

## V. GUIDELINES FOR ARCHITECTURAL DESIGN



NO PARKING, FIRE LANE

# V. GUIDELINES FOR ARCHITECTURAL DESIGN

## *Introduction*

Architectural design guidelines can promote a greater sense of architectural cohesiveness, permanence and visual quality at Los Alamos National Laboratory.

A visually coordinated complex of structures also contributes to improved wayfinding and safety and security functions.

The topics covered in this section include:

- Unifying elements
- Building massing
- Building articulation
- Colors and materials
- Specific planning area color palettes

## *Principles*

The following principles are the foundation for the architectural design guidelines:

- Building design should reflect the science and technology environment of the Laboratory while relating to the climate and aesthetics of the Southwest and New Mexico.
- Buildings should incorporate energy and resources conservation materials and systems.
- Architectural design controls should be used to promote visual clarity and cohesiveness within each planning area.
- Building design should incorporate low-maintenance, fire-resistant materials.
- Buildings should be designed to have flexible space in order to accommodate future uses or functions.

## *References*

Other Laboratory and industry documents to be referenced are as follows:

### **LEM**

LANL Engineering Manual

### **LEED**

Leadership in Energy and Environmental Design

### **UFAS**

Uniform Federal Accessibility Standards

### **ICC/ANSI A117.I**

International Code Council/American National Standards Institute  
("Accessible and Usable Buildings and Facilities")

### **ASHRAE - Standard 90.1**

American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.

## A. UNIFYING ARCHITECTURAL DESIGNS

Unifying design establishes architectural cohesiveness within each planning area as well as within the overall facility. A specific palette of colors, materials, and forms will visually link the areas and an identified unifying element will act as a visual connector to link other design components within the Laboratory.

### 1. Architectural Color Palettes

Specific color and material palettes have been established for the following planning areas:

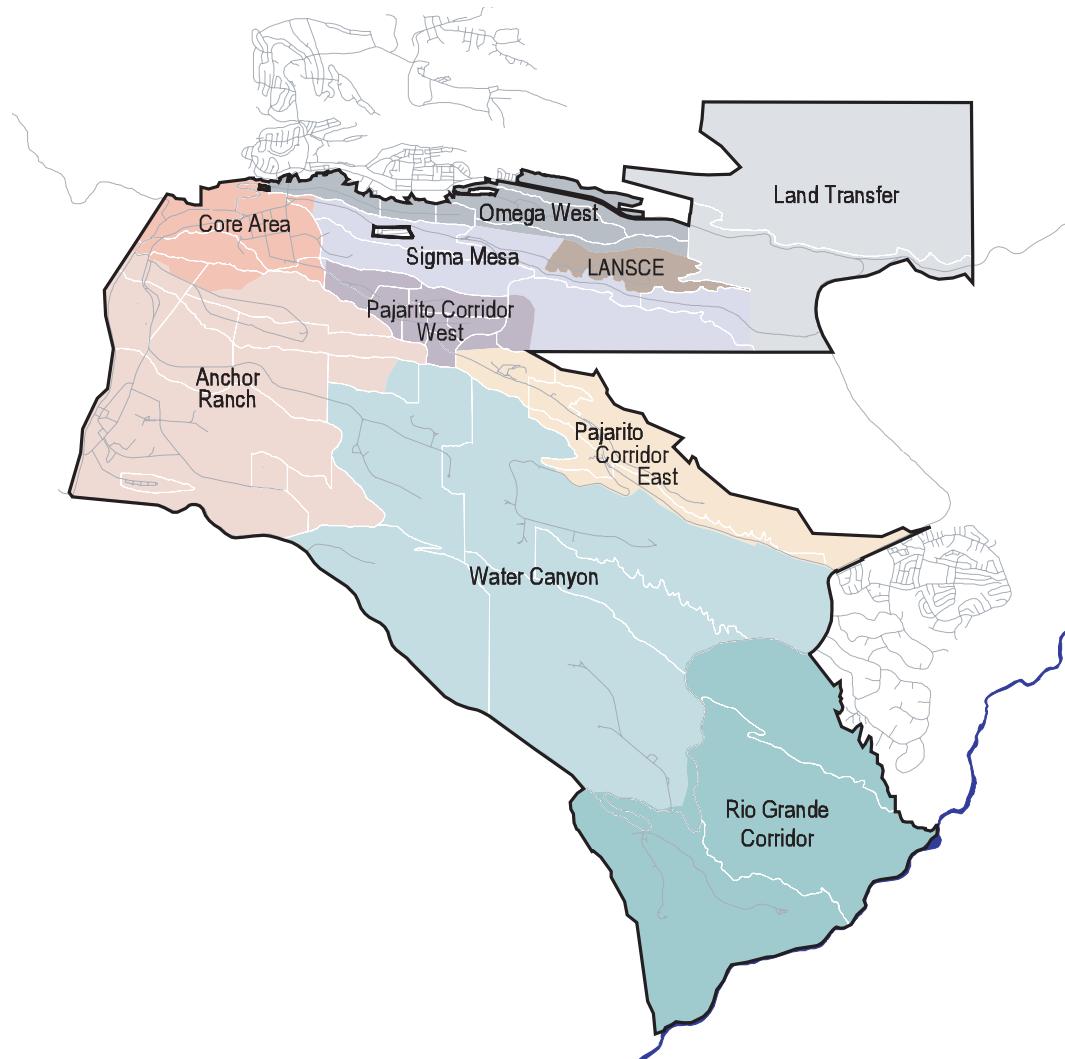
- Core area
- LANSCE
- Pajarito Corridor West
- Pajarito Corridor East
- Anchor Ranch

