

ATTACHMENT NO. 4

**ELLSWORTH AFB DESIGN COMPATABILITY
STANDARDS (1998)**

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DESIGN COMPATIBILITY STANDARDS



ELLSWORTH AIR FORCE BASE SOUTH DAKOTA



DESIGN COMPATIBILITY STANDARDS



ELLSWORTH AIR FORCE BASE SOUTH DAKOTA

1998

Prepared by CMSS Architects, P.C.

EXECUTIVE SUMMARY



Ellsworth Air Force Base currently consists of six clearly distinguishable districts:

- Mixed Use Central Core
- Flight Line
- Flight Line Support
- Facilities Engineering
- Residential Neighborhoods
- Wetlands/Recreational

The clear distinction of each of the districts and their precise functional adjacency presents a highly ordered and well organized environment for pursuing the base mission. Each of the districts is functionally distinct and, consequently, each district has unique physical characteristics. It is the goal of these Design Compatibility Standards to enrich the unique character of each district while promoting policies reinforcing a harmonious base-wide visual appearance.

Hence, these Design Compatibility Standards have been formulated to:

- Promote conformance with the Air Combat Command (ACC) Architectural and Interior Design Standards.
- Further the development of a Prairie base-wide “corporate image” through the creation of a base-wide “campus atmosphere.”
- Further the architectural style of the base, by establishing clear guidelines for achieving a coherent “Prairie Modern” architectural style.

While a military base certainly possesses unique functional requirements (high security, munitions and fuels storage, mission training, etc.) and spatial areas (e.g. runways and hangars, weapons storage, rifle ranges), the majority of the base physical plant corresponds roughly with current developments of corporate office parks and college campuses.

The development of a “corporate image” involves visual unification of the physical elements of the base. Implementing standard wall and roof materials, standardizing the ratio of windows and walls, specifying common colors, and selecting common accessories will lend visual coherence throughout a base. Similarly, the development of a “campus atmosphere” involves overall spatial unification, i.e. development of a clear, orderly arrangement of buildings with common relationships to the streets, to the base open space and to each other.

The development of a “Prairie Modern” style, an architectural style unique to Ellsworth Air Force Base, consists of broad, strong, horizontal masonry wall elements (recalling the linearity of the prairie) into which are inserted light, vertically oriented, (often glazed) elements which serve as visual landmarks as well as points of entry. While the Rushmore Center clearly stands out as the apex of the “Prairie Modern” style on the base, the 37th Bomb Squadron Life Support Facility at 129 Ryan Street and the 28th Bomb Wings Headquarters and Operations Building on Scott

Drive all exemplary elements of the "Prairie Modern" style.

In pursuit of these overall objectives, this manual has been established to provide coordinated design criteria throughout the base. These criteria include:

- Site Design Standards
- Architectural Standards
- Interior Design Standards
- Landscape Architecture Standards
- Signage Standards
- Site Lighting Standards
- Engineering Standards.

All projects at Ellsworth Air Force Base must be constructed in accordance with the Ellsworth Design Compatibility Standards, the ACC Architectural and Interior Design Standards, dated August 1996 (Appendix 2), the Americans with Disabilities Act, the Uniform Federal Accessibility Standards, the Uniform Building Code and the Force Protection Guidelines.

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I. INTRODUCTION



I. INTRODUCTION

A. Base Mission

1. History

Ellsworth Air Force Base was founded on 2 January 1942, as the Rapid City Army Air Base. The first military runways opened in September 1942. The original mission involved the training of B-17 Flying Fortress crews, and instructors trained thousands of pilots, navigators, radio operators, and gunners throughout World War II.

After the War, the base served as a training location for weather reconnaissance and combat squadrons. Soon thereafter, the base was made the home of the new 28th Bombardment Wing flying the new B-29 Superfortress. After completion of runway improvements in early 1948, the 28th Bombardment Wing converted from B-29s to the new B-36 Peacemakers. In 1950, the base was reassigned from the 15th Air Force to the 8th Air Force.



B-17 Flying Fortress

In 1955, the Strategic Air Command reassigned the 28th Bombardment Wing back to the 15th Air Force from the 8th Air Force. Shortly thereafter, the Strategic Air Command acted to replace Ellsworth's B-36s with the new B-52s and, following their arrival, the base came under the command of the 821st Strategic Aerospace Division, headquartered at Ellsworth.

The 850th Strategic Missile Squadron, initially under command of the 28th Bombardment Wing, was activated at Ellsworth in October 1960. This squadron prepared for the assignment of Titan I Intercontinental Ballistic Missiles (ICBM). Headquarters Strategic Air Command activated the 44th Strategic Missile Wing in January 1962, shortly before the arrival of the ICBM's. At this time, SAC also named the 44th Strategic Missile Wing as the host wing of Ellsworth. By the end of 1962, the original Titan I missiles had been rendered obsolete.

In July 1962, the Strategic Air Command activated the 66th Strategic Missile Squadron. The 66th was joined shortly thereafter by the 67th and the 68th Strategic Missile Squadrons. These three squadrons were charged with operating 150 Minuteman I ICBMs under the 44th Strategic Missile Wing. On 1 June 1971, the 821st Strategic Aerospace Division was inactivated. Later that year, upgraded Minuteman II ICBMs replaced the nine year old Minuteman I.



A. Base Mission

The next wave of changes occurred in the 1980s. In 1986, plans were made for phasing out the B-52s and for incorporating the new B1-B Bombers. The existing runway was renovated, new dormitories were constructed, a new BX and commissary were constructed, and new aircraft maintenance facilities were erected to accommodate the B1-B. In January of 1987, the first of a total of 35 bombers arrived at the base. In July of 1988, the 12th Air Division moved to Ellsworth, assigned with the responsibility for training B1-B, transient B-52, and the 28th Wing's KC-135 Stratotanker air crews. The 99th Strategic Weapons Wing was activated in August of 1989, assuming primary responsibility for B1-B and B-52 advanced air crew training.

The 1990s brought additional transformations to Ellsworth, largely resulting from the decline of the Cold War. On 3 January 1990, the Strategic Air Command redesignated the 812th Combat Support

Group as the 812th Strategic Support Wing, tasked with consolidating all combat support functions into a single organization. Later that year, the Strategic Air Command replaced the 12th Air Division with the Strategic Warfare Center, designated to provide operational, command, and administration control over Ellsworth's subordinate units.

On 1 September 1991, the 28th Bombardment Wing was renamed the 28th Wing, the 44th Strategic Missile Wing was renamed the 44th Wing and the 99th Strategic Weapons Wing became the 99th Tactics and Training Wing. Shortly afterwards, the Strategic Air Command deactivated both the Strategic Warfare Center and the 812th Strategic Support Wing, with the 28th Wing assigned to absorb all of the 812th's functions and to serve as Ellsworth's host organization. Following the Secretary of Defense's order to stand down all alert operations, the Air Force deactivated the Strategic Air Command, transferring Ellsworth's organizational structure to the newly activated Air Combat Command in 1992.



B-29 Superfortress

I. INTRODUCTION

A. Base Mission

After less than a year under the Air Combat Command, the 28th's mission changed from strategic bombardment to worldwide conventional munitions delivery. The 99th Tactics and Training Wing was renamed the 99th Wing and subsequently transferred to Nellis Air Force Base, Nevada in September 1995. The 44th Missile Wing, having completed the dismantling of the 150 ICBM arsenal in April 1994, was inactivated on 4 July 1994.

2. Base Components

The 28th Bomb Wing reports to the 8th Air Force under Air Combat Command and is the ACC's lead B-1B conventional wing. The 28th Bomb Wing consists of the 28th Operations Group, the 28th Logistics Group, the 28th Support Group, and the 28th Medical Group.

The 28th Operations Group is supported in its mission by the 28th Operations

Support Squadron, the 37th Bomb Squadron, and the 77th Bomb Squadron. The 28th Logistics Group is supported by the 28th Logistics Support Squadron, the 28th Maintenance Squadron, the 28th Munitions Squadron, the 28th Supply Squadron, the 28th Transportation Squadron, and the 28th Contracting Squadron. The 28th Support Group is supported by the 28th Civil Engineer Squadron, the 28th Communications Squadron, the 28th Security Police Squadron, the 28th Services Squadron, and the 28th Mission Support Squadron.

3. Mission Statement

The mission of the 28th Bomb Wing is to provide rapid, decisive, and sustainable combat air power...anytime, anywhere!



B-1B Bomber



B. Regional Setting

1. Geographic Setting

Ellsworth Air Force Base is at the western edge of the Great Plains, nestled against the slopes of the Black Hills. Mount Rushmore is located just 28 miles southwest of Ellsworth. Ellsworth Air Force Base, in western South Dakota, is located 10 miles east of Rapid City, South Dakota and is easily accessible via Interstate 90.

2. Climatic Setting

The climate at Ellsworth Air Force Base is typical of the High Plains. At an altitude of 3,247', the climate is semi-arid with an average annual rainfall of 17", and an average annual snowfall of 38".

Summers are mild and winters are temperate, with the region experiencing a mean temperature of 47°F. The mean daily maximum temperature is 60°F, while the mean daily minimum temperature is 37°F.

3. Geological Setting

The natural, regional landscape character is prairie grassland. While open prairie extends to the east, the region is bounded on the west by the Black Hills, the easternmost outcropping of the Rocky Mountains. The mountains rise to a peak elevation of 7,242' above the rolling prairie hills. Dense stands of pine and spruce, climbing amid bald granite crags,

create a vast dark range when viewed against the western sky. Hence the name, Black Hills. Harney Peak (elev. 7,242'), the highest point in South Dakota, is located just 43 miles southwest of Ellsworth. On the base proper, the land generally slopes to the southernmost boundary. Drainage for the base as well as for the entire region flows to the Missouri River.

4. Soils

Soils on the base generally consist of expansive clays. Soil borings are required for all subsurface design.



