glass, or metal may be used as the predominant material.
- Parking facilities for secure campus buildings may be located closer to the front door of the facilities than they would be in the Central Core. This section of the campus will likely be more auto-centric due to larger distances between buildings. However, priority should be given at the entry to shuttle or bicycle facilities, where possible.

6.6 REVIEW AND COMPLIANCE

Per Texas A&M System Policy 51.01, the RELLIS Campus Master Plan and Design Guidelines will be administered by a Planning & Design Review Board to ensure compliance with the intent of each.

PLANNING & DESIGN REVIEW BOARD

The Planning & Design Review Board (PDRB) will be appointed to facilitate the review and compliance of Minor (less than \$4M) and Capital (\$4M and greater) projects. The PDRB will initially consist of two members with the capacity to appoint additional subject matter experts (SME) as required. One member will be an appointed RELLIS Campus representative, and the second member will be the A&M System, Facility Planning & Construction representative. Appointed members should be well versed in the RELLIS Campus Master Plan and Facility Design Guidelines. Appointed SMEs should maintain professional expertise to analyze and ensure compliance within the field of expertise required.

The PDRB size is kept small to be able to respond quickly to project requirements as the campus grows. Once the campus population increases, additional members may be added to provide input from a broader constituency. Potential members may be appointed from A&M System institutions occupying the campus.

The PDRB will have the responsibility of reviewing the proposed facility schematic concept and proposed site location. As the program of requirements and design are further developed, the PDRB will have the responsibility of reviewing the proposed site plans, architecture, landscape architecture, and signage to ensure that designs comply with the approved RELLIS Campus Design Guidelines. The PDRB can further establish the RELLIS Technical Review Sub-Council and RELLIS Design Review Sub-Council as required (refer to Figure 6.46). All sub-council recommendations will be submitted to the PDRB for consideration and action as required.

PROCESS

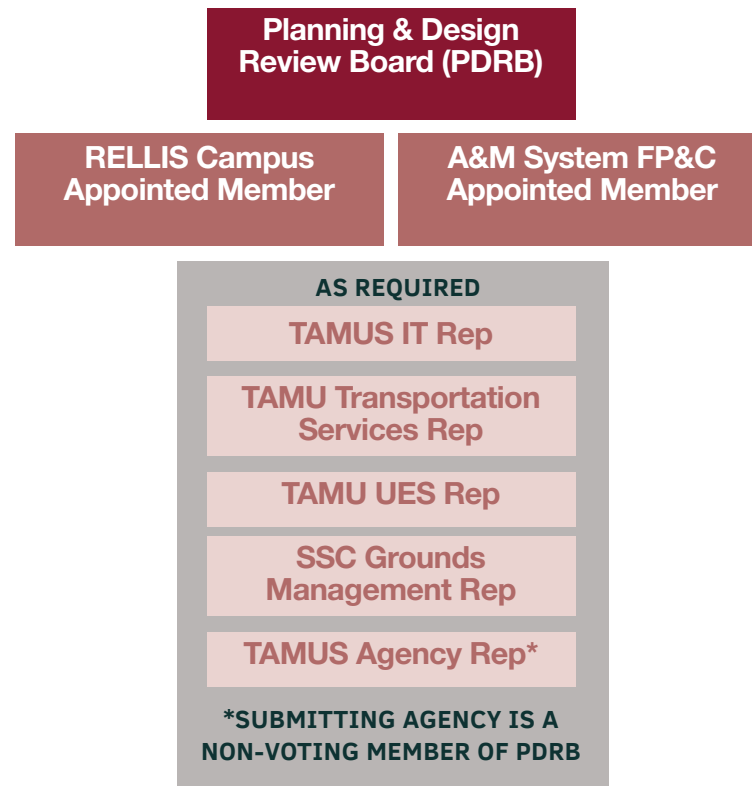
The PDRB shall review all projects (both minor and capital) to ensure they are developed in accordance with the RELLIS Campus Master Plan. Projects should be reviewed at the following intervals:

1. Initial review of proposed project, conceptual design, and potential site selection to ensure conformance with the master plan.
2. Technical review for feasibility in terms of function, site selection, availability and sufficiency of utilities, roads and parking. etc.
3. Review of site and exterior design at major milestones (at a minimum of SD and DD).
4. Review of exterior building material, assembly mockup, and signage.

APPROVAL

Following the review of the PDRB, projects shall be submitted for approval by the RELLIS Campus Director.

FIGURE 6.46 PLANNING & DESIGN REVIEW BOARD ORGANIZATION



PDRB COMPOSITION & RESPONSIBILITIES

Members:

- RELLIS Administration
- A&M System FPC Member

Responsibilities:

Review the proposed projects for compliance with the Campus Master Plan.

- The proposed project location is appropriate for the land use and function designated in the Campus Master Plan.
- Coordinate proposed use with other RELLIS stakeholders.
- Ensure project is identified on the approved Capital Plan.
- Recommend approval/disapproval of the Program of Requirements when completed.
- Recommend approval/disapproval of subcommittee recommendations to the RELLIS Campus Director.

RELLIS TECHNICAL REVIEW SUB-COUNCIL (TRSC)

Members:

- RELLIS Administration
- A&M System FPC Engineering
- TAMU UES
- RELLIS IT
- TAMU Transportation Services
- TAMUS Risk Management
- TAMU EHS
- TAMUS General Counsel

Responsibilities:

Confirm technical feasibility and the impacts of the given project on the existing and planned campus. The assessment will include, but not be limited to, a review of the following aspects of the project:

- Infrastructure
 - Utility adequacy
 - Utility points of connection
 - Impact to existing plans and facilities
- Site Utilization
 - Availability
 - Compliance with the Campus Master Plan
 - Impact to existing and proposed land uses

- Parking impacts on existing/planned
- Environmental Health and Safety Issues
 - Fire & life safety
 - Hazardous materials
 - General risk
- Security
- Planning & Construction
 - Lay down areas
 - Project timing
 - Other impacts
- Regulatory Requirements
 - THECB rules
 - Board of Regents requirements
 - TAMUS policies & rules
- Risk Management
 - ADA access
 - Environmental impact
 - Hazard considerations
- General logistic issues

RELLIS DESIGN REVIEW SUB-COUNCIL (DRSC)

Members:

- RELLIS Administration
- A&M System FPC Project Manager
- SSC Landscape & Grounds Management

Responsibilities:

Ensure exterior design projects comply with the intent of the Campus Master Plan and Facility Design Guidelines. Recommend exceptions when appropriate.

- Review and monitor proposed new facilities or alterations/additions to existing buildings to ensure that the architectural and cultural significance of the original buildings are retained and enhanced.
- Evaluate projects to ensure that they meet the qualitative standards.
- Recommend modification or development of the RELLIS Campus Facility Design Guidelines as required.
- Review proposed monuments and proposed changes to historical facilities to ensure minimum standards in the display, care, and collection is maintained and institutional initiatives do not transcend the RELLIS Campus vision.

7

Signage and Wayfinding

- 7.1 Introduction
- 7.2 Common Signage Standards
- 7.3 Campus Signage Standards
- 7.4 Partner Signage Guidelines
- 7.5 Signage Requirements





7.1 INTRODUCTION

The purpose of the signage section of the guidelines is to define the standards for all signage design and construction. The objective is to assist the RELLIS Campus in providing a thoughtful and useful experience for its greater community through consistent visual signage design standards.

What is it

The institutional signage design guidelines for RELLIS provide a central resource to assist in visioning and design for all future development. It offers clarity for all stakeholders and ensures compliance with signage requirements. The standards ensure that each visitor will be left with a positive and lasting impression of RELLIS.

How it works

The signage guidelines provide the means for campus stakeholders and partners to reference the guiding principles, material specifications, usage diagrams, sign type inventories, restrictions, and related material. It is intended to be a comprehensive point of reference. Any sign designed in adherence to the guidelines can be built and installed by following the procedures herein.

Common Signage Standards

- Material vocabulary
- Typography and graphics
- Sign information hierarchy

Campus Signage

The Campus Signage section addresses the needs of campus administration and facilities management. Content includes the following:

- Overview
- Illumination
- Sign Type Inventory
- Sign Type Diagrams
- Conceptual imagery
- Usage diagrams

Partner Signage

The Partner Signage section provides reference for institutional and corporate partners. This allows each partner's brand presence to make an outward display of quality and uniqueness contributing to this special, energizing place. Content includes:

- Overview
- Submission procedures
- Material vocabulary
- Usage diagrams
- Monument sign prototypes
- Typical details
- Sign types diagrams



FIGURE 7.1 The RELLIS Campus will have a variety of signage needs from campus infrastructure signage to guidelines for development partners within the campus.

7.2 COMMON SIGNAGE STANDARDS

GUIDING PRINCIPLES

There are several guiding principles that unify the design and development of all RELLIS Campus signage:

Brand Expression

The design of all sign structures and messages must align to the brand standards of the RELLIS Campus, as determined by the A&M System. All campus signage designs must be in line with the prescribed brand standards and approved before production.

Unified Campus Environment

The signage guidelines establish a unified system that enhances visitors' recognition of the campus, the daily experience of its community, and the prestige of the RELLIS Campus as an institution.

Safety and Utility

The signage guidelines assist in creating and siting signage where it will be most effective to keep both visitors and the campus community informed of the proximity of restricted and/or hazardous areas. The guidelines also utilize best practices to make wayfinding as intuitive as possible.

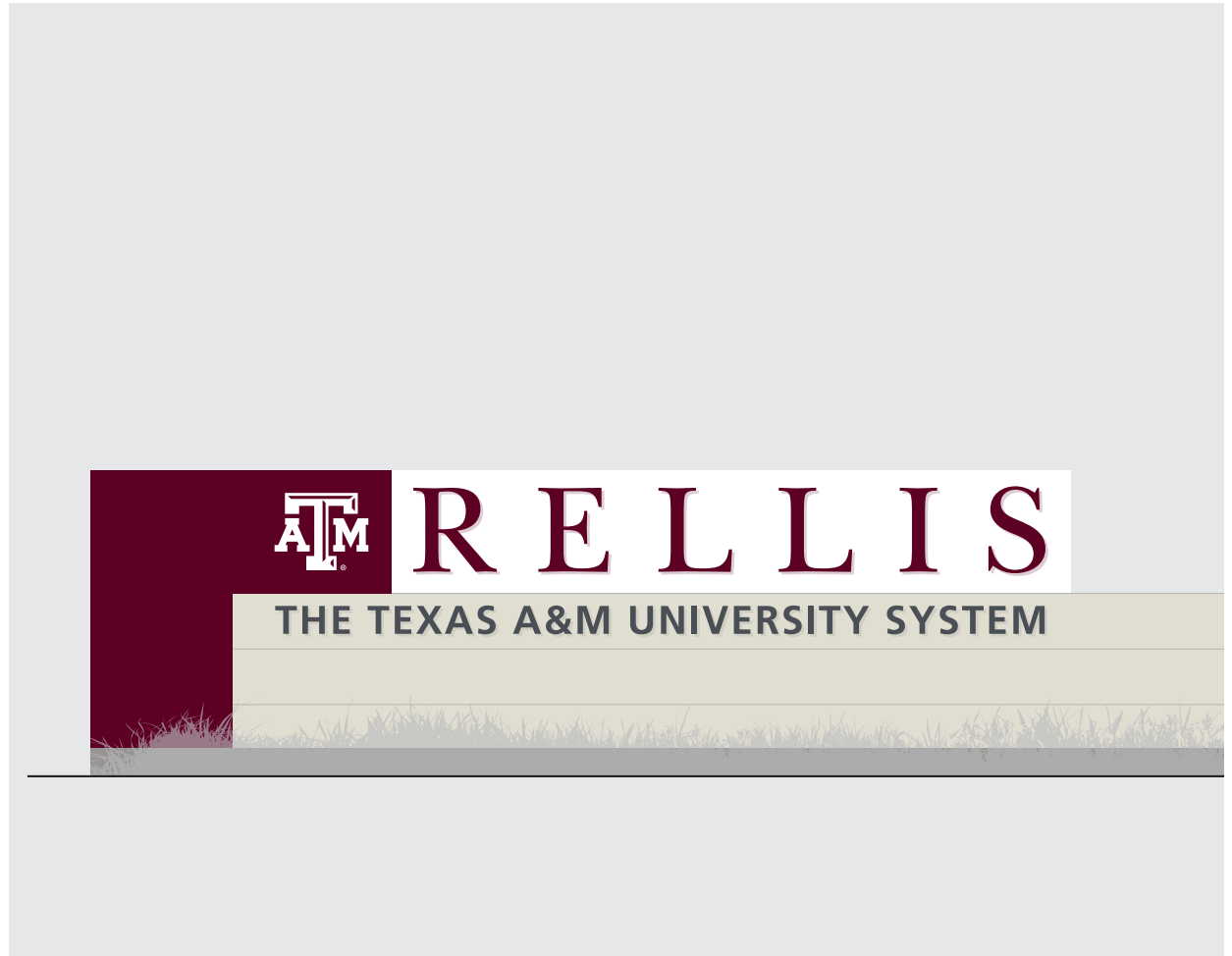


FIGURE 7.2 Campus signage will reflect the RELLIS Brand and help reinforce the unified campus environment.

MATERIAL VOCABULARY

The RELLIS Campus architectural color and material palette will inform the look and feel of all signage.

Sign Cabinet/Lettering Colors



Pantone 7421z



Pantone 422

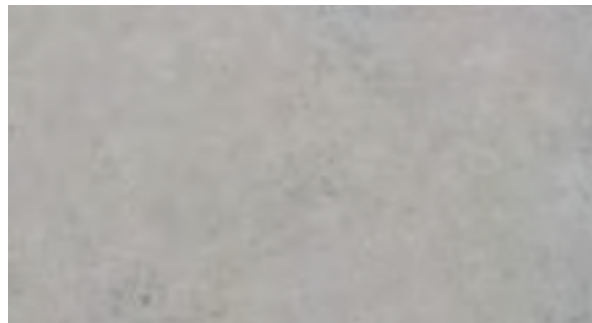


Pantone 7540

Sign Base



Lueder limestone with honed finish



Arriscraft Sepia - Adaia Anchored

Foundation



Smooth finished concrete only is signage foundation

TYPOGRAPHY AND GRAPHICS

Typography for the RELIS Campus signage will be:

Primary Typeface

Frutiger Lt Std 65 Bold is the primary signage and wayfinding typeface. It will be used for all wayfinding and informational content. It could also be appropriate for stylized storytelling, narrative, or interpretive elements.

Frutiger Lt Std - 65 Bold

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789

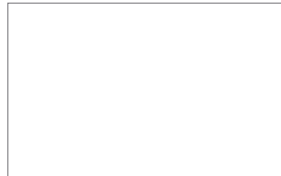
Secondary Typeface

Frutiger LT Std - 55 Roman is the secondary typeface. It will be used for formal building and place identification. It could be appropriate for stylized storytelling, narrative, or interpretive elements.

Frutiger Lt Std - 55

ABCDEFGHIJKLMNOPQRSTUVWXYZ
 abcdefghijklmnopqrstuvwxyz
 0123456789

Typography Colors



White



Pantone Cool Gray 424C



Pantone Cool Gray 422C

RELLIS Logo



RELLIS logo - Full Color

RELLIS logo is only to appear on campus identification monument signage.

Secondary Branding Element



The Texas A&M University System Seal



Secondary Branding Element

A secondary branded graphic element will be employed on signage elements which establish the perimeter of the campus. This branded element can be in Aggie Maroon, Pantone 442, Cool Gray 11, or tonal on approved materials.

The Texas A&M University System Seal

Only RELLIS campus signage shall have conspicuous display of The Texas A&M University System seal.

RELLIS Campus use of the A&M System Seal can be in the form of bronze plaques, carved elements or other additive features. Development Partners may only utilize bronze plaques OR internal, nondescript use of the System Seal.

SIGN INFORMATION HIERARCHY

Core Principles

For signage information hierarchy and nomenclature include the following:

- Clear and consistent messaging will be used throughout all campus communications. Destinations and place names will be vetted with consideration for visitors. Naming opportunities to increase orientation and better serve direction sets include campus organization (east and west), entrances, parking areas, and public destinations.
- Vehicular wayfinding can carry a minimal amount of information and should be easily readable at a glance (3-5 destinations).
- Pedestrian wayfinding can carry a variety of information with different levels of density (quick reference directional cues and detailed information to study).

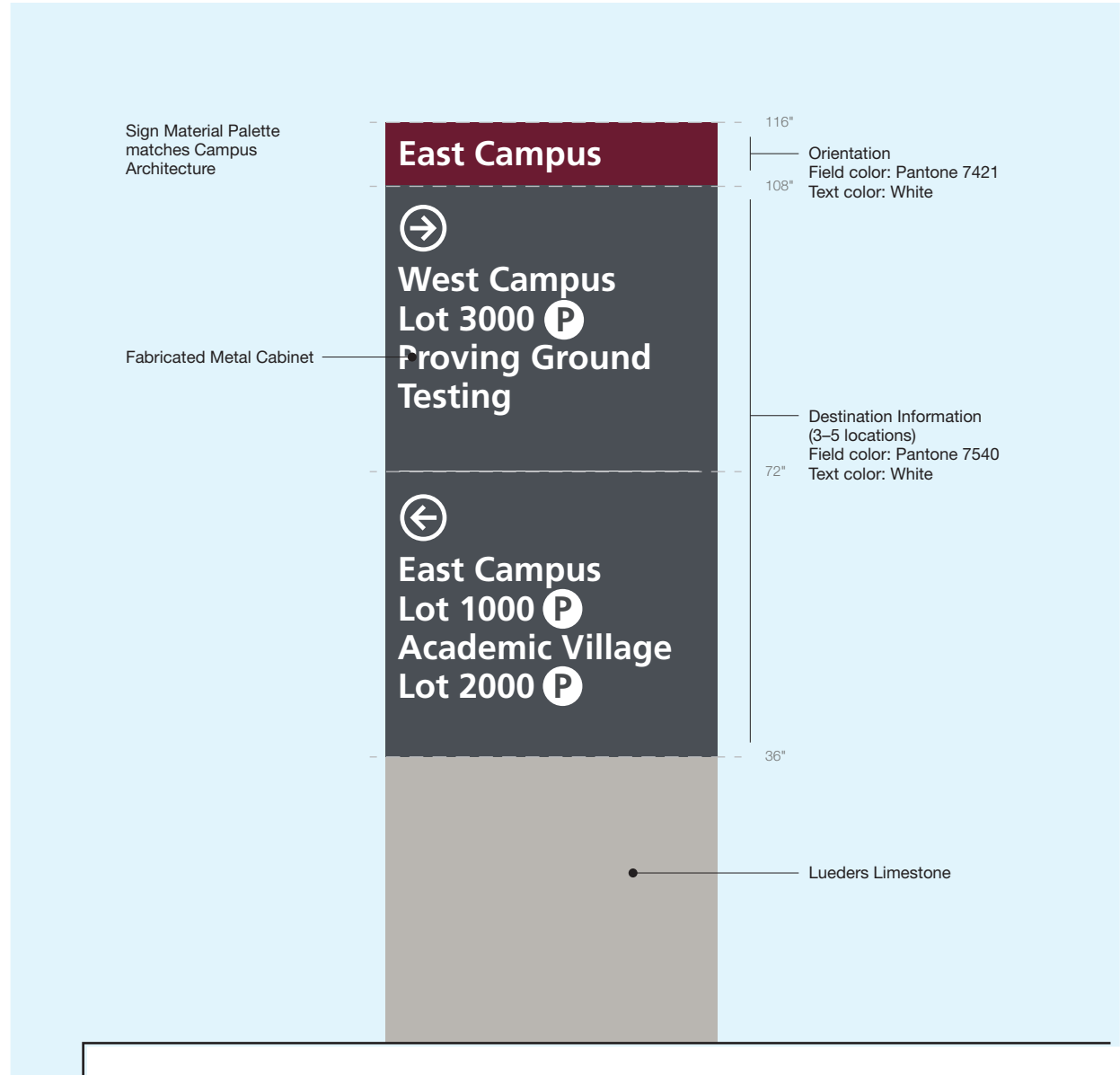


FIGURE 7.3 Information hierarchy will provide a systematic approach for displaying information consistently from one sign to the next.

Messaging and Naming Hierarchy

The message hierarchy system for the RELLIS campus should maintain the following principals:

- Use naming and language that is expandable as the campus grows.
- Make use of clear and consistent terminology. Only use acronyms that have a common understanding.
- Display information in a consistent manner to allow the wayfinding system to be easy to use and intuitive.
- Use on-brand terminology.
- Use language and messages that work with technology tools such as websites, mapping programs, etc.

Wayfinding and Messaging Logic

The primary steps or sequence of events that make up the logic for the campus wayfinding system are:

- Find the Campus
- Orient to major/primary campus organization (east and west campuses)
- Follow street address system to partner facility with dedicated parking.
- Follow wayfinding signs to public parking or to primary campus destination.
- Once parked, follow pedestrian wayfinding signs to destination.

Messaging Listing for Campus

Main approach roads:

- TX Hwy 21 - from I-35 and approaches from the west.
- TX Hwy 47 - from Bryan, College Station, TAMU flagship campus, and approaches from the east.

Entrances:

- Primary - TX Hwy 47
- Secondary - TX Hwy 21

Primary Areas:

- West Campus - Secure areas, Proving Grounds, Testing, and the Track.
- East Campus - Academic Village, Training, Collaborative Research, and Industry Partner Facilities.

Secondary Areas:

- Academic Village - Appear on wayfinding signage; location for education institutions such as Blinn College and the Academic Complex.
- Experimentation Testing & Training Grounds - Appear on wayfinding signage; location for test track and testing areas.
- Collaborative Research - Appear on website and used in conversational language, will not appear on wayfinding signage.
- Secure areas/campuses - Appear on website and used in conversational language, will not appear on wayfinding signage.

- Training and Testing - Appear on website and used in conversational language, will not appear on wayfinding signage.

Primary Wayfinding Destinations, all will appear on wayfinding signs:

- East Campus
- West Campus
- Academic Village
- Experimentation Testing & Training Grounds
- Chapel and Assembly Hall
- Hwy 21
- Hwy 47
- Parking Lot 1000 - serves the Academic Village and other nearby institutions.
- Parking Lot 2000 - serves the institutions in the Training area.
- Parking Lot 3000 - serves the secure areas on the West Campus.

All other campus destinations are self navigate based on street address, similar to a typical city experience. Anticipate most campus visitors will use cell phone based GPS, car based GPS, directional information from a campus institution or website, or a combination of these tools.

FIGURE 7.4 Diagrammatic plan showing Primary and Secondary areas, and Primary Destinations.

As part of the wayfinding system, the Testing area on the West Campus will have a grid overlay. The grid overlay will allow for testing locations, both on and off pavement, to be identified in a consistent manner. It will also allow users to locate a specific testing site using a consistent naming convention that can be used much like a street address.

The grid overlay will allow areas to be closed as needed to allow for appropriate safety zones around active or sensitive testing sites. An online reservation system can be utilized to identify open locations and automatically close locations within a preset parameters depending on the type of testing being performed.

Each grid is 1000 meters square and will be identified with a system of markers placed at appropriate meeting points in each grid. Pedestrian wayfinding can be used to direct around the testing area. Using pedestrian scale signs will allow for posting of wayfinding information while having the smallest impact on the area.

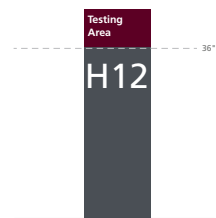


FIGURE 7.5 Testing Area grid identification marker.

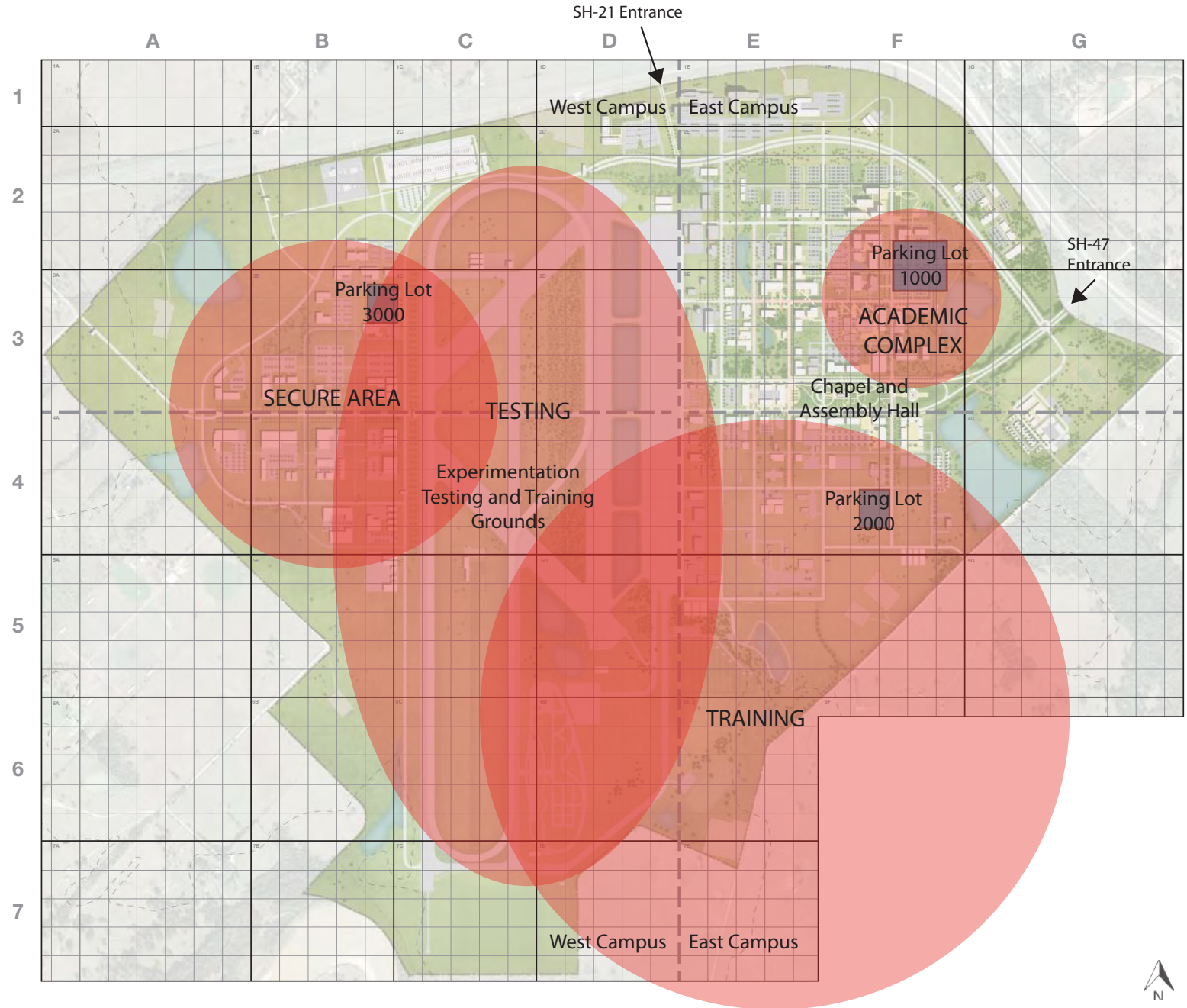
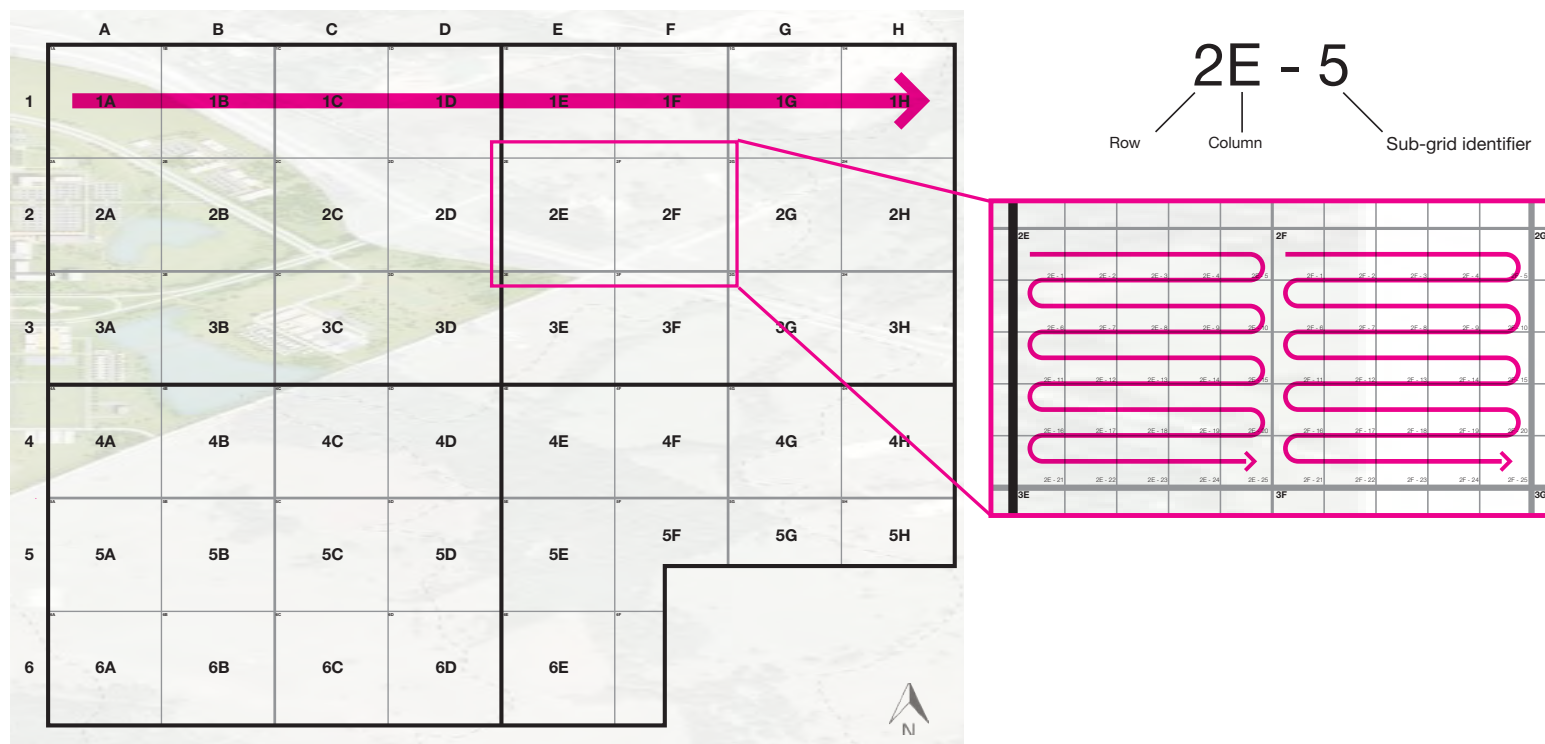


FIGURE 7.6 Diagrammatic plan sub-grid organization.