Each planning area's palette is unique but also relates to an overall palette for the Laboratory. The color and design specifics for each of the above planning areas follows the architectural guidelines in Section V-D-1 and 2.

### 2. Unifying Elements

A metallic material used as an accent should be incorporated into all new or renovated buildings and facilities. The metallic accent should complement the Laboratory's proposed wayfinding system as well as the exterior lighting fixtures, functional architectural elements, or primary entry design. Feature elements should be visible from the primary entry.

*Figure V-1: Comprehensive Site Plan Area Map*



## B. BUILDING MASSING

The Laboratory can promote a cohesive environment through a distinct vocabulary of architectural forms based on a visual inventory of existing buildings. The intent is to highlight the Laboratory's science and technology mission while acknowledging indigenous regional architecture.

The Laboratory's architecture is defined by:

- Building design
- Building form
- Roofs
- Building entries

### 1. Building Design

#### a. Architecture

An architectural style direction has been identified for use at the Los Alamos National Laboratory. The Laboratory's architectural guidelines for newer renovated structures includes:

- Use strong forms that characterize the Southwest imagery such as circles, arcs and stepped massing (*Image V-1*).
- Provide a predominance of wall mass over window openings on appropriate solar exposures (*Image V-2 and V-3*).
- On large wall areas, use warm colors in various materials such as stucco, stone, stone tiles, concrete and concrete block (*Image V-1*).
- Use stronger accent colors from a southwest palette on architectural elements such as window frames, entry structures, sunshades, accent wall segments and accent roof elements.
- Combine durable natural materials such as stone with industrialized materials such as steel, glass and aluminum.

#### b. Fire-Resistant Design

All new structures should follow Laboratory and reference guidelines for fire-resistant building design. Existing buildings should incorporate these design measures when upgraded and renovated.

*Image V-1: Building Design Example*



*Image V-2: Building Design Example*



*Image V-3: Building Design Example*



## 2. Building Form

Building form is determined by various factors including building size, building footprint, number of stories, intended use, structural system and limits established by adjacent spaces and structures. The following sections identify design guidelines based on building size, composition, height and location. Mechanical stacks or cooling towers are not considered a building mass for purposes of assessing massing requirements.

### a. Building Massing

Building mass requirements should be based on building square footage. See *Table V-1* for guidelines.

Additional building mass requirements include:

- Provide a break in plane for each change in mass. Massing changes should have a five-foot minimum offset horizontally and three-foot minimum offset vertically (*Figure V-2*).
- Provide a change in mass and plane at all primary entrance facades. Small structures may achieve this with an entry element projection or recess.
- Maintain an approximate 1/3 to 2/3 proportion mass between the primary facade relative to the overall building length (*Figure V-3*).
- Articulate secondary facades by means of plane changes, material and color changes, and window patterning.
- Step back buildings three stories and greater a minimum of five ft. along 50% of the building perimeter.

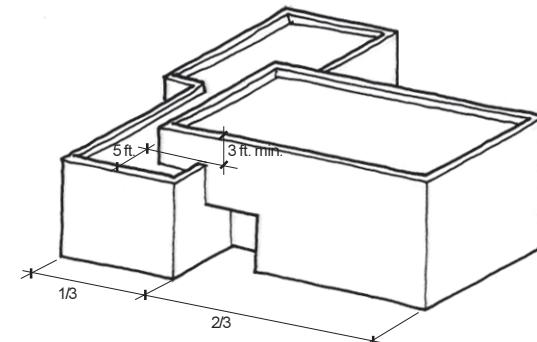
### b. Building Composition

Buildings should express a balanced composition of massing, fenestration and detailing. The horizontal direction should have a greater percentage of mass or area than the vertical direction to connect the building to the site. This effect can be achieved through:

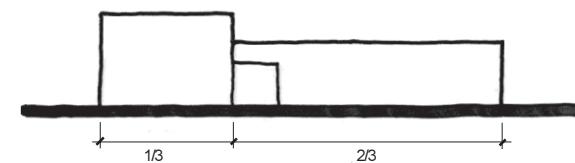
- A composition of building masses on a multiple structure complex,
- A composition of openings (window and door) on a single mass structure, or
- Any combination thereof.

Unique elements such as triangular shed roofs or vaulted roofs, as utilized on the Materials Science Laboratory, add further interest and impact to the overall building composition. See *Table V-4* for specific building form guidelines for each planning area.

