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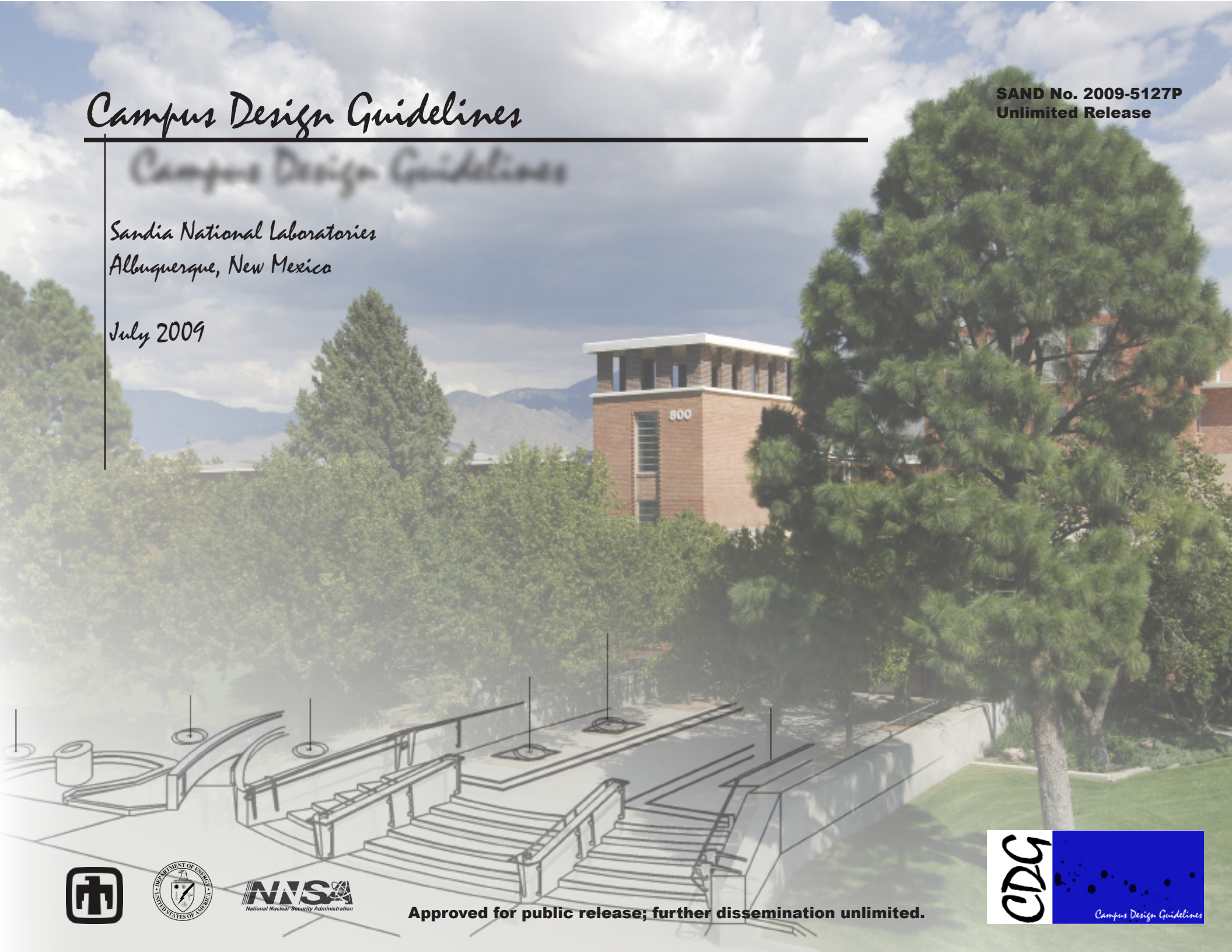
Campus Design Guidelines

Campus Design Guidelines

Sandia National Laboratories
Albuquerque, New Mexico

July 2009



National Nuclear Security Administration

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CDG
Campus Design Guidelines

CAMPUS DESIGN GUIDELINES

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http://www.sandia.gov/engstds/

CAMPUS DESIGN GUIDELINES APPROVAL

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"I believe Architecture with a capital "A" makes a difference."
- Annabelle Selldorf

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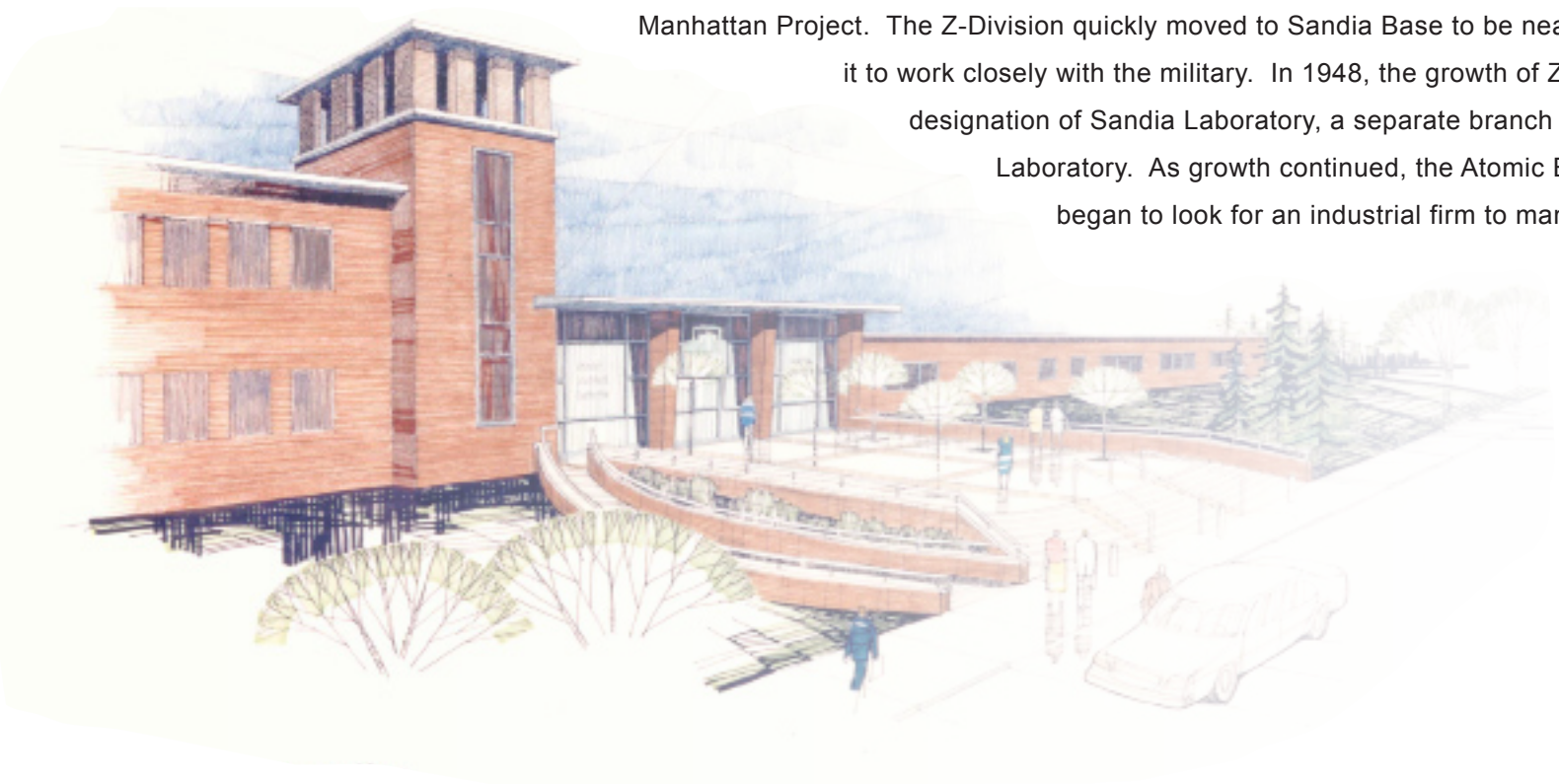
CHAPTER 1: INTRODUCTION

SNL History - Context for the Campus Design Guidelines (CDG)

Sandia National Laboratories' roots lie in the Manhattan Project of World War II, and its history reflects the changing national security needs of postwar America. Originally focused on ordnance engineering — turning the nuclear physics packages created by Los Alamos and Lawrence Livermore National Laboratories into deployable weapons — Sandia has expanded into new areas as national security requirements have changed. Besides ensuring the safety and reliability of the nuclear weapons stockpile, Sandia is now applying the expertise acquired in weapons work to a variety of related areas such as energy research, supercomputing, weapons treaty verification, and nonproliferation. In addition to the Albuquerque campus, Sandia maintains facilities in Livermore, CA, and a Test Facility in Kauai, HI.



Sandia's precursor was Z-Division, created in 1945 as the ordnance design, testing, and assembly arm of the Manhattan Project. The Z-Division quickly moved to Sandia Base to be near an airfield and enable it to work closely with the military. In 1948, the growth of Z-Division prompted the designation of Sandia Laboratory, a separate branch of Los Alamos National Laboratory. As growth continued, the Atomic Energy Commission began to look for an industrial firm to manage the engineering facility. President Harry Truman asked American Telephone and Telegraph (AT&T) to accept managerial responsibility of Sandia Laboratory. Western Electric, the

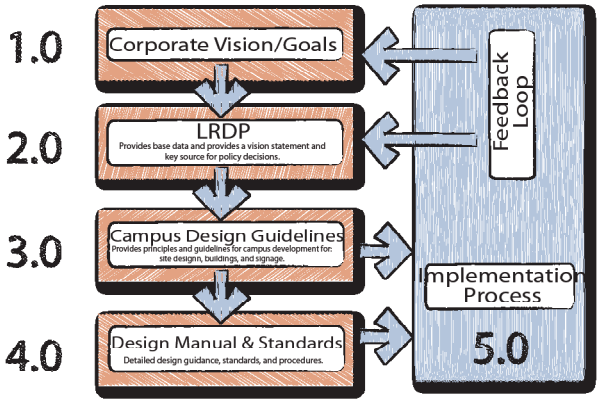
manufacturing arm of AT&T, accepted the management role on a nonprofit, no-fee basis. On November 1, 1949, Sandia Corporation, a wholly owned subsidiary of Western Electric, began managing Sandia. In 1979, Sandia was designated a national laboratory. In 1993, Martin Marietta Corporation assumed management of the Sandia contract, and two years later merged with Lockheed Corporation to become Lockheed Martin.

Buildings, their landscapes, and the constructed environment reflect cultural events and values. The Sandia Albuquerque site reflects a sixty-year history as a part of the U.S. Department of Energy (DOE) Nuclear Weapons Complex. Sandia is currently transitioning from being a major employer of scientists and engineers focused on nuclear weapons development to being an employer of individuals focused on more market-centric, cutting-edge, and new-product oriented activities. The minimal facility aesthetic and amenity standards acceptable to a prior generation and employment market segment are inadequate by today's employment market standards. Major institutions like Sandia with enormous replacement costs are ships that are hard to turn, and facility bricks and mortar have long life cycles. These factors make changing investment trends in site and building design, landscaping, and amenities imperative for addressing major demographic and cultural shifts anticipated in the not-so-distant future.

As nuclear weapons work declines and nonnuclear weapons work increases, hiring competition will increase because the modern labor pool will be more mobile with more choices of location. The modern labor pool also will likely place a premium on a pleasant, convenient, healthful, and stimulating work environment. Consequently, as the global market for the best and brightest minds becomes more competitive, Sandia must remain competitive in terms of the amenities it offers its employees such as personal office/research space, state-of-the-art technology/communications, and other work-related benefits. This CDG is intended to serve as a tool to help Sandia enhance the quality of both site and building design at its Albuquerque campus.

Relationship Between the CDG and the LRDP

The CDG is a tool for facilitating overall design and development objectives articulated in Sandia's Long-Range Development Plan (LRDP). The LRDP campus design principles noted below govern various components of the LRDP that need to be addressed from either a site-design or building-design perspective. The CDG is intended to provide detail and guidance with respect to ways in which the LRDP's design and development objectives may be advanced as it addresses each of the development plan components noted below.



Campus Design Approach

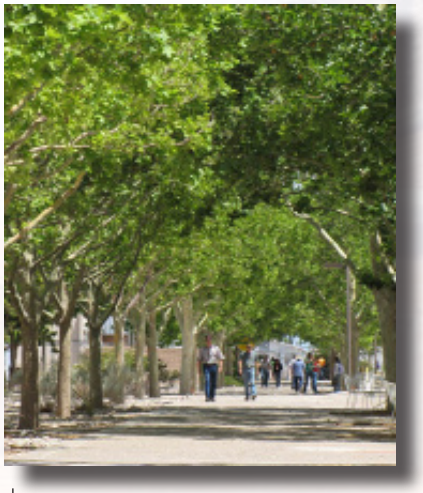
LRDP Design Principles

Gateways & Approaches

Create gateways and approaches that convey images of "science and technology," strength and purpose, in combination with clear and convenient access for visitors and staff. The CDG supports this principle by defining a common palette of materials and colors for architecture and landscape design. Also, the Renovation and Protection Guidelines in the CDG support this principle by integrating new designs into the existing context without creating aesthetic disparity and preserving existing elements that have environmental or cultural quality.

Overall Growth

Identify and pursue growth opportunities within the Core Research and Administrative Area and within the Emerging Technical Center Area, where land is available and development will establish functional connections and links between the Core Research and Administrative Area and the Pulsed Power Research and Development Area.



11th Street Pedestrian Mall

MESA Boulders

Land Use and Development

Support and maximize development of adjacent, compatible, and functionally related land uses, and coordinate development of land with systemic planning and installation of infrastructure. The CDG supports this and other principles by providing a basis for evaluating proposed design solutions.

Internal Circulation and Interaction

Reinforce the prominence of internal destinations, improve connectivity between destinations, and maximize opportunities for synergistic interaction between people and programs.

Security & Safety

Maintain a hierarchy of security levels, and provide a secure environment for mission capabilities, while celebrating the physical and technological infrastructure that protects us. Apply state-of-the-art technology to support campus security and construct facilities in a manner that inherently provides security and extend campus security levels to off-site facilities.

Site Utilization

Minimize the use of a site for surface parking, mobile offices, and small-scale development to maximize the best use of valuable real estate.

Surety

Ensure the protection of SNL's assets by integrating principles of surety into planning and design considerations.

Sustainability

Ensure the optimization of SNL's assets by integrating principles of sustainability into planning and design considerations.