The grid organization is aligned left to right. Each grid square can be further broken down into a 100 meter sub-grid.



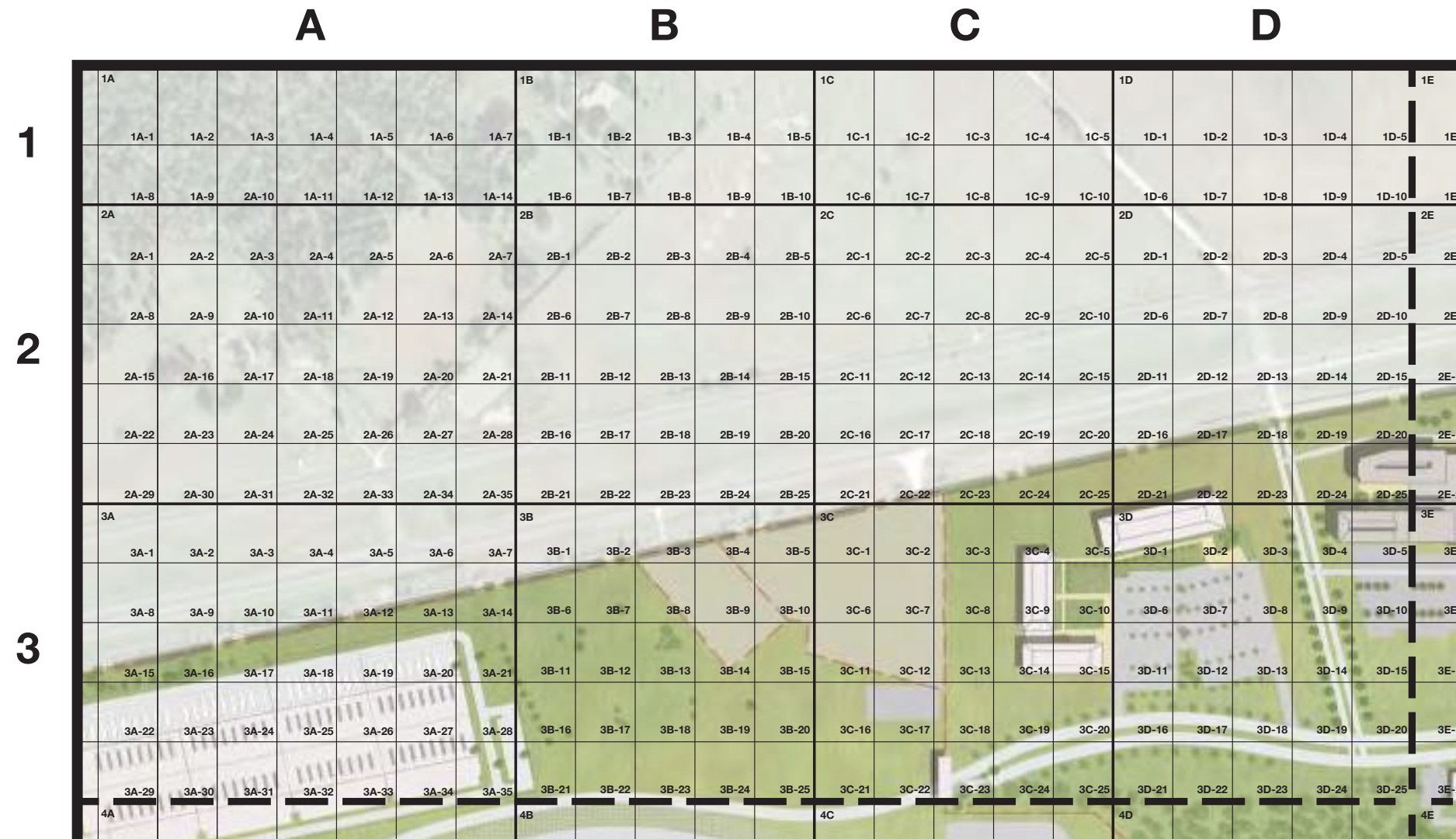


FIGURE 7.7 Northwest grid detail



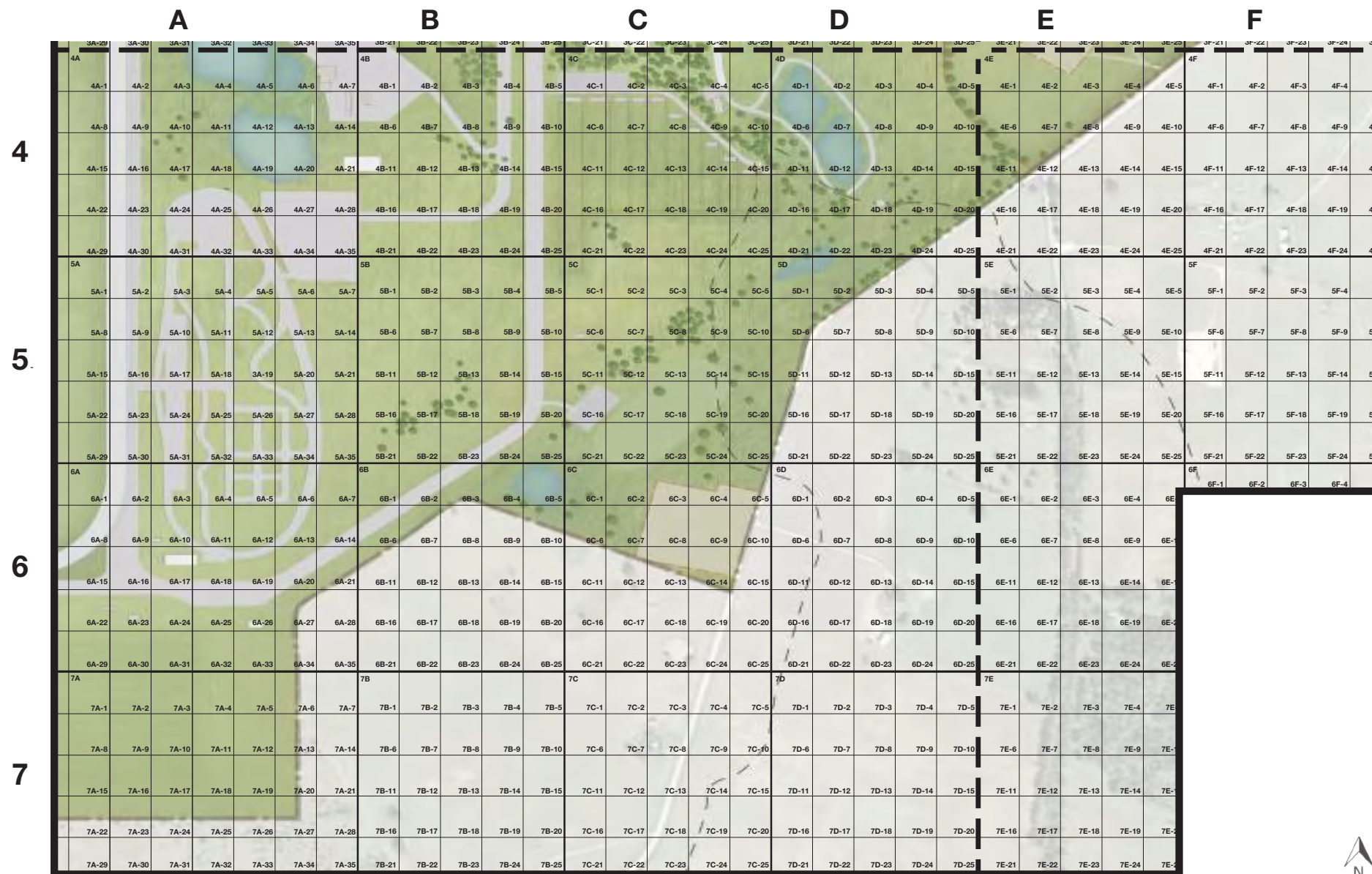


FIGURE 7.8 Southwest grid detail

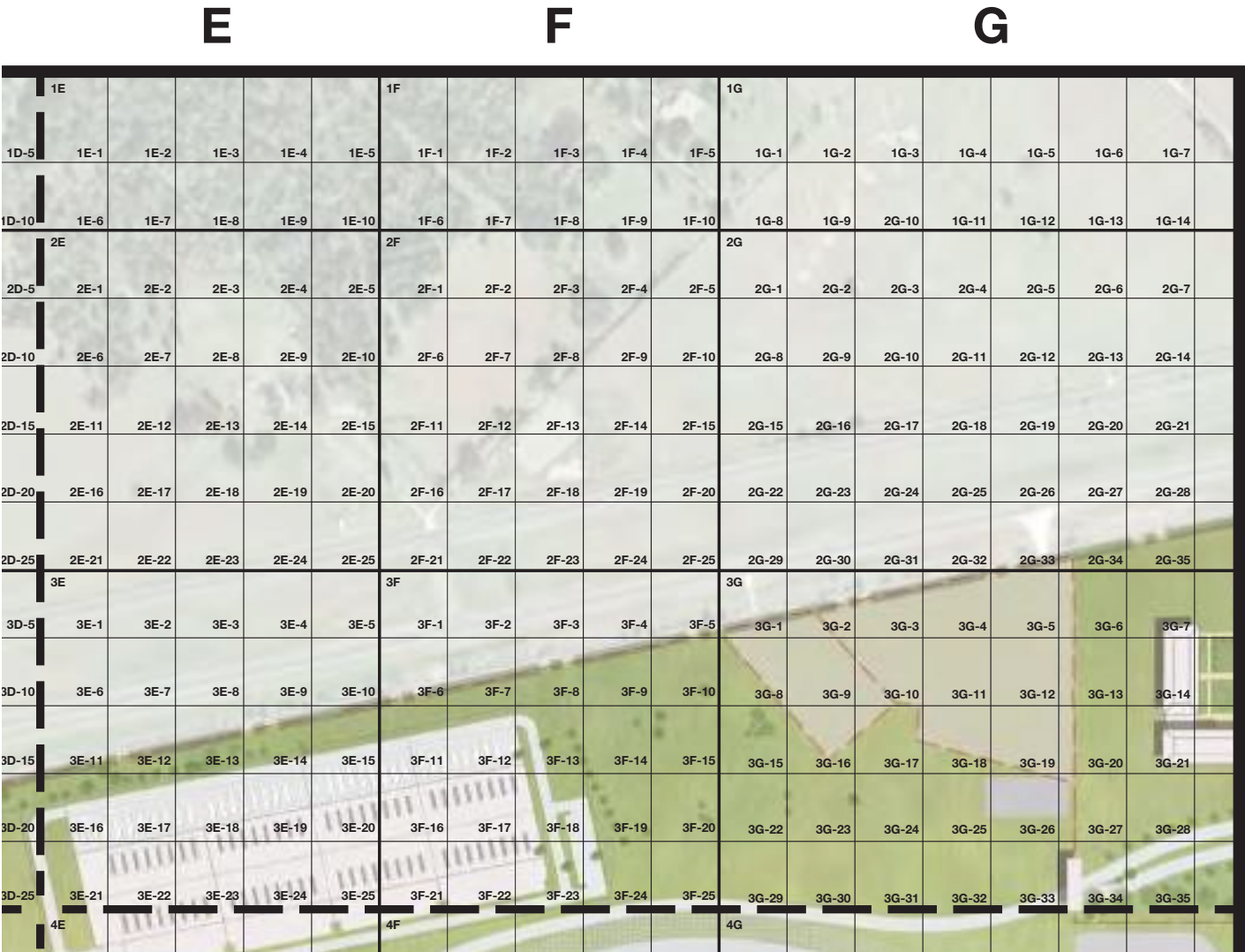


FIGURE 7.9 Northeast grid detail





FIGURE 7.10 Southeast grid detail

7.3 CAMPUS SIGNAGE GUIDELINES

OVERVIEW

The contents of this section are guidelines for signage design and installation for all official RELLIS Campus infrastructure signage. All campus departments must adhere to these guidelines for all development or temporary signage.

All signage should be designed as a part of the overall campus presentation. Signage should complement the campus brand as well as the architecture of the buildings or facilities.

Policies

Nothing in this document shall be construed to preempt any local, state, or federal regulation or ordinance. It is the responsibility of the campus to ensure that proposed signage meets all requirements of the Texas A&M system. Any deviation from these criteria must be approved in writing by the campus administration.

The A&M System and RELLIS Campus require accuracy or conformity with any building code, signage code, or other governmental and regulatory requirements. Campus procedures to ensure the accuracy and conformity of plans, and the responsibility for obtaining all permits and approvals from all appropriate governmental and regulatory bodies, must be applied and followed. Please refer to the Resources section for additional guidance.

DEVELOPMENT DISTRICTS

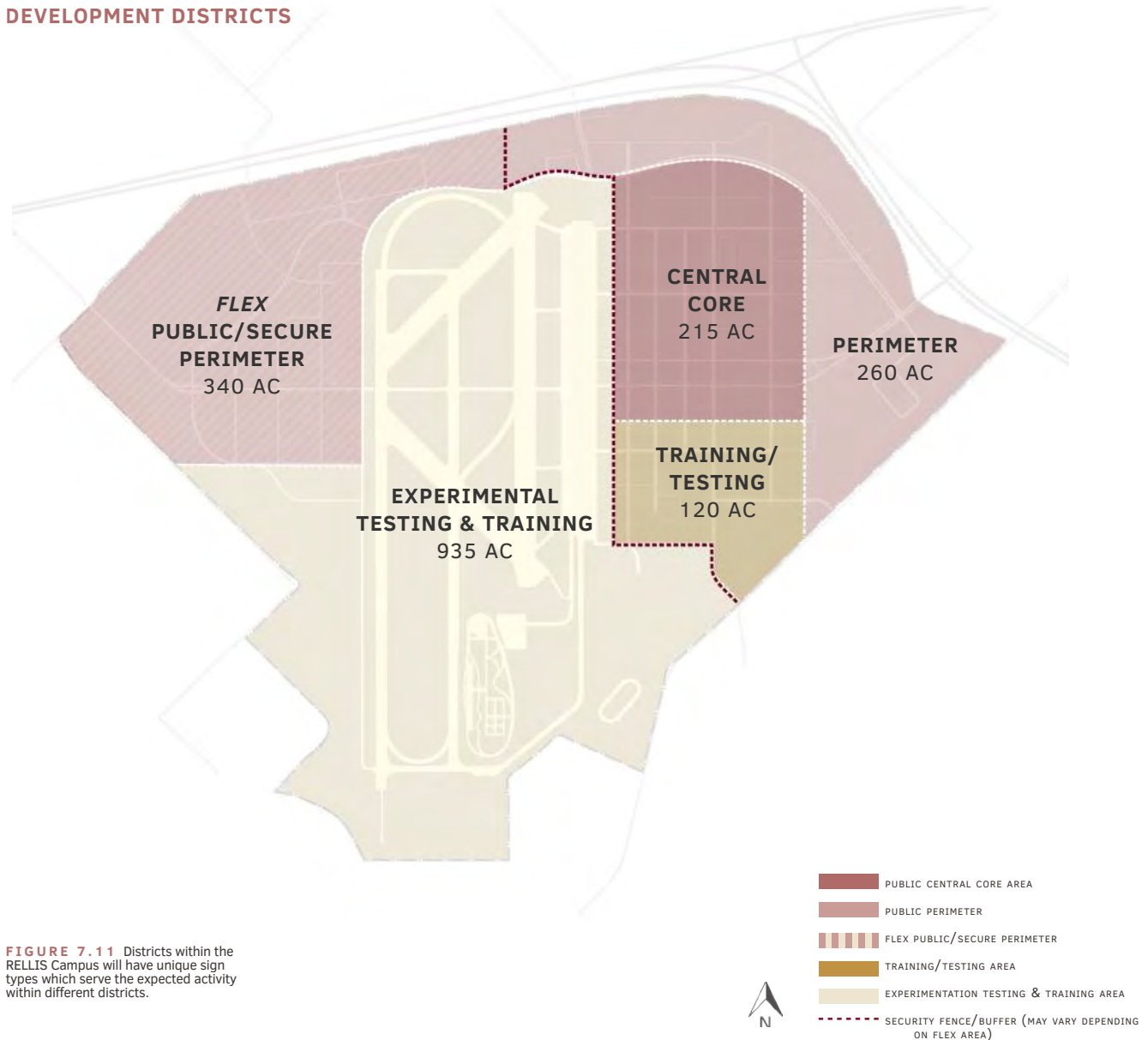


FIGURE 7.11 Districts within the RELLIS Campus will have unique sign types which serve the expected activity within different districts.

ILLUMINATION

Campus signage with illumination will have ground mounted or indirect, and internal illumination methods.

Campus identification and major directional elements will have a combination of internal and ground mounted illumination. Typical directional elements will not have internal or external illumination.

- Ground mounted illumination: low profile light fixtures used to illuminate the sign face, with a lighting color temperature of approximately 3,000 -3,500K. Ground mounted lighting should be placed up out of finished grade conditions, not mounted in areas to receive mowing or other mechanical maintenance. Efforts to obscure the lighting elements with landscape bedding plants or other elements are encouraged. Users must maintain the lighting in working conditions at all times
- Halo illumination: letter-forms, graphics, or signage elements applied to sign face with internal illumination that is projected out the back of the letter-form or graphic, creating a halo or glow, bringing a definition to the letter-form, graphic, and signage element.
- Internal illumination: push-through lettering or logo cut through the sign face and backing material and mounted or inlaid so the sign looks as if the lettering or image had been pushed through, up, and out of the sign. Push-through lettering may be back-lit through the sign, or the fascia of the lettering may be translucent to allow lighting the imagery from behind.



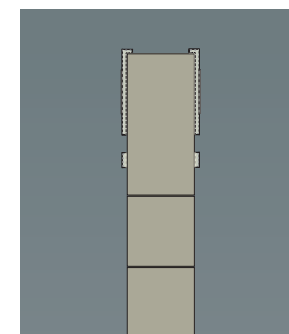
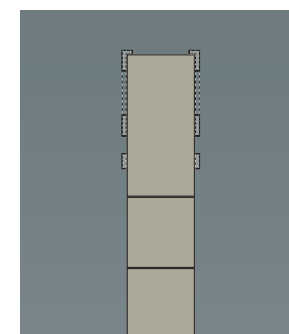
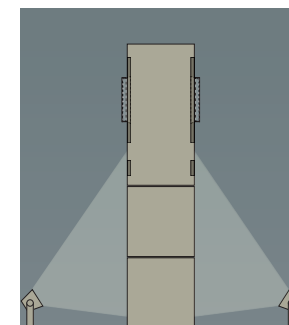
FIGURE 7.12 Primary logo cut out of field with halo illumination. Sub-text relief cut out of stone sign face and lit with external ground lighting. Secondary branding element, cut out of field with white halo lighting.



FIGURE 7.13 Primary logo and sub-text cut out of field with halo illumination. Secondary branding element pushed through sign cabinet and internally illuminated.



FIGURE 7.14 Primary logo text and secondary branding element pushed through sign cabinet with internal illumination.



SIGN TYPE INVENTORY

Multiple sign types in many forms make up a comprehensive system.

Minimum Program Requirements

The following sign types are the minimum program requirements. They address the campus identity and arrival experience from surrounding roads, support top-level vehicular and pedestrian wayfinding needs, and solidifies a unified campus environment.

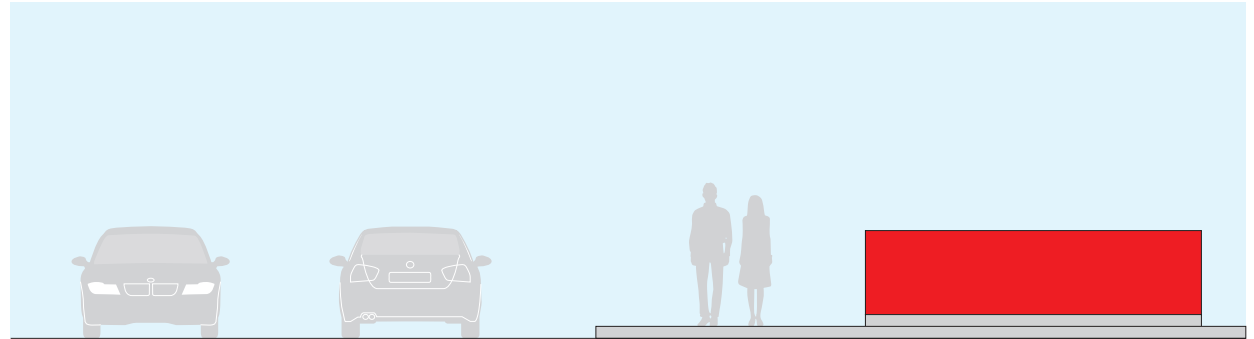
- Site Identification
- Vehicular Wayfinding
- Vehicular Regulatory
- Pedestrian Wayfinding.

Design Principles

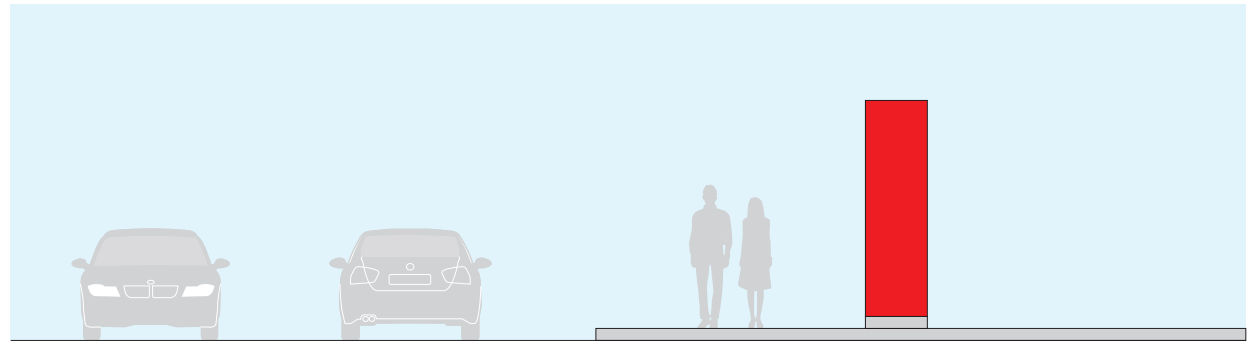
- Design the wayfinding system as a coordinated family of elements.
- Establish clear hierarchy and nomenclature for clarity and consistency.
- Provide useful information when and where it is needed.
- Create a memorable and iconic arrival experience to the campus that celebrates the unique aspects of the physical place, visually engaging State Highway 21 and State Highway 47 to promote the University's presence.
- Promote campus legibility to all campus users – visitors, students, faculty, staff, administration, and the broader community.
- Ensure ease of implementation and maintenance.
- Use materials and methods appropriate to the architectural and natural environment that can be implemented over time while maintaining their integrity.

SIGN TYPE DIAGRAMS

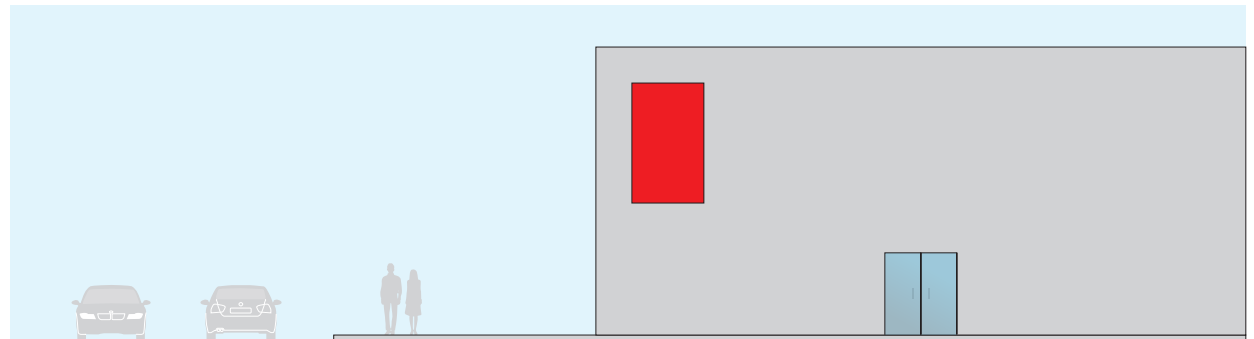
The RELIS Campus will require many different sign types as it evolves. The campus sign system should be considered for consistency of form, application, economy of scale, and modularity.



Site Identification - Monument Sign



Site Identification - Pylon Sign

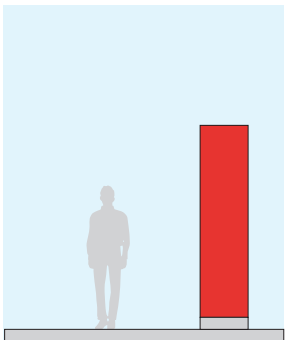


Site Identification - Building Mounted

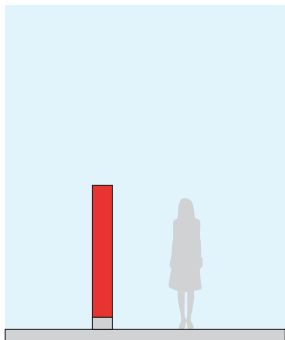
FIGURE 7.15
Example of sign types shown
as diagrams.