*Figure V-2: Building Massing*



*Figure V-3: Primary Building Facade Massing*



*Table V-1: Building Massing*

<b>Building Massing</b>	
<b>Building Size</b>	<b>Mass Requirements</b>
<b>&lt; 25,000 sf</b>	1 mass min. with a break in plane on two facades min.
<b>25,000-50,000 sf</b>	2 masses min.
<b>+ 50,000 sf</b>	3 masses min.

*Image V-4: Building Massing and Roof Forms*



### c. Building Height and Use

Requirements for building height are a function of building use and location (see *Table V-2*). All office, administrative, and light lab buildings two stories or more in the core area maximize the buildings use and adaptability while minimizing site impact (*Image V-5*).

### d. Relationship Between Old and New Structures

Design new structures within a building complex to relate to adjacent structures as much as is practical through integration of similar forms, massing, materials, details and colors. Colors and materials should comply with those approved for the specific planning area.

### e. Adaptive Reuse

Design all new office and laboratory buildings for changes of use or user. Design interior spaces for greater space planning flexibility and adaptability by limiting or strategically organizing interior structural elements.

*Table V-2: Building Height Requirements*

<b>Building Height</b>		
<b>Planning Area</b>	<b>Office, Administrative and Light Laboratory</b>	<b>Storage</b>
<b>Core Area</b>	60 ft. min. / 2-5 Stories	x
<b>TA 35, TA 16 Admin.</b>	60 ft. max. / 3 Stories	x
<b>Other Planning Areas</b>	30 ft. max. / 2 Stories	x

*Image V-5: Building Height Requirements*



*Image V-6: Building Height Requirements*



## 3. Roof Forms

### a. Roof Design and Climate

The following are guidelines for roof design in response to the local climate:

- Design roofs to accommodate winter snow loads and summer rains common to the north central New Mexico climate.
- Detail roof edges to protect the structure from moisture damage.
- Locate drainpipe outlets to manage rain and snow melt runoff and avoid ice buildup particularly on northern exposures.
- Incorporate a system of internal or external downspouts and gutters, site drains and/or swales to deliver water away from the building.

### b. Roof Forms, Colors and Materials

Acceptable roof forms include flat, pitched (shed, gable) and vaulted (bow). For added interest on administrative, office and light lab buildings, pitched or vaulted roof forms may be combined with parapeted roof forms on a single building (e.g., shed and parapeted or vaulted and parapeted). Roof monitors and clerestories are encouraged as a means to admit daylight and solar heat gain.

*Primary Roofs* - Primary roof forms are those that dominate the building massing.

*Secondary Roofs* - Secondary roof forms (i.e. projecting entry structures) are those that complement the primary roof form and cover minor building masses.

Acceptable roof materials have a Class “A” fire rating, are low-maintenance and have long-term durability. The following table (*Table V-3*) identifies acceptable roof forms, materials, pitch, light reflectance value (LRV) and color ranges. For a listing of metal roof colors and roof forms identified for use within each planning area, see *Table V-4*.

### c. Mechanical Equipment

*Basic Rooftop* - Screen rooftop mechanical units from view with parapets and/or metal enclosures. Match the color of the metal enclosures with the primary wall color.

*Larger Equipment* - Coordinate cooling towers and mechanical stacks with the design of the main structure in regard to style, color and finishes. Screen mechanical equipment from view of main access roads behind solid materials that are consistent and harmonious with the main structure, see *Image V-7*.

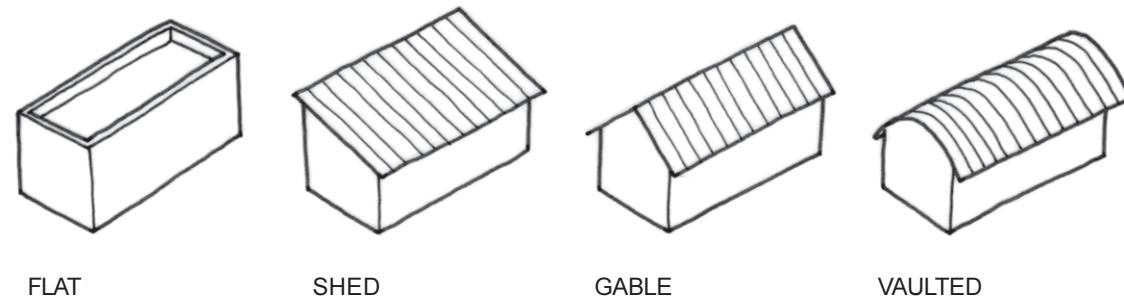
*Table V-3: Roof Standards*

<b>Roof Standards</b>				
<b>Roof Form (see Figure V-4)</b>	<b>Material</b>	<b>Color</b>	<b>Pitch</b>	<b>LRV</b>
<b>FLAT Parapetted</b>	Single-Ply membrane	Cap sheet or gravel color to be harmonious with primary field color	Sloped to drain 1/2" per foot min.	Medium value or darker
<b>PITCHED Shed Gable</b>  (may be combined with flat)	High-quality, heavy gauge metal Standing seam (main facilities) Panelized (storage + support facilities)	Large areas are to be in muted shades. Accent roofs may use more intense shades.	Shed 3/12 to 8/12  Gable 5/12 to 8/12	35% or less
<b>VAULTED Bow</b>  (may be combined with flat)	High-quality, heavy gauge metal Standing seam (main facilities) Panelized (storage + support facilities)	Large areas are to be in muted shades. Accent roofs may use more intense shades.	Flatten arch, no full barrels	35% or less