Design Intent

Sandia recognizes the opportunity to attract and retain quality personnel by providing a desirable work environment and a functional and attractive campus. The corporate goal is that the Albuquerque campus be organized as an attractive main campus as well as being functional and visually integrated with its satellite research parks. Achieving a regionally appropriate landscape around zones of administration, manufacturing, parking, service, facilities, laboratories, and office buildings is standardized and implemented. An additional corporate goal is a campus design that expresses the look of "science and technology" for all institutional and industrial buildings.

Design guidelines intend results from a general acknowledgement that design should grow from proper design sense, skills, and sensibility. Sandia builds for long-term interest and stewardship of the site as a whole, not merely the expedient or limited needs of a particular project. This notion extends to line organizations and their relationship to facilities. The various business units in the Facilities Maintenance and Operations Center (FMOC) understand the need to construct facilities and infrastructure with a long-term and comprehensive view. Sandia hires a select group of A/E firms and construction partners, and design personnel are placed on project teams because they have professional skills and acumen. The intent of the CDG is to provide guidance in specific topical areas, some unique to Sandia. Construction Contractors should utilize this document as a reference regarding approved materials.

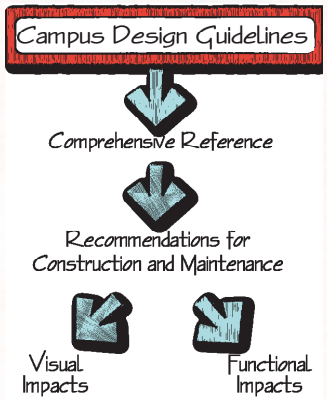
Customers and program managers who fund projects are expected to participate in improving Sandia as a whole, not merely solve problems associated with specific programs or utilitarian needs unique to a project. The CDG assumes campus design and form begin at the exterior of a building and extend inward, not from the building

Building 1008 Main Entrance

Building 1008 Interior

outward. Site conditions and externalities drive a considerable number of decisions. If these are ignored in favor of the particular desires of a project, a disjointed campus results.

The procession of movement through the Sandia campus begins with arrival at a Kirtland Air Force Base (KAFB) gate, travels along primary and secondary traffic corridors to parking areas, passes through security portals, walking along other exterior areas, and finally arriving at a particular facility. Daily staff movement includes travel along various pedestrian routes or vehicular corridors from one facility to the next. Consequently, addressing visual clues and clutter along these routes is crucial. Providing guidance for locating building entrances that relate to site conditions, parking areas, and pedestrian flow is one example of the necessity for addressing design in an integrated fashion. The CDG is a significant integrated design tool for Sandia campus development.



Integrated Campus Design Guideline Process

Design Review Process

Using the CDG can improve the Sandia campus by requiring examination of design options and construction/installation of certain amenities. Following these guidelines allows for faster campus development and ensures the corporate goal of an identity/character reflecting "science and technology" is achieved. This document is not intended to outline a formal design process; rather, it provides design guidelines for implementing site improvements as development occurs. It should be used in tandem with the FMOC Standards and Design Manual.

All projects subject to compliance with these guidelines and standards must be reviewed by the Operations Lead, Site Planners, Systems Architects and Engineers.

Primary components of the design review process include:

- Projects are to follow the CDG throughout the design process, from the conceptual or schematic design stage (nominally 10%) to final design.
- Design reviews are to be accomplished through participatory committee meetings scheduled at the request of the Operations Lead.

- Decisions regarding implementation of the CDG are to be made by consensus. The authority having jurisdiction will have acceptance/rejection authority when consensus cannot be reached or when the Design Team and Project Leaders take exception to CDG specifications.
- Design Team leaders are to ensure compliance with the CDG before continuing with design.

General Framework

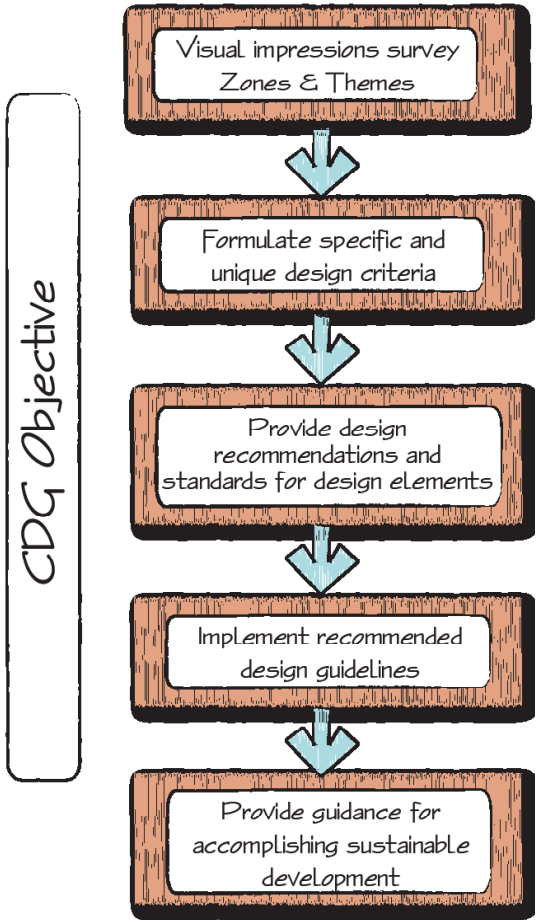
The CDG is organized into two primary focus areas: Site Design Guidelines and Building Design Guidelines. Appendices provide more specific details and explanations of various design elements.

The CDG is intended to bridge gaps between general institutional and corporate goals, security requirements, and FMOC Architecture/Engineering specifications. Throughout the document, web links coordinate FMOC documents with other organizations and expedite cross-referencing standards and examples. As other external guides become available, they may be linked or incorporated into this document.

Applicability

The CDG is applicable to all capital and expense-funded projects noted below. These projects will be reviewed by the Campus Development Committee to determine compliance with the CDG.

- Line Items
- Major Renovations
- General Plant Projects (GPP)
- Institutional General Plan Projects (IGPP)
- Customer funded projects
- Operations and Maintenance (O&M) projects
- Activities impacting the campus appearance.



Integrated Campus Design Guideline Process

Guidelines Ownership

The CDG is owned by the Architecture Department in FMOC. The CDG is maintained by the Campus Development Committee, comprised of:

- Architecture Department
- Strategic Planning Department
- Facilities Leadership Team

Periodic Updating and Refining of the Guidelines

The CDG will be reviewed and updated every three years, or more frequently if necessary. Requests for updates should be submitted to the FMOC Architecture Department. The Department Manager will convene the Committee (Architecture and Planning) to study the requested changes and make recommendations. Changes must be approved by the Campus Development Committee before they are integrated into the CDG.

CHAPTER 2: SITE DESIGN GUIDELINES

Land Use and Siting

Site Utilization & Building Massing

The intent of the building site guidelines is to promote building planning that is integrated with site development guidelines. Building site guidelines apply to both permanent and temporary buildings. Permanent building sites accommodate buildings that are major capital investments and are intended to last more than 30 years. Placement of permanent buildings should be in accordance with setbacks from the street and other buildings as specified by regulatory and safety requirements and guidelines in this document. Permanent buildings are to be connected to pedestrian malls and pathways by an entry court. Future land use and facility sites are to be guided by the Site Selection Process and must consider:

- Program Mission
- Site Planning and Planning Goals
  - Circulation: Pedestrian/Vehicular
  - Public vs. Service
  - Site Orientation (wind, sun, etc…)
- Site/Campus-available building sites and infrastructure
- Security Requirements
- Safety/Hazard Impacts

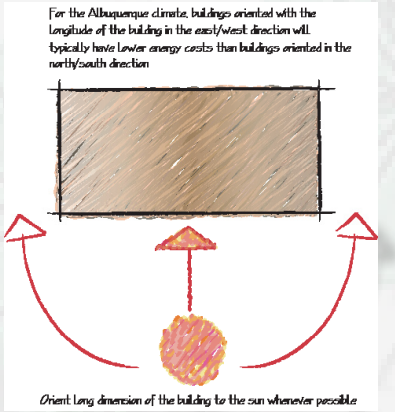
Gateway Site Plan

The Strategic Planning department will maintain flexibility to meet unexpected needs. Future potential building and

> "The hardest part of designing a campus is where to place the center."
>
> - Matthew Brito

redevelopment sites are to be identified as-needed by Strategic Planning and set aside based on:

- Vehicular Accessibility
- Utility Availability and Constraints
- Pedestrian Access Requirements
- Permanent Structures
- Safety/Security Requirements
- Environmental Restoration Requirements



Solar Orientation

Siting

- General site planning techniques that result in sustainable development are cost efficient because they preserve energy and reduce construction and maintenance costs.
- Preserve natural site features such as topography, hydrology, vegetation, and tree cover.
- Orient facilities with consideration of climatic conditions such as wind, sun, and microclimates.
- Facilities are to be clustered to preserve land and reduce construction costs. Clustering should occur on the flattest land areas.

11th Street Mall Terminus

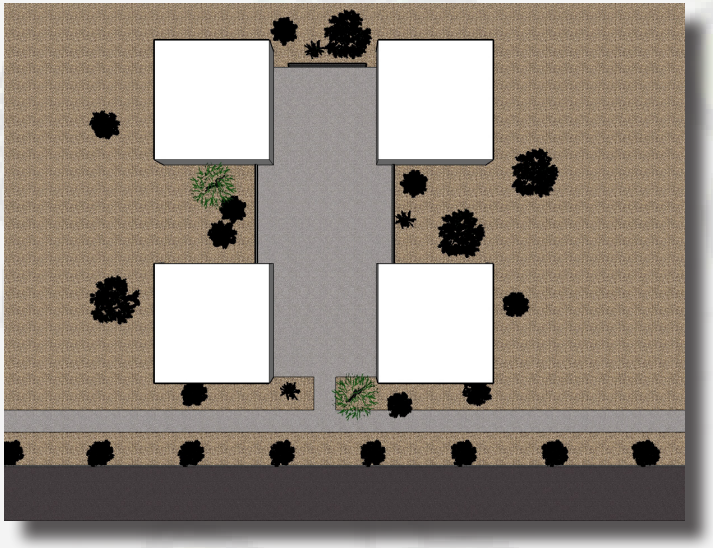
Functional Relationship with Adjacent Structures

Image and Setbacks

Temporary buildings, including Mobile Offices (MOs) and Transportables (T-Buildings), are intended to serve a short-term use and may be moved to other sites during their useful life. In general, acquisition and continued use of temporary buildings is discouraged; all temporary structures should be gradually replaced.

Other site planning goals for new temporary structures include:

- Maximize density to reduce land consumption, transit needs, and infrastructure costs.
- Linking portable structures together is encouraged when site and program permits.
- Provide a minimum 6'-foot wide concrete or asphalt pathway from the sidewalk to the portable structure.
- Provide access to each portable structure or groups of structures, as appropriate, in accordance with ADA/ABA Accessibility Guidelines for Buildings and Facilities.
- Groups of portable buildings are to be sited to allow sufficient space to create spatially varied and interesting interior courtyards and pedestrian pathways that link to nearby sidewalks and/or malls.
- Extensive landscape development is not recommended around temporary structures; a simple landscape buffer or simple courtyard development is encouraged to enhance the overall working environment.
- Coordination with DOE -STD-1088-95 Fire Protection for Relocatable Structures.
- Coordination with pertinent IBC and IFP requirements.



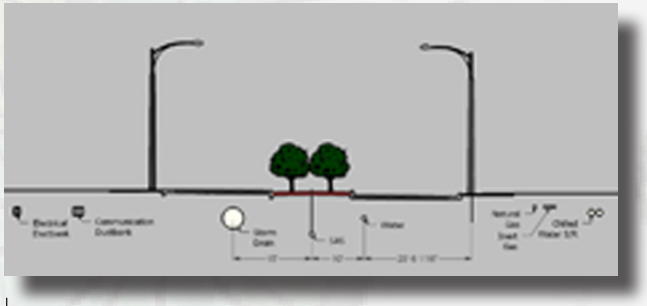
Service Area/Pedestrian Designation

Utility Corridors

Incorporate utilities efficiently and in a manner that accommodates future needs and allows for incremental development. All new site utilities are to be placed underground. Existing overhead utilities must not pass over security areas without physical protection features to prevent unauthorized access into the security area. Physical protection features must be implemented at all locations where unattended openings occur (e.g., the intersection of storm

sewers, drainage swales, and site utilities with the security boundary or area). Contact SNL Physical Security or refer to M&O Contract, Section J for further information.

- Consider future building sites; coordinate with the Strategic Planning Department-Permiting Process.
- Promote an organized system of utility line locations that anticipates and allows access for maintenance and periodic update and replacement.
- Decrease visual clutter by encouraging underground utility placement.
- Integrate with roads and pedestrian walkways whenever practical; ensure proper screening section of equipment and refuse receptacles when integrated with pedestrian walkways.
- Plant material that will not interfere with overhead utility lines is to be selected; likewise, plants with roots that will not interfere with access and maintenance of utility lines.



Utility Setbacks

Utility Corridor Requirements

Utility repair work can be a major disruption to a site and warrants guidance. In general, surfaces are to be restored to previously existing conditions or better after a utility is installed or replaced.

For new utility lines and routes:

- Utilities should follow designated underground utility corridors whenever possible. Generally, these trenches follow road alignments except where existing utility distribution makes it impractical.
- Where possible, utilities should share common trenches.
- Utilities should be placed underground in the corridor in a predetermined order, both horizontally and vertically.
- Paving material should allow for easy access and should be easily replaceable.
- Utility corridors should avoid landscaped areas.

Utility work in existing landscapes is a more complex issue. For landscape/utility conflicts, existing trees are to be excavated, stored, and replanted where practical. Trees up to a 6"-inch caliper can be removed when dormant, stored in boxes, and replanted later. Trees require an investment of time and money to achieve a reasonable size. Removing and replacing a growing, transplantable tree with a younger tree is simply disposing of an asset and not paying for its full replacement value. Preserving an existing tree supports the LRDP goals of sustainable development.

Pavements are to be replaced in like kind or upgraded where older large exposed aggregate walks occur. Gravel surfaces are to be replaced, where damaged, with new gravel matching the existing type and depth.

Utility Appurtenance/Vehicular Access/Surface Clearances Required

Certain utility appurtenances need vehicular access and are outlined below:

- Electrical/Communication Manholes – provide 20'-feet of clear access around the manhole cover; if the manhole cover is in a planted area, expect that the plants will be subject to damage from vehicles and plan accordingly.
- Electrical transformers, switchgear, and boxes – provide screening when the site and budget allow.
- Inlets and Storm and Sanitary Sewer manholes.
- Valve Boxes.