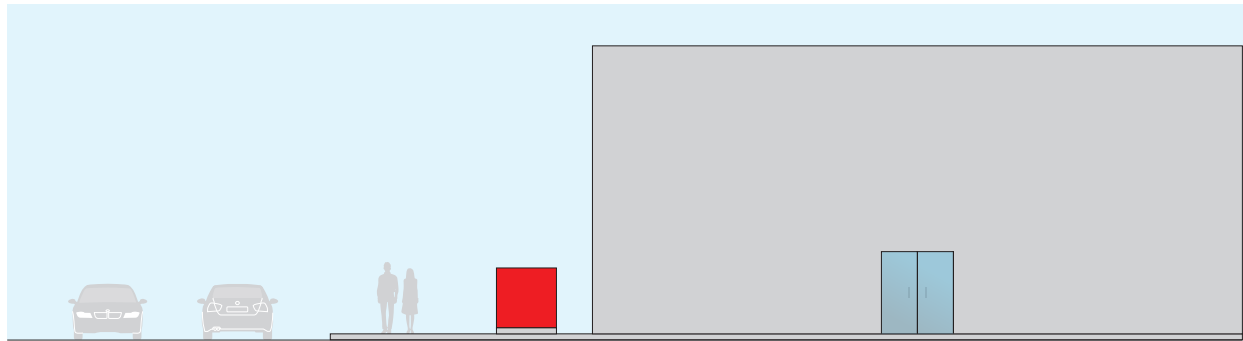
Building Identification - Building Mounted



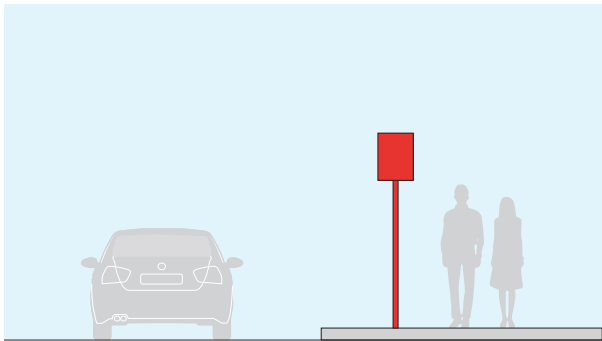
Large Pedestrian Directional



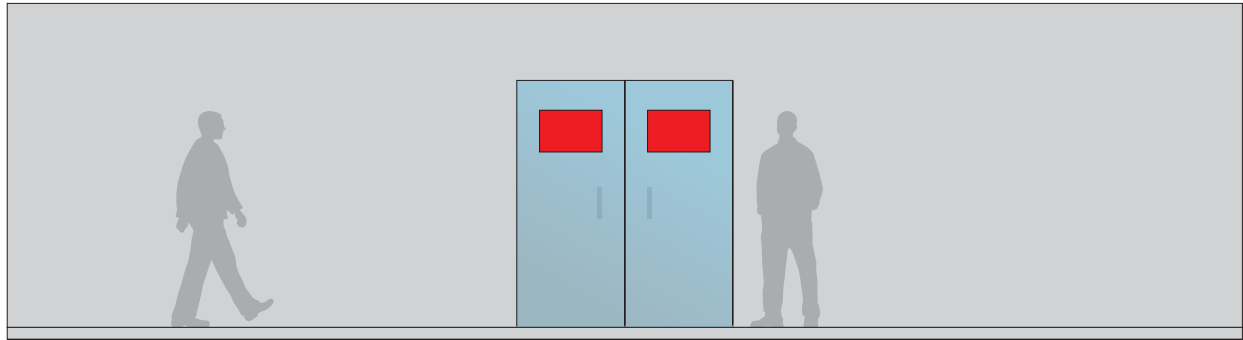
Small Pedestrian Directional



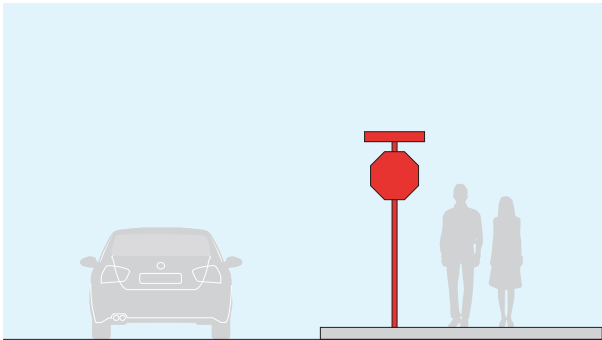
Building Identification - Free Standing Monument Sign



Typical Regulatory Sign

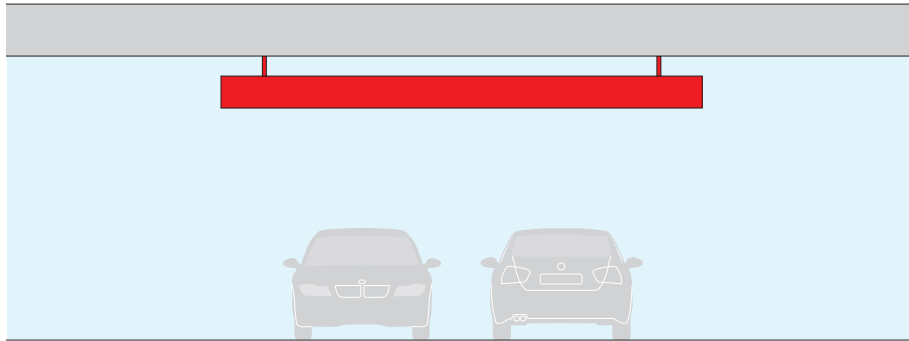


Building Identification - Vinyl on Glass

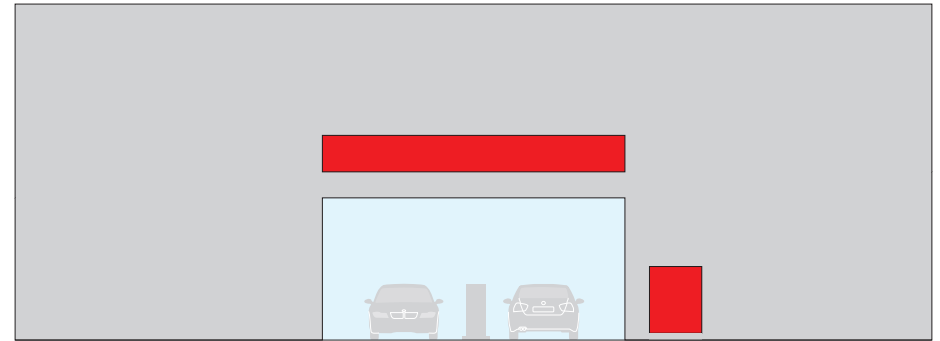


Street and Stop Sign

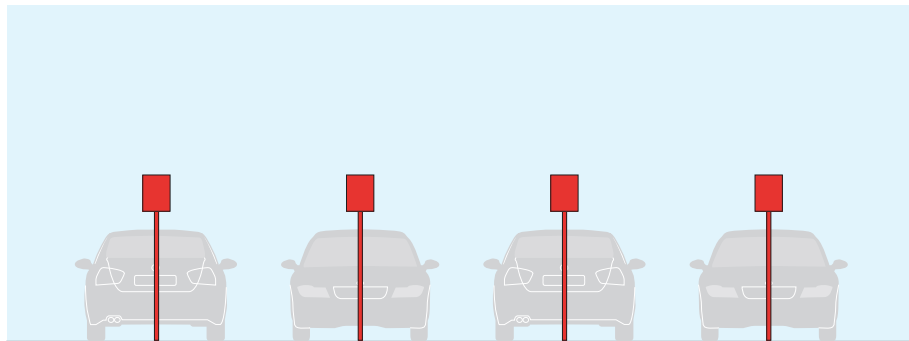
FIGURE 7.16
Example of sign types shown
as diagrams.



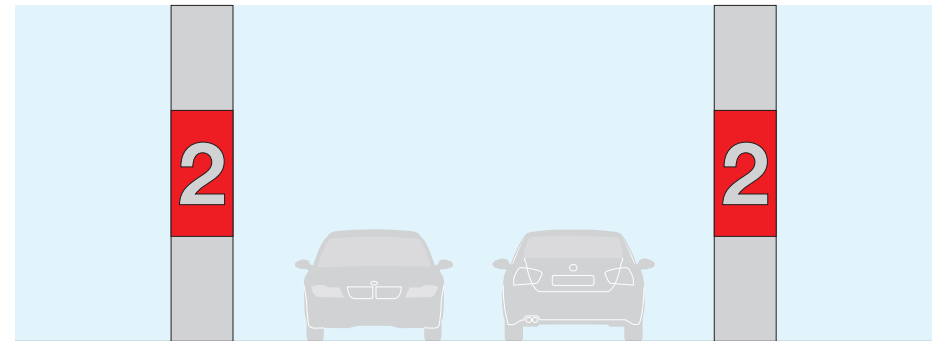
Column Mounted Level Identification



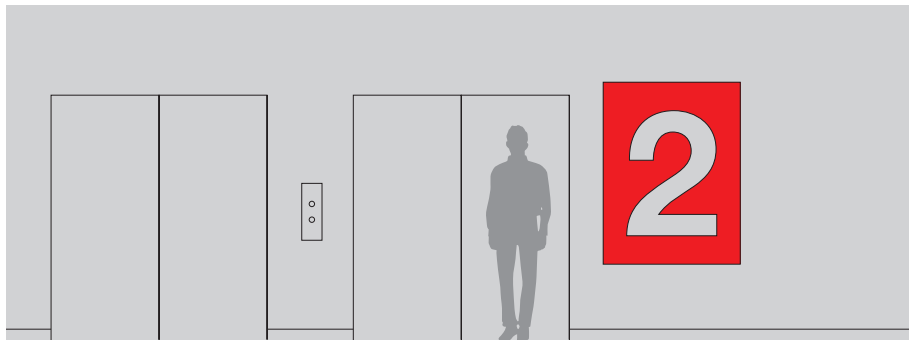
Parking Lot Identification - Free Standing Monument and Building Mounted



Parking Stall Singage



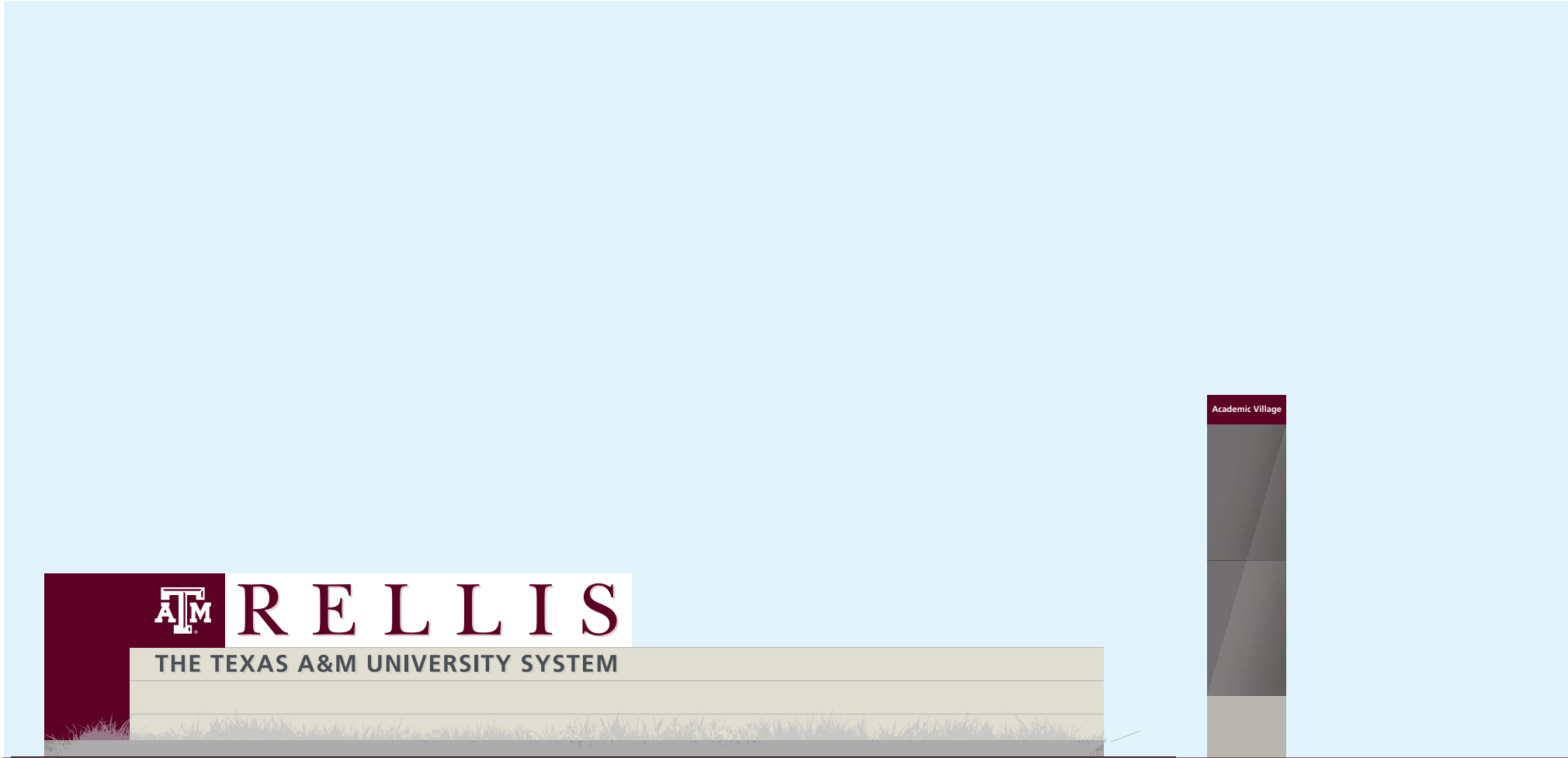
Column Mounted Level Identification



Elevator Lobby Level Identification

FIGURE 7.17
Example of sign types shown
as diagrams.

CAMPUS SIGNAGE SYSTEM SHEET EXAMPLE



Site Monument Identification - Future Entrances

District
Identification
Signage

FIGURE 7.18
Example of RELLIS Campus
Sign System.

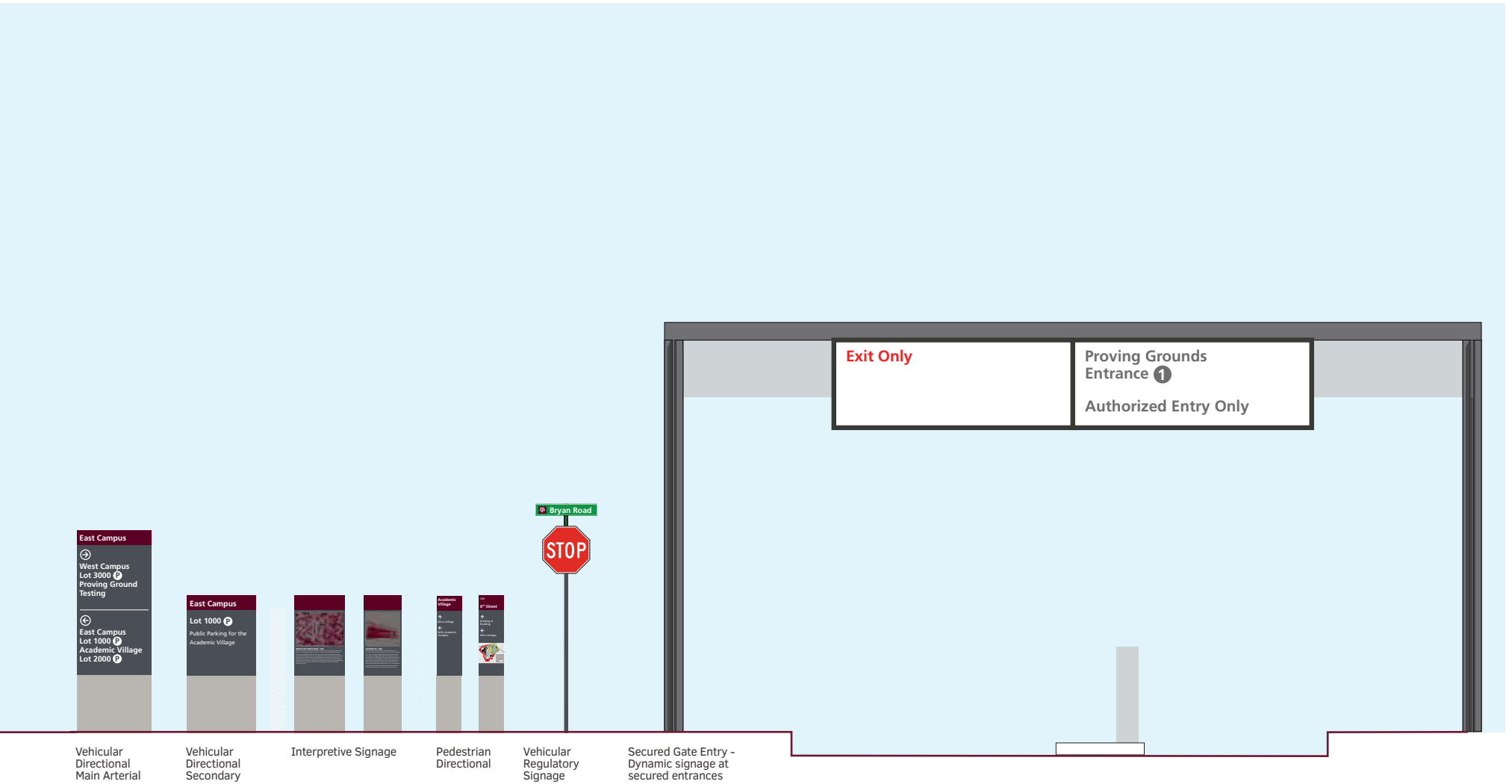
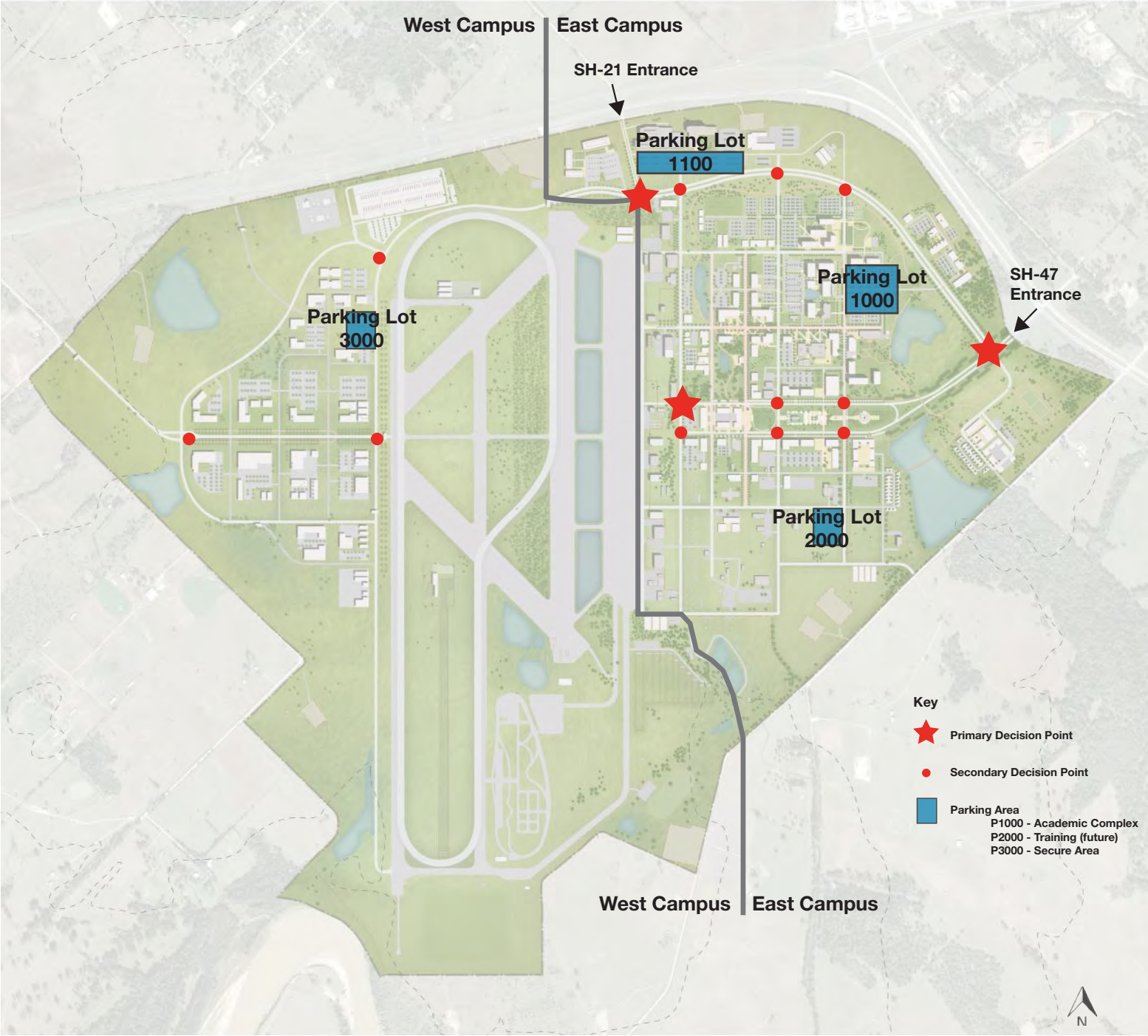


FIGURE 7.19 Wayfinding signs are placed at decision points.

Primary decision point is appropriate for a Main Arterial Directional. Secondary decision points are appropriate for a secondary directional.

Major parking lots and potential numbering are shown for reference. The primary lot for a district should be given a large round number as shown. Secondary lots serving multiple buildings, such as the TTI/CIR lot, should be given a round number within the sequence of the district, organized from north to south and leaving out numbers for future lots. Tertiary lots should be numbered in sequence within the secondary structure.



CAMPUS ENTRY SIGNAGE

Future Entrance

A new secondary campus entrance was constructed off State Highway 21, and another is anticipated in the future. The signage for each entrance will help not only to announce the presence of the RELLIS Campus but will help set the tone for the arrival experience for the different parts of the campus.

The campus entrance should have a formal, timeless quality, utilizing a palette and materials which share a common vocabulary with the campus architecture.

The entrance monument sign should be of size and orientation so as to be seen from each direction of traffic.

Future entrances should be marked with monument signs of similar character and nature.



FIGURE 7.21 Example of future entrance Sign Plan

FIGURE 7.20 Key view of example future Entrance Sign

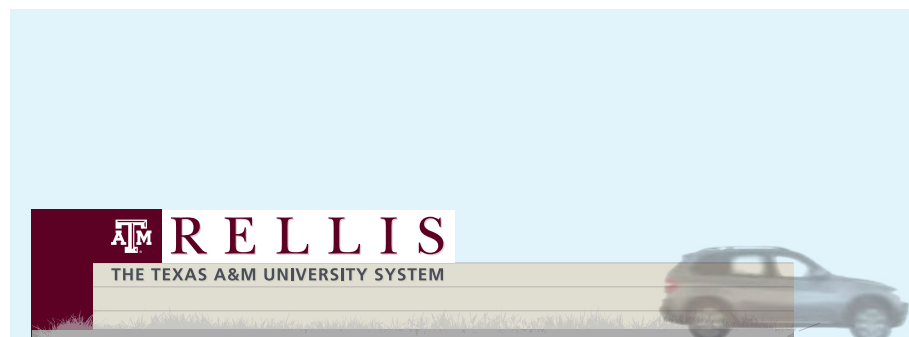


FIGURE 7.22 Example of RELLIS Campus Entry Signage

DISTRICT IDENTIFICATION

Campus District Markers

RELLIS will have sub-districts within the campus core area. There is potential to use markers at thresholds to help identify these districts or to create placemaking opportunities.

These markers can be an extension of the campus signage system of a variety of scales and materials. Alternatively, they can be a part of the streetscape or architectural fabric of the district.

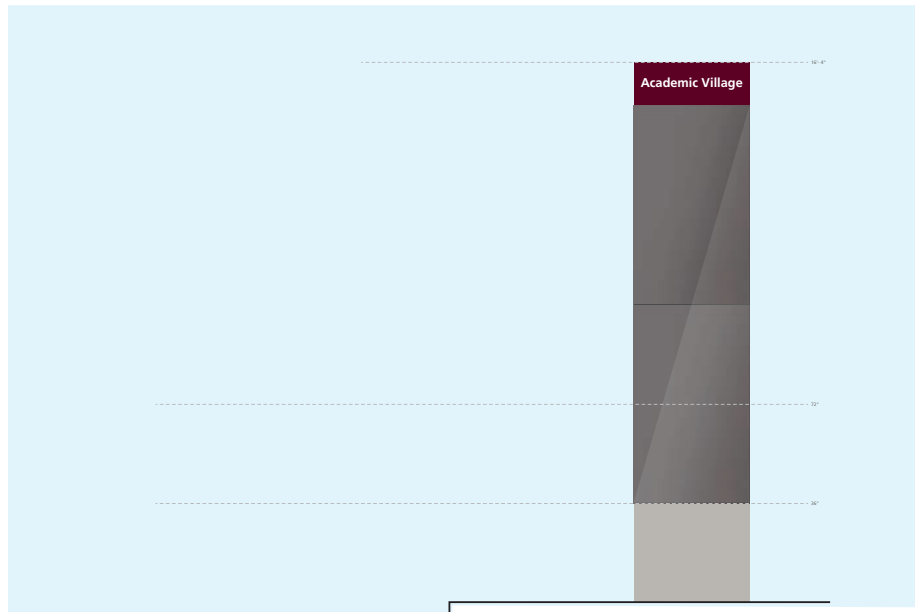


FIGURE 7.23 Example of RELLIS Campus District Marker.

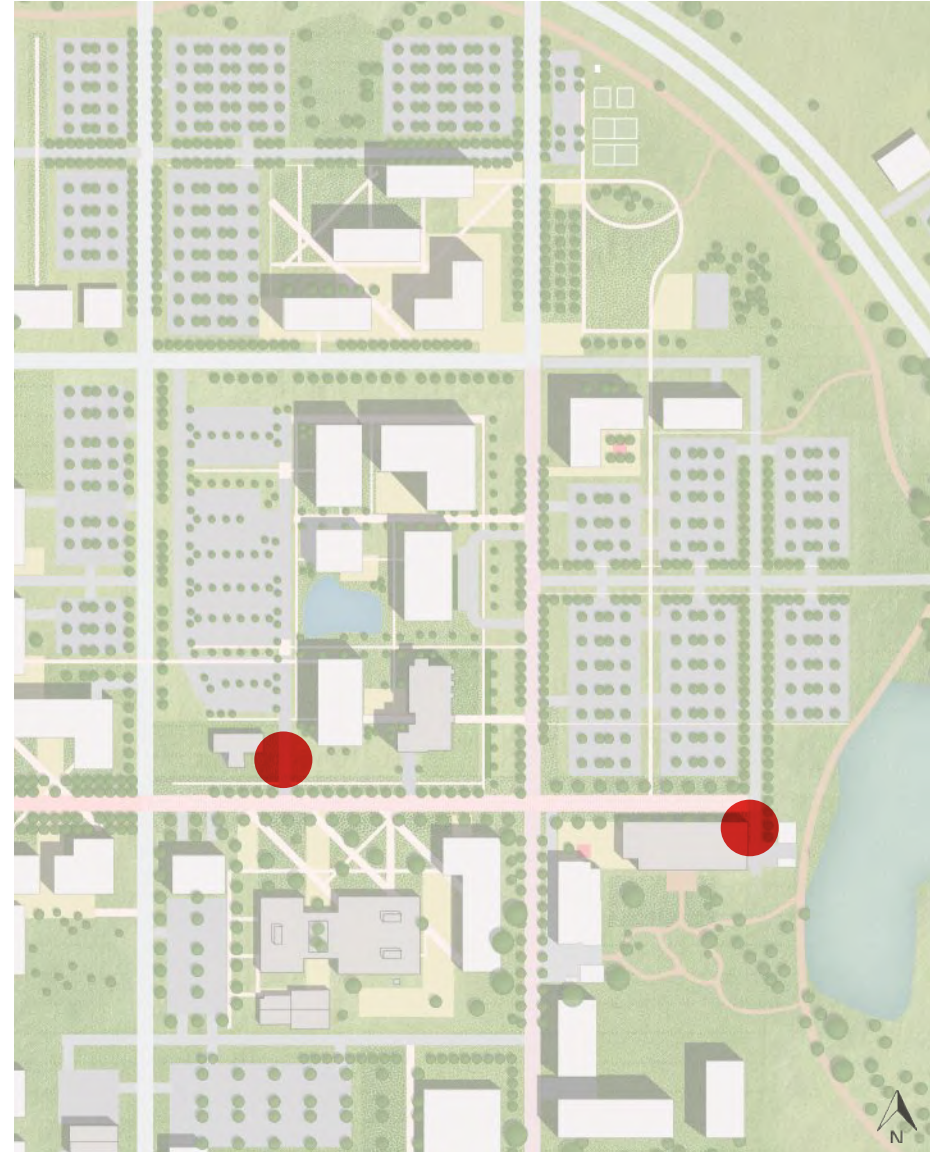


FIGURE 7.24 Potential locations of Campus District Markers.

Dynamic Digital Signage

Because of the secure nature of the entrances of the Experimentation Testing & Training Grounds and training areas and the need to reconfigure different types of information through the day, dynamic signage will be employed at these secure entrances and possibly other locations to aid in safety and security.

Static Signage

The majority of campus signage at RELLIS will be traditional static sign types. Modularity will be employed to ease modification.