*Image V-7: Mechanical Integration and Screening*



*Figure V-4: Roof Forms*



## 4. Building Entries

Guidelines for primary and secondary building entries are:

- Clearly define building entrances as viewed from primary access points (streets, walkways, parking areas). The entrance can become more visually prominent by constructing it as a separate, distinctive mass attached to the building or as a large, recessed opening within the building's overall mass. The use of entrance courts, awnings, canopies, trellises and special accent materials or colors can also highlight building entrances.
- Incorporate materials such as stone or highly finished metals into primary entrance designs to add interest and importance.
- Design all entrances at a human scale through the use of easily recognizable elements such as standard heights of doors, railings, stairs, seating and window mullions.
- Provide weather protection for all seasons at primary entries with a covered area projecting or recessed a minimum of eight ft.
- Identify secondary entries similar to primary entries but with fewer and smaller accents.

*Image V-8: Primary Entry*



*Image V-11: Covered Entry*



*Image V-9: Entry Canopy*



*Image V-12: Entry Feature*



*Image V-10: Entry Canopy*



*Image V-13: Facade Articulation*



Table V-4: Architectural Materials by Planning Area

<b>Architectural Materials by Planning Area</b>				
<b>Planning Area</b>	<b>Roof Form</b>	<b>Metal Roof Color</b>	<b>Wall Materials</b>	
<b>Core Area</b>	FLAT - Primary SHED - Secondary or accent GABLE - Primary (storage bldgs only) VAULTED - Primary, secondary, or accent	Large areas: Complement field color(s); Light reflectance in medium value range  Accent areas: Shades selected from accent colors palette	Stucco - Primary or secondary Concrete Panels - Primary or secondary Concrete Block - Secondary or accent Metal Panels - Secondary or accent Metal Siding - Primary (storage buildings only) Stone - Secondary or accent	
<b>LANSCE</b>	FLAT - Primary SHED - Secondary or accent GABLE - Primary (storage bldgs. only)	Large areas: Complement field color(s); Light reflectance in medium value range  Accent areas: Shades selected from accent colors palette	Stucco - Primary or secondary Concrete Panels - Primary or secondary Concrete Block - Accent only Metal Panels - Secondary or accent Metal Siding - Primary (storage buildings only) Stone - Accent	
<b>Pajarito Corridor West</b>	FLAT - Primary SHED - Secondary or accent GABLE - Primary (storage bldgs. only)	Large areas: Muted colors selected to be consistent with or complement field color(s); Light reflectance in medium value range  Accent areas: Shades selected from the accent color palette	Stucco - Primary or secondary Concrete Panels - Primary or secondary Concrete Block - Primary or secondary Metal Panels - Secondary or accent Metal Siding - Primary (storage buildings only)	
<b>Pajarito Corridor East</b>	FLAT - Primary SHED - Accent only GABLE - Primary (storage bldgs. only)	Large areas: Muted colors selected to be consistent with or complement field color(s); Light reflectance in medium value range  Accent areas: Shades selected from the accent color palette	Stucco - Primary or secondary Concrete Panels - Primary or secondary Concrete Block - Secondary or accent Metal Panels - Accent only Metal Siding - Primary or secondary (storage buildings only)	
<b>Anchor Ranch</b>	FLAT - Primary GABLE - Primary, secondary, or accent	Large and accent areas: Muted colors that complement the field color(s) or the shades found in the accent colors palette	Stucco - Primary or secondary Concrete Panels - Primary or secondary Concrete Block - Secondary or accent Metal Panels - Accent only Metal Siding - Primary or secondary (storage buildings only)	

## C. BUILDING ARTICULATION

Façade articulation (visual changes along a building) adds interest to a structure's appearance. Façade articulation can reduce the scale and mass of a large structure. Fenestration can add depth, rhythm, shade and shadow to the building façade.

Methods of articulating buildings covered in the *Design Principles* include:

- Façade articulation
- Fenestration
- Building skin materials
- Colors and materials

*Image V-14: Horizontal/Vertical Balance*



### 1. Façade Articulation

Façade articulation can reduce the scale and mass of a large structure. Various fenestrations can be used to add depth, rhythm, shade and shadow to the building façade (Image V-13).