Open Space

Open Space Management and Design Guidelines

Design: The guiding concept for open space design should be to establish open spaces with regional vegetation and traffic control measures in contrast to those used in more hardened and durable urban areas. Examples of design solutions that identify open space corridors are post-and-cable type traffic control

measures similar to those around the access road to the Explosive Components Facility (Building 905). These are simple measures which visually recede into the background landscape. Other examples might be unpaved trails along the top of an escarpment, with gates for security and emergency use only.

For projects in these open space areas, provide spatial articulation and implement the following:

- Traffic and access control: A major challenge in successfully managing open lands and native plant communities is vehicular access control. Open land access should be restricted by a post-and-cable system, a delineated network of roads and communication systems, and corporate policies to curtail travel through native or native-like areas without specific permission.
- Pedestrian access enhancements: Pedestrian use of open space lands should be restricted to trails, and access should be controlled by signs or other methods.
- Safety barriers: Certain areas in open spaces must remain off-limits (e.g., the centrifuge area in the Tijeras Arroyo escarpment, steep slopes). Such areas require a safety barrier suitable to an open space area.
- Screening: Where needed and practical, screening should be provided. Views to service areas and developed, unnatural areas are to be screened by landforms, native plantings, or other methods. Screening should also be used to provide noise control.
- Security: Within Limited Area clear zones, clearing/maintaining vegetation may be required.
- Wind protection/Glare and reflection reduction: Refuge areas from wind, glare, and reflection are to be included in open space planning.
- Ground plan stabilization: The Final Revegetation Action Plan for KAFB is an excellent reference for revegetation activities at KAFB.
- Wildlife: Preserve existing wildlife activities.

Management: A facet of open space management is control of invasive trees and plants. Where project opportunities arise, removal of Elms (Ulmus), Salt Cedars (Tamarix Chinensis), Trees-of-Heaven (Ailanthus), and other invasive shrubs and grasses is to be included. Using natural runoff to encourage and support

plants such as Desert Willows (Chilopsis Linearis) and native landscape helps create a more sustainable landscape.

A schedule of periodic clean-up, mowing, and monitoring of the irrigation systems is to be implemented as needed in these open space areas.

Vegetation management to remove temporary annual weeds such as kochia, goatheads, and similar temporary invaders should also be implemented. These areas should be restored by seeding with native grasses and shrubs.

Gateways & Approaches

Image

The Sandia New Mexico campus shall present its employees and visiting public with a positive first impression that complements the site's role as a world-class research and development institution. Architecture and movement through the campus are to create a unique character based on Sandia's history, industrial uses, topography, and views. Visual quality is achieved through a process of analysis, planning, design, and implementation. This process includes planning, compatible land use arrangements, performing site analyses that support appropriate site selection, and designing site layouts, architectural character, and landscape features that complement adjacent facilities. All entry zones should convey a sense of place by defining the following:

Clarity and Identity

When appropriate, Sandia will collaborate with the state, city, and Kirtland AFB to manage the progression of a visitor on the Sandia campus to a desired destination while maintaining a clear and separate identity from its KAFB neighbor.

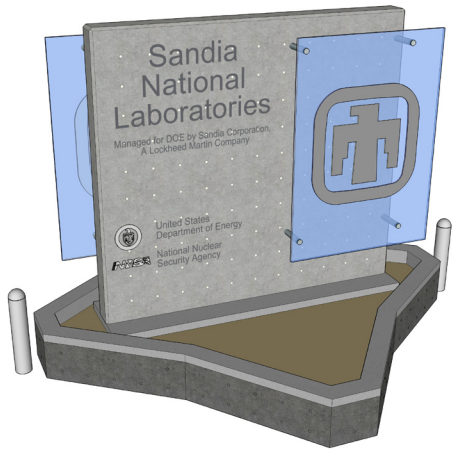
Building 800 Entry

A distinction is to be made between employee "front door" site entrances and visitor entrances. Historically, the gate entry at Eubank Boulevard has been considered an employee "front door," and the Wyoming gate entry is for visitors. As the movement of Sandia functions continues to expand to the southeast portion of the campus, the gate entry at Eubank Boulevard will become much more prominent as an arrival portal. Visitors should feel welcome and comfortable while finding their destination.

Visual Assets and Liabilities

Visual assets include the surrounding natural landscape and setting of the laboratories and some of the newer buildings such as the Microsystems and Engineering Sciences Applications (MESA) complex. Smaller visual assets are the brick buildings north of H Ave. Key visual liabilities include 50+ acres of barren areas, visual clutter from utility appurtenances that seem to be randomly attached to buildings for economic convenience, and the intense glare from lack of shade trees. As design guidance:

- Avoid more visual clutter by screening or better placement and siting;
- Increase shade elements to reduce glare;
- Increase restoration of ground planes to protected native grasslands where circulation and use indicate it to be the correct solution (not simply an inert ground plane of gravel);
- Increase visual access to the natural landscape beyond the laboratories.



SNL Site Sign

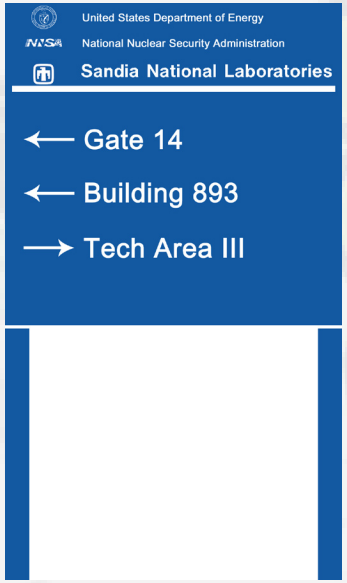
Monumental and Directional Signs for Gateways and Approaches

Coordinate with and use the SNL Sign Standard. Key site signs are required at 20th Street and F Avenue, Hardin and 9th Street, on F Avenue near Wyoming, and at other areas identified by SNL Systems Architects.

Sign Guidelines

All signs must follow the SNL Sign Standard and at a minimum must identify:

- Site Name
- Building Numbers
- Building Entries
- Parking Lots
- Designated Visitor Areas
- Security Signs (Limited Areas, Property Protection Areas, etc...)
- Use as needed in parking areas, roadways, circulation systems, plaza entries, etc.



SID-ES3 Sign

Circulation and Interaction

Roadway and Service Access Design Concepts

Vehicular Movement

At Sandia New Mexico, pedestrians take priority at all levels of transportation on the campus. Design for low vehicle speeds (15 mph in developed areas) discourages through traffic, which makes possible implementation of accessibility regulations into all aspects of site movement and parking. Ensure traffic volumes and speeds remain low over time. Roadway designs are to provide clear and safe vehicular pathways which include distinct and buffered pedestrian pathways. Use landscaping to provide a cohesive visual appearance and facilitate direct emergency access, while utilizing durable and maintainable materials.

See also Facilities Standards Design Manual, Roads Section at (http://www.sandia.gov/engstds/dsnmanual.html) for additional guidance for roads.

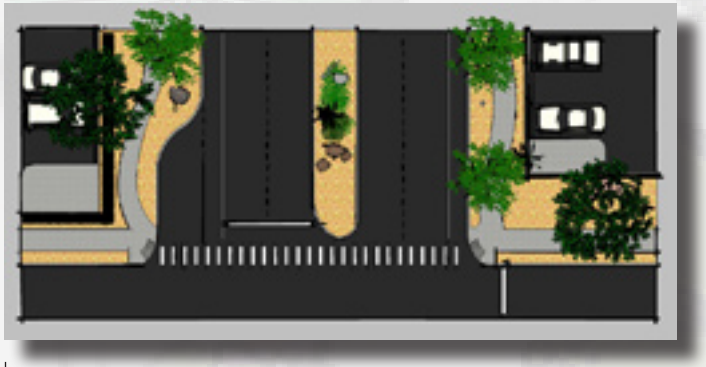
Primary and Secondary Roadway Types

Primary Four-Lane Roadway

Emergency and fire protection roadways uses are considered in both Primary and Secondary Requirements. These roads serve as the network connecting major activity centers and are continuous through-traffic alignments that are relatively straight or large-radii curvilinear to handle moderate to high speed traffic. Primary roads carry high traffic volumes into and around the campus. They include but are not limited to: Gibson Boulevard, Wyoming Boulevard, Eubank Boulevard, F Street, 20th Street, and Hardin Boulevard.

Secondary roads feed primary roads; they are access routes between large groups of buildings or test areas within the site. These roads provide the means of traffic movement between primary and tertiary roads. The roads are to be continuous through-traffic alignment, either straight or curvilinear, based on the desired design speed and topography. Secondary roads include, but are not limited to: G Avenue, H Avenue, M Avenue, 9th Street, 10th Street, 11th Street, 12th Street, and 14th Street. They are designed to allow comfortable travel at Technical Area selected speeds, and pedestrian zones are clearly segregated.

E-Z-Go carts may use primary and secondary roads where noted on the Cart map at (http://www-irn.sandia.gov/esh/se_programs/traffic_safety/docs/Cartmap.pdf).

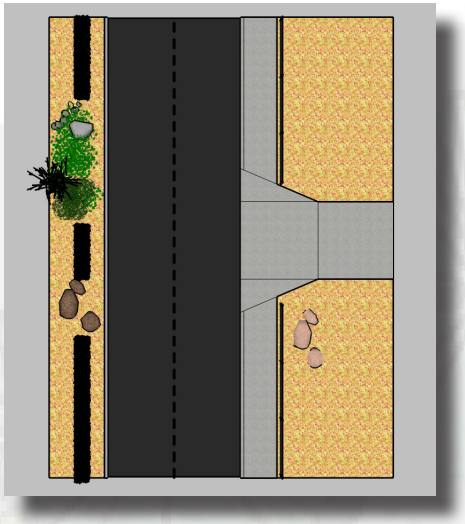


Primary Four-Lane Roadway

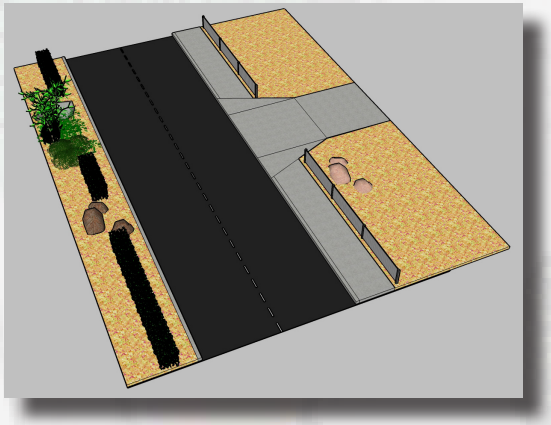
- For primary roads, provide two to four 12'-foot traffic lanes, turning lanes, and a 12'-foot minimum median separating the lanes of traffic when space is available. (Provide an additional 10'-foot wide landscaped median for four-lane traffic designs). A designated minimum 5'-foot wide bicycle lane should also be designed for both directions of travel.
- For secondary roads, design a two 12'-foot wide roadway, with an 8'-foot wide parking bay on one or both sides. The parking lane can also be used as a traffic lane during utility work.
- Evaluate use of bulb-outs at intersections but also recognize the need for large vehicle (AASHTO WB-50) turning radii and roadway drainage.
- Design streets to intersect at right angles as nearly as practical, consistent with topography and sound design.
- Intersections along arterial streets are to be minimized.
- Provide turn lanes at major intersections. If these turn lanes are meant to be free right turns (i.e., no stop needed), indicate the continuation of the bicycle lane with a sign posted before the turning bay indicating "Yield to Bicyclists." The sign on south 20th Street before the intersection at K Avenue is an example.
- Stop signs are appropriate at all intersections.
- Provide clear sight-lines at all intersections in accordance with AASHTO regulations. Provide two lanes for vehicle traffic and install stop signs at intersections. Stop signs control right-of-way and also control speeds. Use paving materials and visual clues that discourage speeding and signify pedestrian crossings.

Primary and Secondary Roadway Landscaping

- Provide street trees in a regular pattern, 30'-feet on-center, adjacent to Technical Areas and on major loop road systems.
- Provide natural/native landscaping in more remote and natural areas.
- Medians: Provide accent trees, ornamental shrubs, and ground cover adjacent to Technical Areas.
- Maintain a traffic view line of sight at street corners for traffic safety.



Tertiary Roadway Plan



Tertiary Roadway

- Illuminate streets and pedestrian pathways.
- Provide directional signs consistent with the SNL Sign Standard.

Tertiary Roadways

Tertiary roadways are service roads, bicycle lanes, and pedestrian pathways. Tertiary (service) roadways provide access to individual buildings or service areas within a Technical Area. Existing service roads include:

- K Street (west of 17th Street)
- 9th Street (north of H Street)
- 8th Street

Separate service and emergency traffic from other vehicular and pedestrian modes of traffic. In some cases, service/emergency access overlaps pedestrian pathways. Service roads that access service entrances and designated service zones for mechanical/electrical rooms (typically at the rear of a building) are to be accessible by service, logistics, maintenance, and emergency vehicles and be centralized to service multiple buildings whenever possible. When possible, provide off-street loading spaces for service vehicles.

Minimum Width of Tertiary Roadways:

- 24'-feet, with no parking on either side of roadway.
- 32'-feet, with parallel parking on one side of roadway.
- 36'-feet, with parallel parking on both sides of roadway.
- Design turning radii in accordance with AASHTO criteria for expected vehicle use.
- Use color integrated bollards to protect walls and maintain limited access, see SNL Standard

Specification 129300.

- The minimum width of fire lanes is 20'-feet according to Section 503.2 of the International Fire Code.
- Additional requirements for widths and proximities to buildings are listed in the International Fire Code (IFC) 2006 or latest edition.
- Provide curb cuts that are at least 2'-feet wider than secondary roads or fire lanes on each side of an intersection.
- Fire apparatus access roads 20'-26'-feet wide are to be posted on both sides as a fire lane.
- Fire apparatus access roads greater than 26'-32'-feet wide are to be posted on one side of the road as a fire lane.
- Provide a 16'-foot minimum vertical clearance above emergency access routes.
- Grades of roads, streets, and fire lanes should not exceed 4.5 percent; 1 to 3 percent downward slopes for 100'-feet from an intersection for secondary roads or fire lanes intersecting with a main road. Provide a minimum percentage slope to ensure drainage of the roadway and to prevent pooling of water.

Tertiary Roadway Landscaping

- Provide street trees on a regular pattern, 50'-feet on-center.
- Groundcover: Gravel mulch.
- Provide directional signs at intersections consistent with the SNL Sign Standard.
- Provide screening (if space is available) adjacent to parking lots, service yards, trash areas, storage yards, transformers, etc.
- Illuminate streets and pedestrian pathways.