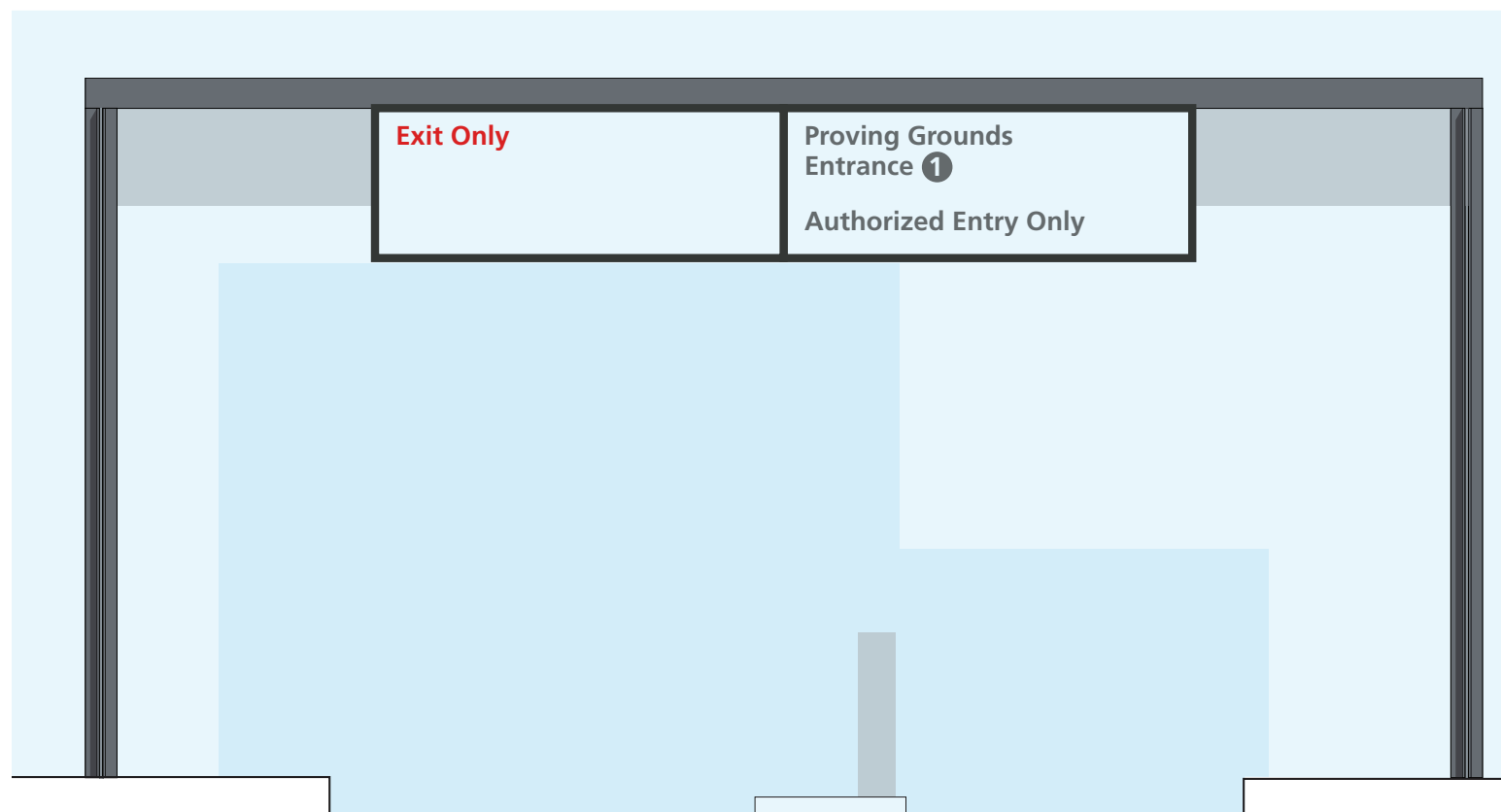


FIGURE 7.25 Secured Entry gates require dynamic messaging that can be seen from a distance of 100'-0" or more.

SECURED GATE ENTRY

Experimentation Testing & Training Grounds Entrances

The campus will be divided between public and secured areas. The secured areas will be the proving grounds and some training areas. Access to these areas will vary depending on the activities of these areas. Clear entrance identification is crucial, as different entrances may have different security concerns within overlapping time periods.

Because of the secure nature of the entrances of the Experimentation Testing & Training Grounds and training areas and the need to reconfigure different types of information through the day, dynamic signage should be employed at these secure entrances and possibly other locations to aid in safety, security, and the clear broadcast of information.

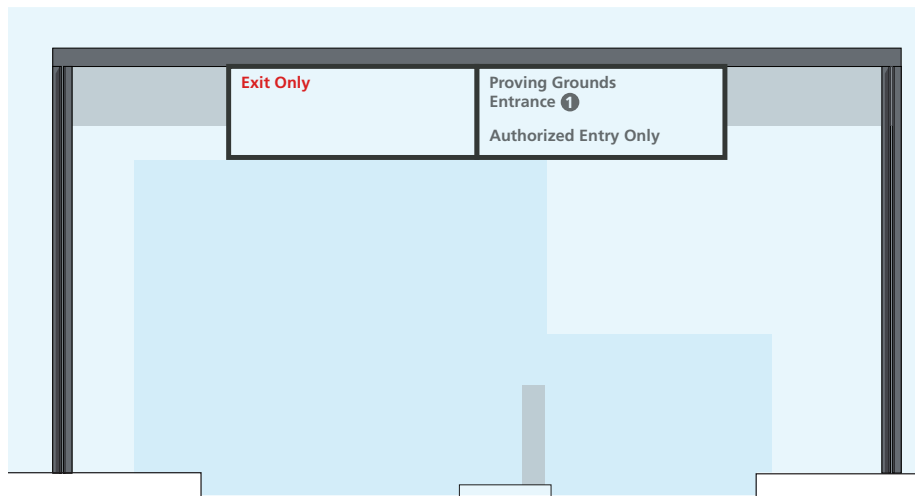


FIGURE 7.26 Example of RELLIS Campus Secured Entry Gate Signage.

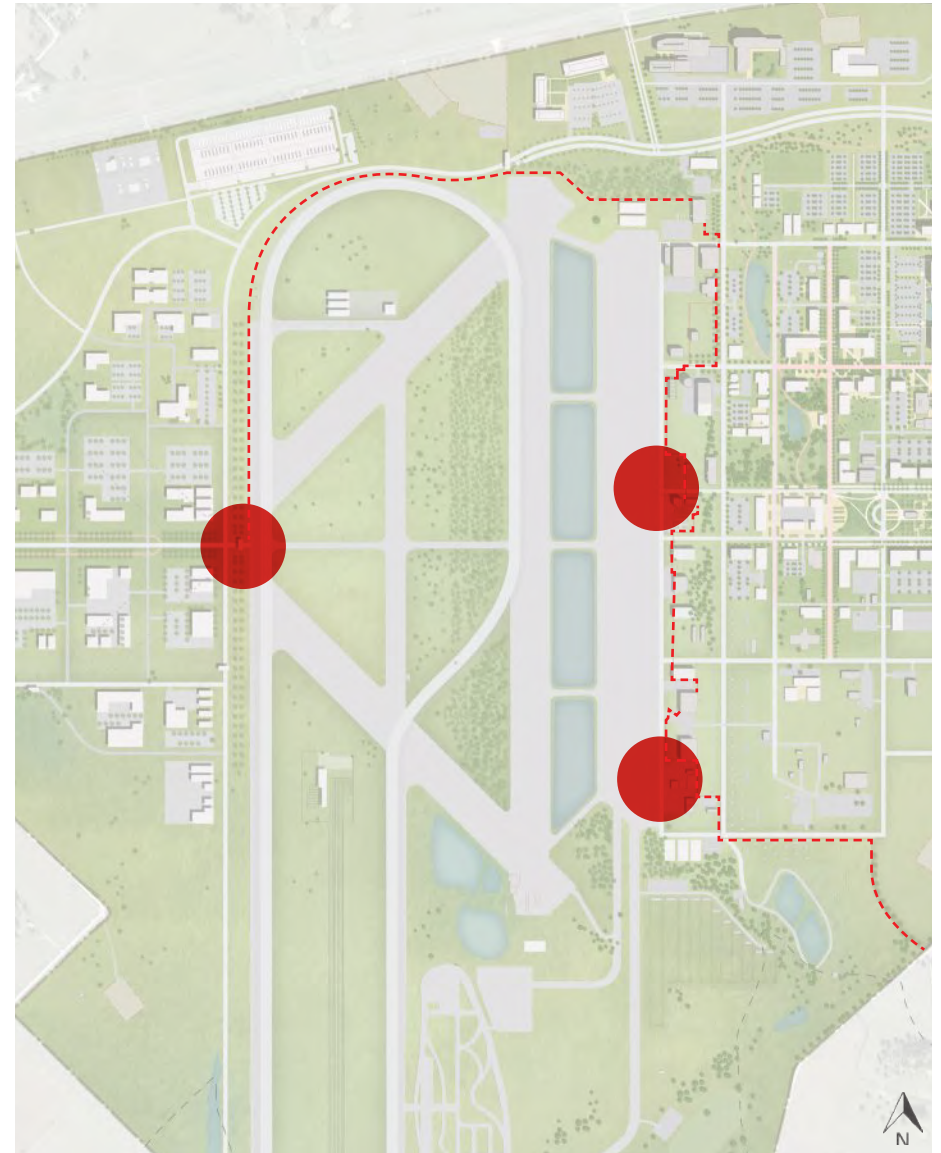


FIGURE 7.27 Potential locations of Secured Gate Entry locations and fence line.

CAMPUS DIRECTIONAL SIGNAGE

Vehicular Directional Signage

Directional Information:

Vehicular wayfinding signage will direct to major geographic destinations and public parking.

Vehicular wayfinding will provide clear guidance at multiple decision-making points within the campus. It will clarify navigation to defined parking zones and reinforce visibility of primary complex destinations.

Content for vehicular directional signs will highlight visitor destinations and include simple, prioritized information about key parking areas, geographic locations, roadways, and visitor destinations. However, vehicular signs will not include individual building or donor named locations to keep signs relevant for the maximum amount of time. Wayfinding will direct visitors to visitor parking areas associated with key visitor destinations.

Vehicular wayfinding will work within the modular system. Wayfinding information should be applied to elements that are sized according to the information that is necessary to display.

Vehicular directional elements should not overpopulate the roads and streets but offer cues at important decision points.

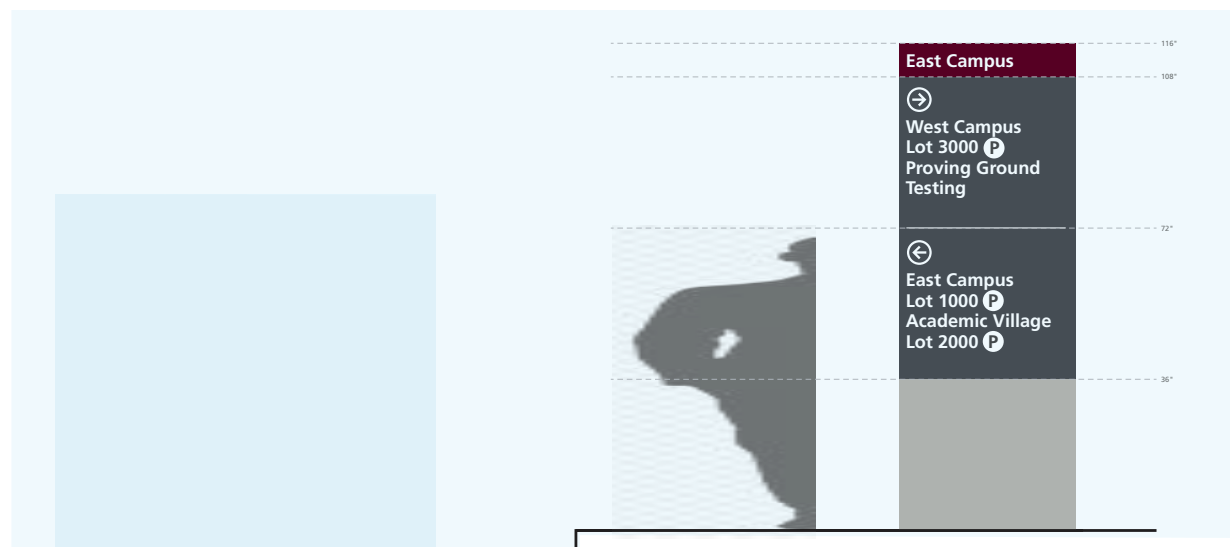


FIGURE 7.28 A typical roadway intersection with two stacking signage modules can allow for two levels of directional information.



FIGURE 7.29 Locations which require a single group of information using a single signage module.

Pedestrian Directional Signage

The majority of pedestrian traffic originates from parking areas and on campus housing with considerations for future public transit stops.

Pedestrian wayfinding will establish clear orientation and direction for pedestrian traffic, encouraging foot traffic along the campus pedestrian-only areas and supporting the connections of the different districts.

Pedestrian wayfinding can carry a variety of information with different levels of density, including quick reference directional cues, as well as detailed information for further study.

Signage can include orientation maps, travel distances to major destinations, highlight community amenities, and serve recreational and exploration purposes. It can also serve to increase pedestrian safety at traffic intersections.

Part of the Smart Campus design approach could be implemented in signage by installing bluetooth features that connect with smart phones, allowing individuals to better navigate the campus.



FIGURE 7.30 Example of RELLIS Campus Pedestrian directional .

Pedestrian Directional Signage Map

Maps should appear on the pedestrian directionals so that visitors can use them as the navigate the different areas of the campus.

The maps should be easy to be changed on the directional elements and be of an illustrative nature to reinforce the RELLIS brand. The maps can carry a variety of information from simple directional cues or highly detailed features of the campus with travel times marked illustrated.

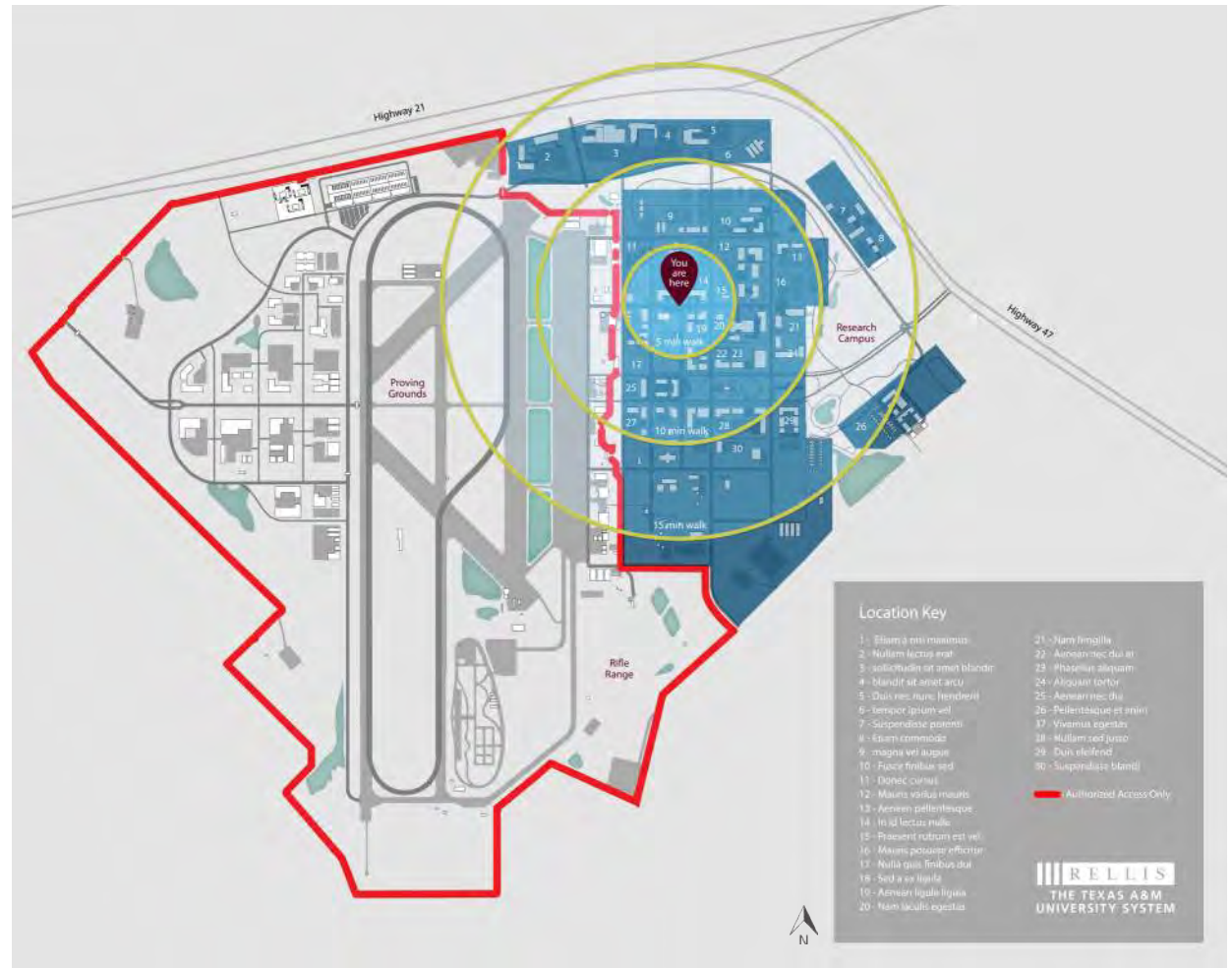


FIGURE 7.31 Example of a RELLIS Campus Pedestrian Directional Map.

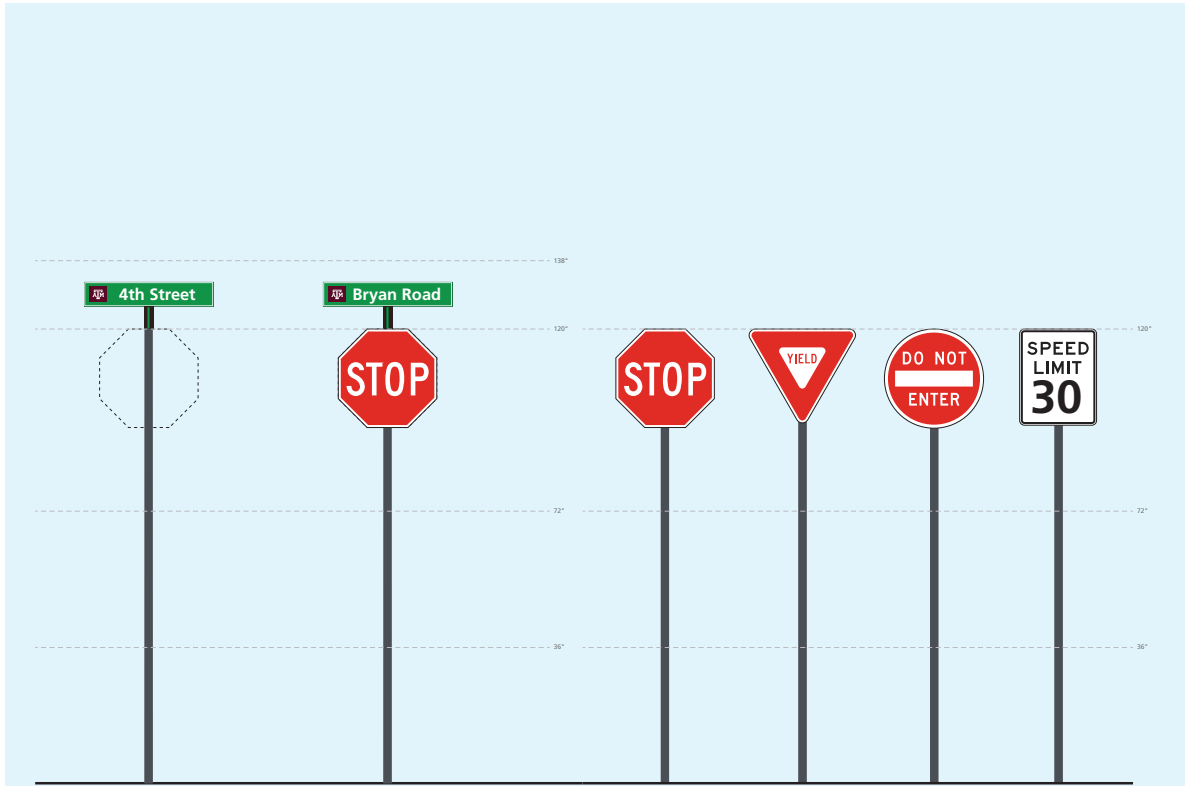


FIGURE 7.32 Example of RELLIS Campus Regulatory Signage.

REGULATORY SIGNAGE

The campus will employ typical regulatory signs that comply with RELLIS traffic control, law enforcement, and the A&M System requirements.

Campus regulatory signage may employ a custom painted sleeve for sign posts that are in public facing areas, major roadways, and streets.

INTERPRETIVE SIGNAGE

Interpretive Signs communicate specific messages to visitors. These messages can be written as a commemorative sign, to change behavior, educate, or evoke an emotion in the reader. They are mounted so they are visible to pedestrians in public areas or areas of note.

Part of the smart campus design approach could be implemented in signage by installing blue-tooth features that connect to smart-phones, allowing individuals with disabilities to experience and learn more about the campus.



FIGURE 7.33 There is opportunity within RELLIS to champion the unique history and convey those stories to the present.

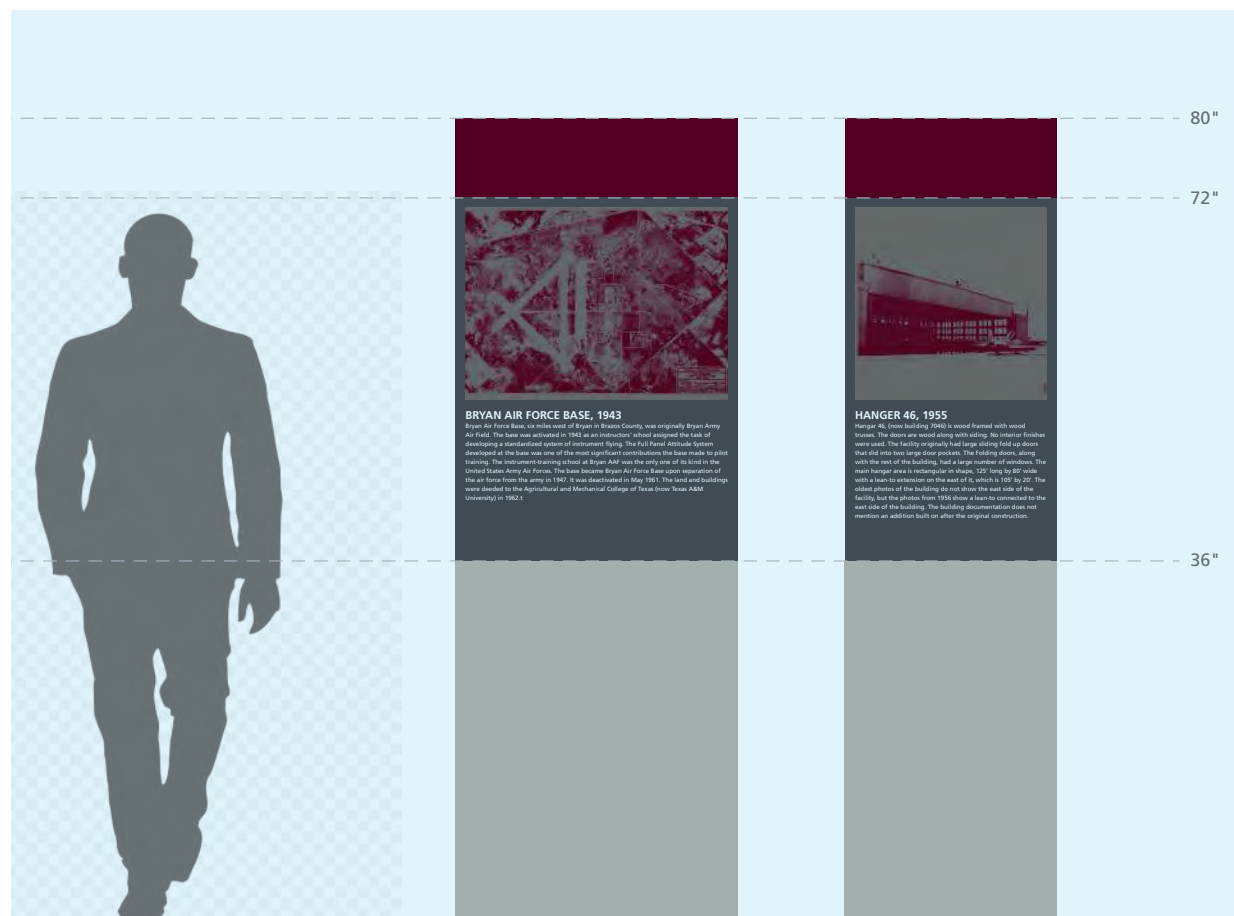


FIGURE 7.34 Interpretive signage can occur at a variety of scales for different message applications or locations.

CAMPUS SIGNAGE PLACEMENT DIAGRAMS

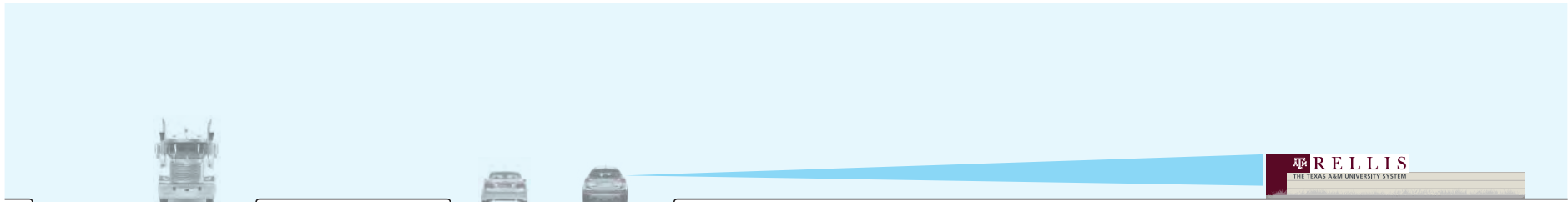


FIGURE 7.35 Highway signage requires scale and placement specific to highway visibility and reduction of speed from 75mph.

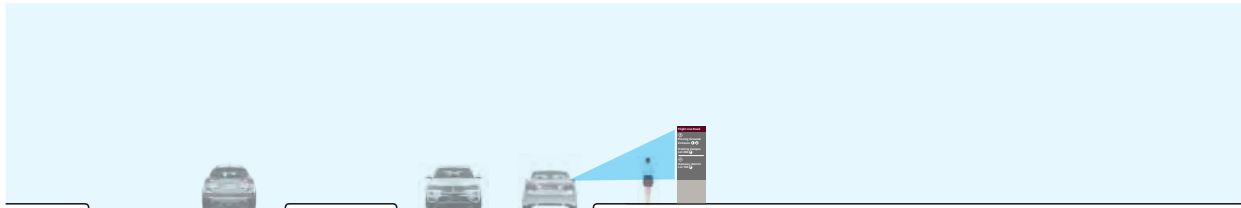


FIGURE 7.36 Interior loop signage requires scale and placement specific to RELLIS Parkway visibility and reduction of speed from 35mph.

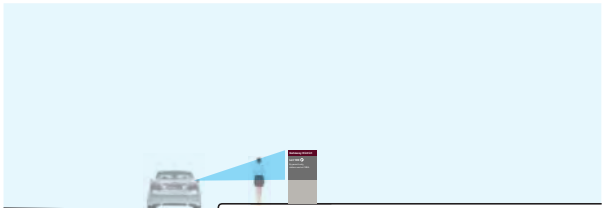


FIGURE 7.38 Interior surface street signage should be placed as close to curb edge as possible while still allowing for safe vehicle passage.

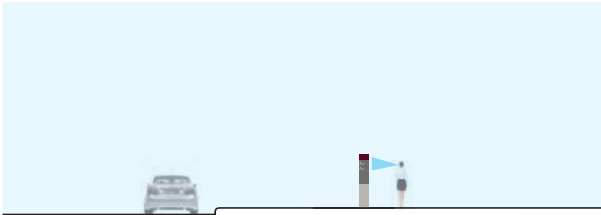


FIGURE 7.37 Pedestrian signage should be located close to the path of travel and be visible from some relative distance. A variety of information from quick directionals to detailed maps should be provided.

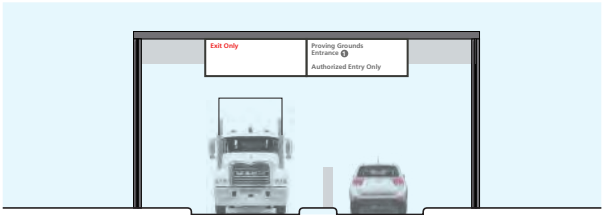


FIGURE 7.39 Secure entry gates requires clear, flexible, and highly visible signage.

7.4 PARTNER SIGNAGE GUIDELINES

OVERVIEW

The contents of this section are guidelines for signage design and installation for all A&M System Members, and institutional and corporate partners operating on the RELLIS Campus. Partners must adhere to these guidelines for all permanent or temporary signage.

All business entities are encouraged to express their brand presence in an outward display of quality and contributing nature to reinforce RELLIS as a campus environment.