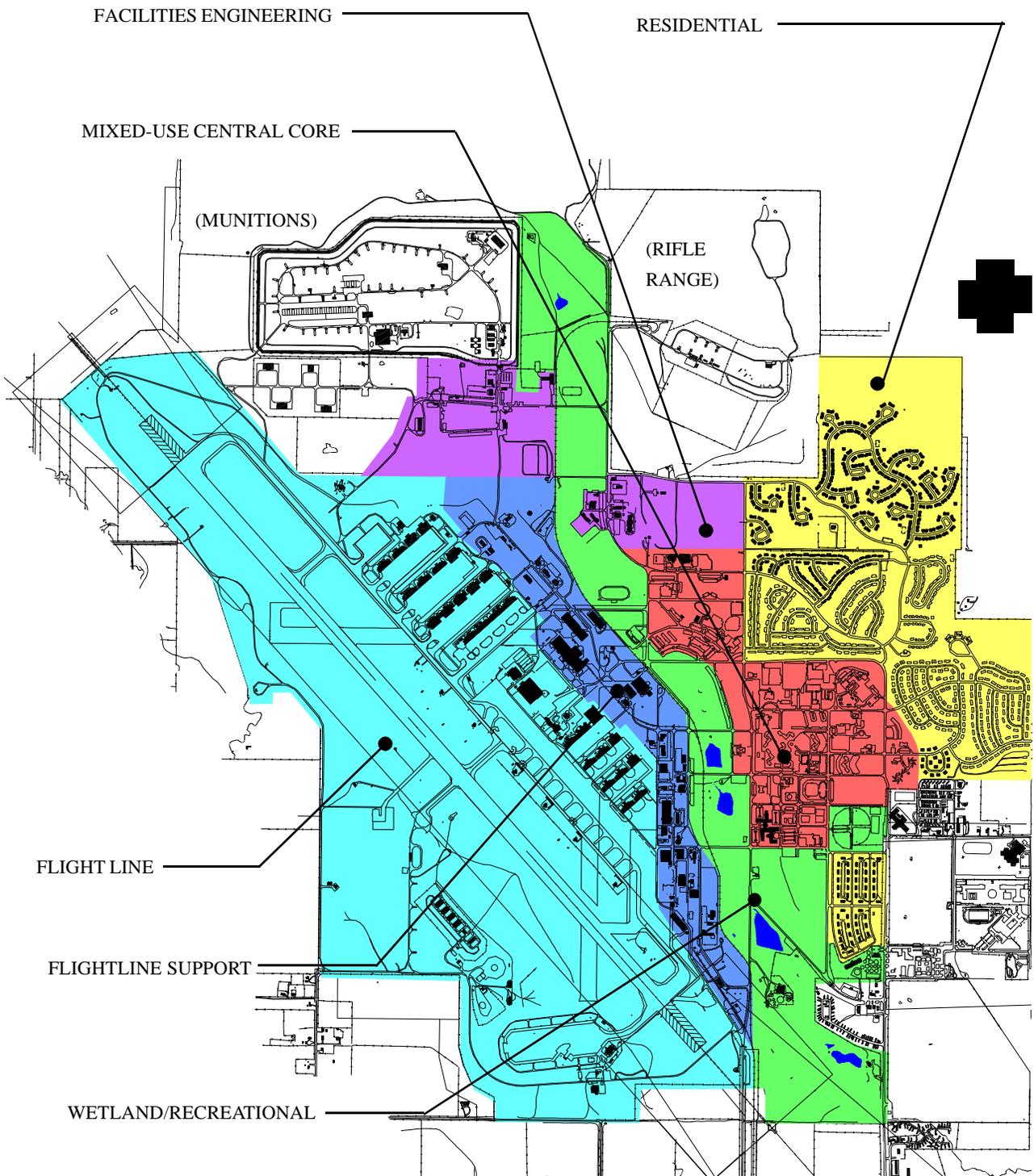
Mount Rushmore

II. BASE OVERVIEW AND DISTRICT ANALYSIS



II. BASE OVERVIEW AND DISTRICT ANALYSIS

A. General Overview





II. BASE OVERVIEW AND DISTRICT ANALYSES

A. General Overview

Ellsworth Air Force Base consists of six clearly distinguishable districts:

- Mixed Use Central Core
- Flight Line
- Flight Line Support
- Facilities Engineering
- Residential Neighborhoods
- Wetlands/Recreational District.

The clear delineation of each of the districts and their precise functional adjacency presents a well organized environment for pursuing the base mission. Contributing to this organizational clarity, each of the districts is functionally distinct and, therefore, each district has unique physical characteristics.

These Design Compatibility Standards seek to unify the design of Ellsworth Air Force Base by fostering the creation of a “corporate image” for the base through the development of a “campus atmosphere” on the base.

While a military base certainly possesses unique functional requirements (high security, munitions and fuels storage, mission training, etc.) and spatial areas (e.g. runways and hangars, weapons storage, rifle ranges), the majority of the base physical plant corresponds roughly with current developments of corporate office parks, college and university campuses, and small American towns.

The development of a “corporate image” involves visual unification of the physical elements of the base. Implementing standard

wall and roof materials, standardizing the ratio of windows and walls, specifying common colors, and selecting common accessories will lend visual coherence throughout a base. Similarly, the development of a “campus atmosphere” involves overall spatial unification, i.e. development of a clear, orderly arrangement of buildings with common relationships to the streets, to the base open space and to each other.

The plan for achieving this unique “base atmosphere” is the implementation of simple and clear principles of planning, architecture, and landscape architecture throughout the base. The planning principles generally include the development of guidelines for integrating buildings and open space.

The guidelines coordinate the regulation of street hierarchy, building massing and heights, and functional zoning and sub-zoning for the creation of unified districts. The criteria also includes common setback requirements for the reinforcement of street edges, direct relationships between buildings, entrances, and street frontage, and guidance regarding appropriate adjacencies at district edges.

II. BASE OVERVIEW AND DISTRICT ANALYSIS

A. General Overview

With respect to the overall landscape, the importance of street trees for the creation of a unified environment cannot be overstated. The planting of street trees throughout the individual districts can successfully integrate them into a coherent whole. These various districts, together with the open prairie which simultaneously unites and divides them, form a basewide system of open space development, providing a continuous, yet varied, network of vehicular and pedestrian pathways.

Architecturally, the Standards specify a limited, but not overly restrictive, palette of exterior materials. In addition, common districtwide policies towards sloped roofs and common fenestration types and patterns further reinforce the “base atmosphere.” This assists in the creation of a unified image for the base, an updated version of the traditional “prairie style” best described as “Prairie Modern.” This style primarily consists of broad, strong horizontal masonry wall elements (recalling the linearity of the prairie), into which are inserted light, vertically oriented (often glazed) elements which serve as visual landmarks as well as points of entry.

The Landscape Architectural Standards at Ellsworth focus on providing landscaping appropriate for the regional environment. The guidelines incorporate indigenous plant material, xeriscaping principals and designs intended to reduce maintenance and water usage. These policies assist in the creation of a regionally appropriate landscape.

II. BASE OVERVIEW AND DISTRICT ANALYSES



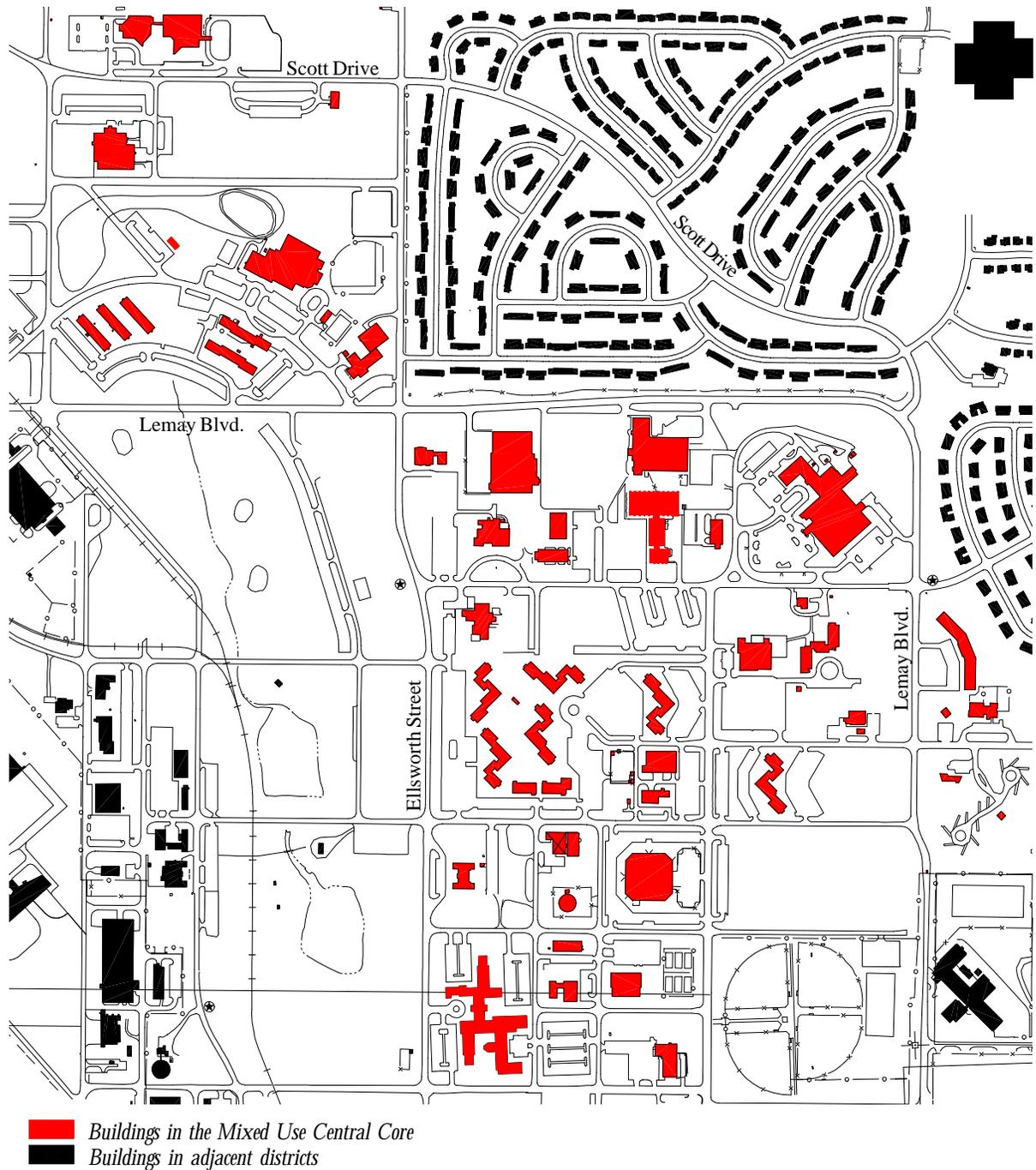
B. Ellsworth Air Force Base Districts

The following pages provide a location map and description of each of the following Ellsworth Air Force Base Districts:

1. Mixed Use Central Core
2. Flight Line
3. Flight Line Support
4. Facilities Engineering
5. Residential Neighborhoods
6. Wetlands/Recreational Area

II. BASE OVERVIEW AND DISTRICT ANALYSIS

B. Ellsworth Air Force Base Districts





II. BASE OVERVIEW AND DISTRICT ANALYSES

B. Ellsworth Air Force Base Districts

1. Mixed Use Central Core

The buildings in the Mixed Use Central Core vary greatly in almost every respect. This area of the base contains a vast array of functional building types, including retail buildings, dormitories, office and command buildings, chapels, a collocated club, and a hospital. Exterior wall surfaces are typically brick, though colors vary. Older buildings are of a light buff color while newer buildings are of a darker color. A few facilities are faced with metal panels and some have been renovated with exterior insulating finish systems. Roofing materials range from asphalt shingles to standing seam metal on sloped surfaces. Flat roofs are either of a ballasted EPDM type, or of a built-up type with gravel cover. Fenestration throughout the district is climatically appropriate, with most buildings having “punched out” windows of fairly modest size and scale.