Service Areas

Dumpsters are required to have a 90'-foot standoff if the dumpster is outside a Limited Area according to (http://www.irn.sandia.gov/corpdata/doe/prime/base_06.html); DOE M 470.4-1, Program Planning and Management, and repeated in Attachment 2, (https://www.directives.doe.gov/pdfs/doe/doetext/restrict/neword/470/m4704-1.pdf), in a DOE Security Condition 3 (SECON 3) implement Measure 14.

Bicycle Circulation Concepts

Provide connections to existing and future bikeways and bicycle lanes leading off-site. Consider shared bicycle and automobile lanes in remote areas or roads used exclusively for emergency and maintenance vehicles. Provide a minimum 5'-6'-foot wide bicycle lane on primary roadways in both directions of travel. On 15 mph secondary roadways, bicycles share the roadway according to (http://www-irn.sandia.gov/corpdata/esh-manuals/mn471001/s04k.htm#BICYCLES) and AASHTO Guide for Development of Bicycle Facilities .

Pedestrian Movement

Selected interior areas of Technical Area I are intended to be pedestrian-oriented. A system of sidewalks, malls, and plazas create interior circulation separate from vehicle and service traffic, with pedestrian amenities such as pedestrian-scale lighting, specialty paving, and landscaping. Designs are to have strict separation from vehicles, and pedestrian zones are clearly segregated. The general intent of the pedestrian mall and sidewalk guidelines is to:

- Encourage pedestrian access to all facilities.
- Provide a safe, pleasant, and accessible pedestrian route of travel within the Technical Areas.
- Separate, as practical, pedestrian traffic from vehicular modes of travel.
- Accommodate emergency, security, and maintenance vehicle access.

- Provide amenities such as seating and landscaping.
- Make all areas accessible in accordance with the ADA/ABA Accessibility Guidelines.

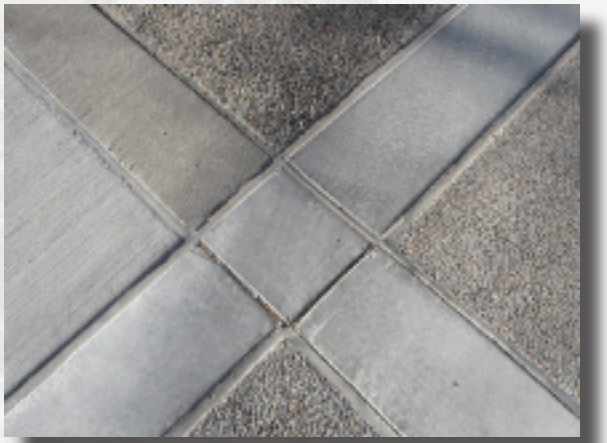
Plazas

Pedestrian plazas and malls are to provide a pleasant and safe way to travel from district to district and provide links to major activity areas, including open space. Plazas are to be strategically placed at or near major intersections to provide central, outdoor spaces for eating, meeting, formal events, and break areas. All plazas must adhere to emergency, security, and maintenance requirements. Size and location of plaza areas will vary. See the LRDP for examples of major and minor plazas.

810 Plaza

Plaza Paving Requirements

- Where plazas are used to meet the requirements of fire department apparatus access, they are to be considered fire lanes (minimum width of 20'-feet and thickness of 6"-inches) and must be designed accordingly.
- Concrete designs with a medium broom finish are to reduce the potential for slips, trips, and falls.
- Plazas are to be accessible in accordance with ADA/ABA Accessibility Guidelines.
- Plaza paving should be delineated by colorant added to the concrete.
- Lighting is be provided with consideration to pedestrian-scale lighting.
- Site furniture shall be integral to the design. Consider the use of fountains, amphitheaters, special seating, plantings, and shade structures, see SNL Standard Specification 129300.



810 Plaza Paving Pattern

Malls

Outdoor malls are to be designed and located to provide for activities. Malls can be located as a part of the primary entrance to a building. Malls are to be designed to be compatible with the architectural character of adjacent buildings. Patterning in paving can create visual interest along with the use of material variation and color. Bicycle dismount areas are to be provided when necessary to ensure pedestrian safety. All interior paths of travel are designed as a pedestrian-oriented area, and pedestrians have full right-of-way. Interlocking concrete pavers should be used in areas where frequent utility access is anticipated.

Mall

Mall Sidewalk Requirements

- All streets are to have a sidewalk which is located parallel to the roadway, with a minimum width of 6'-feet for secondary sidewalks; 8'-10'-foot widths are preferred.
- Broom finish is specified for all pavements. (See SNL Facilities Civil Standard Drawing #CP1008STD).
- Provide a minimum width of 20'-feet for mall sidewalks.
- All sidewalks, guardrails, handrails, and ramps are to be accessible in accordance with ADA/ABA Accessibility Guidelines.
- Signs are to be an integral part of the design; follow SNL Sign Standard.
- Provide shade trees at 16'-25'-feet on-center with accent trees; see tree/plant list for tree species.
- Provide rocks, grass, and shrubs for groundcover.
- Lighting is be provided with consideration to pedestrian-scale lighting.
- Site furniture shall be integral to the design; consider the use of fountains, amphitheaters, special seating, plantings, and shade structures, see SNL Standard Specification129300.

Acceptable Paving Materials

All paving materials must meet all current ADA/ABA Accessibility Guidelines.

- Existing Brick: Retain existing brick where possible.
- New Brick: New brick shall be compatible with existing brick. Brick are to be set on a sand bed over structural plant soil or compacted subgrades and set in a running bond pattern. The color should be compatible with the existing district color palette. Contact your assigned Systems Architect.
- Concrete Pavers: Pavers are to be used only as an accent element in a streetscape, entry areas, or at major plaza spaces. Pavers are not allowed for use in high-traffic areas (primary, secondary, tertiary walkways), including picnic areas and bicycle rack placements. Pavers are to be set on sand beds over structural soil or compacted sub-grades. The color must maintain the visual continuity of the district color palette. Contact your assigned Systems Architect.
- Stamped Concrete: Concrete may be used with a variety of textures and colors. Heavily textured, stamped concrete to achieve a "rumble" effect are to be used at approaching intersections to slow down traffic and indicate a pedestrian zone. The finish is to be a medium broom finish with a random texture.

Stamped Concrete

Transit-Friendly Design

Electric Carts

Cart parking is to be provided to serve a building or groups of buildings. Carts are to have access to primary and secondary roads. Access to parking is not to be routed through heavy-traffic or ambiguous service routes.

Suggested Paving Materials

	Entry Zones			Roadways			Parking Lots		Service Access		Pedestrian Mall		Plaza		Building Entry		Edges/ Fences		Utility Corridors
	Roadway	Bike Path	Walk	Roadway	Bike Path	Walk	Parking Area	Walk	Roadway	Walk	Service/ Emergency	Walk	Major Plaza	Minor Plaza	Entry Paving	Bicycle Parking	Bike Path	Walk	Utilities
Crusher Fines									●								●	●	
Asphalt	●	●		●	●		●		●	●							●	●	●
Broom Finish Concrete		●	●		●	●		●		●		●	●	●	●	●		●	
Exposed Aggregate												●	●						
Interlocking Concrete Pavers											●				●				●
Concrete or Masonry Pavers															●				
Specialty Paving Compacted Gravel															●				

Suggested Paving Materials

- Parking for small vehicles (electric or gas carts) and bicycles shall be designated near buildings, and power outlets must be provided for electric carts.
- Photovoltaic charging stations.
- Cord reel design, see SNL standard drawing.

Bus Routes

The Sandia campus has numerous bus routes provided by the City of Albuquerque Transit services (http://www.cabq.gov/transit/tran.html).

Provide street design and turning radii to accommodate vehicle sizes from cars to buses in accordance with the MUTCD. Accommodate route changes as needed during design.

Bicycle Racks

Bicycle rack placements are to be designed with adequate bicycle parking in the right locations. Placement is to be near building entrances but must not interfere with building access. Racks should be located in an area that offers a certain amount of shade for the bicycles. Concrete or asphalt is the preferred material for placement of bicycle racks.

Fixed Bicycle Racks: Are to be placed at a minimum distance of 20'-feet from security fencing. Bicycle rack quantities are determined by building occupancies and projected use. See SNL Standard Specification 129300.

Campus Bus Stops/Shade Structures

Shelters are to be provided for passengers waiting for buses or in areas where people congregate to socialize or eat such as in courtyards or picnic areas.

Clearly designate bus stops (e.g., City of Albuquerque Bus Shelter "C"). Design turning radii in accordance with AASHTO criteria for buses. See SNL Standard Specification 129300. Design with consideration to the following:

- Gathering Points
- Wind protection
- Express "Science and Technology" – Photovoltaics and Metals

Bus Shelter

Emergency Response Considerations

- Sandia operates a large mobile generator at various times. If a parking area is adjacent to the substation (e.g., Sub-station #31), provide a roadway paving section under the expected route for the emergency generator.
- Turning Movements – coordinate turning radii for the generator trailer with the electrical operations group in accordance with the MUTCD guidelines, AASHTO or Architectural Graphic Standards.
- Provide screening when budget and site allow.

Bus Shelter

Emergency Response and Fire Routes

- Surface treatments – concrete, minimum 4000 psi, etc.
- Widths and heights – 20'-foot minimum width; 16'-foot minimum clearance height.

Parking

Parking Lot Design

Parking Requirements

Bike rack outside of Building 880

Reduce on-street parking. Small, interconnected parking lots are preferred to vast parking lots. Locate employee parking lots on the periphery of limited-access areas to reduce vehicular traffic within the technical areas and to prevent vehicle/pedestrian conflict. Convenient connections are to be provided from parking lots to pedestrian walkways and adjacent buildings. Landscaping is to be provided at on-grade lots to mitigate heat and glare, see landscaping section. Incorporate buffer areas around parking lots with tree massing to decrease visual impact and clutter and glare and provide shade, screen walls, berms (designed and planted to contour with the surroundings to appear natural), lighting and site furniture. Provide sufficient trees to ensure that at least 30% of parking areas are shaded within 5 years of project completion. Incorporate storm water management into the parking area design. Parking designations are prioritized as follows: 1. Handicapped, 2. Government, 3. Carpool/Motorcycle/Cart, 4. Privately owned vehicles.

See also Facilities Design Standards, Manual Parking Section, (http://www.sandia.gov/engstds/dsnmanual.html) for additional parking guidance.

- High-use parking lots are to be paved with concrete or asphalt.
- Maintain a minimum distance of 20'-feet on each side of a road between parking areas, fences, and other site improvements for landscape screening and walkways.
- Maintain a minimum distance of 90'-feet between buildings and parking areas, in accordance with (https://www.directives.doe.gov/pdfs/doe/doetext/restrict/neword/470/m4704-1.pdf).
- Provide driveways or parking lot entries a minimum of 100'-feet apart, aligned on opposite sides of a road when possible.
- Minimize driveways or parking lot entries on primary roadways.

- Locate the intersections of driveways no less than 150'-feet from a roadway intersection.
- Striping: Vehicle stop lines and pedestrian crosswalks should be striped in a color that contrasts with the pavement color.
- Motorcycle parking areas should include a ¼"-inch thick metal diamond plate to ensure kickstands do not sink into the asphalt. See SNL Standard drawing #CP5006.
- Parking spaces shall be designated by signs, see SNL Sign Standard.

UNM Parking Structure

Parking Structures/Parking Lots

Sufficient parking spaces are to be provided by enforcement of parking regulations and future plans for a parking structure, see LRDP. The parking structures must not diminish the architectural quality of the campus and should be carefully proportioned and located. Public access to parking structures should be through elevators and stair towers with an increased level of visual access for reasons of security and comfort. Unscreened parking on the roof is not permissible if the roof is visible from the campus. Building materials may include poured-in-place concrete or pre-cast concrete. For employee parking, evaluate the likely impact to current parking facility use. If a determination is made to add additional parking, contact SNL Strategic Planning. Projects are to absorb the cost of building the necessary parking.

Parking areas are to be permanently paved with asphalt using concrete curbs and gutters at the perimeter of permanent parking areas.

- One-way, 60-degree orientation from the curb line is preferred in employee parking lots.
- Provide a minimum 24'-foot wide driveway for two-way traffic in parking lots. Use two, 12'-foot wide lanes with a 12'-foot center median in major new parking lots.
- Setbacks outside limited areas must comply with SNL Physical Security requirements in accordance with (http://www.irn.sandia.gov/corpdata/doe/prime/base_06.html); DOE M 470.4-1, Program Planning and Management, and repeated in Attachment 2, (https://www.directives.doe.gov/pdfs/doe/doetext/restrict/neword/470/m4704-1.pdf) to DOE, in a DOE Security Condition 3 (SECON 3) that implements Measure 14.

UNM Parking Structure

- Provide driveways with sufficient visibility for motorists for safe entrance and exit in accordance with AASHTO guidelines for intersection visibility.
- Provide a minimum 8'-foot wide sidewalk within or adjacent to parking lots.
- Provide perimeter screen plantings, 60-percent opaque metal panel screen fences, or walls to effectively control adverse visual impacts of parking lots as well as provide windbreaks or shade.
- Drain parking lots into small localized landscape areas, tree pits, planters, or other runoff harvests. Avoid draining into large basins and storm drains.

Type of Vehicle	Stall Width (feet)	Stall Length (feet)
Government Vehicles	9	20
Handicap Vehicle Parking	9	20
Handicap Accessible Parking	15	12
Electric/ EZ-GO Carts	9	6
Carpool	9	20
Motorcycles	4	8
Passenger Vehicles	9	20
Bicycles	2	6

Stall Angle: 90 degrees is preferred;
for all other stall angles, contact SNL Traffic ===

Parking Space Requirements

Parking Lots

- Minimize stormwater runoff and protect water and air quality. Utilize natural topography to drain surface stormwater into storm drains (where available), landscape areas, tree pits, or planters or use large collection basins for harvesting runoff.
- Provide minimum 5'-foot wide end-of-row islands in large parking areas to define vehicular circulation.
- Parking lot islands: Provide one deciduous tree for every eight spaces.
- Screen parking areas from surrounding buildings and roadways with planted earth berms, trees, shrubs and/or walls to soften the visual expanse of the parking lot. Do not obstruct sight lines as defined by clear-sight-triangle criteria.
- Design parking lots to preserve significant existing trees.
- Provide minimum 20'-foot wide parking medians in new lots for every six parking rows.
- Setbacks outside limited areas must comply with SNL Physical Security requirements in accordance with (http://www.irn.sandia.gov/corpdata/doe/prime/base_06.html to DOE); DOE M 470.4-1, Program Planning and Management, and repeated in Attachment 2, (https://www.directives.doe.gov/pdfs/doe/doetext/restrict/neword/470/m4704-1.pdf) to DOE, in a DOE Security Condition 3 (SECON 3) that implements Measure 14.