Good design practices ensure harmony throughout the overall campus presentation. Signage should complement the unified campus experience as well as the architecture of the buildings or facilities. Presentation should work with surroundings to create a sense of place for the individual partner and its neighbors and also within the campus as a whole.

Policies

Nothing in this document shall be construed to preempt any local, state, or federal regulation or ordinance. It is the responsibility of the campus to ensure that proposed signage meets all requirements of the local city sign regulations, as well as all applicable building or other governmental or regulatory requirements. Any deviation from these criteria must be approved in writing by the campus administration (Campus).

RELLIS requires accuracy or conformity with any building code, signage code, or other governmental and regulatory requirements. The **submissions resources** section provides many tools to assist partners in achieving compliance. However, the responsibility for obtaining all permits and approvals from all appropriate governmental and regulatory bodies ultimately lies with each partner.

Please refer to the **resources** section for additional guidance.

PARTNER SIGNAGE GUIDING PRINCIPLES

There are several guiding principles that unify the design and development of all RELLIS Partner signage:

Brand Expression

The design of partner sign structures and messages must align to the design standards established by the RELLIS Campus, as determined by the A&M University system. Any partner signage that deviates from these guidelines must be modified and be in compliance before production can be approved. The guidelines provide broad accommodations for the inclusion of corporate or institutional identity elements necessary for partners to establish and maintain the presence of their brand.

Unified Campus Environment

The signage guidelines establish a unified system that enhances visitors' recognition of the campus, the daily experience of its community, and the prestige of the RELLIS Campus as an institution.

Quality

Partner signage should strive to communicate that RELLIS is a place of quality and excellence. High quality design and materials should be paramount for signage elements.

SIGN TYPES

Multiple sign types in many forms make up a comprehensive system.

Signage helps define Partner developments reinforcing their brand, helping to improve operational aspects and help build the collective of the RELLIS experience. The major signage elements that affect the outward appearance of a development are:

- Project identity
- Monument (RELLIS standard)
- Building identification

Other elements include

- Internal wayfinding
- Regulatory/security
- Placemaking
- Donor recognition*

RELLIS Partner signage allotments are dictated by the property type and size of building. Partners will align their overall development configuration with their building sizes to determine project identification size and number.

Internal elements not critical to the overall visual experience to a development such as internal exterior wayfinding, donor recognition elements, or placemaking, will be reviewed by the Campus for quality of design and appropriateness to the campus.

* Donor recognition features that are part or whole of a building mounted project identification or a ground or building identification sign must conform to the maximum allowable areas allowed.

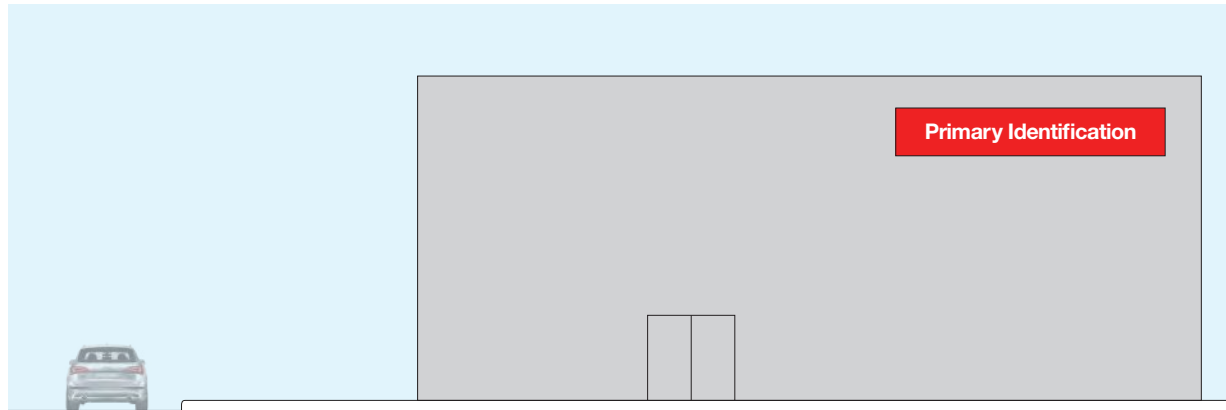


FIGURE 7.40 BUILDING MOUNTED PROJECT IDENTIFICATION.

Project Identification Signage

Project identification signs are signs with the purpose of displaying entity branded logos, word-marks, and organization names and are meant to be seen external to the property.

Project identification signage can be building or ground mounted.

Allotment and sizes determined in the subsequent sections.

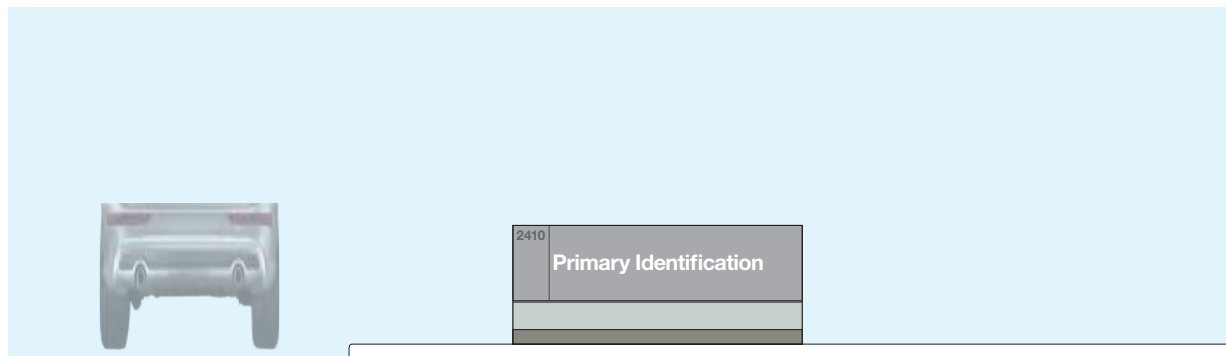


FIGURE 7.41 Ground mounted Project Identification monument (RELLIS Standard).

Building/Entrance Identification

Messaging priorities:

- 1. Donor/Honorific name
- 2. Entity Address
- 3. Entrance Identification
- 4. Regulatory Information
- 5. Wayfinding Information

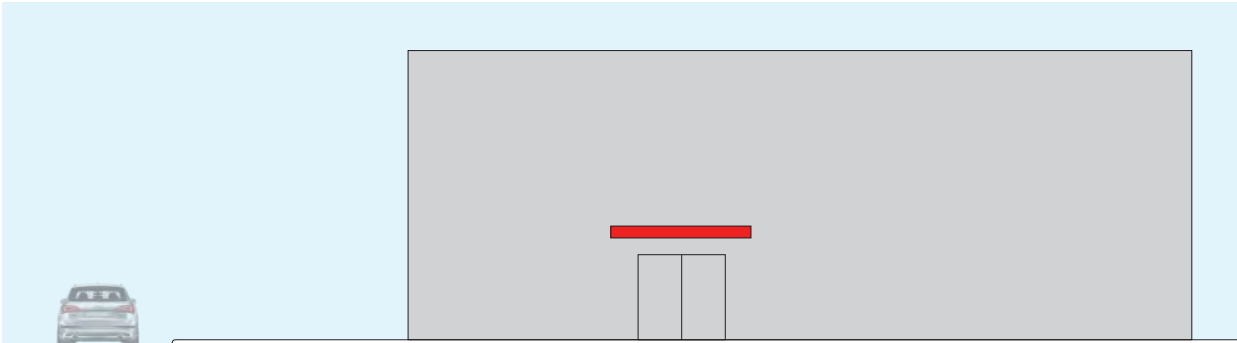


FIGURE 7.42 Donor/Honorific Name

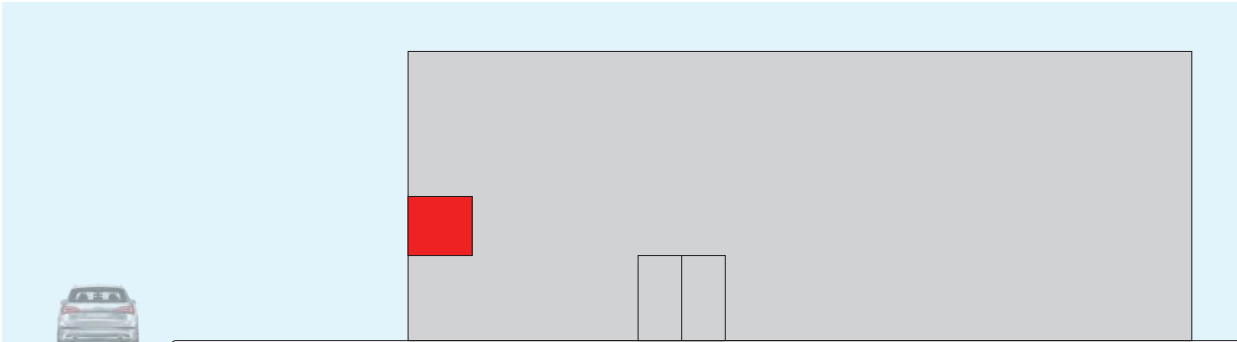


FIGURE 7.43 Building Mounted Identification

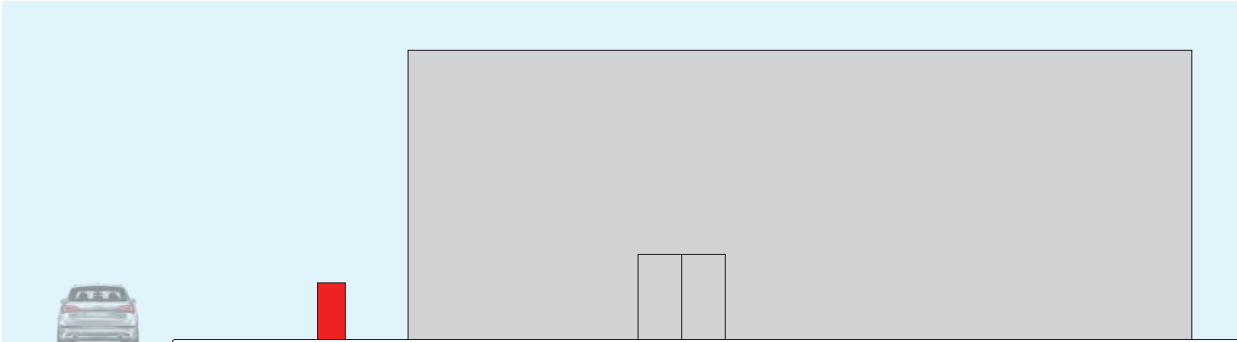


FIGURE 7.44 Free-standing Identification

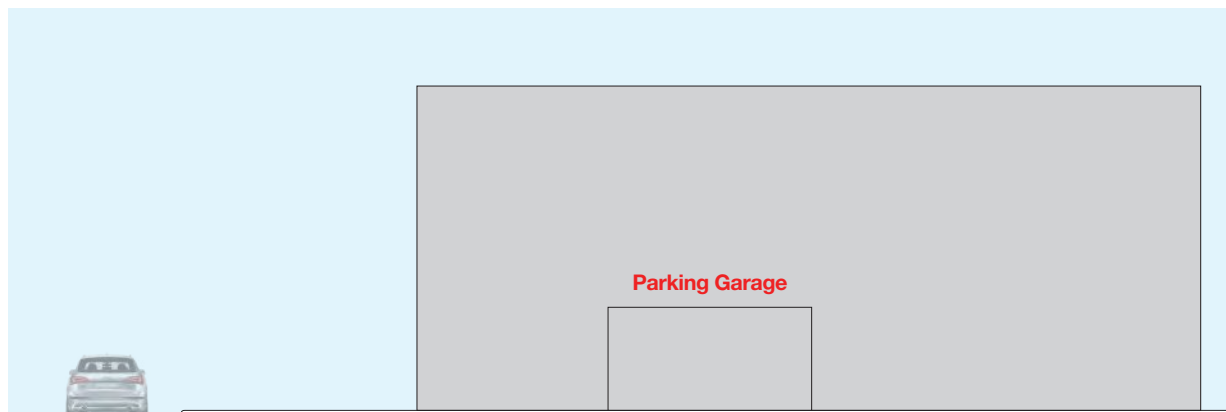


FIGURE 7.45 Parking structures will have clear identification for the entrance/exit and clearly identify private or public use.

Vehicular Entrance/Parking

Messaging priorities:

1. Entity Address
2. Entrance Identification
3. Regulatory Information
4. Wayfinding Information

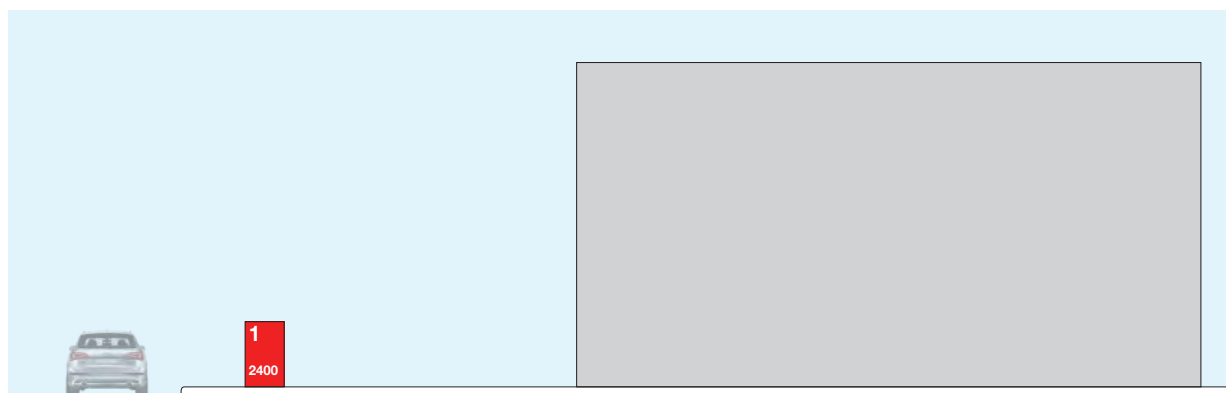


FIGURE 7.46 Partners with multiple parking entrances will have the ability to define separate entrances and their use.

SIGN QUANTITY DIAGRAMS

Each diagram type on the following pages shows the number of signs allotted in each existing condition.

Type 1

Location with one building and on-site parking that represents total site build-out:

Allowed two exterior project identification signs (building or ground mounted) with clear hierarchy between the two.

Permissible scope:

- (A) 1 building mounted identification sign
- (B) 1 ground mounted monument sign (RELLIS Standard)
- (D) 1 building entrance identification sign per main entrance; can be building or ground mounted

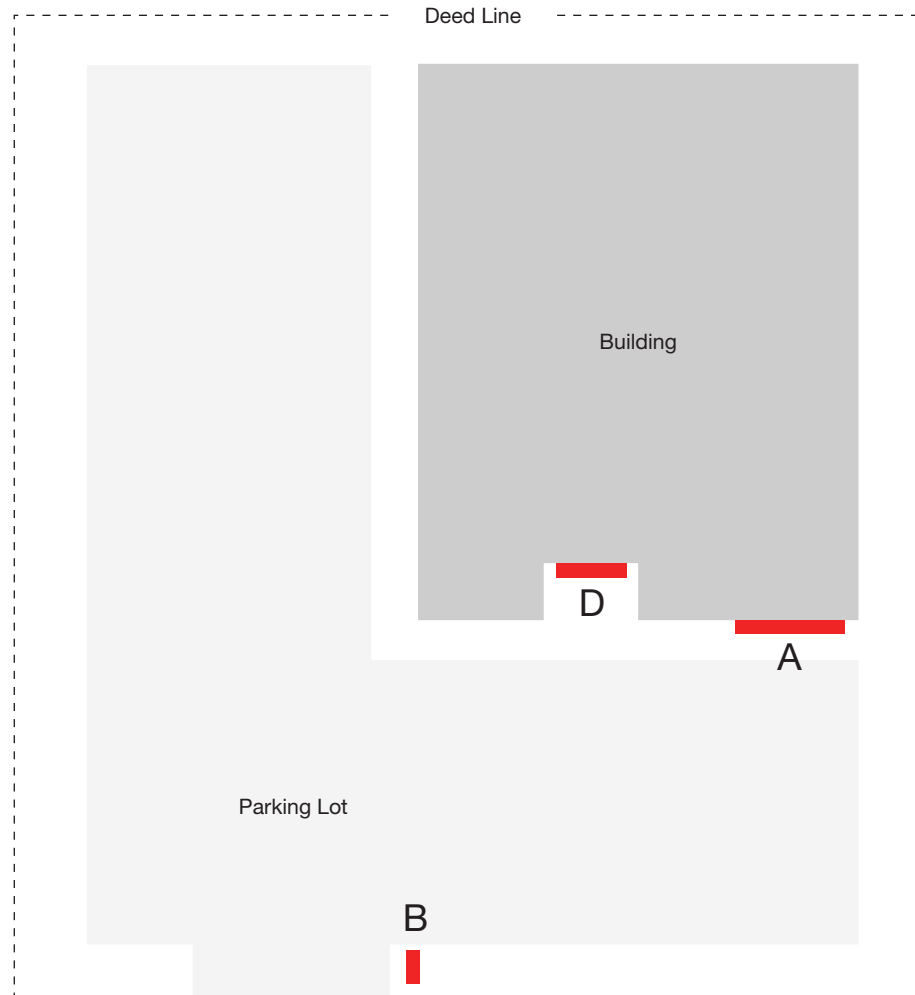
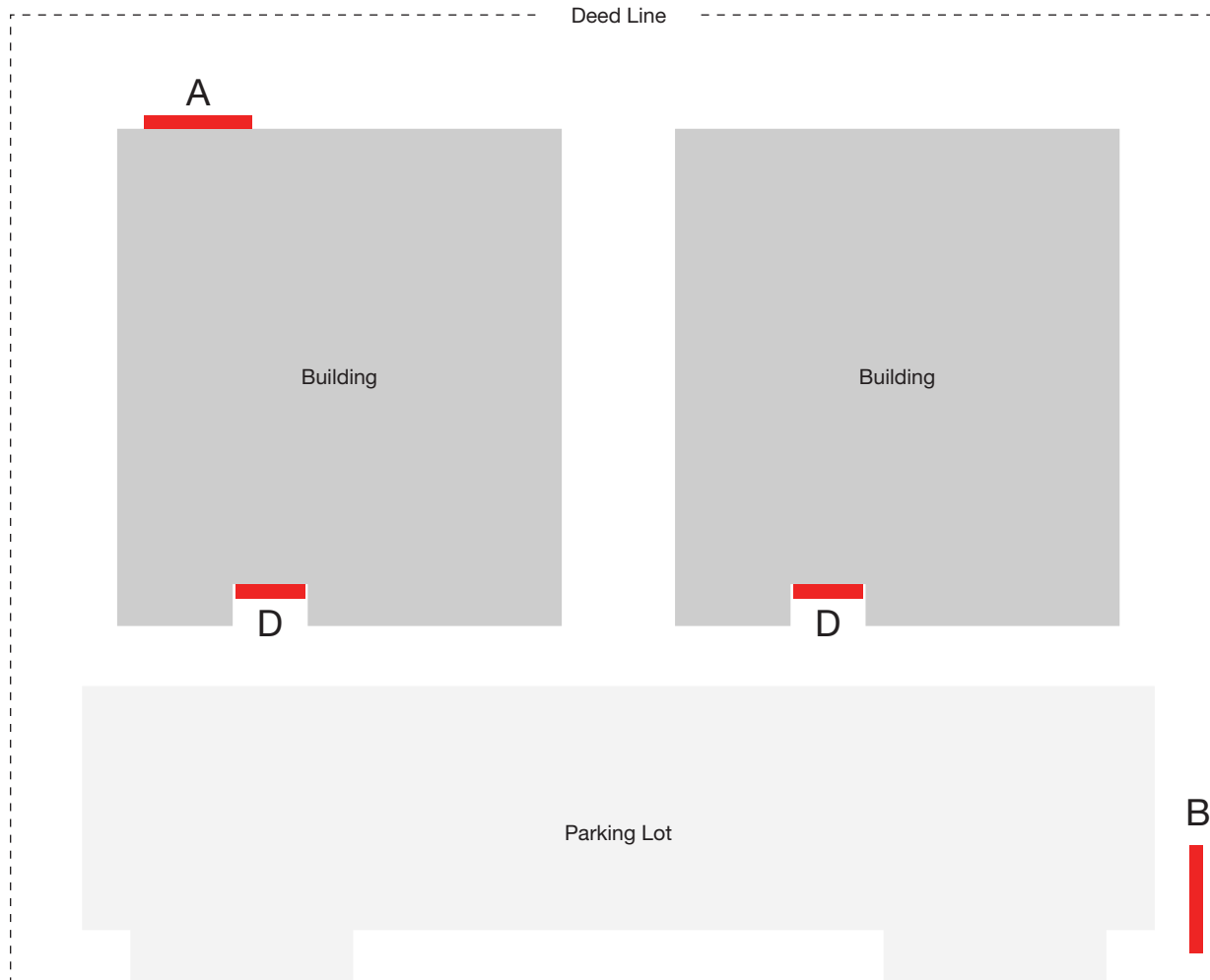


FIGURE 7.47 A partner may place their signage at their discretion per the other requirements within this document.



Type 2

Location with multiple buildings and on-site parking that represents total site build-out:

Allowed two exterior project identification signs (building or ground mounted) with clear hierarchy between the two.

Permissible scope:

- (A) 1 building mounted identification sign
- (B) 1 ground mounted monument sign (RELLIS Standard)
- (D) 1 building entrance identification sign per main entrance; can be building or ground mounted

FIGURE 7.48 A partner may place their signage at their discretion per the other requirements within this document.

Type 3

Location with multiple buildings and multiple on-site parking that represents total site build-out:

Allowed two exterior project identification signs (building or ground mounted) with clear hierarchy between the two.

Permissible scope:

- (A) 1 building mounted identification sign
- (B) 1 ground mounted monument sign
- (C) Parking lot identification
- (D) 1 building entrance identification sign per main entrance; can be building or ground mounted

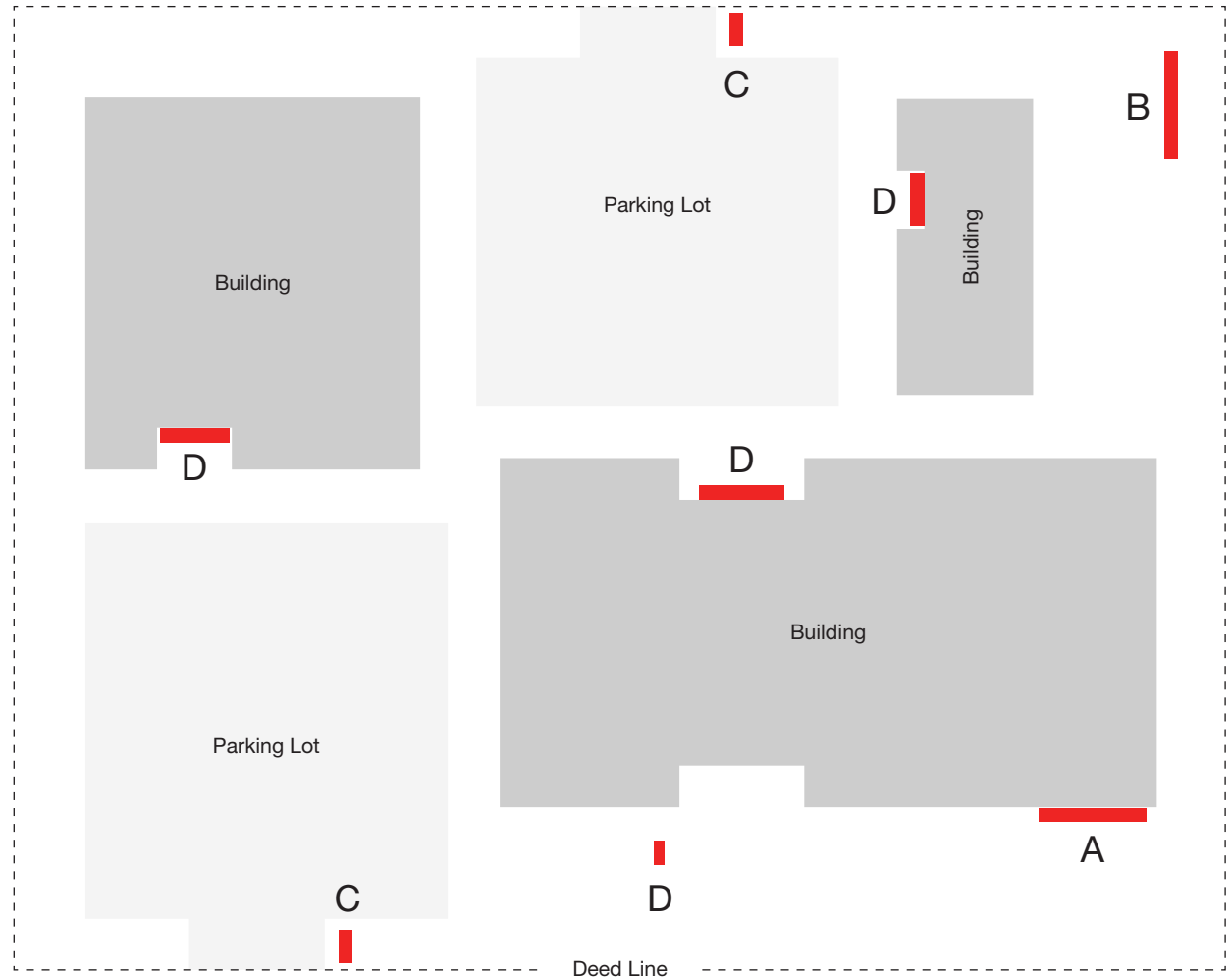
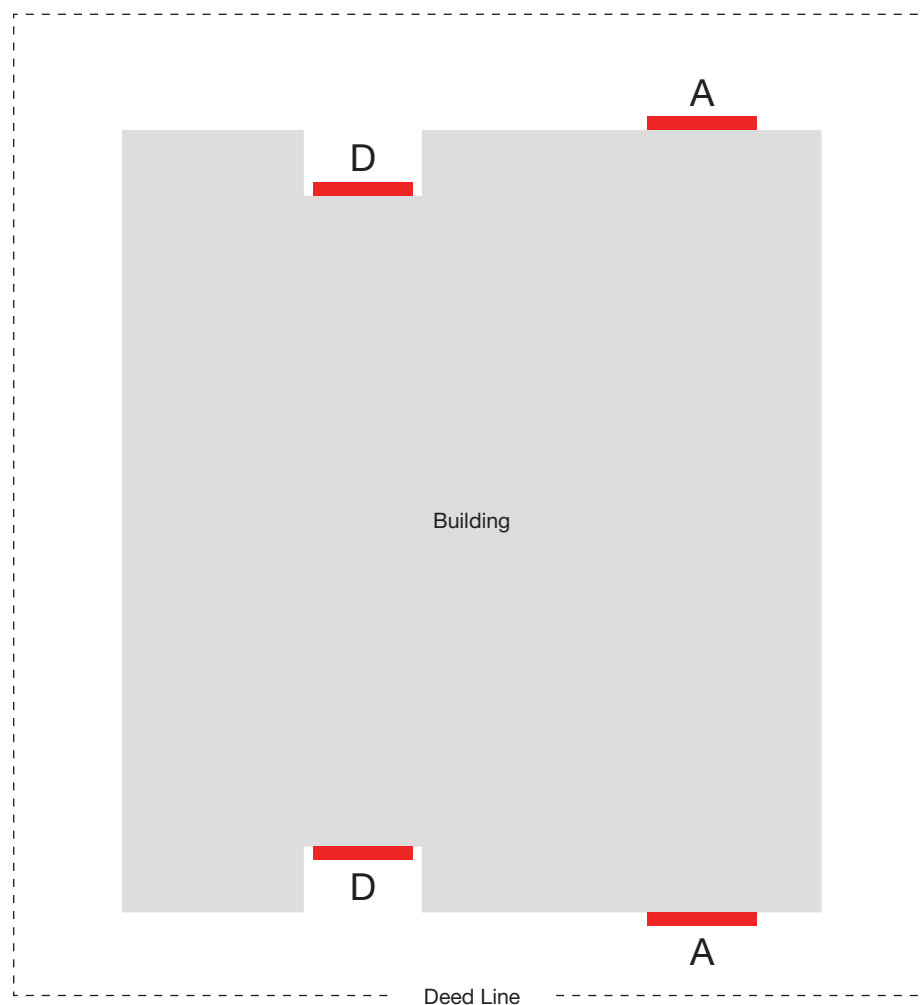


FIGURE 7.49 A partner may place their signage at their discretion per the other requirements within this document.

**Type 4**

Location with one building without on-site parking that represents total site build-out:

Allowed two exterior project identification signs (building or ground mounted) with clear hierarchy between the two.