In general, the Mixed Use Central Core needs to reinforce the development of street hierarchy and hierarchy of building massing, and enforce a district wide policy regarding the consistent relationship of buildings to the street. Landscaping in the district should continue recent trends towards ecologically sensitive, lower maintenance plants with limited areas of turf and mulched plant beds. Together,

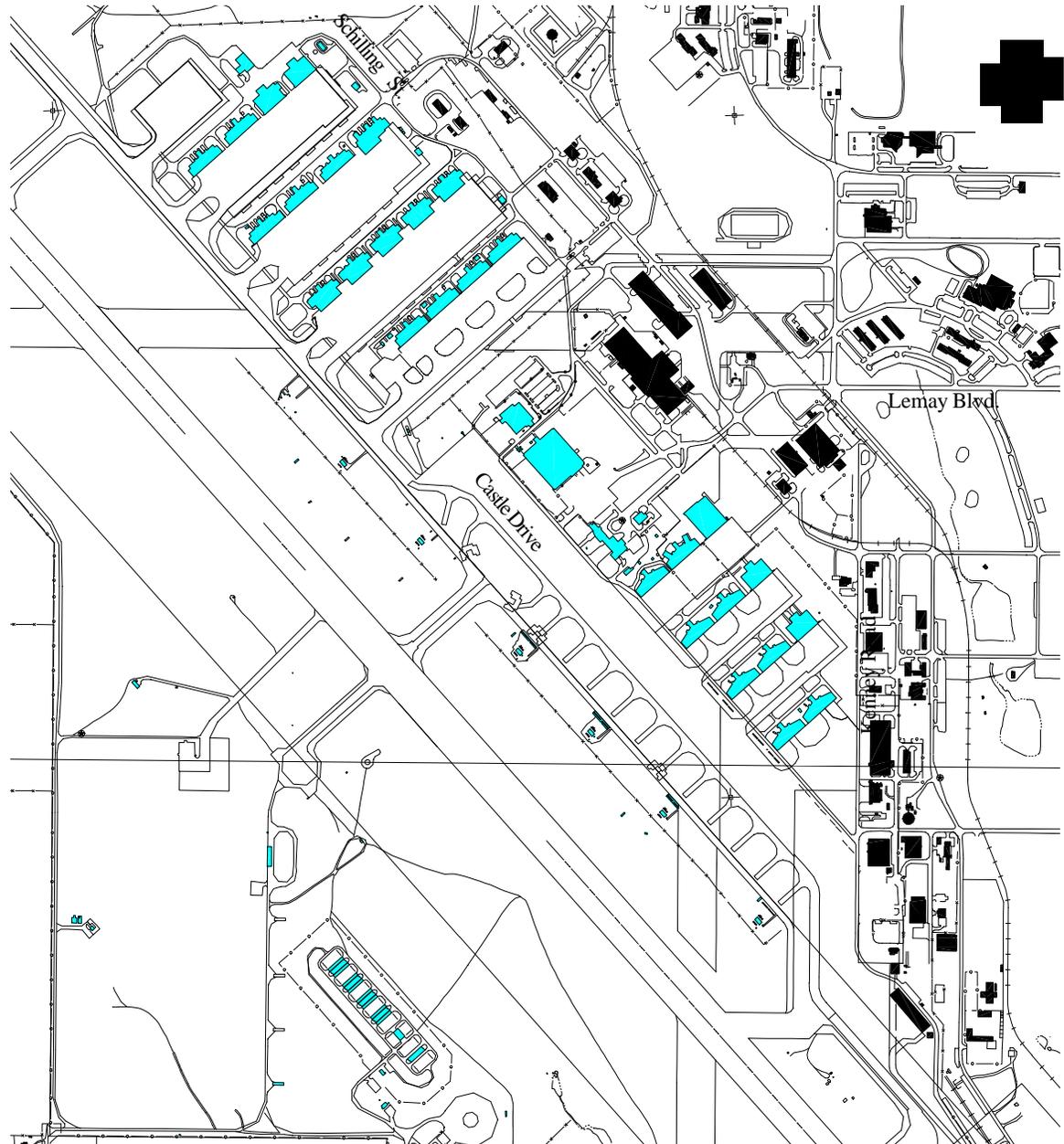


the policies will continue the transformation toward a more pedestrian oriented environment; providing dormitories with close access to the central elements of the base.

The Rushmore Center, a newly completed office complex, serves as a model for Ellsworth’s future. The building fronts Ellsworth Street well, the main entry is sensitively sited with respect to the existing street network, and the materials, colors and fenestration advance the traditional “prairie style” architectural vocabulary into a unique “Prairie Modern” style.

II. BASE OVERVIEW AND DISTRICT ANALYSIS

B. Ellsworth Air Force Base Districts



-  Buildings in the Flight Line
-  Buildings in adjacent districts



II. BASE OVERVIEW AND DISTRICT ANALYSES

B. Ellsworth Air Force Base Districts

2. Flight Line

The Flight Line consists of a linear array of buildings along the western edge of the base, extending perpendicular to the runway. Between these fingerlike extensions are large parking and maneuvering aprons for the bombers. The Flight Line is primarily industrial in character, with the majority of buildings consisting of large metal panel structures with sloping metal roofs. These buildings form a clear and coherent visual presence for the primary mission of the base.



Landscaping in the Flight Line District primarily exists at the Base Operations Center and the Pride Hangar. Turf areas have been reduced in size through the use of plant material and gravel mulch. Between the two buildings a decorative and functional fence provides a barrier to the operational apron. These features assist in distinguishing the central area from the hangars, a visual distinction which should be maintained in the future. Reducing the use of turf in this area is also encouraged.

In general, the Flight Line District has a well developed presence visually as well as organizationally. The main vehicular entry to the District is Lemay Boulevard. Lemay leads directly to the Pride Hangar which, together with the new fire station, forms a central mixed use functional sub-zone of

the Flight Line District. To the north and south of this central area are the hangars. While the clarity of this internal organization is very positive, the District needs to enhance the clarity of its organizational and visual relationship with the adjacent Flight Line Support District. The application of a masonry wainscote base to the hangar buildings can be used to successfully integrate the structures with other masonry buildings in the District as well as with buildings of the Flight Line Support District.

II. BASE OVERVIEW AND DISTRICT ANALYSIS

B. Ellsworth Air Force Base Districts





II. BASE OVERVIEW AND DISTRICT ANALYSES

B. Ellsworth Air Force Base Districts

3. Flight Line Support

The Flight Line Support District is bounded by the Flight Line District to its west and by the Wetlands/Recreation District to the east. Buildings in the District vary widely in almost every respect. Exterior walls in the District consist of concrete masonry units, brick, siding, metal panels, and exterior insulating finish system materials. Roofing materials include asphalt shingles and standing seam metal. Doors and windows have a “punched out” vocabulary.

Landscaping within this District is limited. Storage and maintenance buildings have pavement on three or more sides. Where there is room for landscaping, turf is used. The landscaping of office buildings in this District consists of turf with some accent planting at entries. Expanding the use of indigenous, low maintenance plants that provide a change of color through the growing season should be encouraged.

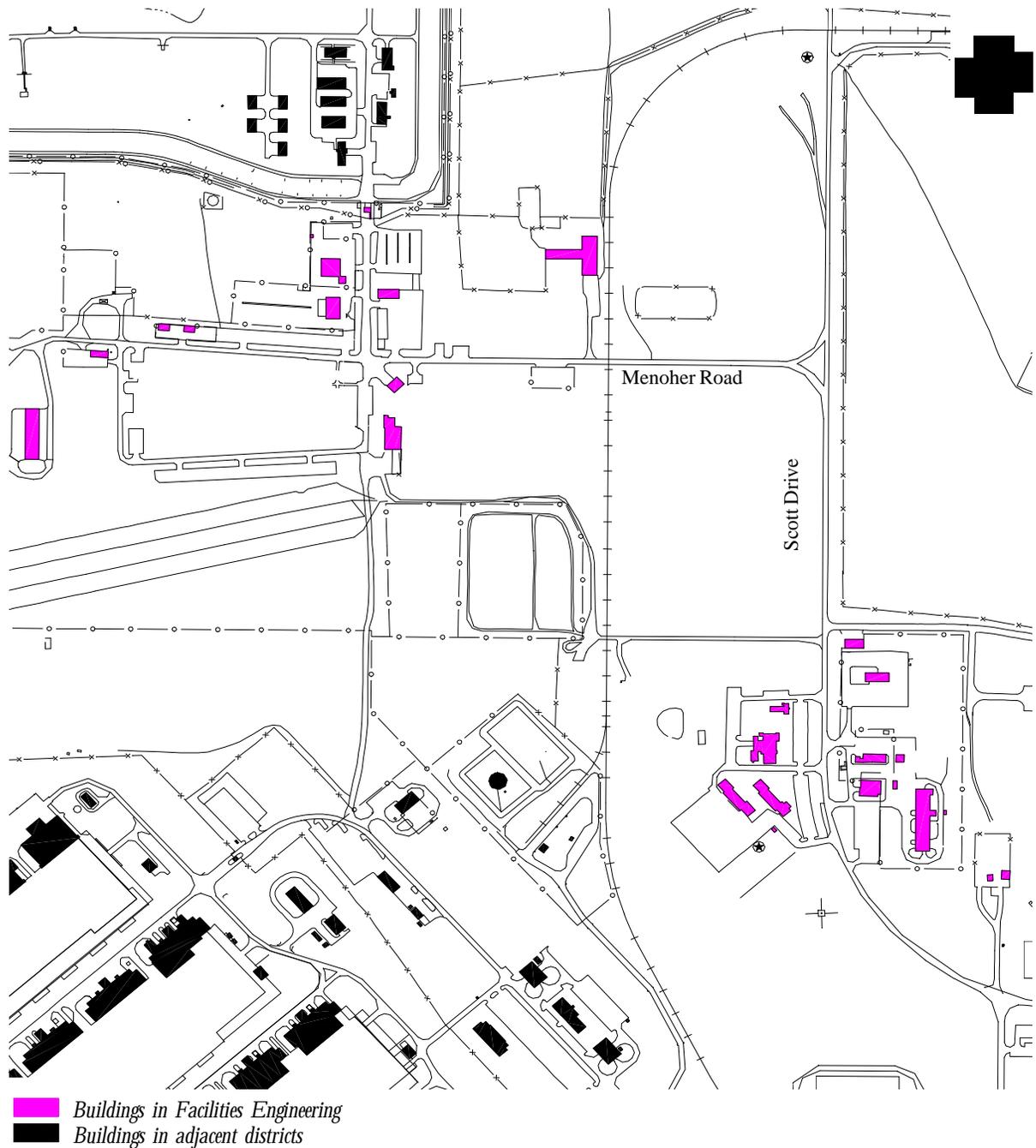
Establishing a consistent relationship between building and street frontage is the most important planning policy needing implementation in the Flight Line Support District. Adoption of this policy will reinforce the extant usage patterns of buildings in this District so that buildings front onto either Kennedy Road or Twining Street, enclosing vehicular service courts towards the interior of the block.



In general, the Flight Line Support District mediates between the Flight Line and the remainder of the base. Coordinating the masonry exterior walls of these buildings together with the masonry wainscote base of the Flight Line and the masonry walls of the Mixed Use Central Core will further unify the visual appearance of the base.

II. BASE OVERVIEW AND DISTRICT ANALYSIS

B. Ellsworth Air Force Base Districts





II. BASE OVERVIEW AND DISTRICT ANALYSES

B. Ellsworth Air Force Base Districts

4. Facilities Engineering

The Facilities Engineering District of the base is a sprawling region of mostly one story structures serving as support for the entire base. The buildings primarily consist of offices and maintenance structures which are simple and utilitarian. The primary materials on office facilities include painted concrete masonry units or exterior insulated finishing system materials. The maintenance and storage facilities typically consist of metal panel buildings. Roofs are either low-sloped or flat. Door and window openings have a “punched out” vocabulary.



With its limited number of buildings, the District consists mainly of open lots, a majority of which are planted with native grasses. Areas around office buildings have turf with few other landscaping elements.

In general, the area needs to reinforce the existing street network by fronting buildings onto the streets, simultaneously using them to screen parking and service areas behind. Landscaping and garden walls may also be utilized to screen service areas. Coordinating the masonry of the walls with the buildings will contribute to the visual harmony of the District.

II. BASE OVERVIEW AND DISTRICT ANALYSIS

B. Ellsworth Air Force Base Districts





II. BASE OVERVIEW AND DISTRICT ANALYSES

B. Ellsworth Air Force Base Districts

5. Residential Neighborhoods

The Residential Neighborhoods at Ellsworth form a clear and coherent arrangement of dwelling units. The buildings are typically one and two story structures with sloping roofs, usually of fiberglass shingles. Exterior wall materials vary from metal siding to brick, different neighborhoods being distinguished through different materials.