Total Number of Parking Spaces Provided in Parking Facility	Minimum Number of Required Handicapped Parking Spaces
10 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2 percent of total
1001 and over	20, plus 1 for each 100 (or fraction thereof) over 1000

Parking Space Requirements

Public Spaces

Hierarchy of Spaces

Grandness

Sandia has few grand exterior places. The Innovation Corridor is the largest attempt at a grand place, as is CNSAC Plaza. The typical site design has been large multi-story buildings with surrounding yards and sidewalks, then streets. Grandness is created from building wall mass that contains spaces. The 11th Street

Parking Lot Design

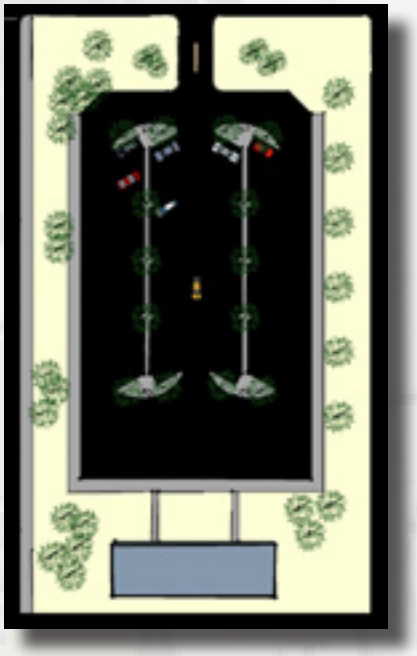
Mall approaches grandness, simply because of its strength as a design element. This approximate grandness comes from its function as a link between two population hubs: Buildings 890 and 891 and the complex of Buildings 821, 822, 823. Smaller buildings serve as "shops" along the way between two major anchors, similar to a suburban shopping mall. Wherever opportunities arise for developing grandness, such as the Gateway Center, ideas are to be explored and developed.

Communal Spaces

Communal spaces are areas such as activity nodes, building entries, and other elaborate locations. Reinforcing the appearance of such spaces and creating more of them will enrich the facility.

Personal Spaces

Personal spaces such as outdoor lunch areas, atriums, exterior break areas, exterior fire congregation areas, and similar spaces are important and need to be continued in the menu of design opportunities. Because these types of spaces receive light use, quantities of such spaces are not necessary.



Parking Lot Design

Focal Points and Activity Nodes

Generally, Sandia has few key and primary reference points to serve as guideposts. Key focal points do not have strong and logical termini. An example of this phenomenon is found at either end of the 11th Street Mall. The eye is focused down a walk under an arrangement of trees; however, end points are unacknowledged. Other missing linear focal points include various primary streets such as H Avenue or 9th Street—their termini are simply guard houses. Even grander circulation areas like Hardin Boulevard have no major termini and minimal framing. The MESA complex is not contained on either end; however, it is bisected by a gate which serves as a modest focal point. Where possible, Sandia should capture views with logical and appropriate terminal view points.

As a facility where the primary focus is interior work with little need for exterior congregation areas, activity nodes have not been key drivers of design. Exceptions to this are the CNSAC Plaza, the area south of Building 861 (Thunderbird Cafeteria), the area north of Building 822, and some parts of the MESA complex. Entries to buildings can serve as informal activity nodes, such as within the MESA complex, east of Building 891, and the entry to Building 701. Potential areas for increased activity without creating grander and larger plazas are at intersections such as those southeast of Building 880 at 14th Street and L Avenue, 14th Street at M Avenue, and areas along the north-south walk in Technical Area IV. Designs should evaluate opportunities for creating informal activity nodes. Designs for activity nodes should reflect regional climatic issues and include shade devices and shelters from wind.

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Landmarks and Reference Points

Landmarks and reference points are typically taller buildings and larger landscape elements. Directional landmarks include the complex of Buildings 800 and 802, Buildings 890 and 891, Buildings 821 and 823, Building 701, and the MESA complex. Non-structures that serve as landmarks include the parking lot at Building 887, the parking band south of Building 898 and Buildings 821 and 823, and the Hardin Boulevard/20th Street system, which visually appears to be a continuum. In Technical Area IV, the taller buildings serve as landmarks with a western belt of parking. Landmarks internal to Technical Area IV tend to disappear, as the area is a cluttered mixture of structures. Designs should reinforce apparent systems, landmarks, and reference points.

Landscape Architecture

Generally, the highest intensity and most formal application of landscaping should be in areas of greatest visibility and pedestrian use (e.g., site entrances, major roadways, and pedestrian malls and plazas). In areas with little pedestrian use and low visibility, landscape features are to be applied in a looser more natural manner (e.g., perimeter roadways, service roads, and remote perimeters).

Design and installation should be functional, safe, efficient, economical, and aesthetically pleasing. The designer must strive for a quality system requiring minimal maintenance while providing a unified, visual image. Features are to be applied to each site element in accordance with the activity within the area. The designer must also strive to reduce initial amounts of stormwater runoff, thus improving water quality and increasing visual appeal. Landscaping must not provide an avenue for unauthorized access to a secured area (i.e., arranged so as not to serve as a climbing aid , or impede visual observation of security area boundaries). A clear zone must be provided along each side of security fences to facilitate intrusion detection and assessment.

This section describes campus-wide applications of:

- Existing Conditions
- Low Maintenance Plants
- Water Conservation
- Contrast: Plant material should be selected and placed to achieve differences in size and shape that add visual interest to the environment.
- Rhythm: Repetition of a single plant or a mass of plants provides visual interest, unity, and formality to a landscape.
- Color and Texture: Plants should be selected and placed to provide visual interest and should be classified as either warm (red, orange, yellow) or cool (violet, blue, green).
- Simplicity: Landscape plans should be simple in form to minimize maintenance.
- Spatial Articulation: Plants should be selected and placed to create enclosed spaces or to separate spaces from one another. They can be used to direct pedestrian traffic by visually defining and reinforcing patterns of movement.

MESA Water Feature

Plantings

There are numerous ornamental and native plants in the Albuquerque, NM area that can cause allergic reactions. When selecting plants, minimize the use or placement of major allergenic types in areas of high public use. Prior to plant installation, proper plant selection and layout are to be coordinated on the site with the SNL System Architect and Gardener. For a list of unacceptable plants, see LRDP Appendix Landscape Guidelines. See also Facilities Design Standards Manual Landscape, Section 3.5.7, Landscape for additional Landscape guidance.

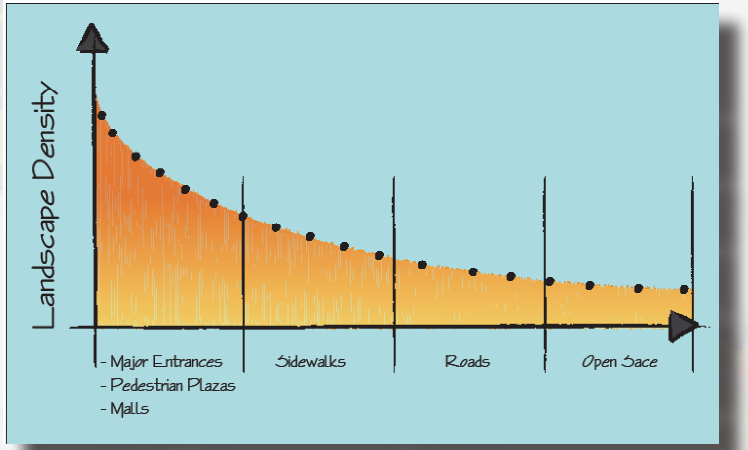
- Vegetation in building courtyards should be relatively dense with a "formal" appearance. Such plantings may require a level of maintenance that includes pruning, mowing, trash removal, sweeping, fertilizing, and irrigation.
- Place landscaping so it will not interfere with maintenance, repair activities, or security area boundaries. Provide as much separation as possible from utilities to minimize the potential for interference.
- Be aware of additional maintenance that may be required because of windblown trash collecting in shrubs. Where possible, provide curbs and walls for shrub planters.

Landscapes by Type

There are various landscape types at Sandia. These are noted below with desired points and places of use.

Barren Areas/Sterilized Ground: Large amounts of barren and herbicide-treated areas are a significant issue. Large amounts of high-visibility land along external circulation corridors create an exceedingly unsightly image. Any projects adjacent to such areas should work to reduce and eliminate this blight by intensive reseeding. In this case, reseeding does not imply the use of standard state roadside mixes but rather larger seed quantities, better soil preparation, and small berms on 1'-foot contours that impede runoff and create subcells that act as temporary irrigation systems.

A risk to avoid is the creation of habitat for prairie dogs. To preclude this, use taller



Landscape Density Graph

plants, shrubs, buried plastic fencing, and raptor roosts. Further information on reseeding is found in the 20th Street Concept Plan (https://wfsprod01.sandia.gov/intradoc-cgi/idc_cgi_isapi.dll?IdcService=COLLECTION_GET_FILE&dID=607808&dDocName=WFS433337).

Campus Site Furniture

Seating, trash receptacles, and tables can serve as expressive elements while maintaining the consistency of the Sandia campus. The site furniture guidelines promote a consistent and coordinated style and color within a set, geographic area that evoke an image of "science and technology." Site furniture should be aranged to allow emergency and fire department access to buildings, fire hydrants, and connections.

Objects such as trash containers, newspaper boxes, crates, etc., shall be placed away from all facilities, particularly buildings of a sensitive or prestigious nature. Per (http://www.irn.sandia.gov/corpdata/doe/prime/base_06.html); DOE M 470.4-1, Program Planning and Management, and in Attachment 2, Part 1, Section B e(3)(d), (https://www.directives.doe.gov/pdfs/doe/doetext/restrict/neword/470/m4704-1.pdf), in a DOE Security Condition 3 (SECON 3) implement Measure 14 which states:

Planters

Building 701 Landscaping

Can be designed to contribute to the character of the campus and provide the proper security requirements, see SNL Standard Specification 129300.

Shade Structures

- Provide shade structures for shelter from the heat and glare of the sun. These structures may be used to define building entry plazas, outdoor spaces, and bus shelters.
- Specify modular structures easily adapted to several different uses and sufficiently constructed to resist local wind loads.
- Choose colors compatible with existing or new buildings. Consult the assigned Systems

Architect for district information. Finish colors should be semi-flat to minimize glare and remain cool to the touch in direct sunlight.

- Locate shade structures on a concrete surface.
- Locate shade structures where they do not compete with existing or newly planted trees. Temporary shade structures may be located next to newly planted trees and removed as the trees mature.

Site Furniture

Benches/Tables

Place benches and tables on concrete pads with concrete or asphalt walkways leading to general use sidewalks. See SNL Standard Specification 129300.

- Provide handicap access to at least one side of tables where possible and practical.
- Place picnic tables in shady locations wherever possible.
- Installations must follow ADA/ABA Accessibility Guidelines.

Metal Tree Grates

Use of tree grates is to be avoided if possible; however, for manufacturer specifications, see SNL Standard Specification 129300.

Trash Dumpsters

Garbage dumpsters are to be located in areas enclosed by walls or plant materials that screen the receptacles but allow access for garbage collection. Trash containers/dumpsters, bottle storage, recycling bins, and other service-related items in designated service areas or approved side yards must adhere to the following design criteria:

- Minimum space allowance for a dumpster is 142 square feet.

Site Furniture

Sceen Wall for Electrical Boxes

Screen Wall for Trash Dumpsters

- All major visible mechanical and electrical equipment, as well as any trash and recycle containers, are to be screened from pedestrian malls or walkways.
- Screen finishes must be compatible with adjacent buildings; contact the assigned SNL Systems Architect.
- Allow a minimum of 12'-feet for docking and service turnaround.
- Outside limited areas, locate dumpsters 90'-feet from buildings.

Trash Receptacles

Trash receptacles are to be located wherever people walk or congregate. Receptacles should be located along major walkways and at all building entrances, seating areas and vending machines. Place trash receptacles away from building entrances with a style that matches the architecture. See SNL Standard Specification 129300.

- Outside limited areas, locate trash receptacles 90'-feet from buildings.

Kiosks

A long-term goal for signage is to incorporate digital kiosks with touch-sensitive LCD displys that can display campus maps and changing campus information. The kiosks are to help visitors find their destinations more quickly as well as help employees and contractors stay informed of activities. Kiosks are to be provided as information centers in areas of high pedestrian traffic. A standard kiosk design should be selected for sitewide utilization.

Flagpoles

A standard design flagpole shall be utilized throughout the site. The number and locations of flags are limited to prevent proliferation of flags.

- Standard flagpole height shall be 25'-feet.
- Maintenance of placed flags is to be coordinated with SNL ProForce to ensure proper lighting, etiquette and replacement.

Screen/Directional Walls

Provide screening around unattractive site elements and visual clutter. Other uses for screening include: security, boundary definitions, wind breaks, pedestrian/vehicular control, retaining soil, and hiding or enhancing views. Screen walls may be made of metal with an industrial look or CMU block with a cementitious coating, if adjacent to a cementitious-coated building. Colors should blend with the building or adjacent materials; coordinate screening installation with the assigned SNL Systems Architect. The height of directional walls is generally to be 6'-feet but may be adjusted as indicated by site conditions or visibility requirements.

Fine Art Opportunities

Site designers should consider opportunities for incorporating fine art into plazas and intermediate spaces throughout the campus. Sandia campus pedestrian emphasis, history, and mission offer numerous possibilities for art.

- Art should be integrated into the design of the campus and should respond to surface treatments, landscaping, and site furnishings.
- Art should capture the Sandia industrial spirit and nature of the work being performed.
- Art should create connections to surroundings and the districts in which it resides.

Building 880 South Parking Lot Screen Wall

Safety & Security

Site Security

Required security and limited access areas are to be maintained. As much as possible, security perimeters are to be aesthetically integrated into the overall site development planning. Personal security is to be promoted by providing well-lit, "defensible-space" sites and building designs. Respecting and reinforcing required security and safety areas through safe movement of pedestrians, bicycles, and vehicles, must be accomplished.

Safety Zones

Safety zones are established to protect site populations from hazards. These zones recognize past and current activities, as well as desired long-term site conversion. In general, safety zones seek to place hazardous activities away from site populations.