The following are façade articulation techniques:

- Window fenestration and multiple wall surface materials
- Score lines on stucco or concrete walls
- Banding of different colors or materials
- Attached or free-standing shading devices on south or west exposures

*Image V-15: Window Groupings*



### 2. Fenestration

#### a. Size, Shape, Pattern, Type & Scale

- *Horizontal/Vertical Balance* - Most Laboratory office, administrative, or light lab structures have predominately horizontal forms. For vertical balance to these structures, individual window sizes should be square or preferably more vertical than horizontal (*Image V-17*).
- *Window Groupings* - Multiple window groupings are expected and acceptable but are most effective when the groups are more vertical than horizontal (*Image V15-18*).
- *Reveals Around Windows* - Windows that are set in from the building façade are preferred over multiple window groupings or openings to emphasize a building's mass. Reveals should be recessed a minimum of six inches to add depth and shadow (*Image V-16*).
- *Tall Buildings* - Buildings three stories or more should have windows with reveals.
- *Scale* - Use mullions and smaller-paned glazing to add human scale to the fenestration.

*Image V-16: Reveals Around Windows*



Figure V-5: Daylighting - Light Monitor

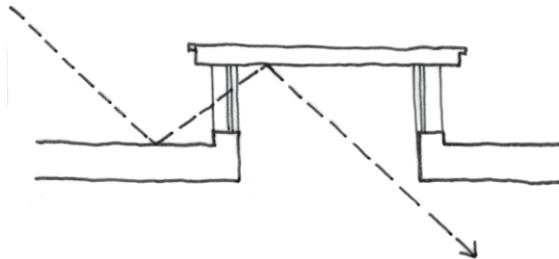


Figure V-6: Daylighting - Shed Skylight

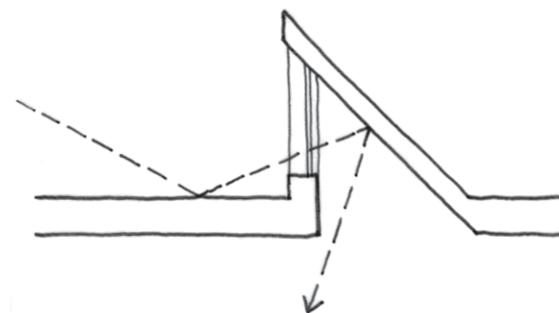
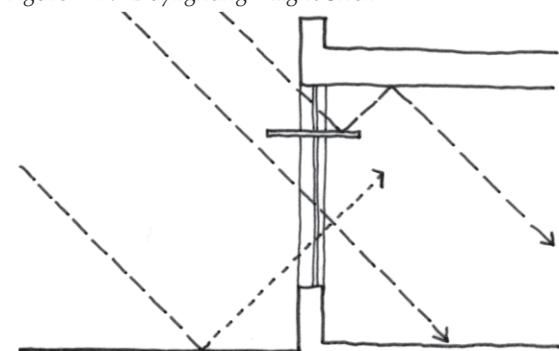


Figure V-7: Daylighting - Light Shelf



### b. Daylighting

Orient and size windows to take advantage of solar orientation and help provide internal lighting to reduce the heating load and efficiently light interior spaces. Use awnings to shade south and west sun exposures during summer months. For efficient interior daylighting, use north-facing shed skylights (Figure V-6), roof monitors (Figure V-5) and light shelves (Figure V-7).

### c. Curtain Walls

Glass curtain walls may be used only as a minor wall surface element and comprise no more than 20% of the building perimeter. Curtain walls may be used only for solar gain or daylighting purposes.

### d. Glass Block

Glass block is an appropriate and functional material that is consistent with the high-tech environment at the Laboratory. Glass block is acceptable for use within any planning area.

### e. Frame & Glass

Window frames should be of factory colored metal or clear anodized aluminum. Distinctive frame colors are encouraged to add interest to the building exterior and help emphasize the architectural style of the Laboratory. The Material Science Laboratory exhibits a successful use of colored window frames. Approved glass colors are gray, green or clear. Use of bronze or highly reflective glass is not allowed.

Image V-17: Roof Form/Window Example



Image V-18: Roof Form/Window Example

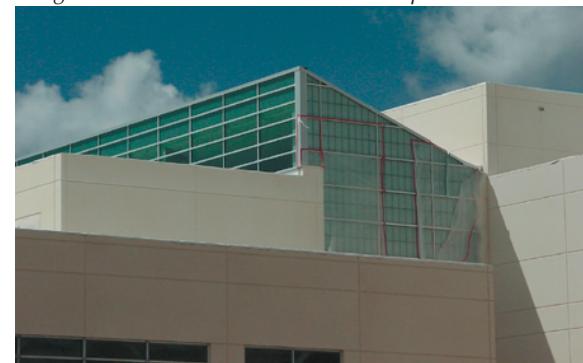


Image V-19: Window Daylighting/Awnings



### 3. Building Skin Materials

#### a. Acceptable Materials

Select building skin materials with high thermal performance, fire resistance, long-term durability and low maintenance. Industrial materials such as steel, selected for its high tech expression, should provide an appearance of refinement and quality. Natural materials such as stone, either in block or tiles, should be selected and incorporated in the design to appear permanent and indigenous to the Southwest (*Images V-20 through V-25*).