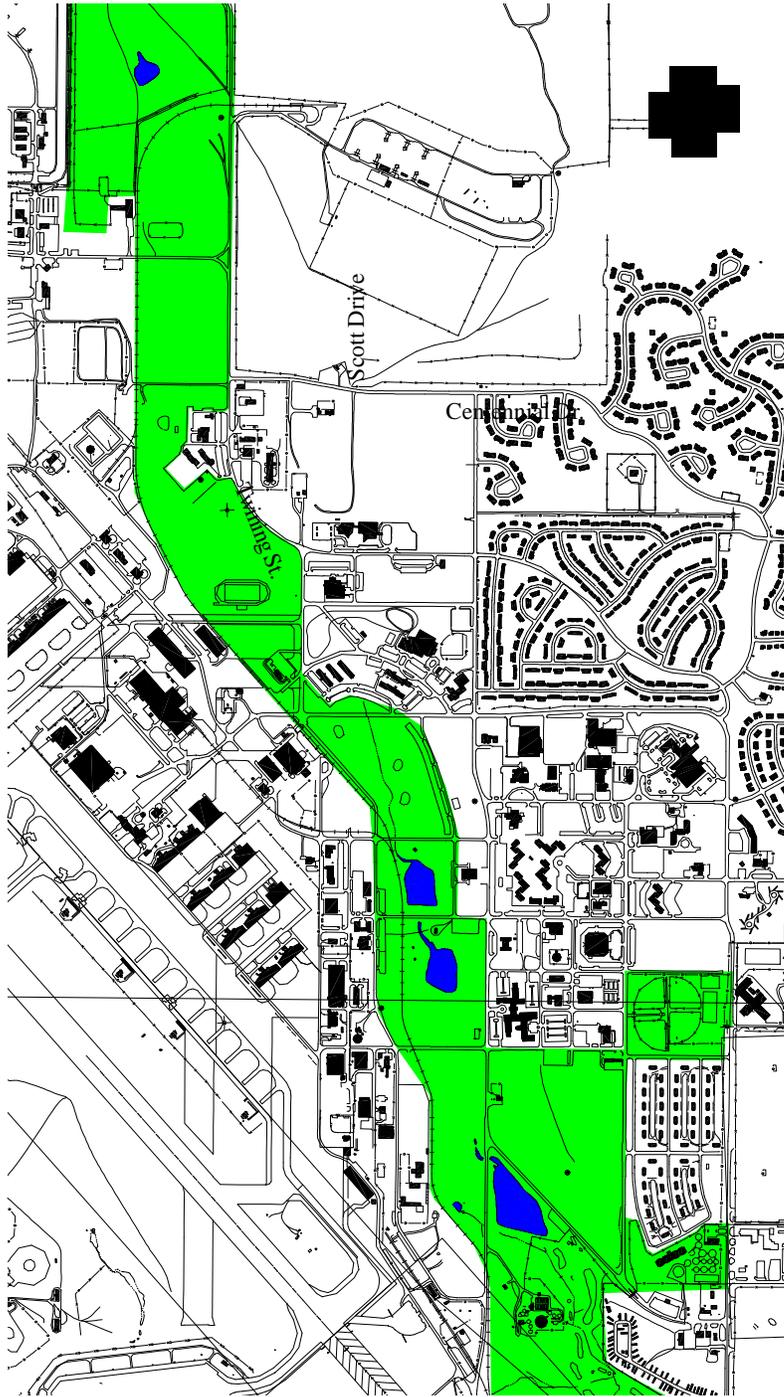
The older residential neighborhoods typically have large trees, which provide shade and enhance the overall appearance of the neighborhoods. Areas of turf (bluegrass typically), requiring high intensity water usage, should be restricted to the rear yards. Front yards should be converted to more native, regional plant materials (prairie grasses and wildflower seed mixes).

In general, the planning of these neighborhoods and their architectural character constitutes a successful program of integrating buildings into coherent unified communities. They also illustrate successful planning for the gradual expansion and growth of neighborhoods over time. The development of separate residential neighborhoods, in lieu of a continuous matrix of undifferentiated housing units, establishes a scale and individuality appropriate to residential usage.



II. BASE OVERVIEW AND DISTRICT ANALYSIS

B. Ellsworth Air Force Base Districts



 Wetlands / Recreational District



II. BASE OVERVIEW AND DISTRICT ANALYSES

B. Ellsworth Air Force Base Districts

6. Wetlands/Recreational Areas

The Wetlands/Recreational District at Ellsworth are woven together throughout the base, with the wetlands providing an enormous resource for passive recreational activities on an open expanse of prairie grasses, streams, and lakes. While formalized active recreation areas, such as softball, baseball, soccer and football fields are primarily located in adjacent districts, these areas are linked to the main open space.

The Wetlands/Recreational District is a large and inviting area consisting of plant material which is primarily natural. The wetlands and lake edges have plant groupings and materials which have propagated naturally. Beyond the waters' edges are large turf areas which allow for passive and informal active recreation. Located throughout the area are open air shelters, simple pitched roof structures supported on columns. The columns are either wood or brick and the roofs are typically of asphalt shingles.

This area offers enormous opportunity for future development as the “central park” of Ellsworth, a central open space encompassed and supported by surrounding districts of varying functions. The area links both active and passive recreational opportunities together with the natural wetlands in a coordinated basewide system of open space.



III. DESIGN STANDARDS



III. DESIGN STANDARDS

A. Site Design Standards

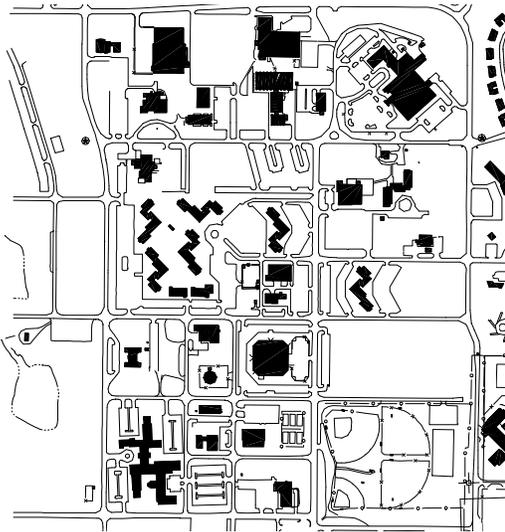
1. Use Groups/Adjacencies

Due to the variety, mix, and growth of building types on the base, projects should be reviewed on an individual basis. In general, new buildings should be located in close proximity to existing buildings of similar usage. This will continue to reinforce the unique character of each of the different districts. Simultaneously, this will reinforce the developing sub areas in the *Mixed Use Central Core*.

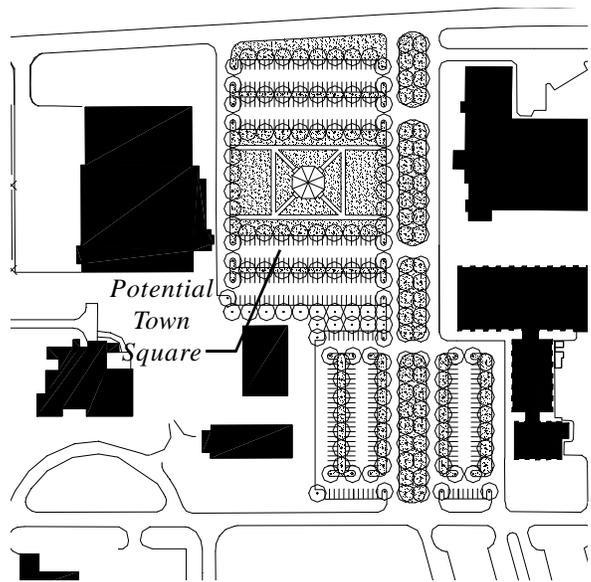
In the *Mixed Use Central Core*, the “downtown” of Ellsworth Air Force base is bounded by Ellsworth Street to the west, George Drive to the south, and Lemay Boulevard to the north and east. This subzone, or “district within the district,”

contains facilities of central social importance to the entire base, e.g. the commissary, library, theater, chapels, etc. Within this downtown area, the current parking area encompassed by the Base Exchange, library, theater and commissary has the potential for development as the town center, or “market square” for Ellsworth Air Force Base. Future retail and civic/institutional buildings should be sited in this area to reinforce the emerging “town square” atmosphere.

Existing bachelor enlisted quarters are integrated throughout the *Mixed Use Central Core*, typically clustered as a pair or quadrangle of units. Future housing should seek to reinforce and expand the



The “downtown” of Ellsworth Air Force Base



The emerging “town center / market square”



A. Site Design Standards

existing clusters rather than creating additional zones of development.

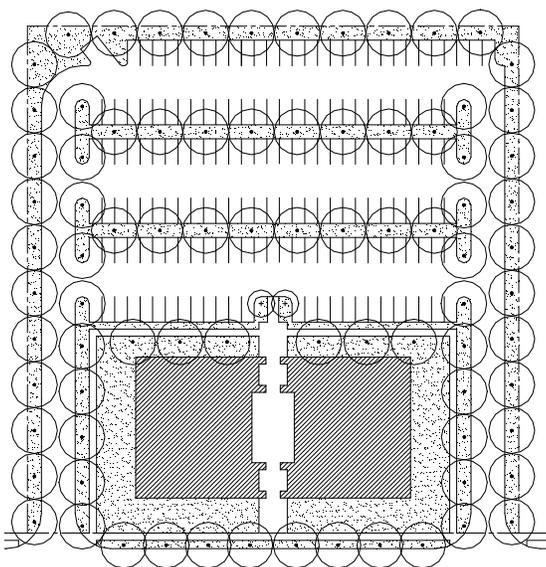
Future administrative facilities which are supportive of the base mission along the *Flight Line* should be situated along the eastern side of Ellsworth Street. This will create an appropriate street wall facade fronting the *Wetlands/Recreational District's* open space and serve to link new facilities both to the *Flight Line Support* and to the *Flight Line*.

In the *Wetlands/Recreation District*, congregate recreational structures (bandstands, gazebos, picnic shelters) together to generate coordinated areas of activity within the larger overall area.

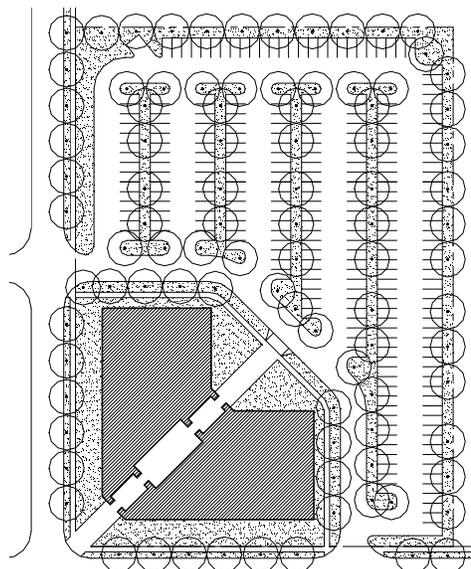
2. Bulk: Massing and Heights

Projects should be reviewed on an individual basis. In general, throughout the base, buildings are restricted to two stories in height, except unaccompanied housing facilities, which are permitted to be three stories.

Heights of buildings may vary as functionally required, but height should not vary more than one story from adjacent buildings. Hangar facilities along the *Flight Line* should be sized according to functional requirements.