Strategic Planning maintains a GIS file of Hazard Zones in (pwdesc://Sandia/Documents/FGIS/Geographics Maps/Planning). This and other maps are to be consulted for any building as part of the Site Selection Process. Items to consider include:

Gate 4 Entrance

- Consult with the SNL Building Operations Team and Strategic Planning for further site-specific knowledge (e.g., SF6 and hydrogen tanks at Building 858 N/S). There is separation guidance for people and hazardous equipment, ES&H, DOE STD 1021, PC-2.
- Field hazards exist around some Property Protection Areas, such as the Building 858 complex. Such hazards are to be evaluated prior to working near these facilities.
- "Exclusion During Tests" zones exist, such as Building 970 in Technical Area IV. Contact the Operations

Tech and Customer Operations Team if working around such an area.

- Various other items are noted in the Hazards GIS file.
- Building height limits.
- LAZAP operational limts for its laser.
- Satellite dishes south of Building 855.
- Satellite dishes south of Building 856.
- Hydrogen tanks (at Building 858EF) and pertinent restrictions, if any.
- Satellite dishes south of Building 965/north of Building 970.
- Department of Defense, 148'-foot standoff at the KAFB and DOE boundary along the extended Eubank alignment.
- Other items, to be determined.

Site Surety Design

As general guidance, though not required, improvements outside limited areas should follow the guidance in Appendix C as shown in UFC 4-010-01, Unified Facilities Criteria, DoD Minimum Antiterrorism Guidelines, latest version.

- Protection
- Safety
- Creating assurances

Gate 4 Security Signage

- Integral, not an 'add-on'

Fences and Gates

The use of alternate security fencing to provide a more welcoming atmosphere (e.g., masonry walls or metal railings) instead of chain link fencing at major pedestrian gateways is encouraged, but must be coordinated and approved by Physical Security. Locate fencing to allow fire department access and fire hose placement. See also Facilities Design Standards Manual Fencing Section (www.sandia.gov/engstds/dsnmanual.html) for additional fencing guidance.

There are four categories of fencing/screening (materials which require minimal maintenance are preferred):

- Limited Area Access (secured or classified)/Higher Security Areas
- Property Protection Areas
- Visual/Screen Walls
- Safety/Hazardous

Limited Area /Property Protection Area

The first two types of fencing are considered security fencing for security purposes. Such fences keep sites secure from intruders and must be easily patrolled and maintained. They must be a minimum of 8'-feet high and meet the requirements of DOE Physical Protection Manual 470.4-2: (https://www.directives.doe.gov/pdfs/doe/doetext/restrict/neword/470/m4704-2.pdf) and Chapter 9, S&S Man 011, Physical Security Manual, (http://www-irn.sandia.gov/security/c_docs/man/man_011/man_011.pdf). Maintain a 20'-foot wide clear zone on both sides of the fence for surveillance.

Whenever Technical Area boundaries are modified, new fence is installed, or screening and wall modifications occur, coordinate with the SNL Physical Security Department.

Visual/Safety Screen Walls

These types of fences are used to screen unattractive areas and protect personnel from hazards. Use screening to mitigate areas of poor visual quality while maintaining security needs. Plantings can also be used for screening; however, fixed and more opaque barriers are preferred. Storage yards, maintenance yards, delivery areas, outside testing and equipment storage areas, and building mechanical system equipment should be screened. Equipment screens are to be designed to allow ventilation of equipment. If in a Limited Area, maintain a 20'-foot wide clear zone on both sides of a fence for surveillance. Design screen walls to be similar in style with existing materials; heights depend on the items to be screened. Walls are to be designed and located to be functional while maintaining harmony with the character and appearance of the setting. The materials, color, and texture for walls are to be compatible with those recommended for buildings. Coordinate with the assigned SNL System Architect.

MESA Boulders

Gate Design

The design of Limited Area and Property Protection Area gates has been standardized for turnstiles, allowing for a consistent and integral appearance across the Sandia campus. Gate design should match the style of Gate #25 south of Building 898 and the new MESA complex gates. Gates are to be of steel; the use of chain link gates is discouraged except when they are part of a chain link fence. The use of metal, plastic, or wood slats in existing chain link fences is not permitted. Integrate fencing with buildings around visually prominent site areas. Design walls to match building colors and textures and/or use buildings as part of

a security perimeter. The design of gates is to be consistent with a common look and feel that adheres to the following:

- The height of the gate structure (canopy and columns) is to be consistent with the existing Gate #25.
- Structural columns are to extend above the elevation of the canopy and support the canopy with stainless steel rods.
- The horizontal canopy and vertical structural elements of the gate are to be blue in color (Pantone PMS 280-BLUE).
- Support and trim elements below the canopy line are to be gray, Sherwin Williams Online-SW 7072. Turnstiles are to be consistent with this gray color.
- Translucent transom glass panels are to be used as accent elements above turnstiles.
- Signs designating the gate number are required; use SID-ES10 from the SNL Sign Standard (http://www.sandia.gov/engstds/DsnManuals/Other/Sign_Std_0107.pdf).
- The use of a vertical element (e.g., an architectural spire or tower) is required as a method for way-finding. A tower element is the preferred method for way-finding, if budget allows or if surrounding buildings impede proper view of a gate.
- Design gate in a manner to prevent using any part of the gate as a climbing aid to bypass the security area boundary.

Gate 27 Entrance

Gate Numbering Plan

- Technical Area I-(http://www-irn.sandia.gov/gis/area1gates.pdf).
- Technical Area II and IV-(http://www-irn.sandia.gov/gis/990108.pdf).
- Technical Area III
- Technical Area V

Bollards

Bollards are used to separate vehicular and pedestrian traffic, to direct access, or as decorative elements in pedestrian-only zones. Bollards may be used along streets which do not have proper curbs and in areas where driving or parking on pedestrian zones is discouraged.

Security Bollards

Breakaway Bollards

PVC Bollards: To discourage vehicular traffic on pedestrian walkways, provide white, PVC bollards that are removable and can break away for emergency/service vehicle access. Bollards are to be placed linearly no more than 4'-5'-feet apart. See SNL Standard Specification 129300.

Fixed/Removable Bollards

Metal Bollards: Locate removable, metal bollards at pedestrian entries that are not used for emergency access but where service access is required.

Use 6"-inch, impact-resistant, fixed, metal bollards at transformers, and around other equipment. Paint according to the designated district color scheme, contact the assigned SNL Systems Architect. Bollards are to be placed linearly no more than 4'-5'-feet apart. See SNL Standard Specification 129300.

Security Bollards

Fixed Security Bollards

Bollards are to be placed linearly no more than 4'-5'-feet apart. See SNL Standard Specification 129300.

Post-and-Cable on Unpaved Roads

Provide post-and cable-systems in accordance with Standard Drawing #CJ1003. Paint posts black, Sherwin Williams Domino SW6989. In high-visibility areas use 2"-inch square steel or aluminum tubing.

Exterior Mobility Control and Illumination

Lighting

See Facilities Design Standards Manual, Lighting Section (http://www.sandia.gov/engstds/dsnmanual.html) for a general overview of exterior lighting design.

Photovoltaic Lighting in Building 800 Parking Lot

Parking Lot fixtures

Lighting along the traffic circulation system is to be used not only for public safety but also for aesthetic appeal. Lighting is intended to support a safe, attractive surrounding and create a consistent appearance along primary pathways and roadways. Lighting is to be organized and provide enough illumination to create a safe atmosphere while complying with the New Mexico State Law, Chapter 74 - Environmental Improvement, Night Sky Protection Act (NMSA 1978, 74-12-1 to 74-12-10; http://law.justia.com/newmexico/codes/nmrc/jd_ch74art12-1b117.html). New light fixtures are to match existing fixtures and coordinate with the district in which they are placed. Pedestrian-scale lighting is to be used in mall and plaza areas.

Pole-mounted exterior lights are as to be as follows:

- Pole-Mounted Fixtures: 20'-40'-feet high in parking lots and roadways, 16'-feet on walkways, on tapered round steel poles designed to withstand extreme (110 mph) wind loads. Use "cut-off" type fixtures (i.e., ones that reflect light downward and out, rather than upward), box-type, similar to existing fixtures used in the M Street parking lot. See Exterior Lighting Units, SNL Standard Specification 16521,(http://www.sandia.gov/engstds/ConstSpecs/Div_16/16521_

Exterior_Lighting_Units_1206.pdf).

- Use color-corrected, high-pressure sodium lamps for exterior lighting.
- Provide for turning exterior lights on/off using a central timer, photocells, and/or motion sensors.
- Spacing may range from 40'-60'-feet on center and should be coordinated with tree layouts (when provided).
- Recommended lighting levels and measurement procedures are described in the IESNA HB-9-2000, IESNA Lighting Handbook, Illuminating Engineering Society of North America (http://www.iesna.org/).
- For security purposes, light poles can not be placed within the fence clear zone.

Alternative Lighting Design: Recommend using PV lighting, or solar shaded parking at distant parking to encourage walking.

Building Light Fixtures

- Wall fixtures attached to buildings and at entrances are to be compatible with Architectural style and security requirements.
- Use motion detectors on lights at entries with infrequent night time use.
- Where lighting is provided for security reasons, coordinate lighting levels and locations with Sandia Security personnel and the IESNA Handbook.
- Use down-lighting to accent signs and other landscape features in primary areas with night use.
- Keep light fixtures in planting areas a minimum distance of 1'-foot from the edge of paving. In walls or raised planters, use wall lights.

Sustainability

Shading

Building shading should be accomplished within the architectural vocabulary. Passive solar shading is useful for conserving energy, animates buildings and public spaces, and creates additional design opportunities (e.g., a deep-set window shaded by the building frame or by the addition of sunscreens). Sunscreen frames and supports should be metal and finished with a low-maintenance coating.

Water Efficiency

Water use reduction and irrigation efficiency – limit or eliminate the use of potable water for landscape irrigation. Reduce the volume and slow the flow of storm water runoff through the landscape with vegetated swales and sequences of check dams and catchments, cisterns and water collection points in parking lots.

Landscape

Erosion and sediment control. Reduce site disturbance and/or restore damaged areas. Choose landscape which reduce the heat island effect. Choose landscaping that is compatible with New Mexico's climate.

Materials

Use durable, recyclable materials or materials made from recycled content or locally produced.

Indoor Air Quality

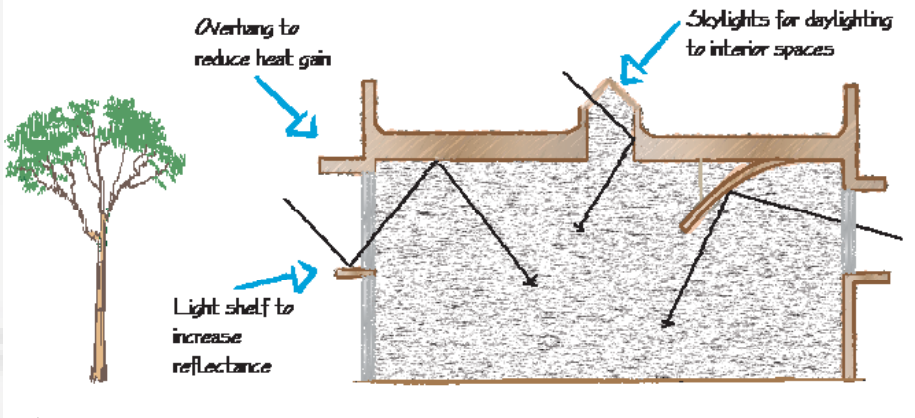
Indoor chemical and pollutant source control. Use maerials which enhance IAQ and contribute to the comfort and wellbeing of occupants.

Sustainable Energy

The Sandia EMT recommends, when funding is available, to implement on-site renewables such as the Building 833 Building Integrated Photovoltaics (BIPV).

Daylight

Using daylight from windows, clerestories, skylights, atriums, etc., is encouraged to reduce artificial lighting and increase user satisfaction. Skylights and atriums should allow narrow building footprints to be naturally lit. Windows close to the ceiling are encouraged to allow greater penetration of daylight. Interior offices should incorporate transoms and vision lights to allow light infiltration into deeper spaces.



Daylighting Section

Uncontrolled use of daylight can lead to user discomfort and increase mechanical cooling requirements. Buildings should incorporate appropriate shading devices over windows and entryways. Roof overhangs, recessed windows, sunshades, and arcades are all devices which can be used to create shade on the face of a building. Automated, motion-sensor or user-controlled interior lighting, either natural or artificial, should be provided to maintain user comfort and reduce energy costs.

Orientation

The natural setting of the site, its contours and vegetation, shall be viewed as assets to be preserved and woven into the design as much as possible. For the Albuquerque climate, buildings oriented with the longitudinal axis of the building in the east/west direction will typically have lower energy costs than buildings oriented with the longitudinal axis of the building in the north/south direction.

Sun Shade on Building 858EL

CHAPTER 3: BUILDING DESIGN GUIDELINES

Sandia National Laboratories must maintain a distinct and separate identity from Kirtland Air Force Base. This section provides architects and engineers a basis for evaluating proposed designs and resolving project-specific design problems. It also defines a palette for future architectural design at SNL/NM and promotes a unique architectural character for campus areas that respect Sandia's development history, function, and vision for the future. Buildings can have a unique architectural and visual character when attention is given to:

- Development History
- Historic Preservation
- Architectural Context
- Materials
- Color
- Height
- Massing
- Form
- Function
- Flexibility
- Setbacks
- Accessibility
- Sustainable Design Principals

Building 899

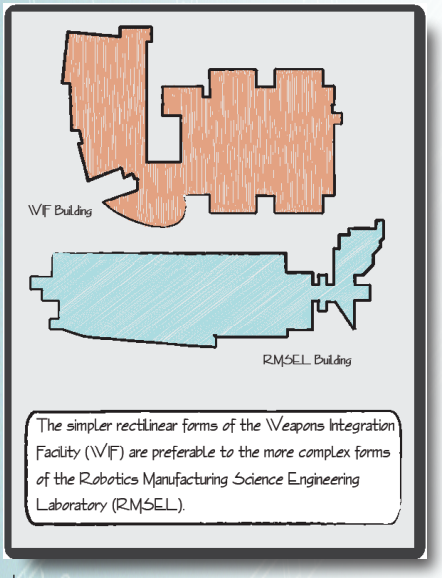
As a result of incremental planning and development over the years, there is a significant diversity of architectural forms, materials, and styles at SNL/NM. To create program-specific aesthetics within the campus, the CDG capitalizes on existing elements of visual continuity to promote consistency and integration of facilities with their district. Campus-wide, a detailed framework of roadways, pedestrian areas, and landscaping is used to create cohesion. Building guidelines are another major component of the planning system that directs current and future building projects. Architectural designs must be integrated with all project design disciplines in order to optimize building performance and aesthetics.