Permissible scope:

(A/B) 2 project identification signs; can be building or ground mounted

(D) 1 building entrance identification sign per main entrance; can be building or ground mounted

FIGURE 7.50 A partner may place their signage at their discretion per the other requirements within this document.

Type 5

Location with multiple buildings without on-site parking that represents total site build-out:

Allowed two exterior project identification signs (building or ground mounted) with clear hierarchy between the two.

Permissible scope:

- (A) 1 building mounted identification sign
- (B) 1 ground mounted monument sign
- (D) 1 building entrance identification sign per main entrance; can be building or ground mounted

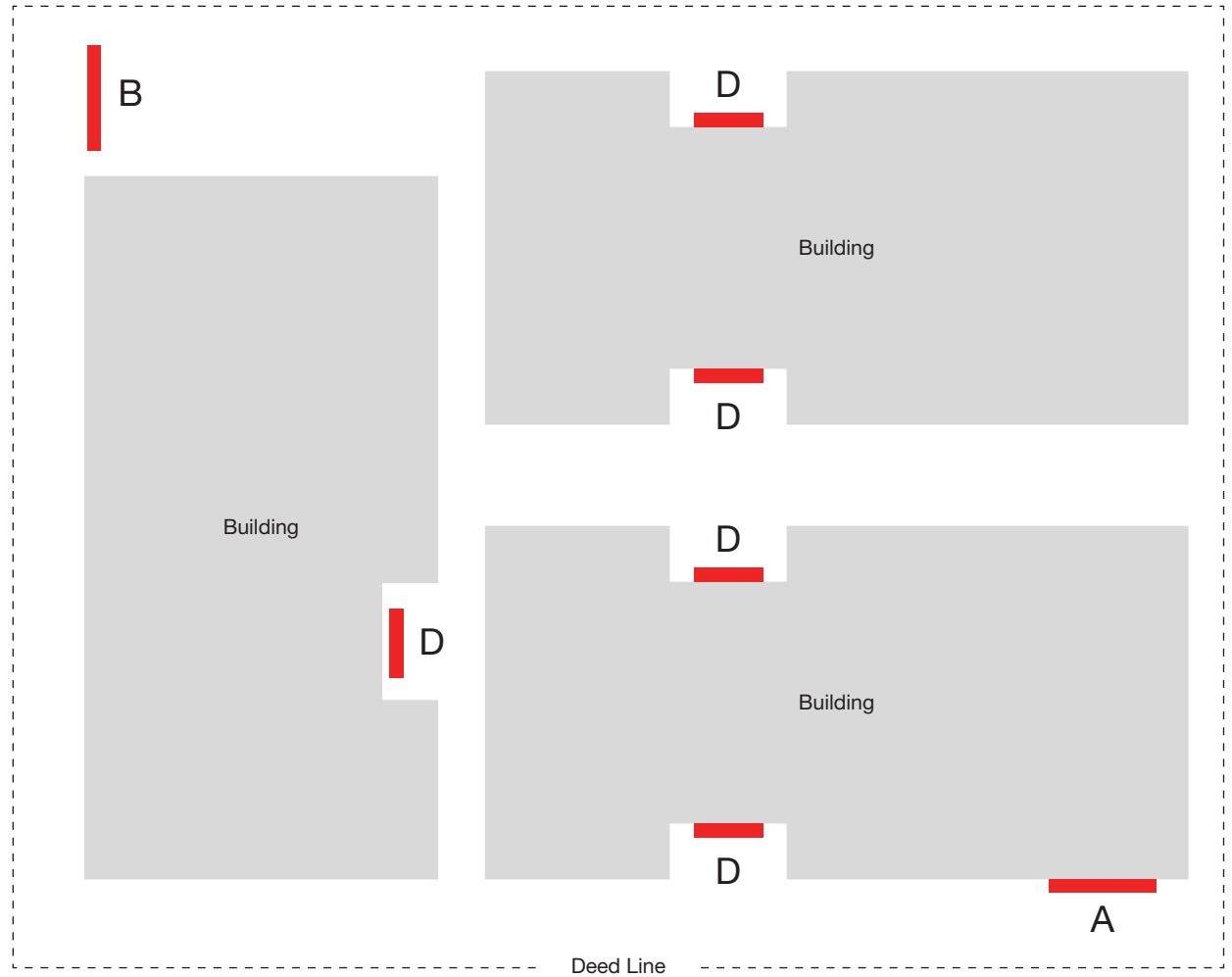


FIGURE 7.51 A partner may place their signage at their discretion per the other requirements within this document.

SIGN ALLOTMENTS

Use these calculations to determine the size of the major signage components for your development type.

(A) Project Identification - Primary Building Mounted

Total number of 2.5 square feet per linear foot of the primary public facing facade of building with a maximum of 250 square feet; see conditions below for total overall square footage:

less than 20,000 sq ft overall = 50 sq ft maximum
less than 100,000 sq ft = 75 sq ft maximum
less than 300,000 sq ft = 100 sq ft maximum

(B) Building Identification - Ground Mounted

Total number of 9 square feet for each public entrance or public facing facade with a maximum of 2, which includes donor recognition components.

(D) Building Identification - Building Mounted

Total number of 20 square feet for each public entrance or public facing facades with a maximum of 2, which includes donor recognition components.

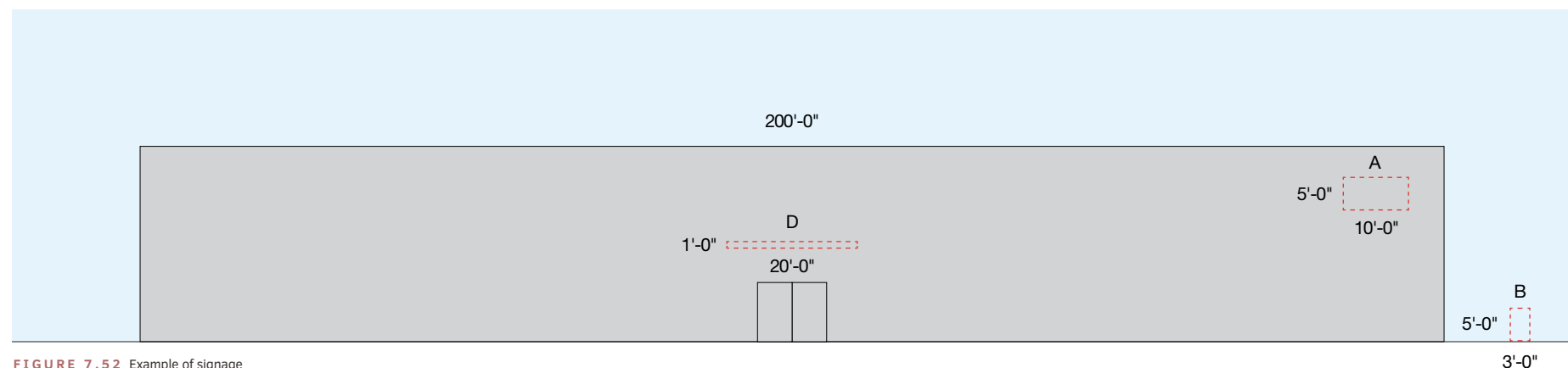


FIGURE 7.52 Example of signage allotments for a 20,000 SF building.

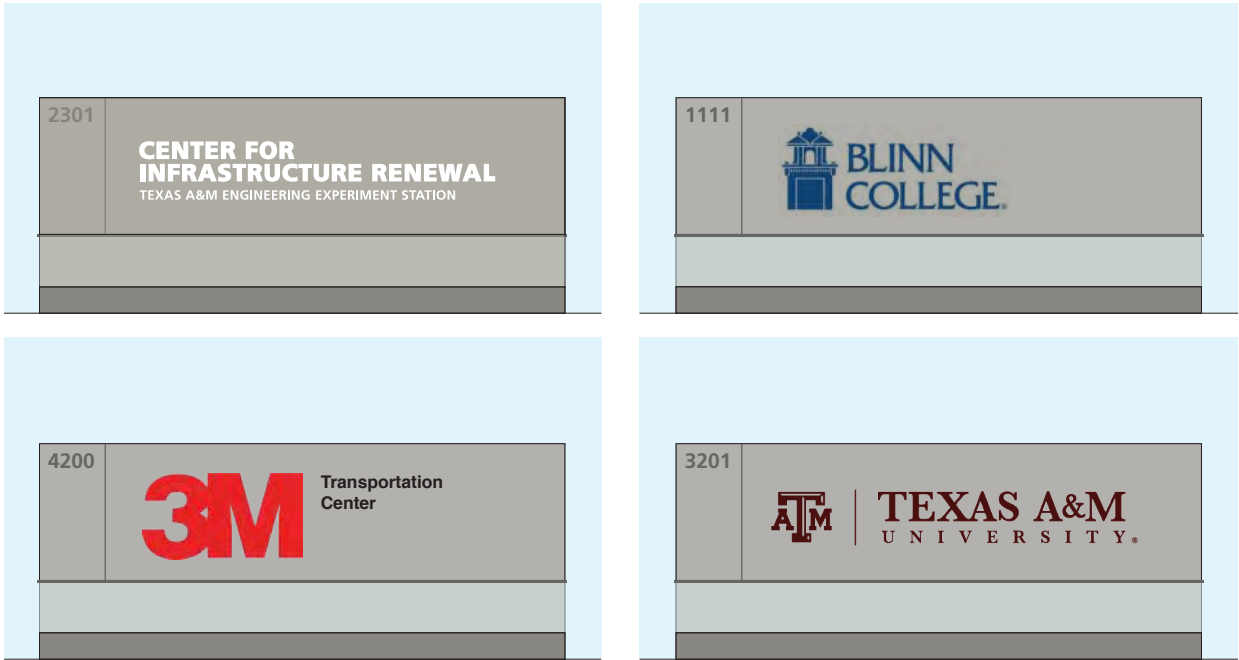


FIGURE 7.53 example of partner monument signage

PARTNER MONUMENT SIGNAGE

Partner monument signs have a standard sign body while allowing partner logos in a confined area.

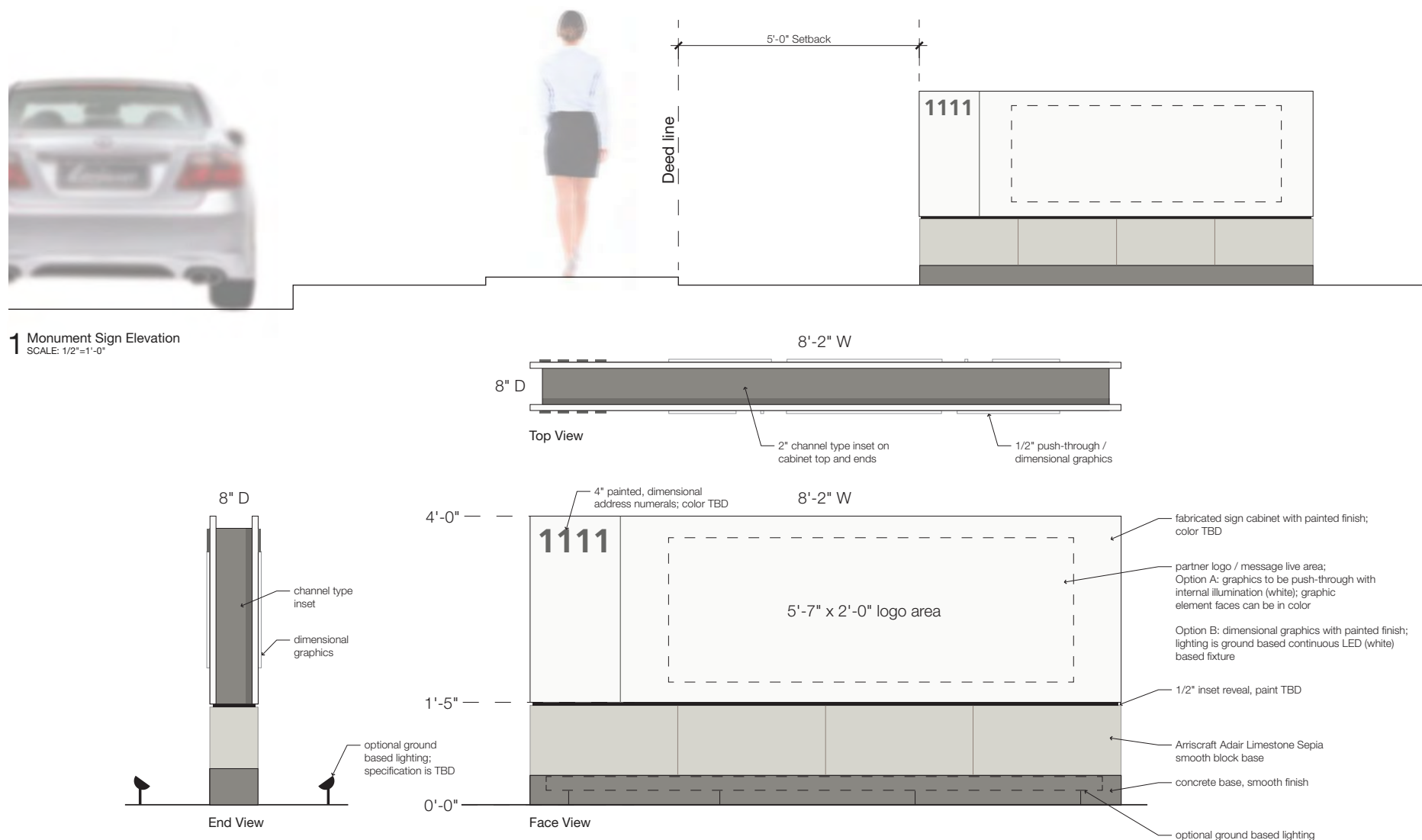
RELLIS development partners wanting to have monument signs for their development allotment are required to use the RELLIS Standard monument sign.



FIGURE 7.54 example of partner monument signage lighting options. internally illuminated, halo lit letters on left; external up-lighting on right.

RELLIS STANDARD MONUMENT SIGN DETAILS

FIGURE 7.55 All entities wanting ground mounted monument sign allowed by their development type must use the RELLIS standard monument sign.



PARTNER BUILDING MOUNTED SIGNAGE

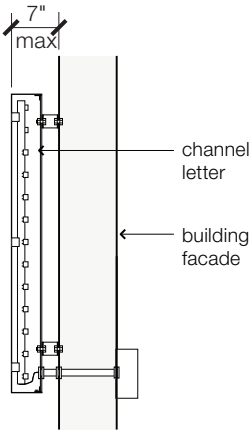
Partner allowable building mounted signage are shown as diagrams.

Internal Illumination

- Reverse Channel-letter with halo illumination
- Perforated face channel letter with LED illumination
- Push through letters with internal illumination
- Channel letters with internal illumination



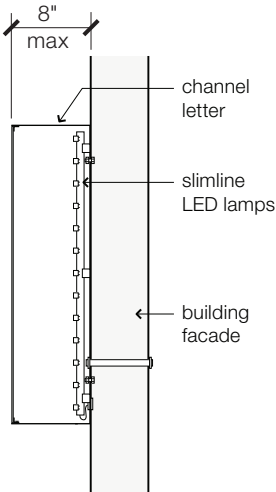
FIGURE 7.56 Reverse channel-letter with halo illumination, letters mounted to building facade.



Section Detail



FIGURE 7.57 Open-face channel letter with LED infilled and perforated metal face. No plastic or rubber trim rings allowed.



Section Detail

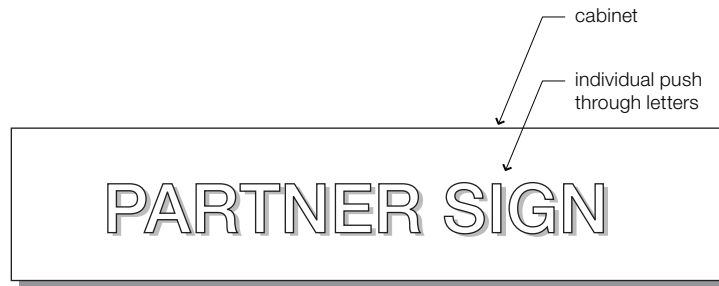
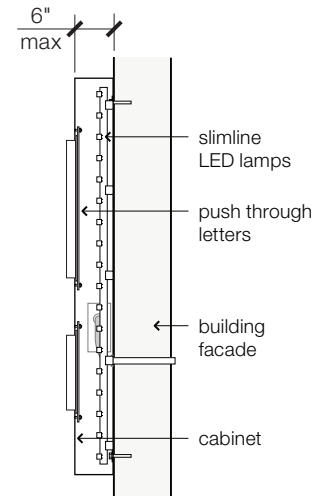


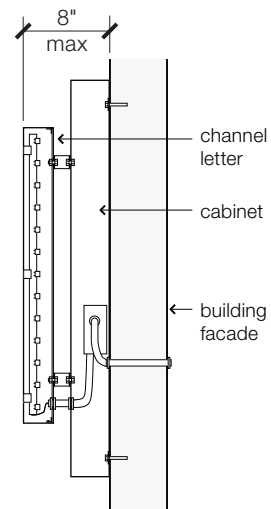
FIGURE 7.58 Push-through letters with internal illumination.



FIGURE 7.59 Channel letters with internal illumination.



Section Detail



Section Detail

PARTNER BUILDING MOUNTED SIGNAGE (CONT.)

External Illumination

- Dimensional letter-forms with external illumination

PARTNER CANOPY MOUNTED SIGNAGE

Partner allowable building mounted signage are shown as diagrams.

Internal Illumination

- Channel letters with internal illumination

External Illumination

- Front-face externally illuminated
- Back-face externally illuminated

Canopy Signage Design Considerations

- Some tenant signs will have descenders that need to protrude in front of the canopy fascia, consider all cap font options with no descenders.

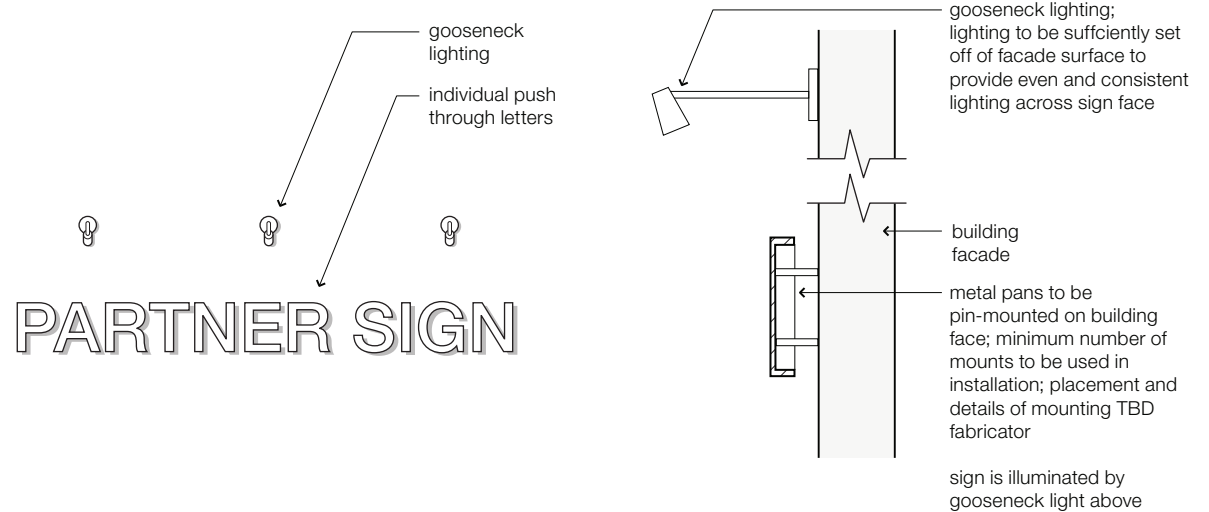


FIGURE 7.60 Dimensional letter-forms with external illumination (light source may be mounted above or below dimensional letters).

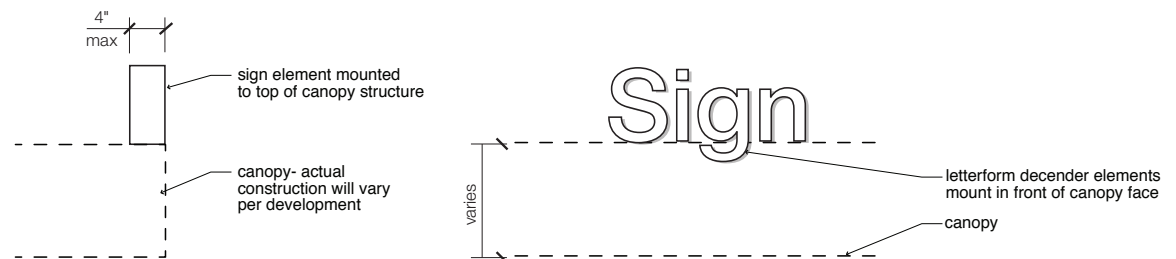


FIGURE 7.61 Diagram of an internally illuminated canopy mounted sign.

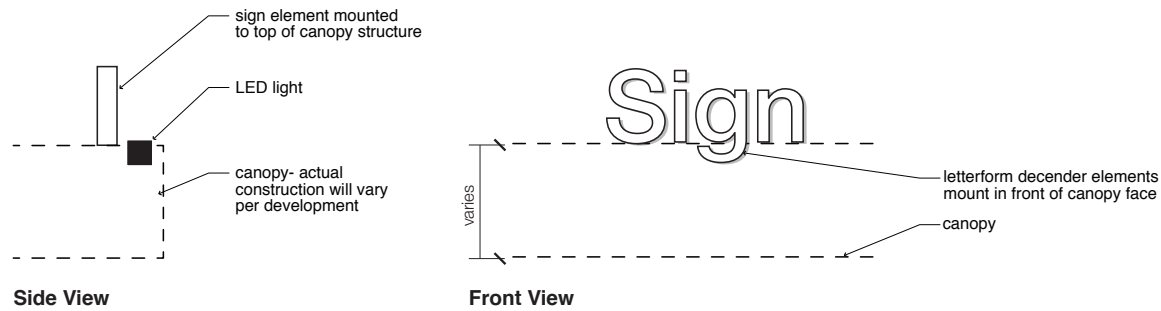


FIGURE 7.62 Diagram of a front-face externally illuminated canopy mounted sign.

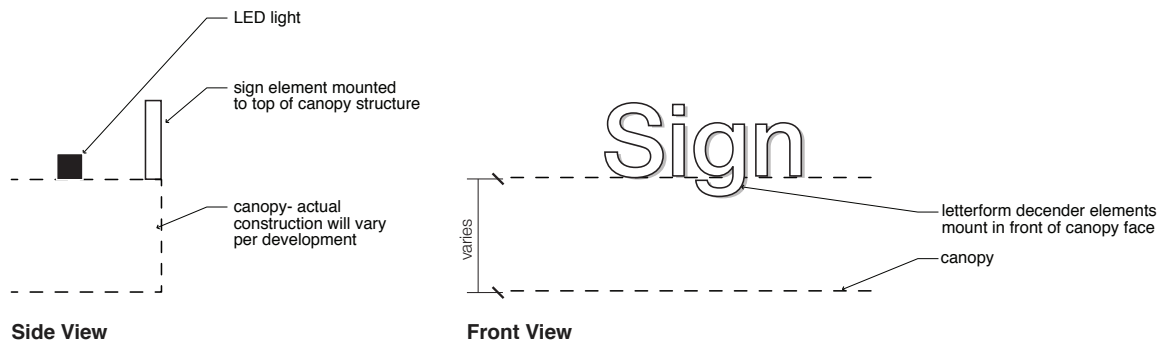


FIGURE 7.63 Diagram of a back-face externally illuminated canopy mounted sign.

SIGNAGE GUIDELINES

Primary Partner signage may be made in any number of methods, materials, and can incorporate many different lighting methods. This signage serves as the main identification for the Partner's space. Partners are allowed one sign per facade, no more than two signs maximum unless by written permission from the Campus.

Tips and Recommendations

- Using simple shapes and color palettes help with visibility and contrast
- Dimensional pin-mounted letters add depth and interest.
- Keep lettering simple and minimal.
- Use colors and materials that contrast with the facade.
- Illumination allows the sign to be effective at night.
- Use fonts that are easy to read.
- Use materials and methods appropriate to the architectural and natural environment that can be implemented over time while maintaining their integrity.
- All lighting shall be Dark Sky compliant.

Primary Signage

Depending on site configurations, Partners shall be allowed up to two primary identification signs, one facade mounted and one freestanding. In certain site configurations, a Partner may have two facade mounted primary signs and no freestanding, providing the arrangement of the same meets the approval of the Campus and is within the restrictions of the local sign code.

If a Partner elects to have a facade sign in addition to another sign type, one shall be deemed the primary identification through a hierarchy of dimensions or sizing. Use of second primary identification requires prior Campus approval.

Facade sign content shall be limited to the Partner's name. Description of services or products offered is not allowed on a facade sign. Additional brand language requires prior Campus approval. Multi-line signs require prior Campus approval and should be no more than 30" overall height or the maximum allowed by the specific property. Overall signage length is to be determined case-by-case at the discretion of the Campus based on frontage and facade proportions.

Signs may have internal or external illumination. External illumination shall be well integrated into storefront design. A projecting facade sign, or blade sign, is an option for Partners with corner locations and is only permitted with prior Campus approval.

Any external light fixtures shall be the Campus's standard, Cooper Lighting Cambria 922 or PAR20 bullet sign lighter.

- Recommend 1-LED2741 light source (this is wide angle)
- With OSL lens option
- Lights mounted w/ on-center spacing, approx. 24" (28" max.)

Partners may specify a fixture of equal or better quality, subject to the Campus's review and approval. External light fixtures is to be white in color.

Facade signs area to have a minimum clearance of 10" from upper and lower edges of sign band, and 12" clearance from a demising wall center line. Facade signs and other sign elements may not be installed outside of Partner's frontage without prior Campus approval.

Refer to local codes and ordinances for maximum sign size for business type.

Primary Freestanding Signage

A freestanding sign is most appropriate for when an out parcel is set back from the street or sidewalk. The RELLIS standard monument sign has two faces and the Partner's brand elements shall be appropriately scaled to compliment the sign and the Partner location.

A freestanding, out-parcel, business shall be allowed one freestanding sign provided the approval of the Campus and is within the restrictions of the local sign code.

Place freestanding signs near the public right-of-way where appropriately scaled for pedestrians or slow speed surface streets, a minimum of five feet from the street right-of-way and ten feet from all interior side lot lines. No freestanding sign should be placed in a manner that obstructs the pedestrian walkway or visibility from street intersections or parking lot entrances or exits.

If a Partner elects to have a freestanding sign in addition to another sign type, one shall be deemed the primary identification through a hierarchy of dimensions or sizing. Use of a second primary identification sign requires prior Campus approval and shall be within the restrictions of the local sign code.

Freestanding sign content shall be limited to the business name and address. Description of services, tag lines, or products offered is not allowed on a freestanding sign. Additional brand language requires prior Campus approval.

Freestanding signs may carry more than one business name but must be considered as part of the overall building signage plan. If more than one business is displayed, they should be considered primary occupants of a building.

Refer to RELLIS monument signage diagrams for illumination and other signage information.

Any external light fixtures may be Campus's standard, Cooper Lighting Cambria 922 or PAR20 bullet sign lighter.

- a. Recommend 1-LED2741 light source (this is wide angle)
- b. With OSL lens option
- c. Lights mounted w/ on-center spacing, approx. 24" (28" max.)

Partners may specify a fixture of equal or better quality, subject to Campus review and approval. External light fixtures are to be white in color.

Freestanding signs must have a maintained ground plain of plantings, mulch, gravel, or other improved dressing as a component of an overall landscape plan. Bollards or other traffic impediments are not permitted. Signs must not interfere with street trees or the future growth of street trees.