Typical mid-block development



Typical corner development

III. DESIGN STANDARDS

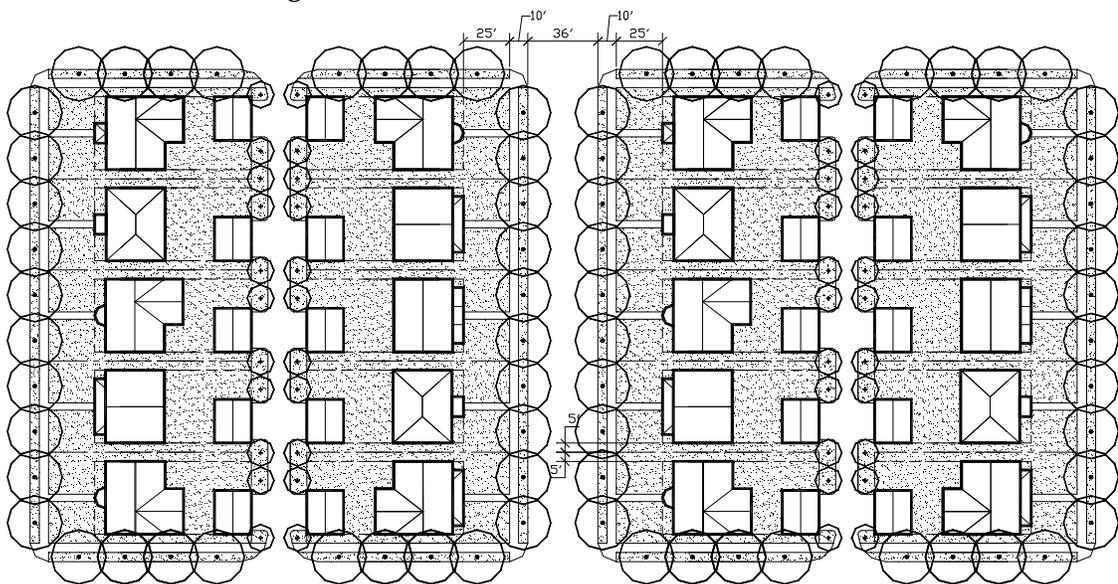
A. Site Design Standards

Along the *Flight Line Support District*, at the southern end, locate future support and storage facilities. These lower height buildings should “front” onto either Twining Street or Kenney Road, and will create both a western edge for the *Wetlands/Recreational District* and integrate the larger industrial hangar buildings into the human scale of the base.

In the *Facilities Engineering District*, attempt to maintain the one-story industrial character of this area.

In the *Residential Neighborhoods*, future development should incorporate two-story residential units as a means of economizing on land use, foundation and roofing costs, and HVAC usage.

In all districts, where massive, large floor plate buildings are sited adjacent to smaller facilities, the larger building should be “broken down” visually to integrate with the adjacent structures. Building entrances, canopies, loggias, and the articulation of exterior wall components can all serve to integrate larger buildings into the streetscape.

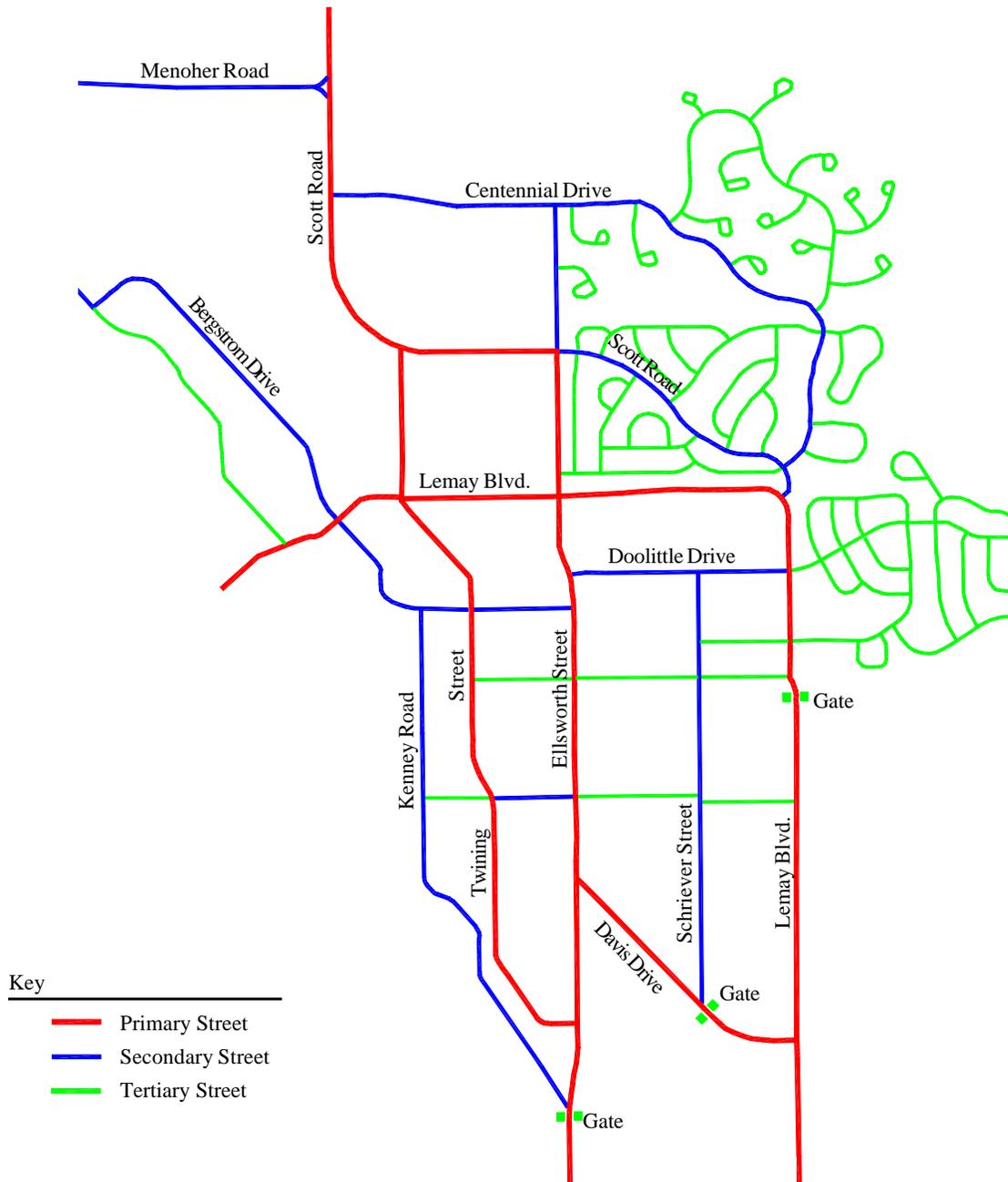


Typical residential street and alley

III. DESIGN STANDARDS



A. Site Design Standards



Street System

III. DESIGN STANDARDS

A. Site Design Standards

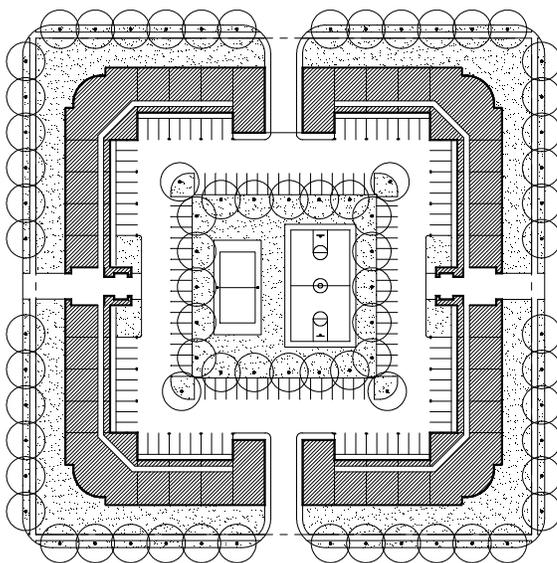
3. Open Space: Street Walls, Yards and Setbacks; Streets & Sidewalks

Given the diverse and spread out character of the base, providing regularity of the streetscape elements offers tremendous opportunity for creating a more cohesive environment. This includes controlling the relationship of sidewalks to curb, coordinating street plantings in relation to the curb, and regulating the types of street tree plantings. These guidelines reinforce the existing street hierarchy of the base, creating a more “legible,” user friendly environment. See Appendix 1 for street tree planting schedule and plant types.

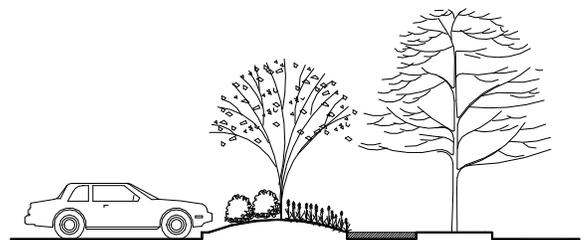
a. Street Walls, Yards & Setbacks

In all districts, to promote the development of street walls, buildings should front directly onto a street, and not be set diagonally to the street frontage.

In all districts, setbacks are to be a minimum of 25' for front and rear yards, 10' for side yards. Front yard setbacks may vary up to 20% to accommodate varying conditions of existing buildings. In no case should buildings vary by more than 10% from the average setback of the existing surrounding buildings.



Typical unaccompanied housing quad reinforcing street edges



Desirable screened parking example.

III. DESIGN STANDARDS



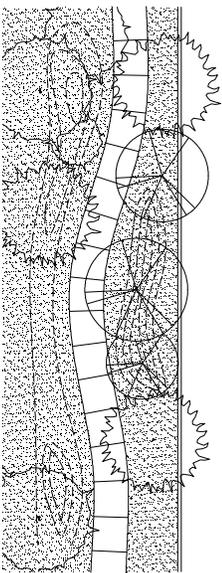
A. Site Design Standards

On corner lots, both streets are to be considered front yards, and both sides abutting other lots are to be considered side yards. Setbacks for screen walls shall be the same as for the buildings.

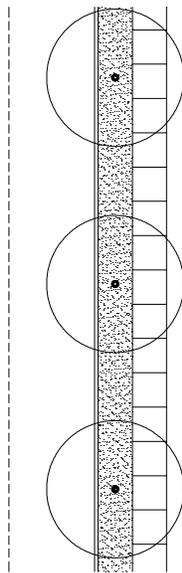
b. Streets and Sidewalks

To enhance and unify the overall character of the base, while simultaneously clarifying the uniqueness of each district, trees should be provided along the streets and at intersections in accordance with the following schedule:

- Streets which serve as major base wide thoroughfares (Lemay Boulevard, portions of Ellsworth Street and portions of Scott Drive, serving vehicular traffic almost exclusively) will not receive street trees. Avoiding planting street trees on the major thoroughfare will reinforce the open prairie character of the overall base.
- Streets which border the *Wetlands/Recreational District* (portions of Ellsworth Street, Davis Drive, portions of Twining Street, and portions of Scott Drive) will have street trees only on the side opposite the *Wetlands/Recreational District*.