Acceptable building skin materials include:

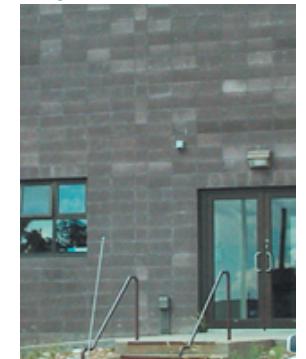
- Synthetic stucco
- Concrete block
- Concrete panels
- Metal panels
- Structural steel framing
- Stone

Alternate or additional materials may be submitted to PM-1 for review. See *Table V-4* for material guidelines within specific planning areas.

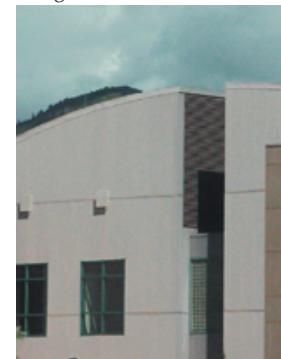
Building skin application guidelines for structures are intended to:

- Provide more than one, but not more than three, solid wall materials per structure.
- Utilize the same materials wherever appropriate within a complex, but vary the application.
- Combine smooth surface materials such as glass, metal and stucco with textured materials such as stone, concrete block, or textured concrete.

*Image V-20: Precast Concrete* *Image V-23: Concrete Block*



*Image V-21: Metal Panels*



*Image V-24: Structural Steel*



*Image V-22: Stucco*



*Image V-25: Stone Veneer*



## D. COLORS AND MATERIALS

### 1. Defined Color and Materials Palette

Specific types of materials and ranges of colors have been identified for each planning area in order to develop a more unified appearance.

Each planning area's color and materials palette has field and accent colors. Primary field colors cover more than 50% of the facade area, secondary field colors cover less than 50% of the facade area, and accent colors complement the field color to give greater definition and interest to the architecture. In general, the selected field colors reflect the tones and values found in the surrounding rock cliffs and native plants. These colors are primarily warm and neutral shades. Many of the colors are rich and deep rather than bright and light while values are medium to dark. Lighter colors are discouraged because of their high reflectivity and tendency to stand out from the local surroundings.

The field colors have an overall light reflectance value (LRV) of 67% or less. The following guidelines apply when selecting colors for a specific project:

- Primary field colors : 55% to 25% LRV
- Secondary field colors : all colors permitted
- Accent colors: 35% or less LRV

Kwal Howells manufactures the recommended paint color palettes. Designers may work directly with these colors or utilize their own preferred manufacturer provided the colors closely resemble the recommended colors and follow the LRV requirements.

### 2. Color and Material Application

The following specific guidelines address color and material application:

- Use darker colors at the base of a building to effectively anchor the structure to the ground.
- Change color at logical places in the building's design such as changes in form, massing, material, or between floors.
- Use multiple colors or materials to add interest and variety.
- If a building only has one material or color, the building design should gain interest through its form, massing, fenestration, or façade articulation.
- Integrate material and color changes with the fenestration pattern.
- Use accent colors to highlight window frames, main or equipment doors, entry structures, railings, accent roofs, or metal panels in curtain walls (*Image V-26 and V-27*).

#### a. Colors for modular and portable buildings

The color scheme for all portables and modular buildings recommended as a default selection throughout the Laboratory is:

Field Color: 8744D "Sweetwood"  
Trim Color: 8752W "Stonehenge Shadow"

#### b. Wall and fence colors

Wall and fence colors and materials of a specific facility should match or compliment the colors and materials of that facility.

Refer to the Site Elements section for additional fencing design guidelines.