7.5 SIGNAGE REQUIREMENTS

GENERAL SIGNAGE REQUIREMENTS

1. The sign and any part, or parts thereof, except as otherwise provided in these criteria, shall be located within the limits of the business's storefront premises.
2. All signs must be new and custom-made. Restored vintage or re-purposed signs may be acceptable with written approval by the Campus.
3. The term "primary identification signage" or "facade signage" used in this section refers to the partner's most prominent display of identity. Primary identification signage may be placed anywhere within the storefront envelope and may be any sign type listed in this document. The term "secondary identification signage" denotes any sign that supports the aesthetic or branding message of the primary identification sign or business identity. Primary signage shall be larger than any single secondary signage element. The use of primary/secondary signage is intended for the Partner to have an opportunity to convey a hierarchy of messaging. Placement locations will require the Campus review and approval.
4. The signage contractor shall perform all cutting and patching of existing surfaces where required for installation of the signage work included herein. The procedures for the accomplishment of cutting and patching work shall be submitted by the sign contractor to the Campus for approval. The submission is to also include a work schedule showing start of work, finish date, and any other important dates within the project time line. The procedures shall include a detailed description of the methods and equipment to be used for each operation. The sequence of operations of all materials for patching and repairing of existing surfaces shall match existing adjacent surfaces in all respects.
5. Service/rear egress/delivery doors to business areas will have standard identification (business's name and address number) designed and installed by the Campus at the business's expense. No other signing or graphic is permitted at the service entrance.
6. Illumination shall be internal to the sign or by external front lighting. Light sources shall not cause glare hazardous to pedestrians or vehicle drivers. Lighting for internally illuminated signs is to be white. With the exception of neon signs, colored lamps shall be permitted only with Campus approval.
7. Face illumination should only consist of day/night type face material so that the face reads as a solid element during the day and illuminates at night. Illumination is to be consistent with no shows or hot spots. Standard type acrylic faced letters/ signs with colored faces are prohibited or by the Campus approval only.
8. Non-illuminated storefront facade signage requires written Campus approval.
9. If applicable, the Partner shall provide a dedicated circuit for the Partner's signage illumination and shall coordinate and utilize a Campus-provided master switching relay system for all illuminated signage.
10. Red, green, or yellow as a primary or majority color of business signage is prohibited without prior Campus approval. This includes material finish as well as illumination.
11. The Campus is not responsible for costs incurred for replacement or construction of signs that do not conform to these sign criteria or for signage that did not receive prior Campus approval.
12. Prohibited sign elements and materials include, but are not limited to the following:
 - a. Flashing lights
 - b. Animated components
 - c. Vinyl trim caps on letter-form/sign face or return. See note J for face material limitations. Use of minimal size aluminum retainers or other low profile retainers for letter-form/sign face are encouraged.
 - d. Cabinet signs with illuminated, translucent background and silhouette letters
 - e. Vacuum-formed plastic letters
 - f. Paper, cardboard, stickers, or decals applied to or located behind the storefront glazing
 - g. Sandblasted wood signs in natural wood finish with painted, raised letters and/or logos
 - h. Advertising placards, banners, pennants, names, insignia, trademarks, or other descriptive or promotional material not designed as part of the business's overall presentation and brand identity may not be affixed or maintained on windows, glass fixtures, equipment, or another area of the storefront without owner approval.

- i. Exposed raceways, exposed ballast boxes, or electrical transformers; if raceway is used, it must be integrated into the design of the sign. Note applies to wall/facade and canopy signs.
 - j. Acrylic faced letter-forms and sign cabinet; the only allowed acyclic faced elements are the day/night type where the face appears a solid color during the day and illuminates white at night. See note C for trim cap limitations unless approved in writing by the Campus.
13. Entity addresses, including building numbers located on the building façade and/or on freestanding signage, shall be the authorized Brazos 9-1-1 address.

Note: The Campus may modify this list at any time to include any material specific to a business's signage design and/or fabrication that in the Campus's opinion is not in keeping with the architectural character or overall quality of the development.

Campus Administration has authority over all campus signage.

SIGNAGE SUBMISSION RESOURCES

Formal Design Submission

Member and Partner applicants will submit the formal design submission to the PDRB. Concepts approved (Concept Design Submission) may then be developed into implementation documents through any required design professionals.

The required design professionals include any professional design services such as architects and engineers for building envelope development. Members and Partners may also consider (though not required) environmental graphic designers to provide designs and fabrication documents for signage. Signage fabricators typically provide the necessary engineering requirements for signage installation.

Formal Design Submission Requirements

Digital files in PDF format of the following materials are required:

- a. Detailed construction documents showing detailed information on materials, colors, dimensions, design details, connection details, lighting features for architectural features, and signage/graphic elements (see Signage Overview for Signage requirements);
- b. Exterior color elevations or renderings depicting the overall architectural and signage characteristics;

Note

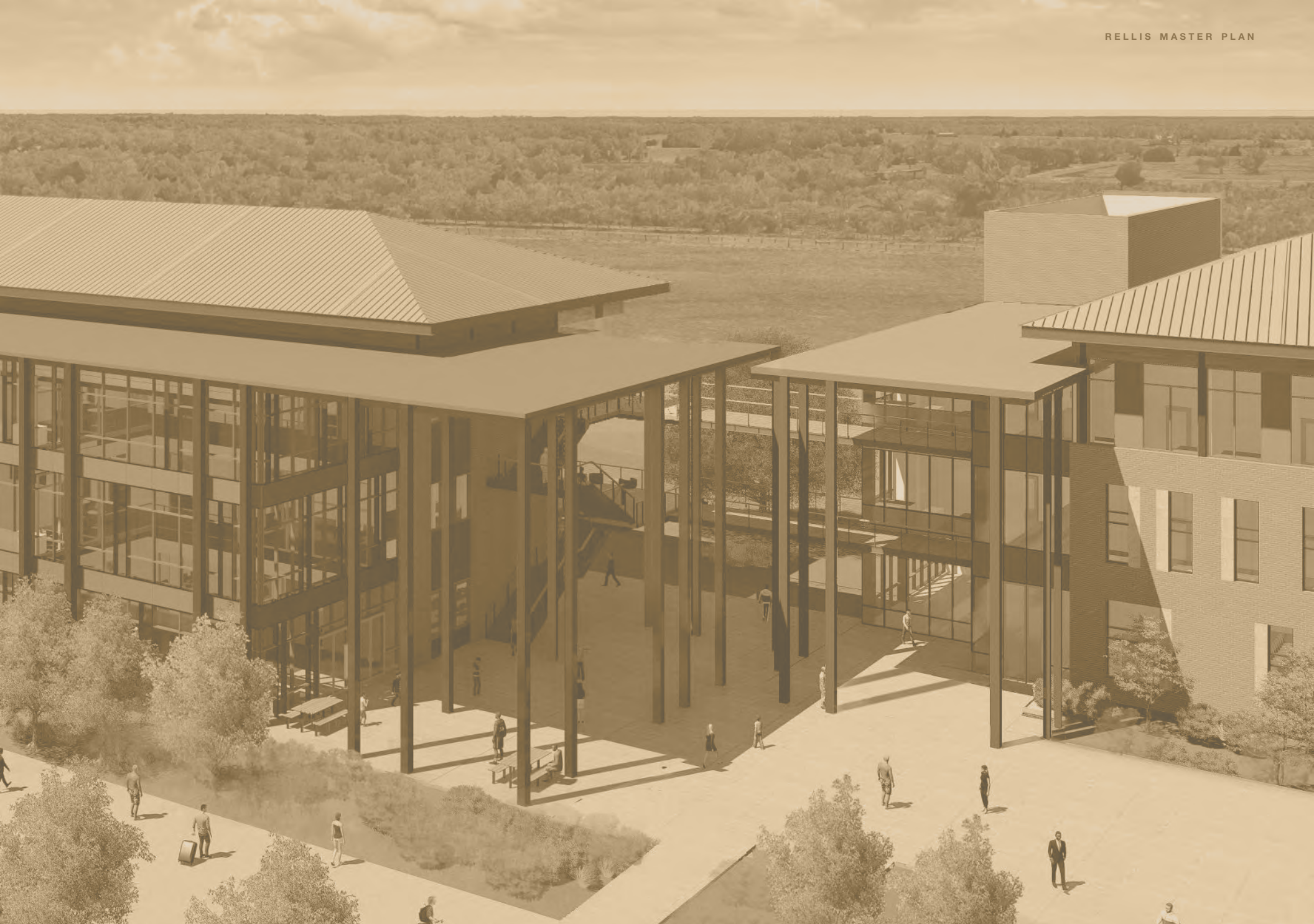
Members and Partners shall provide working drawings to the PDRB.

No construction shall commence until written approval from the PDRB has been obtained.

Appendices

- A Acknowledgments
- B Resources and Additional Studies
- C Campus Comparisons
- D Potential Future Facilities
- E Capacity Analysis
- F Parking and Trip Generation
- G Storm Pipe Observations
- H Projected Utility Loads
- I Smart Campus Checklists
- J Fiscal Year Planning Projections
- K Technical Utility Drawings (Large Format)





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The Texas A&M University System is one of the largest systems of higher education in the nation, with a budget of \$4.55 billion. Through a statewide network of 11 universities and seven state agencies, The Texas A&M System educates more than 148,000 students and makes more than 22 million additional educational contacts through service and outreach programs each year. System-wide, research and development expenditures exceeded \$972 million in FY 2016 and helped drive the state's economy.

UNIVERSITIES

Texas A&M University

Texas A&M Health Science Center

Prairie View A&M University

Tarleton State University

Texas A&M International University

Texas A&M University-Corpus Christi

Texas A&M University-Kingsville

West Texas A&M University

Texas A&M University-Commerce

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Texas A&M Engineering Experiment Station

Texas A&M AgriLife Extension Service

Texas A&M Forest Service

Texas A&M Engineering Extension Service

Texas A&M Transportation Institute

Texas A&M Veterinary Medical Diagnostic Laboratory

Texas Division of Emergency Management

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Gessner Engineering, *Civil Engineering*

Protection Engineering Consultants, *Site Security*

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B RESOURCES AND ADDITIONAL STUDIES

The RELLIS Campus Master Plan presents the future organization and guiding concepts for the development of the site. Individual projects will need to refer to the master plan to ensure they fit within the campus vision. However, not all necessary documents and information for construction projects are contained within this document. Additional resources are available that provide background and specific detail for work on the campus.

THE RELLIS CAMPUS FACILITY DESIGN GUIDELINES are the most significant resource document to be referenced on all capital projects on the RELLIS Campus. These guidelines are intended as guidance for the project architect/engineer and the contractor team during the design and construction process. The content covers specific design criteria, the design process, and administrative procedures for permanent buildings on the RELLIS Campus. The most current version of the guidelines can be found on the A&M System website: www.tamug.edu.

RELLIS RESOURCE DOCUMENTS that were developed prior to the master plan process are available to provide additional detail and background that on items such as infrastructure or existing structures. They are useful resources to understand specific planning decisions. These documents include the following:

- RELLIS Campus Infrastructure Evaluation, *developed by Burns & McDonnell (September 6, 2016)*
- Sanitary Sewer Infiltration and Inflow Investigation, *developed by Stanley Consultants (January 2017)*
- Texas A&M RELLIS Campus Historical Building Assessment, *developed by AmaTerra Environmental (September 2016)*
- The Texas A&M University System Developer Project Guidelines, which can be found on the A&M System website: www.tamug.edu.
- Cushing Memorial Library & Archives

ADDITIONAL STUDIES are likely to be required in the future as the campus builds out and new infrastructure is required. Among these possible studies are the following focuses:

- Wayfinding and signage master plan that provides the campus with buildable documentation of all sign types for ease of implementation and consistency
- Campus security plan

C CAMPUS COMPARISONS

During the analysis phase of the master plan, various research parks and innovation campuses were studied to better understand how the RELLIS Campus can or should be positioned on the national stage. The matrix on the following page provides a high-level summary of these campuses and their relationship of campus size to programmatic function, whether mixed- or single-use.

Campuses identified with red in the matrix were studied to understand their physical conditions, primarily surrounding the ratio of built to open space. Some of these campuses are relatively new, where others have existed for decades and are beginning to rethink their physical model.

An additional case study of the Texas A&M University campus in College Station was developed to provide a point of reference from within the A&M System. Through these analyses, the stakeholder group determined that the initial development scenario for the RELLIS Campus would be approximately 10% built area for the campus at large, with certain areas of elevated concentration, such as the Central Core.

Built areas shown in these cases studies are reflective of building footprint only and not FAR. Areas calculated as structured parking are for standalone parking facilities. Parking areas integrated into larger buildings are calculated within the building footprint.

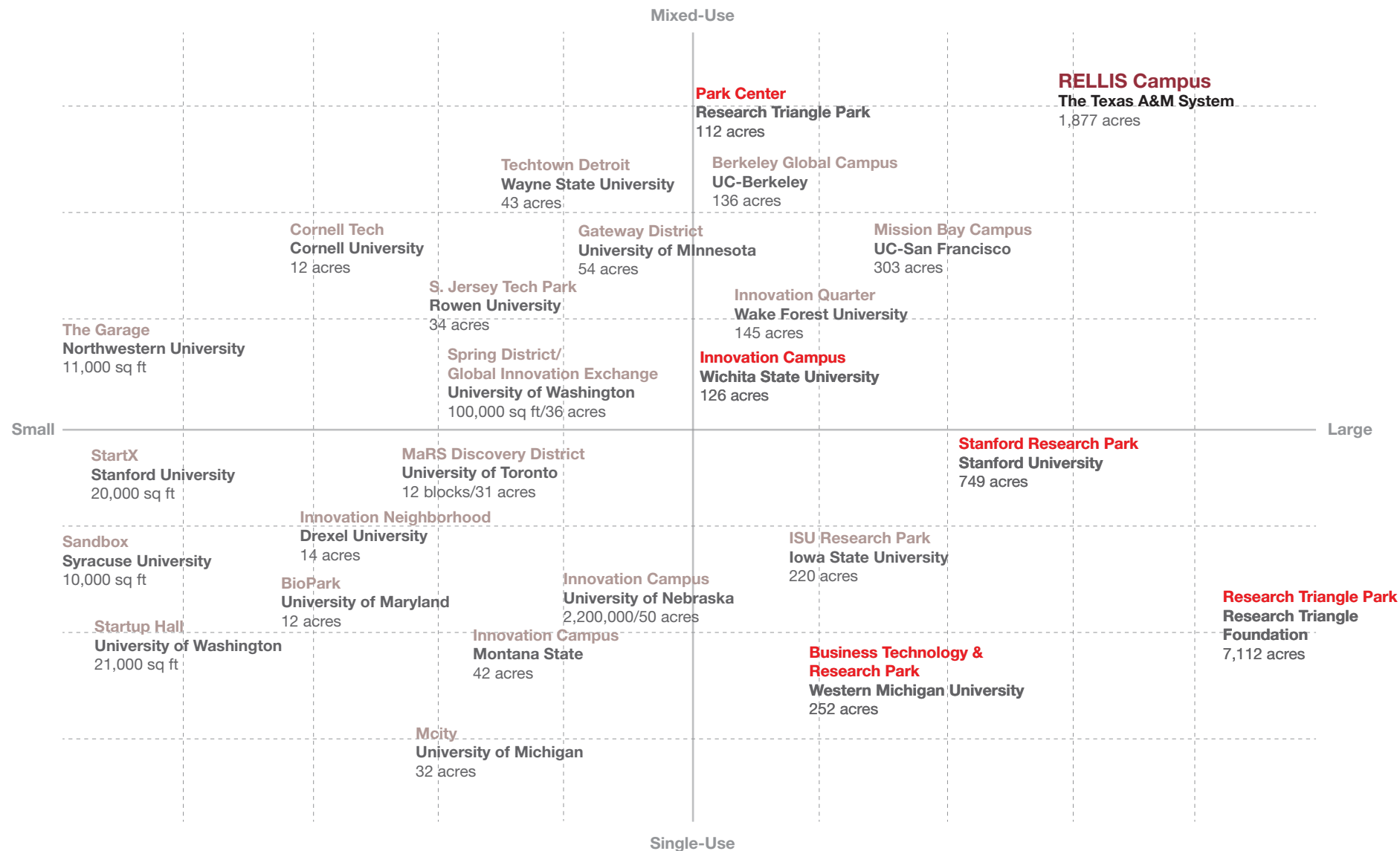


RELLIS Campus (Existing)

Campus Details

Size

1,877 acres



Texas A&M University

Main Campus Details

Size

450 acres (excluding 250 acres for Golf Course and Polo Fields)

Built Area

Building Footprints = 19.6%
Structured Parking = 2.6%

Total Built Area = 22.2%

West Campus and Research Park Details

Size

742 acres

Built Area

Building Footprints = 7.2%
Structured Parking = 0.5%

Total Built Area = 7.7%



Wichita State University
Innovation Campus

Campus Details

Size

126 acres

Built Area

Building Footprints = 14.5%
Structured Parking = 4.4%

Total Built Area = 18.9%



Western Michigan University
Business Technology &
Research Park

Campus Details

Size

252 acres

Built Area

Building Footprints = 4.9%
Structured Parking = 1.7%

Total Built Area = 6.6%



Stanford Research Park

Campus Details

Size

750 acres

Built Area

Building Footprints = 19.5%

Structured Parking = 1.3%

Total Built Area = 20.8%



Park Center
Research Triangle Park

Campus Details

Size

113 acres

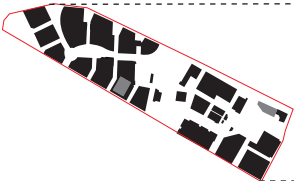
Built Area

Building Footprints = 40.6%

Structured Parking = 1.6%

Total Built Area = 42.2%

**Park Center plan will redevelop a portion of Research Triangle Park.*



Research Triangle Park

Campus Details

Size

6,640 acres (excluding 472 acres of nature preserve)

Built Area

Building Footprints = 3.5%

Structured Parking = 0.3%

Total Built Area = 3.8%



**Only a portion of Research Triangle Park is shown for scale comparison with other campuses.*

D POTENTIAL FUTURE FACILITIES

Over the course of the master planning process, RELLIS Campus stakeholders identified potential future facilities and projects to fulfill the missions of entities active on the campus. Some of these are identified on the current list of capital projects, where others are simply projections of future possibilities based on the existing trajectory of education, research, and training. The following potential future facilities are organized according to the agency, institution, or general campus function and are given an approximate building size or area where one can be estimated.

GENERAL CAMPUS

- Expo/large conference center
 - 30,000-40,000 GSF
 - 300 people for largest capacity meeting
- Wellness facility
- Recreational field
- Residential for students and visiting academics
 - 2,000 beds
- Infrastructure
 - Storm sewer
 - Wastewater treatment plant
 - Stormwater detention
 - Electric substation
 - Field wireless communications

RELLIS ACADEMIC COMPLEX

- RELLIS Academic Complex Phase 2
 - 70,000 GSF
 - 2,000-2,500 students
- RELLIS Academic Complex 3 - 5
 - 210,000 GSF
 - 4,000-5,000 students
- Blinn College
 - (3) additional buildings

AGRICULTURE AND LIFE SCIENCES

- ALEC Agricultural STEM Integration Complex
 - 40,000 GSF
 - 4-5 acres of outdoor space
- BAE SIWI Center and Infrastructure
 - 1 acre
- Natural History Museum/Collections Facility
 - 150,000 GSF
- Animal Science acreage
- Animal Handling Facility Expansion
- Safety City
 - 15 acres

ECONOMIC DEVELOPMENT

- Pad sites for retail
- Retail strip center

- 20+ acres
- Incubator building for potential corporations
 - 12,000 GSF
- Food service
- Data center
 - Phase 1 - 300,000 GSF
 - 1,050,000 GSF total in up to 6 phases

JOINT LIBRARY FACILITY

- Module 3
 - 13,000 GSF (In design, 2020)
- Bookless library
 - 10,000 SF
 - Within another campus building

TEES

- TEES State Headquarters
 - Phase 1 - 38,900 GSF
 - Phase 2 - 25,600 GSF
- Industrial Distribution Buildings
 - IDB #1 - 30,000 GSF
 - IDB #2 - 30,000 GSF
 - IDB #3
 - IDB plaza
- Mary Kay O'Conner Process Safety Center
 - Part of the TEES State Headquarters building

- Technology Innovation and Modernization Catalyst (TIMC)
 - 30,000 GSF
 - 180'x110'
- Cyber/National Security
 - Cyber Security/SCIF - 20,000 GSF
 - Cyber House - 1,500 GSF
- Directed Energy
 - 50 acres
- Research Building
 - Applied Research Lab
 - Industrial Scale Testing
 - Product Development Center
 - 100,000 GSF
- Applied Research Building #2
 - TI Replacement
 - 100,000 GSF
- Flexible Manufacturing Scale-Up
 - 40,000 GSF
- Workforce Development Classrooms
 - 50 person classrooms
 - (1) in each research area
 - Part of other buildings
- Energy Sector/Smart Well
 - Use of existing oil pad
- Large Scale Testing/Coastal Energy
- Solar Field
 - 10 acres

- Subsurface Exploration
 - Use of an existing oil pad
 - Building - 40,000 GSF
- Aerospace Research Facility
 - 40,000 GSF
- Innovative Technologies Development Complex
 - Phase 1 - 79,500 GSF

TEEX

- Advanced Testing & Training Area
 - 145 acres (2,500 lineal feet minimum)
 - Relocated prop houses - 2 acres
 - Expansion of simulation operations
 - Expansion of training capabilities
 - Cyber training
 - Law enforcement training
 - Utilities training (poles & subsurface)
 - Urban grid testing area
 - UAS - 1.5 acres
- TEEX Headquarters
 - 30,000 GSF
- TEEX Print Shop replacement
 - 1.5 times existing facility size
- Indoor Shooting Range
 - 34,000 GSF

TTI

- Erosion Control Support Building
 - 1,200 GSF
- Covered Storage
 - 50,000 GSF
 - Some space to be accommodated in renovated existing facilities
- Temporary AV/CV Vehicle Preparation Area
 - 2 garage bays
- Asset Management Building
 - 20,000 GSF
- Proving Grounds Support Building
 - 45,000 GSF
- Field Testing Portable Trailers
 - (3) trailers
- State Highway 47 ACT Equipment
- Proving Grounds
 - 250 acres
 - Oval track for high-speed continuous testing
- Green Infrastructure Park
 - 15 acres

E CAPACITY ANALYSIS

The Potential Future Facilities list (Appendix D) provided direction on utilization of portions of the campus built area. The adjacent table created additional area assumptions to influence the plan. Beyond these currently envisioned functions, additional “infill” development is possible to meet the target capacity determined through the stakeholder input process. Together, the program summary and the infill development create the built scenario outlined in the master plan’s illustrative plan.

PROGRAM SUMMARY FOR DEVELOPMENT STUDIES									
	BLDG ID	Description	Location	Building Size		Housing	Exterior Space		Estimated Build Projection
				Area (GSF)	Levels	Beds	Infra. (ac)	Green Space (ac)	
GENERAL CAMPUS	G1	Expo/Conference Center	CC	40,000					6-10 year
	G2-2	Residential: Lower Division	CC	337,500	4-5	1,500			6-10 year
	G2-3	Residential: Upper/Visitor	PR/CC	125,000	2-3	500			11-20 year
	G3	Wellness Center	CC	15,000	1				6-10 year
	G4	Emergency Services	PR/CC	20,000	1	4			1-5 year
RELLIS ACADEMIC COMPLEX	AAC1	RELLIS Phase 1a & 1b	CC	68,000	3-4				1-5 year
	AAC2	RELLIS Phase 2	CC	42,000	3-4				1-5 year
	AAC3	RELLIS Phases 3 & 4	CC	140,000	3-4				6-10 year
	AAC4	(3) Blinn College Buildings	CC	210,000	3-4				6-10 year
	AAC5-1	RELLIS Workforce Training Facility - Phase 1	TA	40,000	1				1-5 year
	AAC5-2	RELLIS Workforce Training Facility - Phase 1	TA	40,000	1				6-10 year
	AAC6	RELLIS Phase 5	CC	70,000	3-4				11-20 year
AGRICULTURE AND LIFE SCIENCES	AG1	ALEC STEM Complex	TA	40,000					1-5 year
	AG2	Natural History Museum	CC	150,000					11-20 year
	AG3	BAE SIWI Center	TA	10,000					11-20 year
ECONOMIC DEVELOPMENT	EC1	Incubator Building	CC	20,000					1-5 year
	EC2-1	Data Center - Phase 1	FX	300,000	2				1-5 year
	EC2-2	Data Center - Phase 2-3	FX	250,000					1-5 year
	EC2-3	Data Center - Phase 4-6	FX	500,000					6-10 year
	EC3	Retail	CC/PR	100,000	1				6-10 year
JOINT LIBRARY	JLF1	Module 3	PR	13,000	1				1-5 year
	JLF2	Bookless Library	CC	10,000	1				6-10 year
TEES	TS1	TEES State Headquarters Phase 1 & 2	PR	70,000	2-3				1-5 year
	TS2-1	IDB #1	PR	30,000	2				1-5 year
	TS2-2	IDB #2	PR	30,000	2				6-10 year
	TS3	Technology Innovation & Modernization Catalyst	PR	20,000	2				1-5 year
	TS4	Cyber/National Security	SA	21,500					11-20 year
	TS5	Research Building	TA	100,000	2-3				11-20 year

PROGRAM SUMMARY FOR DEVELOPMENT STUDIES (CONT.)

	BLDG ID	Description	Location	Building Size		Housing	Exterior Space		Estimated Build Projection
				Area (GSF)	Levels		Infra. (ac)	Green Space (ac)	
TEES (cont.)	TS6	Applied Research #2	TA	100,000	2-3				11-20 year
	TS7	Flexible Manufacturing	TA	40,000					11-20 year
	TS8	Workforce Classrooms	TA	Note 1					11-20 year
	TS9	Directed Energy	PR				50		
	TS10	Energy Sector Smart Well	PR				15		
	TS11	Solar Field	PR/SA				10		
	TS12	Innovation Proving Grounds	PR/SA						
	TS13	Aerospace Research Facility	TA/SA	40,000					
	TS14	Research Integration Center (RIC)	SA	79,500	3				1-5 year
TEEX	TX1	TEEX Headquarters	PR	30,000	2-3				1-5 year
	TX2	Advanced Training & Testing	TA/SA				145		1-5 year
	TX3	Prop Houses	TA				2		1-5 year
	TX4	UAS	SA				1.5		1-5 year
	TX5	Indoor Shooting Range	SA	34,000			1.5		1-5 year
TTI	TTI1	Erosion Control Support	SA	1,200	1				11-20 year
	TTI2	Covered Storage	SA	50,000	1				11-20 year
	TTI3	Asset Management	SA	20,000	1				11-20 year
	TTI4	Proving Grounds Support	SA	45,000	1				11-20 year
	TTI5	Temp AV/CV Prep Area	SA	2,000	1				11-20 year
	TTI6	Portable Trailers (3)	SA	2,000					
	TTI7	Proving Grounds	SA				250		11-20 year
	TTI8	Green Infrastructure Park	CC					15	
TOTALS				3,275,700		2,000	473.5	15	

Note 1: Workforce Classrooms are to be constructed as shared facilities within other buildings.

POTENTIAL INFILL DEVELOPMENT

	BLDG ID	Description	Location	Building Size	
				Area (GSF)	Levels
EAST OF RUNWAYS	D1	Core Academic/ Partners	CC	725,000	2-4
	D2	Training/ Research	TA	260,000	1-3
	D3	Partner Real Estate Development	PR	100,000	1-3
WEST OF RUNWAYS	D4	Partner Development	PR/FX	860,000	2-3
	D5	Partner Development	SA/FX	250,000	1-3
TOTAL				2,195,000	

The Potential Future Facilities were placed on the campus layout to present a possible scenario for building locations. When projects are realized, exact site decisions should be evaluated against the intent of the master plan and the specific programmatic requirements.

Facilities in the plan are labeled according to the “BLDG ID” indicated in the tables on the preceding pages.





F PARKING AND TRIP GENERATION

Estimated parking requirements were developed for the projects listed on the Potential Future Facilities list (Appendix D) that included approximate buildings sizes.

References:

Institute of Transportation Engineers (ITE) *Parking Generation*, 4th Edition (2010)

Urban Land Institute (ULI) *Shared Parking*, 2nd Edition (2005)

ESTIMATED PARKING REQUIREMENTS

	BLDG ID	Description	Quantity	Suggested Ratio	Parking Supply
GENERAL CAMPUS	G1	Expo/Conference Center	3,100 people	0.31 spaces/attendee	961
	G2	Residential	2,000 beds	0.67 spaces/bed	1,340
		<i>Subtotal</i>			<i>2,301 spaces</i>
RELLIS ACADEMIC COMPLEX	AAC1	RELLIS Phase 1a & 1b	112,200 SF	4.8 spaces/1,000 SF	538
	AAC2	RELLIS Phase 2	70,000 SF	4.8 spaces/1,000 SF	336
	AAC3	RELLIS Phases 3 & 4	140,000 SF	4.8 spaces/1,000 SF	672
	AAC4	Blinn College Buildings		4.8 spaces/1,000 SF	
		<i>Subtotal</i>			<i>1,546 spaces</i>
AGRICULTURE AND LIFE SCIENCES	AG1	ALEC STEM Complex	40,000 SF	4.8 spaces/1,000 SF	192
	AG2	Natural History Museum	150,000 SF	1 space/1,000 SF	150
		<i>Subtotal</i>			<i>342 spaces</i>
ECONOMIC DEVELOPMENT	EC1	Incubator Building	20,000 SF	1 space/367 SF	54
	EC2	Data Center	300,000 SF	1 space/1,000 SF	300
		<i>Subtotal</i>			<i>354 spaces</i>
JOINT LIBRARY	JLF1	Module 3	13,000 SF	1 space/1,000 SF	<i>13 spaces</i>
TEES	TS1	TEES State Headquarters Phase 1 & 2	64,500 SF	1 space/333 SF	193
	TS2	IDB 1 & 2	60,000 SF	1 space/367 SF	163
	TS3	Technology Innovation & Modernization Catalyst	30,000 SF	1 space/500 SF	60
	TS4	Cyber/National Security	21,500 SF	1 space/333 SF	65
	TS5	Research Building	100,000 SF	1 space/333 SF	300
	TS6	Applied Research #2	100,000 SF	1 space/333 SF	300
	TS7	Flexible Manufacturing	40,000 SF	1 space/750 SF	52
		<i>Subtotal</i>			<i>1,133 spaces</i>
TEEX	TX1	TEEX Headquarters	30,000 SF	1 space/367 SF	<i>82 spaces</i>
TTI	TTI1	Erosion Control Support	1,200 SF	1 space/367 SF	3
	TTI2	Covered Storage	50,000 SF	1 space/2,000 SF	25
	TTI3	Asset Management	20,000 SF	1 space/367 SF	54
	TTI4	Proving Grounds Support	45,000 SF	1 space/367 SF	123
		<i>Subtotal</i>			<i>205 spaces</i>
TOTAL					5,976 spaces

Based on the populations estimated from the areas of Potential Future Facilities, approximate weekly and peak hour trip generations estimated for the campus. Trips were not generated for the “Expo/Conference Center”, as convention centers are unique and need to be evaluated on a case-by-case basis to determine the estimate trips.