"A sense of place"

- Unknown

Building Flexibility

With changing missions and programmatic needs, flexible building design that accommodates change is paramount. Initial building phases should be designed as a first step in a larger collection of buildings. Each building phase should be resolved to appear as complete and should be constructed to appear integral. To accomplish this, consider the following:



Simplification of Form

Simple Forms

Simple rectilinear forms with clear or long spans are preferred because these forms are more easily adaptable to change than buildings with complicated forms. Individual forms should be designed to complement one another as well as their surroundings.

Large Floor Plates

Building floor plates should be as large as practical and proportionate to the availability of land to facilitate horizontal organizational communication and change.

Internal Design Promoting Flexibility

Building systems should be designed with minimal obstructions to accommodate internal reconfiguration. Structural systems should minimize interior columns and load-bearing walls; mechanical and electrical systems should minimize the number of interior vertical chases. Create simple circulation systems that are easy for staff and visitors to understand. Avoid mazes of hallways and hidden corners. Exterior doors should be readily visible.

Planned Expansion (Additions and Renovations)

As a site permits, each future building should allow for horizontal growth.

Entrances and Approaches

Building Entry Court Guidelines

Building entry courts provide links between individual building design and site design and should be well defined. At ground level, building design should focus on the pedestrian. Building entrances should be oriented to pedestrian plazas and entry courts and should be open and inviting.

Building 887 Entrance

In general, building entry court guidelines are to:

- Connect a permanent building entrance to adjacent pedestrian malls, sidewalks, and parking.
- Accommodate emergency, security logistics, and maintenance vehicle access.
- Use an Architectural palette of materials, textures, and colors that harmonize with local Architecture.
- Provide a minimum width of 12'-feet and a minimum setback of 24'-feet from the curb.
- Provide accent trees.
- Provide a ground cover: rock mulch and shrubs.
- Provide building identification signs in accordance with SNL Sign Standard on the building as well as directional signs to the building.
- Provide seating, trash receptacles, and bicycle racks; consider trash receptacles and bicycle racks at other major entry points.
- An automatic door opener is recommended at a major entry point in accordance with ADA/ABA Accessibility Guidelines.

Entrances/First Impressions Program

An entrance is a primary building design feature and should be well defined and easily recognizable as a point of entry regardless of the size or importance of the building. To provide a better interface with its customers, SNL has implemented the First Impressions program, with the objective of renovating areas of high visibility such as lobbies

and public plazas. These areas are to be redesigned and renovated to improve their order, pedestrian circulation, and ease of way-finding. New lighting, flooring, seating, wall coverings, and graphics are to provide a more attractive and user-friendly environment. Building entrances should be oriented to pedestrian malls/sidewalks and connected by entry courts. Buildings should be oriented such that their major pedestrian entrances face the major pedestrian entrances of surrounding buildings. On approach, pedestrians should have a clear indication of arrival at the entrances. Service entrances or areas such as loading docks should face the service entrances or similar areas of adjacent buildings. Entrances to buildings should be well lit and comply with security constraints.

Building 858EL Main Entrance

Whenever possible, public spaces within a building, such as reception and waiting areas, should be oriented to the public spaces outside the building. These spaces should be accessible by people with disabilities.

Building forms which reinforce the location of building entrances are more desirable than forms which do not. Entrances should be clearly indicated by signs at roads, pedestrian malls, and sidewalks. Sidewalks should be widened, and doorways should open with adequate space to avoid obstructing pedestrians or forcing them to step out of the way. Paved areas in front of entrances should be covered to allow protection from weather.

Secondary Entrances

- Shall be placed on sides other than the one where the main entry is located.
- Shall be similar in form to the main entrance with understated scale and detail.
- Lighting shall be provided to illuminate the entrance, circulation to the parking lot and adjacent outdoor areas.
- Exterior gathering spaces for personnel are encouraged to include informal patios, break areas and seating.

Building 858EL Lobby

Pedestrian Scale

At building entrances and on streetscape facades, elements that relate buildings to the size of humans are important. While buildings may be up to 75'-feet high, these larger masses can be broken into smaller elements through sensitive use of building materials, window articulation, and building massing.

Building Height/Roof Form

Heights of buildings and their roof forms can be used to promote an overall sense of cohesiveness and offers an opportunity to focus attention to certain key buildings or areas.

Building Height

To provide for adequate fire protection, the maximum allowable height for buildings at Sandia is 75'-feet above ground, including penthouses or other rooftop equipment. Floors below grade are permitted; however, their design must be reviewed by the SNL Systems Architects and Physical Security. Ancillary structures (e.g., power poles) will be addressed on an individual basis. The floor levels of new buildings should match the floor levels of the adjacent existing buildings. Established vertical heights should be maintained to continue the vertical campus grid and allow upper levels of buildings to be connected by bridges.

Building 755

Roofs

Most existing buildings at SNL have flat roofs and such roofs are appropriate in the future. Frequently, large floor plates and rectilinear forms with long spans call for flat roofs. Pitched roofs, such as shed or gable, may be considered in areas where similar roof forms are found. Parapets should be used to screen roof-mounted equipment and serve as fall protection during maintenance activities and shall be capped by metal capping to match facility. Roof-mounted mechanical equipment and vent stack pipes should be grouped together and screened from all

views on campus. Taller equipment should be enclosed by walls or grilles that are in harmony with the design of the building and provide for the required air circulation needs of the equipment. Microwave dishes and antennas must be fully concealed if located on a building. Roof drains shall be directed to splash blocks or underground drainage, divert water from structures and paved surfaces and prevent erosion or ponding. Do not place surface roof drains on north side.

Aesthetics

Maintaining a uniform Architectural style within an area is being proposed for the future. In general, future architectural styles should be compatible with existing architectural styles and should express an image of "science and technology." Literal expression of the pueblo and territorial architectural styles of New Mexico is discouraged. Forms and shapes are to be simple, yet creative and appealing, and should relate to nearby forms.

Building 860

Proportion (Scale)

Proportion is the terminology for the size of a building facade in relation to human size. The proportion of most buildings should be more human-related than monumental. Large floor plates and building height limits should generate building forms that are more horizontal than vertical. Proportions created through massing, structure, and fenestration should reinforce horizontal proportions. Scales should vary but also result in a comfortable relationship to building users.

Fenestration

Opaque walls with separate or independent recessed windows are preferred. Extensive curtain walls are discouraged. This is consistent with most of the existing buildings at SNL/NM and is typically a better response to climate and energy concerns than an all-glass, curtain wall building system.

Glazing

Exterior windows are to be constructed of tinted, insulated, Low-E glazing, set in hollow metal or aluminum frames, and provided with mini-blinds. Tinted, light- to medium-green or blue glass is preferable to dark spandrel-type or reflective glass.

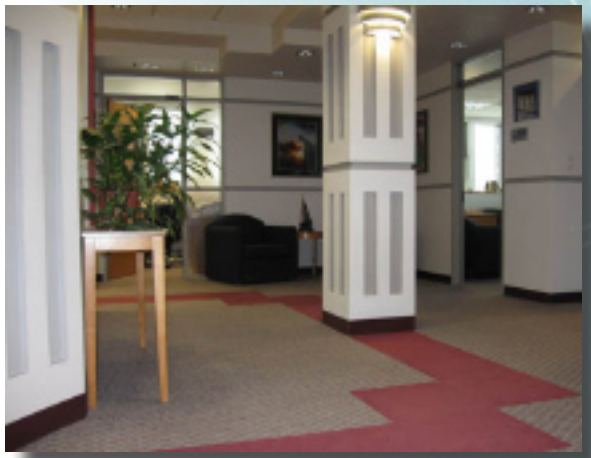
Interiors

Interior design is to be integrated into the Architectural plans. In general, interiors should be finished with materials and colors that support a positive and productive work environment. Like the building design, the interior design should reflect an appearance of "science and technology." Interior office design should continue the palette of materials and colors established by the SNL Architecture Department. To obtain this information, contact the assigned SNL Systems Architect. General allowable square footages for offices are:

Office Size Ratios

- SNL President: 600 SF
- Executive Vice-President: 500 SF
- Vice President: 375-450 SF
- Director: 250-300 SF
- Senior Manager: 200 SF
- Department Manager/Two Person Office: 125-175 SF
- Office Administrative Assistant: 100-150 SF
- DMTS/Team Supervisor: 100 SF (enclosed)
- Staff: 75-100 SF (enclosed/open office)

Building 800



Vice President's Office

Space Name	Floor	Wall	Base	Ceiling
Waiting Area	Quarry tile	Paint	Rubber	Accoustical ceiling tile
Office	Carpet with pad	Paint	Rubber	Accoustical ceiling tile
Break Room	Vinyl Composite Tile	Paint	Rubber	Accoustical ceiling tile
Restroom	Ceramic tile	Paint	Ceramic	Hard ceiling
Vending	Vinyl Composite Tile	Paint	Rubber	Accoustical ceiling tile
Tele/ Comm.	Vinyl Composite Tile	Paint	Rubber	Accoustical ceiling tile
Janitor	Sealed concrete	Paint	None	None
Mechanical	Sealed concrete	Paint	None	None
Visitor Entry	Quarry tile	Paint	Rubber	Accoustical ceiling tile

Office Furniture

For all new and existing construction projects, Sandia has established a standard for furniture, to convey a sense of "Science and Technology." SNL is always striving to improve furniture selection and improve safety at all levels within the work environment. For specific information on furniture, refer to SNL Standard Specifications: Systems Furniture, 12700; Freestanding Modular Furniture, 12701.

Color Design

When selecting colors, examine them in the same light in which they will be used. Color is defined as the perceived quality of light reflected or emitted by an object. The term "perceived" is important because individuals view color differently. Color affects how individuals feel and react in a space. Cool greens and blues are preferred for the Albuquerque site. Here are some examples of colors and evoked reactions:

Red

Reds are welcoming colors and are suggested at entries. Reds typically are warm, cheerful colors and are associated with patriotism.

Orange

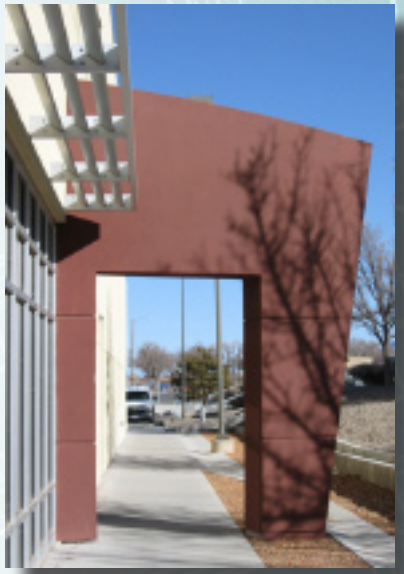
Is a combination of red and yellow, and inherits its sense of cheer from yellow; considered a happy color. Bright orange is best used in small quantities; however, its tints of beige and tan are favored as background colors.

Yellow

Is the lightest of the warm colors and is associated with cheerfulness. It is less aggressive than red yet open and expansive with a high level of reflectivity. It promotes activity and mild stimulation. Yellow tints (cream and beige) are popular background colors.

Green

Is a combination of yellow and blue and is considered a cool color. It is the warmest of the cool colors and is commonly used in restful spaces. Green represents growth, movement, health, tranquillity, and is considered a color of science; however, certain shades of green represent sickness, mildew, and lack of motivation.



Exterior Color on Building Facade

Interior Color in Building 858EL

Blue

Is the coolest of the cool colors and is associated with calmness, peacefulness, loyalty, intelligence, sincerity, rest, simplicity, truth, and purity. Blue encourages thought, contemplation, and meditation and is considered the color of intellectual activity. A negative aspect of some blue colors is the representation of depression and stubbornness.

Violet

Is the combination of blue and red and carries a contrast of liveliness and calmness. Violets and purples should be avoided in some contexts because they can disturb some individuals; however, some shades of violet are viewed as subtle, sensitive, and artistic.

Brown

Is a deeper shade of red, orange, and yellow and takes on some of the characteristics of these colors and can appear warm and comforting.

White

Is a safe color to use in large proportions. It is associated with cleanliness, sophistication, purity, clarity, and simplicity.

Gray

Is a mixture of complementary colors or black and white. Slightly blue-toned grays are "cool" and slightly red-toned grays are "warm." Light grays are often used as background colors.

Lighting Design

Seven-eights of all human perception is estimated to occur through sight. The way objects are illuminated affects the way individuals respond to those objects. Lighting is an essential design element and one of the most important aspects of a successful design. A combination of both natural light and artificial light is desirable because each has unique characteristics.

Building 858EL Conference Room

Natural Light

- Northern light - cold greenish cast
- Southern light - warm pink cast
- Eastern light - harsh yellow cast
- Western light - red-orange cast

Artificial Light

- Fluorescent light - blue cast
- Tungsten light - bright yellow cast
- Halogen light - bluish cast
- Incandescent light - yellow-orange cast

Building 800 Lobby

The effects of bad lighting are serious; they hamper safety, utility, and may produce anxiety and create displeasure with a space, making an otherwise attractive space appear dismal and unwelcoming. On the other hand, good lighting supports convenience, efficiency, comfort, safety, and evokes favorable emotional reactions. Good lighting can produce the following effects:

- Set a desired mood or atmosphere
- Direct or concentrate attention

- Enhance or modify a space or structure
- Aid the viewer to see form and texture
- Provide a sense of security

Renovation and Historic Preservation

Historic Significance

Currently, no buildings at Sandia are listed on the National or State Registers of Historic Places; however, all efforts are made to preserve historically significant buildings on the campus (e.g., Buildings 800, 801, 802, 808, 835, 840, 880). Sandia works with the State Historic Preservation Officer (SHPO) during upgrades and remodeling projects on such buildings through the NEPA process.

Building 800

Retention and Restoration

Building 800 serves as a gateway on the Sandia campus, currently managed under the direction of the State Historic Preservation Office, is to be retained. Quality gateway and entry environments are to be retained and maintained. Where site projects occur, upgrades to facilities can occur to improve the arrival, gateway, and entry experience. For example, during a parking lot restoration project, landscaping can be added to enhance the appearance of the lot and reduce glare and heat islands. Planters can capture runoff to reduce impact to drainage systems. Similarly, as buildings are renovated and restored, various visual clutter can be reduced, entry spaces can be built, and other general public improvements can be made to enhance user experience.