*Image V-26: Field Color + Material Accent Example*



*Image V-27: Color Accent Example*

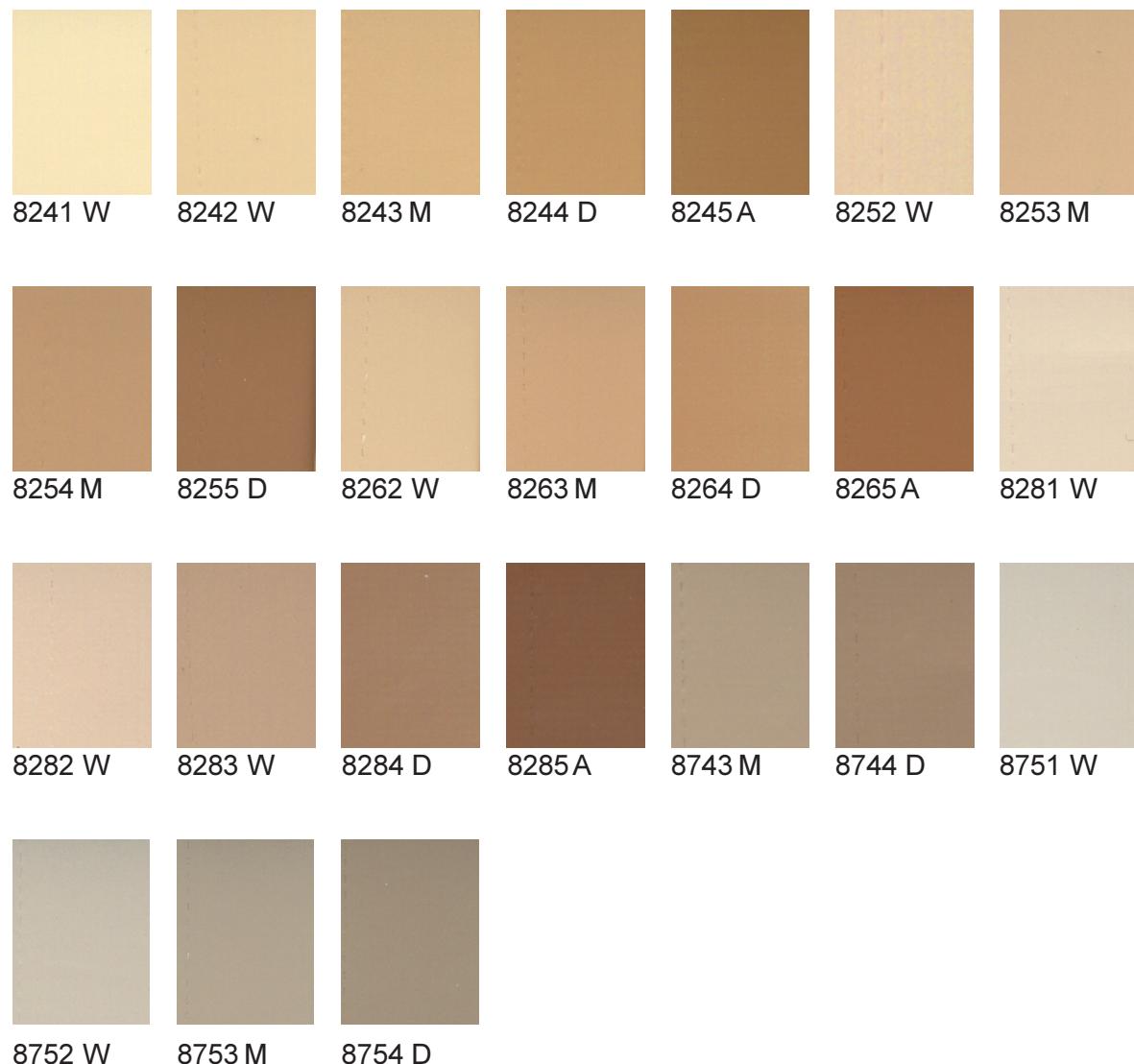


## E. SPECIFIC PLANNING AREAS

### COLOR PALETTES

Each of the following five planning areas have been individually analyzed to develop architectural and other visual consistencies. This section discusses each planning area's unique characteristics and identifies that area's defined color palette and design recommendations.

#### Core Area Field Colors



**NOTE:** Colors shown may differ from exact color. For final color selection refer to samples on file at PM-1.

## 1. Core Area

The majority of buildings in the core area are two- to four-story office and administrative structures with specific science structures occupying the edges. The office/administrative buildings tend to be the most visible buildings within the Laboratory and therefore should be the most representative examples of the image the Laboratory desires to project.

The identified field color palette for this area incorporates many of the existing shades of the TA-03 area for visual continuity but expands upon that palette and directs it away from some of the existing shades that have a yellow cast (Otwi). Accent color selection and application should be expressed more boldly in this highly visible area. The accent palette for the core area contains the greatest variety of shades from muted to rich deep colors.

Each new or renovated building should incorporate at least one accent color from the defined palette in a visually distinctive way. Existing examples of successful accent color application within the core area are the Material Science Laboratory (window frames), the CRC building (accent roofs) and the Physics building (South entry elements and horizontal banding). The Material Science Laboratory demonstrates exemplary use of accent colors.

**NOTE:** Colors shown may differ from exact color. For final color selection refer to samples on file at PM-1.

### Core Area Accent Colors



8045 D



8046 N



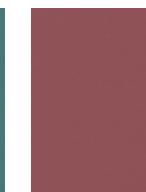
3055 D



8056 N



8076 A



8406 N



8426 N



8444 M



8445 D



8455 D



8464 M



8465 D



8474 M



8475 D



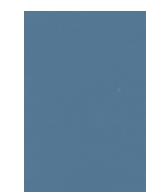
8484 M



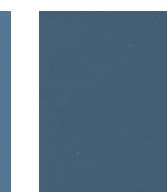
8485 D



8494 M



8495 D



8496 A



8564 M



8565 D



8566 N



8905 D



8915 D



8916 N

## 2. LANSCE

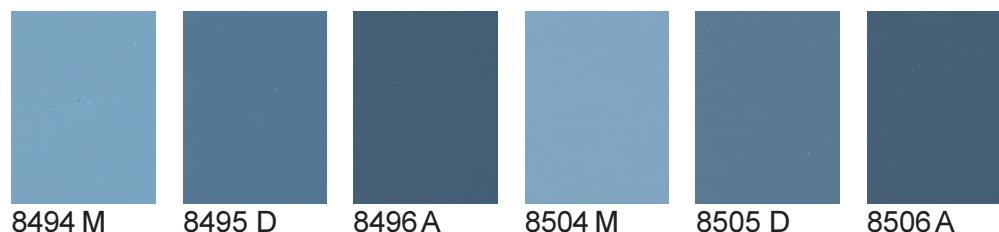
The LANSCE area is a collection of specific science structures, office buildings, and support structures. This area's varying topography provides opportunities for existing structures to be relatively screened from view by neighboring mesas. The field color palette for this area is based on existing shades and expands upon it within a defined color range. The accent color palette expands upon the shades of blue in use on many of the exit and service doors.