Sidewalk and street tree plantings at streets bordering Wetlands/Recreational District



Sidewalk and street tree plantings at Residential neighborhood

III. DESIGN STANDARDS

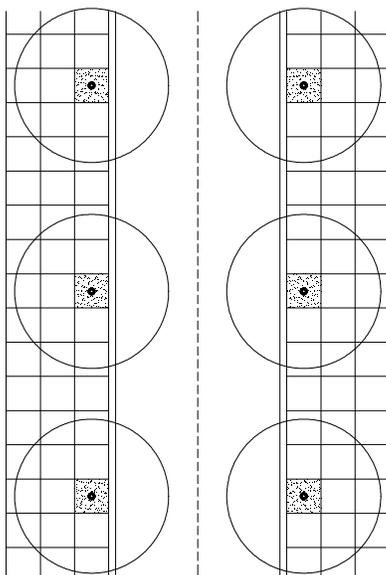
A. Site Design Standards

- Streets crossing the *Wetlands/Recreational* district (portions of McConnell Boulevard, Lemay Boulevard, Bergstrom Drive, Spaatz Drive, George Drive, Ellsworth Street) will not receive street trees. The planting of street trees along the edge of the *Wetland/Recreational* District and the avoidance of street trees on streets crossing the district will reinforce the periphery of the area and emphasize it as an open space resource.
- Streets which are internal streets inside of districts (serving both vehicular and pedestrian traffic) will receive street tree plantings. The street tree plantings along internal district streets will reinforce the individual character

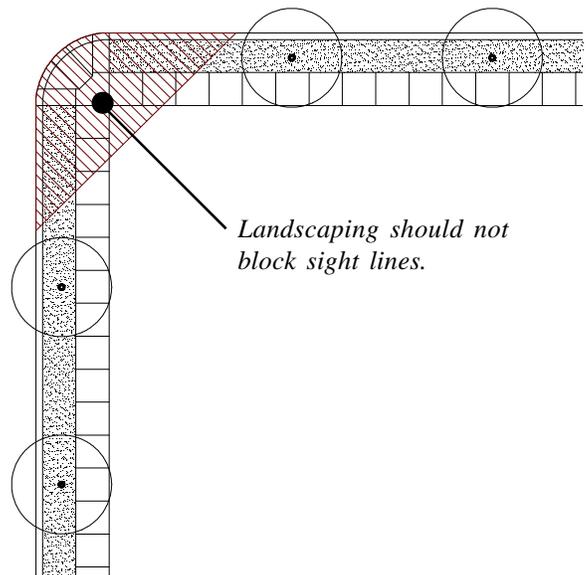
of each district and create and enhance pedestrian activity.

In general, implementation of the street tree planting schedule will help create the appearance of an open, natural prairie landscape containing distinct nucleated settlements of tree lined streets.

Wherever provisions specify a regular rhythm of street tree plantings, they should be supplemented with irregular plantings behind the sidewalk edges. This dual system will ensure an overall harmony and diversity to the base while simultaneously encouraging each district to develop its own identity and



Sidewalk and street tree planting treatment at Town Center/Market Square Area



Sidewalk and street tree plantings at typical intersection

III. DESIGN STANDARDS



A. Site Design Standards

individual character. For detailed information on supplemental landscaping, see the Landscape Architecture Standards.

In general, sidewalk types should be keyed to adjacent land uses:

- Along primary streets, walkways which are parallel to the curb should be held a minimum of 6' from the back of curb. This allows for street trees to be planted between the walk and the curb.
- Walks along the future "Town Square/Market Center" should extend to the back of the curb, with tree pits inserted to accommodate trees.

- Walks adjacent to the open spaces of the Wetlands/Recreational District should be curvilinear.

Walkways should be located and aligned to maximize views of surrounding natural features and open spaces. Curved walkways shall be designed as sweeping curves that create visually appealing landscape forms. Abrupt or irregular curves and jogs should be avoided. Curved walkways should not be used in areas too narrow to allow a sweeping curve.



Well screened parking area



Typical parking lot

III. DESIGN STANDARDS

A. Site Design Standards

All walkways should be handicapped accessible. Requirements of the Americans with Disabilities Act and the Uniform Federal Accessibility Standards must be met when designing walkways, ramps, and other pedestrian access facilities. Where site or development conditions make full handicap access unfeasible, an alternative handicapped route shall be provided with signage. Handicapped accessible walkways shall be designed to the following standards:

- (1) It is preferred that walkways not exceed continuous grades 3%. Walkways with sustained grades in excess of 5% are considered ramps and shall have level areas a minimum of 5' in length every 30'.
- (2) Where possible, walkways should have a continuous common surface, not interrupted by steps or abrupt changes in level exceeding ½". The walk surface shall be relatively smooth and have a non-slip surface such as a medium broom finish. These standards apply wherever walkways cross other walkways, driveways or parking lots.
- (3) Surface cross slopes shall not exceed ¼" per foot (2%).

4. Parking

Parking should be located towards the interior of the block, in the rear yard of each lot, unless otherwise dictated by functional necessity. Where dictated by functional necessity, parking may be located in side yards adjacent to the building.

Parking in *Residential Neighborhoods* should be directly off the street, following current practice. Garages or carports should be set back a minimum of 5' from the front plane of the housing unit, unless otherwise dictated by functional necessity.

In *Recreational Areas*, parking should be located towards the periphery of the recreational area. Multiple lots accommodating fewer vehicles are preferred to a single, large parking lot.

One shade tree shall be provided for every 12 parking spaces with a minimum ground area of 8' x 17' within the parking field and in adjoining curbed planting areas. Trees may be placed around the edges of parking lots to provide the required quantity for peripheral parking bays only. Trees shall be planted in landscaped islands or strips within parking lots. In all cases, tree planting shall be evenly distributed around and throughout parking lots to provide the required planting for both peripheral and internal parking bays. Only

III. DESIGN STANDARDS



A. *Site Design Standards*

one tree may be provided for each 9' x 18' island in a parking lot. Minimum spacing between trees in parking lot islands shall be 25'.

Fifteen percent of the net areas of internal parking bays shall be developed as islands. Islands may be landscaped with one or a combination of shrubs, shade and flowering trees, and groundcovers.

All shade trees in parking lots shall have a minimum branching height of 6' to 8' above finished grade.

Plant material used in combination with berming shall be used to screen parking lots from streets. Where parking lots are visible from any street, the minimum height of the screening plants at installation shall be 30" planted 3' on center.

All site entry drives shall be well landscaped with a combination of evergreen shrubs, flowering shrubs, deciduous shade trees, flowering trees, and flower beds.

Refer to Landscape Standards for additional recommendations.

III. DESIGN STANDARDS

B. Architectural Design Standards

1. Exterior Walls

a. General Recommendations

Exterior walls should be built of brick masonry or, alternatively, integrally colored split-face or ground-face concrete masonry units. Buildings should be limited to one primary type of masonry, with an option to include an accent feature of a complementary type and/or color. Brick masonry walls may be accented with precast concrete bases, stringcourses and/or cornices. In addition, patterning of the brick is encouraged to provide a sense of scale to the buildings. Exterior walls of buildings with HVAC systems shall be insulated to at least R-19.

Patterning of concrete masonry unit walls, such as the insertion of half-height courses, is also encouraged for achieving a sense of scale. Patterning of masonry units can also be used successfully to articulate building entrances. All concrete masonry units and mortar should be manufactured with additives to discourage efflorescence. Metal buildings are not allowed, except in the *Flight Line* and *Facilities Engineering* Districts.

Along the *Flight Line*, and in the *Facilities Engineering District*, when required in large-scale structures (hangars and industrial buildings), metal clad buildings may be used. However, such buildings should be provided with a base of brick or of integrally colored split-face or ground-face



Patterned brick wall with pre-cast banding and punch-out windows



Flight line metal panel buildings should incorporate masonry base

III. DESIGN STANDARDS



B. Architectural Design Standards

concrete masonry units. The base should match the material, height, and color of adjacent administrative or support structures. When used atop this wainscot base, the metal wall panels should be of pre-finished aluminum or galvanized steel. Metal roof panels should match the metal wall panels of the building. To be acceptable, the finish of metal wall panel buildings must be provided with a 20 year guarantee against fading. Use of metal wall panel buildings requires the review and approval of the Base Architect and the Air Combat Command Architect.

Exterior walls in the *Residential Neighborhoods* should be finished with brick. Metal siding, where dictated by reasons of economy, is acceptable. When metal siding

is used, it should be atop a brick base of 3'- 0" minimum in height. The siding should be laid horizontally.

In *Wetlands/Recreational District*, exterior walls and/or columns of structures (picnic shelter, pavilions, barbecue enclosures etc.) should be built of brick. Integrally colored split face or ground-face concrete masonry units are also acceptable.

b. Approved Material and Treatments

Materials and colors of new facilities shall match/blend with adjacent buildings unless otherwise required by the Base Architect.



Appropriate residential building design



Appropriate recreational structure

III. DESIGN STANDARDS

B. Architectural Design Standards

2. Roofs

a. General Recommendations

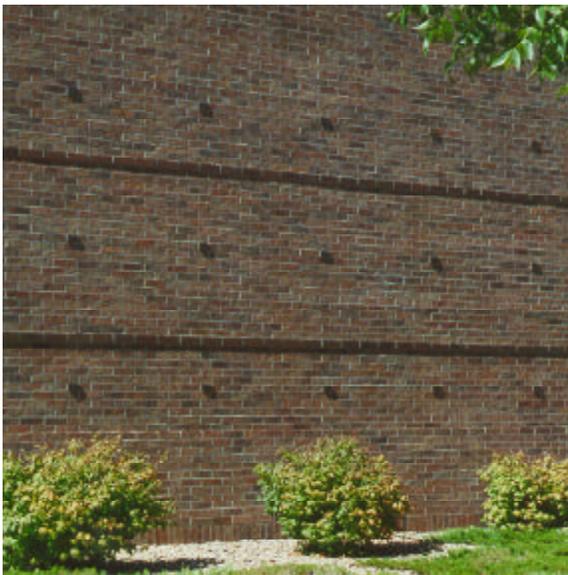
Roofs should have a minimum of 3:12 pitch and be hipped or gabled at the ends. Roofs should be of pre-finished standing seam metal. For community activity facilities, single family, detached residential buildings, asphalt shingles are acceptable. Asphalt shingles should be of an architectural grade and should be warranted for a 30 year period.

Use of a low sloped roof is normally only allowed on buildings with large footprints, such as the base exchange, large supply buildings, etc. Any low slope roof must

be approved by the Base Architect and the Air Combat Command Architect.

Roof overhangs are encouraged. Fascias should be of formed pre-finished aluminum. Soffits should be of medium density overlay (“MDO”) plywood covered with metal. Soffit vents are not desirable. Roofs of buildings with HVAC systems are to be insulated to at least R-30.

Roof penetrations (vent piping, flues, exhaust fans, etc.) should be regarded as trim items, and should be painted to match the roof. Roof penetrations should be located to the rear of the buildings, away from the street frontage, unless functionally unavoidable.



Well detailed brick pattering



Well detailed brick pier



III. DESIGN STANDARDS

B. Architectural Design Standards

No rooftop equipment is permitted on sloped roofs. If required on flat roofs, equipment should be screened with parapet walls or other devices.

Gutters and downspouts are not required or encouraged on buildings with pitched roofs. Rain diverters and snowguards are required at all entrances. Interior roof drains are discouraged. Scuppers, where approved for low sloped or flat roofs, shall be of pre-finished aluminum and provided with downspouts.

b. **Approved Material and Treatments**

Materials and colors of new facilities shall match/blend with adjacent buildings

unless otherwise required by the Base Architect.

3. Doors and Windows

a. **General Recommendations**

Main entry doors should be of a glazed storefront type in thermally broken anodized aluminum frames. Provide a vestibule at all main entry locations. Glazing to be tempered, low-E insulated dual pane with 1/2" argon gas pocket. Secondary entrances, and exit doors should be factory primed insulated hollow metal (R-4 minimum).

In single family homes, exterior entry doors should be of pre-finished insulated



Well integrated roof and exterior wall design



Well integrated roofing system

III. DESIGN STANDARDS

B. Architectural Design Standards

metal (R-4, minimum). Factory primed, field painted doors are acceptable, but not preferred. Storm doors are required.

Vehicular service doors should be of pre-finished aluminum or galvanized steel and should be insulated.

Generally, limit the amount of glazing on a building to 15% of the exterior wall surface area. Avoid large, unprotected expanses of glass in general, and especially facing in the northwesterly direction. Large expanses of glass may be acceptable when facing south to receive thermal gain in winter. Avoid skylights. Clerestory windows, where functionally justified and carefully placed, are acceptable.