Renovation and Protection Guidelines

Improvements to the Sandia campus are most easily completed in large increments. However, when only part of an area can be incrementally improved, it is important to phase the design to allow succeeding phases to incorporate the guidelines set forth in this document.

Building 703

Materials

Exterior building materials selected should be similar in color, texture, and material scale to those of surrounding buildings. Consider using materials and colors that harmonize with other facilities in the immediate area. An example is Buildings 800, 802, and 808, which are defined by the unique color, texture, and material scale of bricks.

Exterior building materials found on a site that may be considered in new construction include: pre-cast concrete, poured-in-place concrete, exterior insulation and finish system, stucco and masonry, including concrete masonry units and brick masonry.

Stucco can be used alone in large expanses or in combination with brick. Stucco is used historically in the Southwest. Qualities include the potential for rich colors and textures. Exterior Finish Insulation System or Dryvit should be considered alternates.

Concrete and stone can be used alone or to complement brick. These materials fit well in the desert context as monolithic walls or stacked units. Lighter toned material reflects the intense heat of the region.

Metal should generally be used as a secondary material for sun shading, vine armatures, balustrades, site furnishings, roofs, etc. Lightness in color and thinness is a good contrast with heavy masonry.

Color

Colors should be selected to synchronize with surrounding buildings. Accent colors may be used. Vivid accent colors should be confined to proportionally small surface areas. Contact the SNL Systems Architecture Department for guidance.

CHAPTER 4: APPENDICES

APPENDIX I: GLOSSARY OF TERMS

Administrative Space	Space for administrative services including office machines, filing, storage, and other office support space in which no one is assigned a permanent work space.
A/E	Architect/Engineer.
AASHTO	American Association of State Highway and Transportation Officials.
ABA	Architectural Barriers Act of 1968 for Federally Funded Projects.
ADA	Americans With Disabilities Act, civil rights legislation.
Ancillary Structures	Any structure that is of secondary use to a primary structure such as mobile storage units, accessory use structure, transportainers and power poles.
Architectural Style	A particular visual expression or a characteristic form from a period in history.

Architecture	The art and science of designing and erecting buildings; a style and method of design and construction.
Arterial Roadways	Major perimeter circulation corridors intended to carry high traffic volume and serve as the 'loop' road access to Tech Area 1.
Berm	A bank of earth or landscaped hill, often used to screen undesirable visual elements.
BFPC	Building and Facilities Planning Committee.
Bicycle Lane	Bicycle route of travel on the same surface as vehicle travel.
Bicycle Path	Bicycle route of travel separate and adjacent to the roadway.
Bicycle Trail	Bicycle route of travel that is separate and usually follows a different network than roadways.
Bollard	A free standing post used to direct or obstruct vehicular traffic and prevent damage to walls or building corners
Building Floor Plates	A horizontal, structural component of a floor system.

Building Manager

Sandia service provision employee assigned as a single point of contact for all facilities-related issues in a given building, including space occupancy and use, facility modifications, O&M, etc.

Clerestory

An upward extension of enclosed, daylight space, carrying a vertical, windowed wall through the roof slope.

Clone Building

A building of the same basic design that is site adapted and repeated at a number of sites.

Computer Laboratories

Space for computers and communications equipment that requires a special environment, high electrical loads, or increased air conditioning loads above the general office levels.

Conference

Rooms equipped for meetings, briefings, or classroom instruction. Does not include associated projection, control, and storage rooms. Excludes small meeting areas or workrooms in the general office area.

Note: a Department/Center-controlled work/conference/teaming room is included in the average office and administrative square footage for that organization.

Corporate

As used in this document, it pertains to the rights, liabilities, and missions of Sandia National Laboratories.

Corporate Space	Sandia space assigned to the Corporate Landlord rather than a Division or Center. Includes corridors, common areas, corporate conference rooms, renovation or demolition space removed from the assignable pool, and space available for immediate reassignment.
Daylighting	Intentional, controlled use of natual light to reduce the requirement for artificial light.
Decontamination and Demolition (D&D)	The program intended to remove buildings from the available inventory, including any known contaminants.
Design Use	The purpose for which the building or structure was originally constructed.
DOE	Department of Energy.
E -Z Go's	Small gas or electric powered carts.
Eclectic	Composed of elements from various sources (e.g., an area of various architectural styles).
Edge	A boundary that is marked by landscape and identification features that clearly identify SNL from its immediate surroundings.

Entry Courts	A design element that provides the link between individual building design and site design.
Facade	A face of a building, especially the principal face.
Facilities Design Manual	Provides detailed engineering design guidance for SNL projects.
Facilities Leadership Team (FLT)	A group of SNL/NM Facilities senior managers responsible for coordinating their Center's activities.
Facilities Management and Operations Center (FMOC)	The Sandia organization responsible for facilities related activities, including space management.
Fenestration	The patterns of windows in a facade.
Fire Lane	A minimum width required to allow access by fire and emergency vehicles.
Fitness-for-mission-use	The measure of whether a building or structure is structurally sound and has the operating utilities necessary to perform its designed use.
Flexible Security Zone	An area or building outside the limited access area with security provisions adaptable to specific programmatic needs.

Gable	The upper part of a terminal wall under the ridge of a pitched roof.
General Laboratory	Laboratories with conventional air conditioning, moderate electrical loads, and minimal piping for sinks or noble gases.
General Office	Office space assigned to staff members and contractor personnel to perform work; includes OAA stations, cubicles, private offices, and open offices/meeting areas.
General Plant Project (GPP)	A capital construction project under $10 million in total estimated cost (TEC).
Gross Square Footage (GSF)	Gross square footage (also referred to as gross space or gross building area) is the sum of all enclosed interior space within the building footprint. It is measured from outside edge to outside edge of the exterior building walls. It includes all floor levels, penthouse areas, basements, etc. Gross space does not include equipment mezzanines or catwalks. Gross space does not include external covered areas (i.e., entry canopies, building overhangs, covered dock areas, balconies, roof decks, etc.).
Hardscape	Paving that includes building entry plazas, seat walls, raised planters, and paving used at walkways, outdoor spaces, and transition areas.

High-Bay Laboratories	Space with a ceiling greater than a single floor (12'-feet) that is designed for large manufacturing or assembly operations, testing, or laboratory equipment with heavy floor loads, special foundations, or extensive overhead material handling equipment.
IBC	International Building Code.
Institutional General Plant Project (IGPP)	Indirectly-funded minor construction project under $10 million in total, estimated cost (TEC), that provides general-purpose, non-programmatic or multi-programmatic institutional space.
Infrastructure Council (IC)	The Infrastructure Council determines long-term strategic guidance for Sandia's Integrated Enabling Services (IES) in order to build an infrastructure at Sandia National Laboratories that provides support and services to the business units and divisions that are agile, business focused, and worth the cost. The IC, chaired by the IES VP, is composed of various Sandia Vice Presidents (IES, CFO, and HR) and Directors (Executive Staff, CIO, CA Site Ops).
IES Manual	Illuminating Engineers Society Manual.
KAFB	Kirtland Air Force Base.

Landlord

The Vice President, Business Management and Facilities Services Division, owner of the real estate and space. Responsible to Infrastructure Council to ensure Sandia-controlled space is managed in a manner to maximize benefits to the entire Corporation.

Landscape Matrix

Definition of plant materials suggested for use in designated areas.

Limited Area (LA)

A type of security area having boundaries defined by physical barriers, used for the protection of classified matter and/or Category III quantities of special nuclear material, where protective personnel or other internal controls can prevent access by unauthorized people to classified matter or special nuclear material."

Line Item

A capital construction project that exceeds $5 million in total estimated cost. Projects can be new construction, infrastructure, large major renovations, or building additions.

Local Roadways

Access routes between large groups of buildings or test areas within the site.

Management Office

Private offices or suites of offices assigned to the President, Vice Presidents, Directors, Managers, and Team Supervisors.

Massing

Architectural relationship between the various masses or volumes of a building or groups of buildings.

Major Renovation

Corporate construction projects using either operating expense or capital funds to renovate existing buildings. The renovation includes a complete remodel of building or space, including completely new (or whatever it takes to bring up to current codes) electrical, mechanical, plumbing, special systems, and architectural finishes intended to extend the life of the building a minimum of 20 years. The renovation could include seismic and other structural upgrades. A major renovation project is normally constructed for a new tenant (new purpose), but can also be for an existing tenant (restore to original designed purpose).

MO's

Mobile Offices.

Net Space

Net space, also referred to as net square footage (NSF) includes spaces that are in direct use by the building occupants (office space, laboratories, etc.) and support spaces such as reception/waiting areas, auditoriums, conference rooms, training rooms, copier/printer rooms, work/storage rooms, computer rooms, libraries, teaming spaces, file rooms, mail rooms, tenant storage, kitchens, break rooms, vending areas and coffee areas, receiving and staging areas, and internal circulation (circulation space used to provide functional access to offices and laboratories). These areas are charged to the occupants of the building.

Non-net space

Non-net space (also referred to as tare) includes areas of a building or structure that are either "common space" areas or not available for use by building occupants for safety reasons. These spaces include but are not limited to: rest rooms, utility chases, exterior walls and structural elements, vestibules, lobbies, main circulation spaces, life safety exit paths, building systems (mechanical, electrical) equipment rooms and shafts, exit stairs and landings, elevators, elevator equipment rooms and shafts, shower and locker rooms, janitor closets, custodial storage, internal distribution rooms (IDRs)/communication rooms, and building maintenance offices and storage rooms. These areas are charged to the occupants of the building based on the percentage of the net space each occupant has in the building.

NFPA	National Fire Protection Association.
Nuclear Weapons Complex (NWC)	The collection of national laboratories and production sites supporting development and maintenance of United States nuclear weapons.
Pedestrian Scale	Elements of a building proportioned to accommodate people walking at the ground level.
OAA	Office Administrative Assistant.
Permit (real estate permit)	A written document in which the rights to use and occupy land, structures, or improvements are transferred from one Federal Agency to another for a specified period of time.
Principles	A set of broad ideas that provide a framework for future new growth and redevelopment of SNL, New Mexico lands.
Property Protection Area (PPA)	A type of security area having defined boundaries and access controls for the protection of Departmental property.
PVC	Poly Vinyl Chloride. A type of polymer.

Real Estate	An identified parcel or tract of land, including improvements (e.g., buildings, structures, roads, utility rights-of-way, or developments located on or attached to land).
Safety Zones	Areas established to protect site populations from hazards.
Sandia-Controlled Space	Real property (land, buildings, or portions thereof) in which the United States Department of Energy has a legal interest by means of ownership, lease, administrative withdrawal, or permit and which DOE has designated for use by SNL. It does not include sites where SNL performs work but DOE has no legal interest (e.g., a courtesy office provided to a visiting Sandia employee on the premises of a technology transfer partner).
Shop	Maintenance, machine, and sheet-metal workspace.
Setback	A minimum distance requirement from a building perimeter.
Shed Roof	A roof having only one sloping plane.
SNL	Sandia National Laboratories.

SNL/NM	Sandia National Laboratories, New Mexico.
Space	The area of a building, mobile office, or temporary building designed for occupancy of tenants, measured in net square foot (NSF) units.
Space Acquisition Form	A web-based document used by the Space Coordinator to communicate space needs to Space and Real Estate Management.
Space Chargeback or Chargeback	The tenant fee for space use and occupancy.
Space Coordinator	A tenant representative, appointed by a Vice President or Director, responsible for coordinating tenant space requirements with Space and Real Estate Management.
Spandrel Glass	An exterior wall or application of opaque, glass -like material.
Special Laboratory	Laboratories with any of the following characteristics: special environment (clean room), high electrical loads (Saturn), extensive piping systems, exhaust systems (PSL), or construction that limits the facility to a single use (i.e., Building 871).

Standard Drawings	Drawings adopted by SNL Facilities Engineering for use in construction projects.
Standard Specifications Manual	Specifications adopted by SNL Facilities Engineering for use in construction projects.
Storage	Facilities for material storage and handling. This excludes tool cribs, active records storage (libraries and reproduction vaults), and maintenance material holding areas.
Support Space	Net space that includes auditoriums, conference rooms of all sizes, computer rooms, and service space.
Systems Furniture	Panel system of modular furniture.
T-Building	Transportable Building.
Technical Area (Tech Area or TA)	A specific parcel of land controlled by Sandia and owned by the Department of Energy, including Technical Areas I, II, III, IV, and V at Sandia/NM, WIPP (located in New Mexico), the Sandia California Site, the Nevada Test Site, and Pantex.
Tenant	An organization assigned Sandia space, or the user or occupant of Sandia space.

Ten-Year Site Plan (TYSP) The detailed plan that examines DOE/Sandia's current and future plans for the Laboratories' physical assets and projects as they relate to the Laboratories' programs. The plan identifies and addresses the impacts of internal and external strategic goals, objectives, and trends that could affect those assets over time.

UFC Uniform Fire Code.

Vacant Space Unoccupied space available for occupancy without major renovation.

Appendix II: Reference Documents by Subject Matter

There are some excellent primers on base and facility design that are to be considered as incorporated by reference. These basic planning and design tenets will not be found in this document. References are listed at the Whole Building Design Guide website and include:

Architectural Accessibility Review Board (AARB) Document-(http://www.access-board.gov/ada-aba/index.htm)

UFC 2-000-02AN Installation Master Planning (03-01-2005)-(http://www.wbdg.org/ccb/DOD/UFC/ufc_2_000_02an.pdf)

UFC 3-210-01A Area Planning, Site Planning, and Design (01-16-2004)-(http://www.wbdg.org/ccb/DOD/UFC/ufc_3_210_01a.pdf)

UFC 3-210-02 POV Site Circulation and Parking (01-16-2004)-(http://www.wbdg.org/ccb/DOD/UFC/ufc_3_210_02.pdf)

UFC 3-210-05FA Landscape Design and Planning Criteria (01-16-2004)-(http://www.wbdg.org/ccb/DOD/UFC/ufc_3_210_05fa.pdf)

M&O Contract, Section J-(http://www-irn.sandia.gov/corpdata/doe/prime/app_g.html)

UFC 3-210-06A Site Planning and Design (01-16-2006)-(http://www.wbdg.org/ccb/DOD/UFC/ufc_3_210_06a.pdf)

UFC 4-010-01, Unified Facilities Criteria, Approved for public release

DoD Minimum Anti-terrorism Standards for Buildings

Unified Facilities Criteria

UFC 4-010-01, Department of Defense, Minimum Anti-terrorism Standard for Buildings

UFC 4-010-02, Department of Defense, Minimum Anti-terrorism Standoff Distances for Buildings

UFC 2-600-01, Unified Facilities Criteria Installation Design, Approved for public release