In addition to trip generation, primary roadways on the RELLIS Campus, such as RELLIS Parkway and Airfield Drive, were analyzed for their likely capacity. These roadways have a theoretical daily capacity in a range between 5,000 and 15,000 vehicles.

References:

Institute of Transportation Engineers (ITE) *Tip Generation Manual*, 9th Edition (2012)

Highway Functional Classification: Concepts, Criteria and Procedure (2013): *Table 5.1 Roadway Capacities from the Smart Transportation Guidebook*, March 2008

ESTIMATED TRIP GENERATION										
	BLDG ID	Description	Quantity	Weekday Trips	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
GENERAL CAMPUS	G1	Expo/Conference Center	3,100 people							
	G2	Residential	2,000 beds	6,693	593	148	445	652	398	254
		Subtotal		6,693	593	148	445	652	398	254
RELLIS ACADEMIC COMPLEX	AAC1	RELLIS Phases 1a & 1b	112,200 SF	1,925	209	155	54	178	103	75
	AAC2	RELLIS Phase 2	70,000 SF	1,925	209	155	54	178	103	75
	AAC3	RELLIS Phases 3 & 4	140,000 SF	3,850	419	310	109	356	206	150
	AAC4	Blinn College Buildings	5,000 students	6,673	814	684	130	872	549	323
		Subtotal		14,370	1,651	1,304	347	1,583	961	622
AGRICULTURE AND LIFE SCIENCES	AG1	ALEC STEM Complex	40,000 SF	1,100	120	89	31	102	59	43
	AG2	Natural History Museum	150,000 SF	N/A	42	36	6	27	23	4
		Subtotal		1,100	162	125	37	129	82	47
ECONOMIC DEVELOPMENT	EC1	Incubator Building	20,000 SF	847	30	25	5	58	12	46
	EC2	Data Center	300,000 SF	297	27	14	13	27	6	21
		Subtotal		1,144	57	39	18	85	18	67
JOINT LIBRARY	JLF1	Module 3	13,000 SF	85	27	19	8	16	8	8
TEES	TS1	TEES State Headquarters Phase 1 & 2	64,500 SF	526	73	64	9	112	19	93
	TS2	IDB 1 & 2	60,000 SF	1,045	70	57	13	88	18	70
	TS3	Technology Innovation & Modernization Catalyst	30,000 SF	897	41	34	7	65	14	51
	TS4	Cyber/National Security	21,500 SF	408	56	49	7	103	18	85
	TS5	Research Building	100,000 SF	1,313	191	168	23	190	32	158
	TS6	Applied Research #2	100,000 SF	1,313	191	168	23	190	32	158
	TS7	Flexible Manufacturing	40,000 SF	135	4	3	1	15	5	10
		Subtotal		5,637	626	543	83	846	138	625
TEEX	TX1	TEEX Headquarters	30,000 SF	897	41	34	7	65	14	51
TTI	TTI1	Erosion Control Support	1,200 SF	754	3	2	1	43	9	34
	TTI2	Covered Storage	50,000 SF	996	60	49	11	81	17	64
	TTI3	Asset Management	20,000 SF	847	30	25	5	58	12	46
	TTI4	Proving Grounds Support	45,000 SF	971	56	46	10	77	16	61
		Subtotal		3,567	149	122	27	259	54	205
TOTALS				33,493	3,306	2,334	972	3,635	1,673	1,879

Based on the individual project trip generation estimates, along with analysis of existing facilities and programs, total peak hour trip generations for the campus were estimated at the 5-year, 10-year, and 20-year build-out time frames. Facilities included in each of these time frames are indicated in Appendix E.

TRIP GENERATION SUMMARY (CUMULATIVE)								
Build-out Year	Quantity	Weekday Trips	AM Peak Hour			PM Peak Hour		
			Total	In	Out	Total	In	Out
5-Year Estimate	1,282,963 SF	14,649	1,264	990	274	1,282	511	771
10-Year Estimate	2,191,613 SF	27,443	2,333	1,800	533	2,617	1,190	1,427
20-Year Estimate	3,839,573 SF	44,579	3,802	2,932	870	4,121	1,845	2,276

G STORM PIPE OBSERVATIONS

All the stormwater piping that runs underneath the runway was observed with CCTV stormwater pipe crawler in 2019. The primary goal was to inspect all underground pipes and record any inconsistencies and deficiencies. The charts on this page highlight these observations. Refer to drawing C-5 of Appendix K for a map of the observation locations.

RELLIS PROVING GROUNDS STORM SYSTEM OBSERVATIONS

Inlet	Line	Observation
1A	1-1	80' south of 1A inlet starts holding water and continue to 180' south
		209' south of 1A noticeable lip at connection of two pipes
1B	1-2	50' south of inlet 1B is a grouping of rocks
		80' south of 1b is the start of silt.
1C	1-2	20' north of inlet 1C is a group of rocks
		40' north of inlet 1C starts silt.
1D	1-3	7' south of inlet 1C is a grouping of rocks
		35" south of inlet 1C observed silt
		65' South of inlet 1C observed large amount of silt
1I	1-6	40', 100' and 210' northeast of inlet 1I is grouping of rocks
		110'-200' and 230'-320' northeast of inlet 1I pipe holds water
		183' and 200' joints need repair
	1-7	Holds water from 440'-510', 590'-635', and 655'-710' southeast of inlet 1I
	1-8	Holds water from inlet 1I to 190' west
		265' west of inlet 1I is a group of rocks
		Holds water from 630' on
	1-9	Large amount of mud 240' north of inlet 1I
	1-10	Holds water from inlet 1I to 65' south and from 360' on

RELLIS PROVING GROUNDS STORM SYSTEM OBSERVATIONS - CONT.

Inlet	Line	Observation
1F	1-11	Holds water from inlet 1F to 260' south and from 360' to inlet 1H
1L	1-12	Holds water from inlet 1L to 100' northeast
2A	2-1	63' and 135' southeast of inlet 2A is grouping of rocks
2E	2-5	Entire pipe holds water
	2-6	Silt
2L	2-9	Holds water from inlet 2L to 240' south
		300' and 420' south of inlet 2L is grouping of rocks
4A MH	4-1	Holds water from 70' south to end of pipe
	4-2	Holds water from start of pipe to 30' north
		320' north is a rod through pipe and rocks
4A Inlet	4-3	10'-40', 70', 100', and 205' south of inlet 4A is grouping of rocks
		215' south is a rod through pipe
	4-4	Pipe blocked
	5-1	60' to end pipe holds water
	5-2	Entire pipe holds water
	5-3	50' to end pipe holds water
	6-2	50' in is a grouping of rocks
	6-5	23' in joint needs repair
	7-1	Silt

H PROJECTED UTILITY LOADS

Utilizing the Potential Future Facilities list (Appendix D), approximate building loads for utilities were projected to determine the required capacity of campus infrastructure in the future. For certain facilities not given an area in the list, an area was estimated in the table to ensure some demand was captured for these buildings. Projects under construction at the time of the master plan were also included to incorporate the complete demand on new systems.

PROJECTED CAMPUS LOAD

					Cooling			Heating			Electrical		
	BLDG ID	Description	Usage	Area	Sq. Ft. / Ton	Tons	CHW GPM	BTU / Sq. Ft.	MBH	MBH (80% Div)	HW GPM	Watts / Sq. Ft.	Connected kW
GENERAL CAMPUS	G1	Expo/Conference Center	Conference	40,000 SF	300	133	229	25	1000	800	67	4	160
	G2-1	Residential: Lower	Residential	<i>Note 1</i>									
	G2-2	Residential: Upper	Residential	<i>Note 1</i>									
	G3	Wellness Center	Gymnasium	15,000 SF	200	75	129	25	375	300	25	3	45
RELLIS ACADEMIC COMPLEX	AAC1	RELLIS Phase 1	Academic	112,200 SF	300	374	641	25	2805	2244	187	5	561
	AAC2	RELLIS Phase 2	Academic	70,000 SF	300	233	400	25	1750	1400	117	5	350
	AAC3	RELLIS Phase 3 & 4	Academic	140,000 SF	300	467	800	25	3500	2800	233	5	700
		Blinn College Building 1	Academic	<i>Note 1</i>								5	350
	AAC4	Blinn College-3 Buildings	Academic	210,000 SF	300	700	1200	25	5250	4200	350		
	AAC5-1	RELLIS Workforce Training Facility Phase 1	Office	40,000 SF	350	114	196	25	1000	800	67		
AGRICULTURE AND LIFE SCIENCES	AG1	ALEC STEM Complex	Academic	40,000 SF	300	133	229	25	1000	800	67	3	120
	AG2	Natural History Museum	Museum	150,000 SF	300	500	857	25	3750	3000	250	4	600
ECONOMIC DEVELOPMENT	EC1	Incubator Building	Lab	20,000 SF	250	80	137	30	600	480	40	6	120
	EC2	Data Center Phase 1-3	Data Center	<i>Note 1</i>									
	EC2	Data Center Phase 4-6	Data Center	<i>Note 1</i>	100	5000	8571	20	10000	8000	667		
	EC3	Retail	Retail	100,000 SF	300	333	571	25	2500	2000	167	4	400
JOINT LIBRARY	JLF1 & 2	Module 3/Bookless	Library	23,000 SF	350	66	113	13	299	239	260	3	69

PROJECTED CAMPUS LOAD (CONT.)

	Cooling							Heating				Electrical	
	BLDG ID	Description	Usage	Area	Sq. Ft. / Ton	Tons	CHW GPM	BTU / Sq. Ft.	MBH	MBH (80% Div)	HW GPM	Watts / Sq. Ft.	Connected kW
TEES	TS1	TEES State Headquarters Phase 1 & 2	Office	64,500 SF	350	184	316	25	1613	1290	108	4	258
	TS2-1	IDB #1	Office	30,000 SF	350	86	147	25	750	600	50	4	120
	TS2-2	IDB #2	Office	30,000 SF	350	86	147	25	750	600	50	4	120
	TS3	Technology Innovation & Modernization Catalyst	Office	30,000 SF	350	86	147	25	750	600	50	6	180
	TS4	Cyber/National Security	Office	21,500 SF	300	72	123	25	538	430	36	4	86
	TS5	Research Building	Lab	100,000 SF	250	400	686	30	3000	2400	200	6	600
	TS6	Applied Research #2	Lab	100,000 SF	250	400	686	30	3000	2400	200	6	600
	TS7	Flexible Manufacturing	Manufacture	40,000 SF	300	133	229	30	1200	960	80	4	160
	TS13	Aerospace Research Facility	Lab	40,000 SF	250	160	274	30	1200	960	80		
	TS14	Research Integration Center (RIC)	Lab	75,000 SF	250	300	514	30	2250	1800	150		
TEES/TTI		CIR	Lab	135,600 SF	250	560	960	30	4200	3360	280	6	814
TEEX	TX1	TEEX Headquarters	Office	30,000 SF	350	86	147	25	750	600	50	4	120
	TX2	Advanced Training and Testing		Note 1									
	TX3	Prop Houses		Note 1									
	TX5	Indoor Shooting Range		Note 1									
TTI	TTI1	Erosion Control Support	Office	Note 1								4	5
	TTI2	Covered Storage	Storage	Note 1	500	100	171	25	1250	1000	83	3	150
	TTI3	Asset Management	Office	20,000 SF	350	57	98	25	500	400	33	4	80
	TTI4	Proving Grounds Support	Office	Note 1									
		TTI Headquarters	Office	190,000 SF	350	543	931	25	4750	3800	317	4	720
INFILL DEVELOPMENT	D1	Core Academic/Partners	Academic	725,000 SF	300	2417	4143	25	18125	14500	1208		
	D2	Training/Research	Office/Lab	260,000 SF	275	945	1621	27	7020	5616	468		
	D4	Partner Development	Office	405,000 SF	350	1157	1984	25	10125	8100	675		
TOTAL				2,163,000 SF	9435		7548	55653		44522		23697	

Note 1: Building is not anticipated to be on the campus thermal loop.

I SMART CAMPUS CHECKLISTS

DECISION CRITERIA

Evaluation Criteria Decisions should reinforce mutual benefits in a manner that is responsive to the RELLIS and the A&M System communities. These benefits should be evaluated across four distinct criteria that advance new pedagogies: Vision, Impact, Implementation, and Transferability.



VISION

Ideas should be bold, creative, and importantly, should tackle the most pressing issues.



IMPACT

Ideas should have the potential to significantly improve citizens' lives. Issues addressed should be timely and relevant.



IMPLEMENTATION

Concepts must demonstrate their commitment and a viable path to bringing ideas to life. This includes garnering support from key stakeholders.



TRANSFERABILITY

Ideas will not only be beneficial to RELLIS, but also have the potential to spread—and succeed—in other A&M System campuses and markets.

DATA STANDARDS

The following questions are intended to facilitate practical questions as a checklist to maintain standards of the RELLIS smart campus initiative. This is not intended to facilitate critical inquiry through any vendor interaction and is not a comprehensive list.

Examples include:

- What data feeds are anticipated?
 - Data to be consumed by system
 - Data to be provided by system
 - Privacy considerations?
- Is the feed well-defined and written down?
- Who will maintain?
- What is the schema for changing default logins and passwords on each device?
 - How does the vendor demonstrate compliance with this requirement?
 - What is the schema for disabling all non-required ports/services?
- What dependencies does this IOT system have on other systems?
- Is there a documented commissioning plan for this IOT system and associated devices?
- Is there a design guide for this IOT system?
- How many endpoints (IOT devices) will be deployed?
- Who will support these?
 - If local FTE, is capacity available?
 - Will it remain available?
 - If not local, vendor availability?
- What are vendor requirements for hosting aggregating server, database, and redundancy hardware/services?
 - Who pays for this?
 - If cloud-based, who pays and manages this?
- Is a risk sharing agreement in place with the vendor?
- Committee for New Projects
 - Planning
 - RFI
 - RFP
 - Contract negotiations
 - Identify adoption roadblocks

J FISCAL YEAR PLANNING PROJECTIONS

Appendix I consists of the projected Fiscal Year Planning for future infrastructure projects to support the build-out of the campus. Projects are broken up between 5-year, 10-year, and 20-year phases with total cost highlighted for each phase as well as each individual project. Costs are provided in 2019 dollars as well as a current estimate of escalated costs based on the proposed timing of the projects.

Reference project numbers are used to tie into the drawings provided in Appendix K.

Fiscal Year 2020-2025 Projections						
Appendix K Reference Project #	Item	Project (D)	Description	Total Cost (3)	Escalated Total Cost (2)	Project Type
Project #1	FY 2020					
	A	RELLIS Parkway thermals (Joint Library)	1200 LF thermal extension by Joint Library Module 3	N/A	N/A	Thermal
	B	RELLIS Campus Infrastructure Phase 3A	To support BAM/IPG improvements, rain tunnel			
		Infrastructure	Includes fiber, electrical, domestic water, sanitary sewer, 2000 LF fence relocation	\$8,327,000	\$8,327,000	Mixed
		Proving Grounds Storm drainage improvements Phase 1	Support BAM/IPG projects	\$4,021,000	\$4,021,000	Storm drainage
	Total FY20			\$12,348,000	\$12,348,000	
Project #2	FY 2021					
	A	35R Leg domestic water	8" line by TTI or private entity (North-South extension, east side of runways)	\$675,000	\$731,000	Water
	B	Chapel Renovation - Offices		\$2,667,000	\$2,667,000	Building Renovation
	C	RELLIS Runway Rehabilitation - 35R		\$5,665,000	\$5,892,000	Runway
	D	8081 Phase B	12,000 GSF office complex	\$5,960,000	\$5,960,000	New Building
	E	Goodson Bend Storage Facility	30,000 GSF Storage Facility (est. \$2.6 Million for bldg)	\$4,300,000	\$4,300,000	New Building
	Total FY21			\$19,267,000	\$19,550,000	

Fiscal Year 2020-2025 Projections (CONT.)

Appendix K Reference Project #	Item	Project (D)	Description	Total Cost (3)	Escalated Total Cost (2)	Project Type
Project #3	FY 2022					
	A	RELLIS Campus Infrastructure Phase 3B				
		Infrastructure	Includes fiber, electrical, domestic water, 7th St. RSU expansion & new south RSU sanitary sewer includes: 16" Main Replacement and Building Conversions along Avenue A south.	\$15,890,000	\$16,526,000	Mixed
		Proving Grounds Storm drainage improvements Phase 2	Includes proving ground detention ponds	\$7,134,000	\$7,134,000	Storm drainage
	B	Access Road west of the proving grounds (6,032 LF)		\$6,667,000	\$7,212,000	Road
	C	RELLIS Campus Transformer + Cable	Includes 1/2 cable option	\$3,422,000	\$3,422,000	Mixed
	D	RELLIS Runway Rehabilitation - 35C		\$6,763,000	\$7,034,000	Runway
	Total FY22			\$39,876,000	\$41,328,000	
Project #4	FY 2023					
	A	RELLIS Runway Rehabilitation - 35L & Taxiway		\$3,327,000	\$3,893,000	Runway
	B	Central Utility Plant equipment expansion	(1) 800 ton chiller (1) 2,400 GPM cooling tower (1) 3,000 MBH Condensing water boiler	\$1,600,000	\$1,872,000	Equipment
Project #5	C	TTI Complex Conversion	(Hangers between Flightline & Avenue A) 6" waterline; Existing building connection to new system	\$256,000	\$300,000	Water
Project #6	D	RELLIS Infrastructure Phase 4	(NOTE: Blinn Building 2 open for students - August 2022) Bryan Avenue and RELLIS Parkway, includes:	\$6,628,000	\$7,754,000	
		RELLIS Parkway - Water	(2,100 LF) 8" Waterline - HDPE - Including Fittings	\$299,000	\$350,000	Water
		Bryan Avenue - Water	(1,800 LF) 12" Waterline - HDPE - Including Fittings	N/A	N/A	Water
		Bryan Avenue SS Extension North	(2,342 LF) 12" SS line including manholes	N/A	N/A	Sanitary sewer
		Electrical ductbank (existing)	Existing electrical, phase 1 infrastructure	N/A	N/A	Electrical
		Site/Roadway lighting	(17) New Light poles along Bryan Avenue to Joint Library, include future 5G capability	N/A	N/A	Electrical
		Data conduit	(2,000 LF) (4) 4" conduits including manholes from 4th Street extending north to RELLIS Pkwy to complete loop	N/A	N/A	Data
		Thermals	(3,350 LF) 24" CHS/R; 12" HWS/R	N/A	N/A	Thermal
	Total FY23			\$12,110,000	\$14,169,000	

Fiscal Year 2020-2025 Projections (CONT.)						
Appendix K Reference Project #	Item	Project (D)	Description	Total Cost (3)	Escalated Total Cost (2)	Project Type
Project #7	FY 2024					
	A	New Campus Water Tower (1.5 million gallons)	Removal of Existing Tower and Installation of New Tower	\$4,688,000	\$5,704,000	Water
	B	RELLIS Runway Rehabilitation - 22 & 28 Cross	Work excludes runway cross area identified to be removed in the future by the master plan.	\$4,667,000	\$5,679,000	Runway
	Total FY24			\$9,355,000	\$11,383,000	
Project #8	FY 2025					
	A	Airfield Drive and Bryan Ave Loop	(2,900 LF) 8" Waterline - HDPE - Including Fittings (1,100 LF) 8" Waterline - HDPE - Including Fittings	\$535,000	\$677,000	Water
			Existing electrical, Phase 1 infrastructure project	N/A	N/A	Electrical
			Existing data, Phase 1 infrastructure project	N/A	N/A	Data
	B	Bryan Avenue Thermal extension south	(900 LF) 24" CHS/R; 12" HWS/R	\$1,160,000	\$1,468,000	Thermal
Project #9	C	Avenue D Leg, includes Building Conversions	(200 LF) 6" Waterline - HDPE - Including Fittings (1) Existing Building Connections to New Water System (1,430 LF) 8" Waterline - HDPE - Including Fittings	\$214,000	\$271,000	Water
	D	Avenue D Thermals	(1,250 LF) 8" CHS/R; 84" HWS/R	\$1,612,000	\$2,040,000	Thermal
Project #10	E	Avenue C Data	Existing data, Infrastructure Project 3 project (4) 4" conduits including manholes Airfield Drive south to 7th Street RSU	N/A	N/A	Data
Project #11	F	Avenue A - south				
		Water	Existing water, Infrastructure Project 3 project (800 LF) 6" Waterline - HDPE - Including fittings (1,400 LF) 8" Waterline - HDPE - Including fittings (1,300 LF) 12" Waterline - HDPE - Including fittings (6) Existing building connections to new water system	N/A	N/A	Water
		Electrical	Existing electrical, Infrastructure Project 3 project	N/A	N/A	Electrical
		Data	Existing data, Infrastructure Project 3 project	N/A	N/A	Data
		Thermals	(1,730 LF) 12" CHS/R; 8" HWS/R	\$2,230,000	\$2,822,000	Thermal
	Total FY25			\$5,751,000	\$7,278,000	
	Total 5-Year Projections			\$98,707,000	\$106,056,000	

5-year projection notes:

Note 1: 2019 Fiscal Year dollars, includes 25% indirect/soft costs and 25% contractor costs

Note 2: Escalation at 4% per year to construction year

Note 3: Includes indirect/soft costs

Note 4: The Fiscal Year starts in September of the previous year. (i.e. FY 2021 starts September 1, 2020)

Note 5: Programs of Requirements / Scopes of Work shall be required to validate preliminary assumptions

10-Year Projections						
Appendix K Reference Project #	Item	Project (D)	Description	Total Cost (3)	Escalated Total Cost (2)	Project Type
Project #12	FY 2026					
	A	Bryan Avenue, 6th Street, and 7th Street Loop and Building Conversions				
		Water	(2,100 LF) 8" Waterline - HDPE - Including Fittings (3,300 LF) 12" Waterline - HDPE - Including Fittings (7) Existing building connections to New water system	\$888,000	\$1,169,000	Water
		Electrical + Data	(5,400 LF) Underground & manholes	\$3,766,000	\$4,956,000	Electrical + data
		Thermals	(3,400 LF) 24" CHS/R; 12" HWS/R	\$4,383,000	\$5,768,000	Thermal
	B	7th Street Main Replacement and Building Conversions		\$204,000	\$269,000	Sanitary sewer
Project #13	FY 2027					
	A	Central Utility Plant expansion	Building expansion (1) 800 ton chiller; (1) 2,400 ton chiller (1) 2,400 GPM cooling tower; (1) 7,200 ton chiller (4) 3,000 MBH Condensing water boiler	\$10,000,000	\$13,686,000	Building + equipment
Project #14	B	Avenue D and 8th Street Loop and Building Conversion	(2,500 LF) 8" Waterline - HDPE - Including Fittings (7) Existing building connections to New water system	\$423,000	\$579,000	Water
	C	Avenue D Main Replacement and Building Conversions		\$454,000	\$622,000	Sanitary sewer
			(4,840 LF) Underground & Manholes	\$3,370,000	\$4,625,000	Electrical
Project #15		Ave B and 3rd extensions	(5,140 LF) Underground & Manholes	\$3,560,000	\$4,873,000	Data
				N/A	N/A	Thermal

10-Year Projections (CONT.)						
Appendix K Reference Project #	Item	Project (D)	Description	Total Cost (3)	Escalated Total Cost (2)	Project Type
FY 2028						
Project #16	A	Waste Water Treatment Plant Options:	(Portions of each option can be phased into future Fiscal Years if needed)			
		Option 1:		\$4,298,000	\$6,118,000	WWTP
		0.4 MGD Expansion to 0.6 MGD WWTP on East Side				
		New Lift Station on West Side w/Force Main				
		New 16" Collection Line to Lift Station on West Side				
		Option 2:		\$4,063,000	\$5,783,000	WWTP
		0.4 MGD WWTP Expansion on West Side				
		0.3 MGD Lift Station Expansion on East Side				
		Option 3:		\$4,375,000	\$6,227,000	WWTP
		0.2 MGD WWTP Expansion on East Side				
		New 0.2 MGD WWTP on West Side				
		New 16" Collection Line to WWTP on West Side				
FY 2029						
FY 2030						

20-Year Projections						
Appendix K Reference Project #	Item	Project (D)	Description	Total Cost (3)	Escalated Total Cost (2)	Project Type
Project #17	FY 2031					
	A	Airfield Drive and RELLIS Parkway Loop	(5,200 LF) 8" Waterline - HDPE - Including Fittings	\$650,000	\$1,041,000	Water
	B	Airfield Drive and RELLIS Parkway 12" extension		\$469,000	\$751,000	Sanitary Sewer
			(4,680 LF) Underground & Manholes	\$3,267,000	\$5,231,000	Electrical + Data
			(4,680 LF) X" CHS/R; X" HWS/R	\$6,038,000	\$9,668,000	Thermal
FY 2032						
FY 2033						
FY 2034						
	A	Central Utility Plant equipment expansion	(2) 2,400 ton chiller (2) 7,200 ton chiller (13) 3,000 MBH Condensing water boiler	\$17,000,000	\$30,617,000	Building + Equipment

10-year and 20-year projection notes:

Note 1: 2019 Fiscal Year dollars, includes 25% Indirect/soft costs and 25% Contractor costs

Note 2: Escalation at 4% per year to construction year for ini

Note 3: The Fiscal Year starts in September of the previous year. (i.e FY 2021 starts September 1, 2020.)

Note 4: See consultant assumptions

K TECHNICAL UTILITY DRAWINGS (LARGE FORMAT)

The technical utility drawings are provided under separate cover for reference of the projected layout of individual utilities on the campus. These may be printed at full scale on 30x42 paper. They are not to be used for construction, but rather show the specific lines and general location anticipated based on the phased build-out of the campus as reflected in the master plan. Project numbers identified in the drawings are used to relate to the Fiscal Year Planning identified in Appendix I.

The following drawings are included in Appendix K:

Stormwater

- C-1 Watershed Diagram
- C-2 Stormwater Management
- C-3 Future Conditions Drainage Area Map
- C-4 Future Conditions Improvements
- C-5 RELLIS Proving Grounds Existing Storm Sewer Map

Water and Wastewater

- WA-1 Existing RELLIS Campus Infrastructure Domestic Water System
- WA-2 RELLIS Campus Infrastructure 2024 Domestic Water System
- WA-3 RELLIS Campus Infrastructure 2029 Domestic Water System
- WA-4 RELLIS Campus Infrastructure 2039 Domestic Water System
- SA-1 Existing RELLIS Campus Infrastructure Sanitary Sewer System
- SA-2 RELLIS Campus Infrastructure 2024 Sanitary Sewer System
- SA-3 RELLIS Campus Infrastructure 2029 Sanitary Sewer System
- SA-4 RELLIS Campus Infrastructure 2039 Sanitary Sewer System

Mechanical

- M-1 Overall Plan - Existing
- M-2 Overall Plan - Phase 1
- M-3 Overall Plan - Phase 2
- M-4 Overall Plan - Phase 3

Electrical

- E-1 Overall Plan - Existing
- E-2 Overall Plan 1-5 Years Future Construction
- E-3 Overall Plan 5-10 Years Future Construction
- E-4 Overall Plan 10-20 Years Future Construction

Technology

- T-1 RELLIS Campus Infrastructure - Existing - Communications
- T-2 RELLIS Campus Infrastructure - Phase 1 2024 - Communications
- T-3 RELLIS Campus Infrastructure - Phase 2 2029 - Communications
- T-4 RELLIS Campus Infrastructure - Phase 3 2039 - Communications