### LANSCE Field Colors



**NOTE:** Colors shown may differ from exact color. For final color selection refer to samples on file at PM-1.

### LANSCE Accent Colors



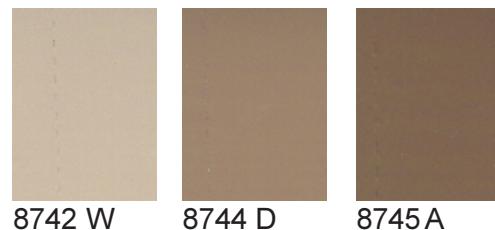
### 3. Pajarito Corridor West

This area is a collection of specific science structures, office buildings and support structures. Many structures have visually exposed storage yards or mechanical areas. The existing field colors in this area are predominantly hues of tan and brown. The redefined field color palette expands upon this limited range to include a greater variety of shades and values. The accent color palette is a collection of muted blue-greens ranging from medium to dark.

#### Pajarito Corridor West Field Colors



**NOTE:** Colors shown may differ from exact color. For final color selection refer to samples on file at PM-1.



#### Pajarito Corridor West Accent Colors



#### 4. Pajarito Corridor East

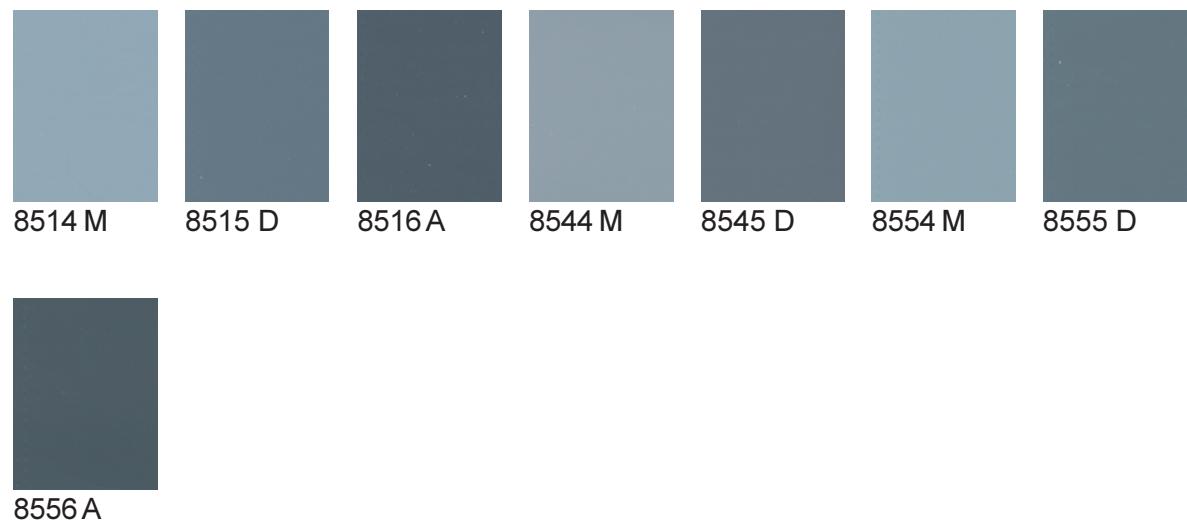
This area is a collection of metal structures, one-story office or laboratory buildings, temporary buildings and tent structures for storage of hazardous materials. The area is perched at the end of a mesa with minimal tree cover and is visually perceptible from long and short distances. Structures should stay low in height and muted in color. The area's defined field color palette is composed of neutral shades in a medium to dark value range. The accent color palette is a modest selection of muted medium to dark blues.

**NOTE:** Colors shown may differ from exact color. For final color selection refer to samples on file at PM-1.

#### Pajarito Corridor East Field Colors



#### Pajarito Corridor East Accent Colors



## 5. Anchor Ranch

This area is heavily screened from outside views by the surrounding forest. Currently, this area is a collection of primarily one-story office buildings, concrete science buildings and storage structures. Metal roofs shelter some of the one-story structures, portables and the concrete fire house. The field and accent color palettes are designed to compliment the forested setting with a range of brown and tan field colors and muted green accent colors.

**NOTE:** Colors shown may differ from exact color. For final color selection refer to samples on file at PM-1.

### Anchor Ranch Field Colors



### Anchor Ranch Accent Colors