A punched-opening vocabulary should be utilized. Ganged units of a limited extent are acceptable. Glazed units should be set a minimum of 2" back from the face of the exterior wall surface.

Windows should be operable and have double glazing (with ½" argon gas pocket) in thermally broken anodized aluminum frames. Triple glazing should be installed on walls where high noise levels are evident (refer to the Air Installation Compatible Use Zone Noise Contours). All glazing should be tinted. Color shading film is not permitted.

In single family homes, windows should have double glazing (with ½" argon gas



Environmentally compatible fenestration



Well detailed fenestration pattern



III. DESIGN STANDARDS

B. Architectural Design Standards

pocket) wood frames with factory applied white finish aluminum cladding. Operable single hung windows are encouraged, though sliding units are acceptable. Fixed units are also acceptable, where functionally justified.

b. Approved Material and Treatments

Materials and colors of new facilities shall match/blend with adjacent buildings unless otherwise required by the Base Architect.

4. Hardware

a. General Recommendations

Door hardware should be selected and sized on a case by case basis for its specific function. In order to unify the quality and appearance of hardware basewide, the following recommendations are a guide to the finish and quality level expected of hardware that may not be specifically listed. All door hardware must comply with the requirements of ADA and UFAS.

b. Approved Material and Treatments

Note: Proprietary names for colors, textures and patterns are for the purpose of selection only. Other manufacturers' products may be acceptable, provided they closely approximate colors, textures and patterns indicated and conform to all other specification requirements.



Well detailed building entrance



Regionally sensitive building entrance

III. DESIGN STANDARDS

B. Architectural Design Standards

Door Hinges: Exterior door hinges shall be heavy weight ball bearing. Interior door hinges shall be ball bearing or plain bearing. All hinges shall be Satin Medium Bronze.

Door Closers: Door closers shall be Grade 1, surface mounted, regular or parallel arm mount. Finish shall be BMHA689, Sprayed medium bronze.

Exit Devices: Single doors shall have Type 1, rim exit device. Double doors shall have Type 2 vertical rod device. Finish of all exit devices shall be Satin Medium Bronze.

Locksets: Exterior and interior locksets shall be BMHA series 4000m Grade 1, lever trim (except in the Residential Neighborhoods District), removable core function as required (see BMHA ANSI function F75-F93). Lever handles shall be provided at all locations requiring full accessibility. Finish of levers, knobs, and all miscellaneous visible parts shall be Satin Medium Bronze. Provide “Best” locks for all work except in residential buildings. The cores must be able to be interchanged with “Master” and “Grand Master” key systems. Residential projects should use “Weiser” locks for doors in the housing areas.

Miscellaneous Hardware: Stops, kickplates, etc. shall be Satin Medium Bronze.

Thresholds: Shall be medium bronze anodized extruded aluminum. Exposed rubber parts on holders, stops and bumpers shall be gray.

5. Outbuildings/Garden Walls/Fences

a. General Recommendations

Out buildings, garden walls, and fences are required for multiple purposes throughout the districts of the base. These include security barriers, utility and dumpster enclosures, loading dock screens, retaining



Well detailed screen

III. DESIGN STANDARDS



B. Architectural Design Standards

walls, and ancillary architectural and landscape features.

For all districts, grade mounted mechanical equipment such as cooling towers and air handling equipment shall be screened with a garden wall, plant material, or a combination thereof. All loading docks and dumpsters shall be screened with a wall 1' higher than the equipment. When screen walls are constructed for dumpsters, the open side shall be aligned so the truck picking up the dumpster will have access and can easily place the container within the enclosure. Dumpsters shall not be accessed from a street. Dumpsters shall not open towards a street or so that people can view into the opening from main building entrances. Garden walls should

also be used to enhance building and neighborhood entrances and street inter-sections. Retaining walls, where required to accommodate changes in elevation, shall not exceed 4' in height. Grade changes which require retaining walls exceeding 4', must be terraced with a minimum 3' clear separation between each wall.

Materials for outbuildings, garden walls, and fences should visually match either the adjacent building exterior or a material integral to the landscape. No outbuilding shall be metal. Patterning of the masonry is encouraged to provide a sense of scale, pattern, and texture to the wall surfaces. Decorative top courses can be used to provide accents to walls which are highly visible. Horizontal breaks, jogs, and



Well detailed garden wall/fence



Well designed screen wall

III. DESIGN STANDARDS

B. Architectural Design Standards

variations in wall heights are encouraged to minimize the monotonous corridor effect of long continuous walls.

Along the *Flight Line*, and in the *Flight Line Support District*, walls can be utilized to restrict access and simultaneously screen the parking areas along existing street frontage.

In the *Facility Engineering District*, walls can successfully contribute to screening the existing storage and loading areas.

In the *Residential Neighborhoods*, walls can be utilized to demarcate each residential neighborhood into its own individual precinct.

III. DESIGN STANDARDS



B. Interior Design Standards

1. General Recommendations

ACC Architectural and Interior Design Standards differentiate whether a finish will be permanent or non-permanent. The differentiation is necessary due to the color palette changes each year. Generally, permanent finishes last longer and consequently need to be a color that will not become dated after a few years. Non-permanent finishes do not last as long and can be updated to the new colors as they change.

2. Approved Material and Treatments

Note: Proprietary names for colors, textures and patterns are for the purpose

of selections only. Other manufacturers' products may be acceptable, provided they closely approximate colors, textures and patterns indicated and conform to all other specification requirements.

3. Permanent Finishes

ACC Design Standards require that all permanent finishes be in either brown-tone or gray-tone neutrals. These neutral shades can be from very light (such as off-white relating to the particular color tone) to a mid-range neutral of this same shade.

Permanent finishes are generally the hard surface structural interior design (SID) finishes that will last 15 to 20 years and



Appropriate interior



Well detailed entry

III. DESIGN STANDARDS

C. Interior Design Standards

whose removal and re-installation is a major disruption to the facility. Such items as vinyl composition tile (VCT), ceramic, and other hard surface tiles, plastic laminates, toilet partitions, lockers, window blinds, all modular or systems furniture panels, work surfaces, flipper doors, etc., are considered permanent finishes.

Special Note: Neutrals can be tricky! It is important to choose true neutrals. A true neutral is one that can work in combination with almost any other color in the spectrum. A brown-tone neutral with a pink or yellow base will not work this way nor will a gray-tone neutral with a blue or green base.

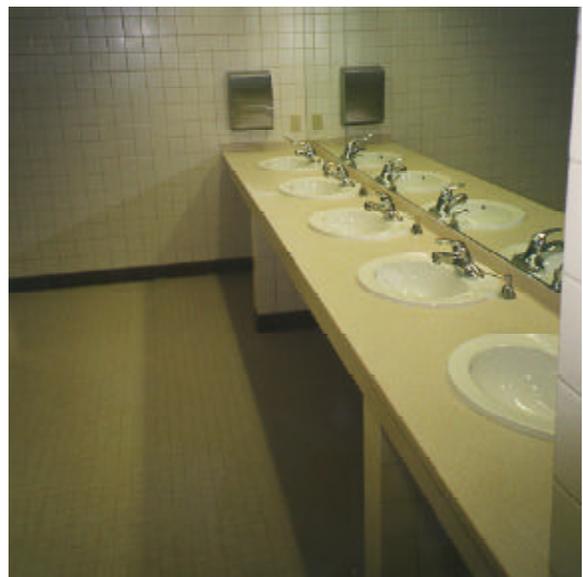


Well integrated cabinetry

4. Non-Permanent Finishes

ACC Design Standards allow non-permanent finishes to be any coloration appropriate to the facility. Most often these finishes will be in mid-range colorations. Very seldom would there be a use for pastel or very bright colors. However, primary colors of red, yellow, blue and green may be used in youth centers, child care centers or bowling centers.

Carpet, paint, vinyl wall covering, upholstery, artwork, etc. are considered non-permanent finishes. Non-permanent finishes will last from five to seven years under most conditions.



Well detailed restroom



C. Interior Design Standards

While non-permanent finishes are allowed in various colors, it is highly recommended that in office and other work areas, the vinyl wall covering or painted wall surfaces also be kept in a neutral coloration. Light reflective surfaces are important to a productive work environment. Dark colors absorb light. In other words, for work areas, develop a neutral shell for the interior space with only the carpet, upholstery, and artwork providing the color accent.

5. Finishes and Treatments

- *Gypsum Boards:* All gypsum board surfaces, which are to be painted, shall receive an "orange peel" texture prior to painting.
- *Vinyl Wall Covering:* Should be Type II in most applications. Type I has very limited use. A vertical texture will help hide seaming.
- *Paint:* Use an eggshell latex on all surfaces except metal which shall be a semi-gloss enamel.
- *Laminates:* Laminate surfaces are much more maintainable if the laminate has a flecked, speckled, mottled, texture or granite-look. Soiling and water spotting is not nearly so visible on these surfaces.
- *Ceilings:* In almost all facilities, ceilings (whether painted or ceiling tile), are to be off-white to coordinate with the color tone of the walls. Textured ceiling tiles in 2' squares with a tegular edge are recommended.
- *Wainscot and Chair Rail:* Wainscot is not recommended. Wood wainscots shall not be used without the approval of the Base Architect. A chair rail, properly located, may be used. It may be stained or painted to coordinate with the other woodwork or doors. The chair rail should be no more than 36" high in rooms and no more than 42" high in corridors. Heavy vinyl bumper guards may also be used to protect walls in corridors where needed. They, too, should be in coordinating neutrals.
- *Vinyl/Rubber Base and Carpet Base:* Use vinyl/rubber base in areas where the floor surface is vinyl composition tile (VCT) or rubber tile. Base is to be in a coordinating neutral to the floor surface, as near the same shade as possible. Do not use a dark color or accent color for the base. Use a 4" carpet base capped with a neutral vinyl/rubber carpet cap in carpeted areas. Use the same carpet for the base as meets the wall in the case of borders. When carpet tile is used it will be necessary to use a vinyl/rubber

III. DESIGN STANDARDS

C. Interior Design Standards

- base. Choose a neutral that will most closely relate to the carpet coloration or wall coloration. With carpet tile, a straight base must be used (one without a cove foot) and installed first with the carpet tile butted up to it. In ceramic tile areas, the base will be a coordinating ceramic tile base.
- *Ceramic Tile:* Use a mottled, flecked or specked floor tile. Use a dark tone grout which coordinates with the floor tile to avoid a stained or soiled appearance. Tile banding accents or patterns are approved for walls and floors provided the accent is another neutral shade which coordinates with the dominant tile color.
 - *Vinyl Composition Tile:* Tile to be $\frac{1}{8}$ " thick, minimum, and pattern shall be homogenous through the tile. Border, or accent tiles, to be of complementary color.
 - *Doors and Door Frames:* Frames to be factory primed, fully welded (not "knock down") hollow metal. Doors to be stained solid core flush oak. In single family homes, wood frames should be utilized. Depending on the quality of the doors, they may be either stained or painted. If painted, they may be painted either a color close to the wall color or an accent color of mid-range blue.
 - *Window Blinds:* Metal or vinyl blinds may be horizontal or vertical and are best in off-white or light neutrals. Dust is not as visible on the light colors as on the dark colors, and vertical blinds collect less dust than horizontal ones. Dark blinds that match the anodized finish of the window frames are acceptable, provided the windows are of reflective glass. If the windows are not of reflective glass, dark blinds will radiate a great deal of heat into the building rather than reflecting it as light or off-white blinds do.
 - *Carpet:* (See ETL 94-3: Air Force Carpet Standard and revised ACC Carpet Guidance - dated 12 October 1993). In general, use mainly bold tweed, nylon, level-loop carpet of a least 28 oz. face weight. Bold tweed means yarns of several different colors, not various shades of the same color. Level-loop is the most hard-wearing type of carpet, and bold tweed allows for several upholstery color coordinations in a facility using only one carpet color-way. Again, use a 4" carpet base capped with a vinyl/rubber, neutral carpet cap.
 - *Dormitory Carpet:* Carpet dormitories by using one carpet pattern per building with a different color-way per floor. Take care to ensure that carpet

III. DESIGN STANDARDS



C. Interior Design Standards

used in living areas is not the same carpet used in the work areas on base. Do not use drab, dull colors in living areas. Bedspreads and chair upholstery can be coordinated per floor to the carpet color-way. Draperies in these small living areas are best kept in neutral colorations to blend in with the walls. This provides a neutral background for personal items of the occupants.

- *Carpet Borders:* Carpet borders may be solid in color. They may be used with either carpet tile or roll goods. Be careful not to over-do borders. In corridors, a border width of 9" is about right. Install field carpet in rectangular shapes and allow border to fill in indentation such as doorways, drinking fountains, etc. Do not use borders in rooms where the furniture will cover the border.
- *Systems/Prewired Workstations/Modular Furniture:* All panel fabrics, work surfaces, flipper doors, etc., are to be in either brown-tone or gray-tone neutrals. Only one type of systems furniture should be used per building in order to allow greater flexibility in reconfiguration, as occupants' needs and requirements change, and to provide continuity throughout the space. Systems furniture should be

installed over carpet tiles. Removal and installation of new carpet in 12' widths becomes a major undertaking. This is not efficient or cost effective. Carpet tile will allow for self-help replacement and ease of maneuvering under the systems furniture. Carpet tile will also accommodate flat-wiring for electrical and communications under the carpet.

- *Special Notes for Single Family Homes:* Interior paint to be Spectre-Tone Navajo White. Solid wood kick boards shall be provided at all kitchen and bath cabinets.

III. DESIGN STANDARDS

D. Landscape Standards

The Ellsworth Air Force Base Landscape Assistance Study dated November 1994, provides detailed landscaping guidelines with specific requirements to be implemented during the construction and maintenance phases of new or renovation projects. These Landscape Architecture Standards are intended to establish a conceptual framework within which those guidelines are executed.

Landscape Architecture can be used to help unify the base as a whole yet still provide identity from structure to structure and district to district. The outcome of this will be an overall visual continuity which will serve as a backdrop for the buildings. Careful consideration should be given to respond to site context, open space, landmarks, views, vistas, streetscapes, and the preservation and protection of existing trees.



Low water use and low maintenance plant material

1. Planting Design

a. General Recommendations

The area has a semi-arid climate. Use plant material to suit the environment. Xeriscaping principles shall be followed which encourage the use of native, low water using, drought tolerant plant material.

The landscape shall vary to denote different areas such as building entrances, entry drives, pedestrian walkways and intersections (refer to Open Space: Street Walls, Yards and Setbacks; Streets & Sidewalks, p. 30). Informal and natural arrangements of plantings shall be used to complement the high plains environment.



Desired entry drive planting

III. DESIGN STANDARDS



D. Landscape Standards

Different species of plants should be used to eliminate monocultural plantings and create diversity. However, where groups of the same species are used, massing is required. Rectilinear masses of plants and straight lines shall be avoided.

Mechanical equipment, transformers, loading docks and dumpsters shall be screened with a combination of plant material and walls. Plant materials shall be installed at a size and spacing which softens the screen walls. (Refer to Out-buildings/Garden Walls/Fence for additional information, p. 44). Landscaping at buildings throughout the base should enhance the architectural character and specific use of the site.

Blend the landscaping into the natural environment whenever possible.

The fronts of buildings should be landscaped in an inviting and aesthetic way. The building entrance should be enhanced to help create a focal point. Avoid annual planting beds at most building entrances.

Currently, large expanses of turf are used in underdeveloped areas. In areas which will not be developed beyond their current level, landscaping and maintenance should be kept to a minimum, a native prairie grass should be used. Native prairie grasses in combination with minimal landscaping will provide a landscape which



Residential street tree planting



Desired building entrance planting

III. DESIGN STANDARDS

D. Landscape Standards

blends directly into the natural environment.

Within the *Mixed Use Central Core*, the Rushmore Center has desirable and appropriate plantings. Turf areas should be limited to use as an accent at building entrances within this district. Areas to the sides and rear of the building should be planted in a more naturalistic manner.

The *Flight Line* is a unique district since the potential for landscaping only occurs in a small area. This area is currently bordered by a brick and ornamental iron fence which has been constructed adjacent to the Pride Hangar. This element defines the limits of landscapable space within

this district, enhancing the central zone of the *Flight Line*.

Plant materials can be installed in free form natural arrangements in areas between buildings. Buildings that have entrances which will accommodate landscape elements shall be enhanced with plant material.

The landscaping which begins at the defined edge of the *Flight Line* shall be continued through the *Flight Line Support* zone which will help unify the two zones which are closely related.

The *Facilities Engineering District* currently consists of large expanses of natural



Flight Line planting which keeps visibility and security at desired levels



Effective foundation planting



D. Landscape Standards

grasses as its primary landscape material. In addition to this generic planting, building entrances should be enhanced with special planting arrangements. Loading and storage areas shall be screened with plant materials and walls. Open spaces shall be left as native grasses to help reduce maintenance.

Within the *Residential Neighborhood District*, landscaping of front yards should provide a diversity of plant material which will help create individuality from house to house. Refer to Streets and Sidewalks (p 31) for structures plantings.

The *Wetlands/Recreational* district at Ellsworth Air Force Base is a unique feature which consists of lakes and waterways with native vegetation surrounded by large fields of turf, wild flowers and native grasses. This district bisects the base and separates the *Flight Line* and *Flight Line Support* districts from the remainder of the base. Landscaping within this area should complement the existing, native plant materials and informal groupings for areas which are to be kept natural. For areas where organized active recreation will occur, turf grasses shall be used. A pathway system should be implemented to provide walking, jogging and bicycling routes throughout this district. Areas for picnicking and relaxing can be located along these pathways. Designing within

the existing features will allow for an enjoyable experience.

b. Approved Material and Treatments

Plant Material

- See Appendix 1 for Plant List

2. Irrigation

a. General Recommendations

Irrigation is an integral part of the landscape environment at Ellsworth Air Force Base. The survival and growth of plant materials depend on an efficient, reliable and easily maintainable irrigation system.

Each site shall be completely irrigated with an automatic underground irrigation system to irrigate all trees, shrubs, and turf areas to any adjoining road edges. Shrubs and all planting beds shall be on separate zones from turf areas. Spray heads irrigating turf shall not spray into planting beds, foundations, structures, parking lots, sign faces, roadways, sidewalks, or walkways. Reduced pressure backflow preventors are required. Backflow preventors shall be placed in a planting bed and screened with evergreen shrubs.

Turf areas will be irrigated with pop-up heads and shall have head to head coverage. Spray irrigated turf areas shall be a

III. DESIGN STANDARDS

D. Landscape Standards

minimum of 8' wide. Systems shall be designed so that peak summertime lawn irrigation can be completed between the hours of 6 p.m. and 9 a.m. Irrigation runoff should not flow into any street. Drip irrigation shall be installed for all plant material other than turf. Appropriate filtration and pressure regulating devices shall be installed. Low growing groundcover and annuals may receive pop-up spray irrigation. No fixed risers are allowed. Drip zones shall be designed so that additional emitters to trees can be installed as the trees mature.

An electric, solid state controller is required and shall be equipped with a master valve terminal and at least two fully independent programs. Irrigation system controllers shall be placed inside buildings. All irrigated areas shall utilize remote electric control valves installed in valve boxes. No manual valves are allowed. A "master" electric control valve shall be installed immediately downstream of each backflow preventor if a foundation structure is present within the irrigated area. The valve must be capable of fully opening under the lowest design flows (drip). Quick coupling valves shall be installed at a minimum 100' spacing and at dead end of all mainline runs to facilitate hand watering of plant material.

Pressure supply lines, non-pressure piping, and control wires passing under

paved surfaces, walls, curbing, etc., shall be sleeved. Each use shall have an individual sleeve. All piping shall be PVC.

3. Site Furniture

a. General Recommendations

Site furniture basewide should be brought to a uniform standard. Furniture such as benches, trash receptacles, bicycle racks and tables, shall be capable of being used across districts. Gazebos and shade structures should be constructed of materials which reflect the architecture of surrounding buildings.

Large barbecues should be constructed of brick masonry units to match the



Desired shade structure/picnic shelter in Wetlands/Recreational District

III. DESIGN STANDARDS



D. Landscape Standards

architecture of adjacent structures. Pedestal mounted grills can be used for smaller areas or adjacent to living quarters.

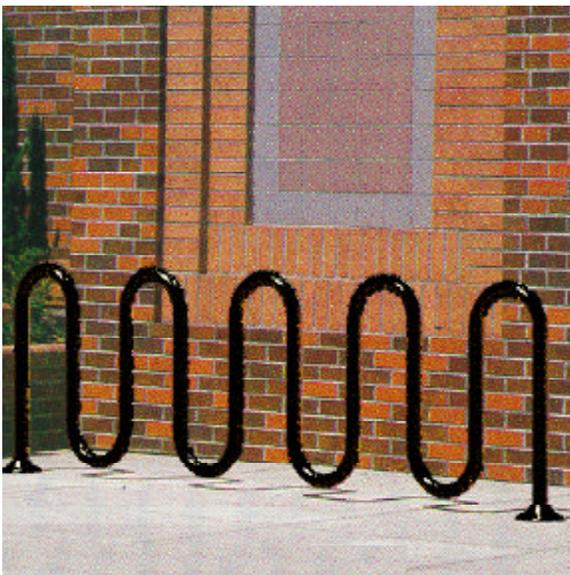
b. Approved Material and Treatments

Wooden benches shall match those at the Rushmore Center, unless otherwise specified by the Base Architect.

Picnic tables shall be wood with metal frame work and shall be as manufactured by Columbia Cascade (800) 547-1940, unless otherwise specified by the Base Architect. Style shall be 2162 and where handicap accessibility is required, shall be 2163. Wood shall be kiln dried, premium Douglas Fir and metal shall have black powder coat finish.

Trash receptacles and ash urns shall match those at the Rushmore Center, unless otherwise specified by the Base Architect.

Metal bicycle racks shall be as manufactured by Columbia Cascade (503) 223-1157, unless otherwise specified by the Base Architect. Style as “Timberform Cycloops.” Color shall be approved by the Base Architect.



Cycloops bicycle rack



Sensitive integration of landscape elements with building design

III. DESIGN STANDARDS

D. Landscape Standards



Typical light bollard



Bench

III. DESIGN STANDARDS



E. Signage Standards

The signage standards are governed by Air Force Pamphlet 32-1097 and ACCI 32-1054. The following provides an overview of AFP 32-1097 and ACCI 32-1054.

The graphics system shall serve to identify buildings, inform users, and direct vehicular traffic in an aesthetically pleasing manner. Signs are to be compatible to architectural elements and enhance the overall design of the buildings. Effective signage should serve as a unifying element. The Base Architect shall review and approve all proposed signs.

1. General Recommendations

Signage should be used to unify the base and provide an effective identification system. Continuity of materials, fonts, and

colors will help simplify the circulation through the base.

The letter style, for all exterior building signs and temporary signs shall be Helvetica. Helvetica Medium shall be used for primary information and Helvetica Regular shall be used for secondary information.

Individual lettering attached to building structures, monuments and entryway glass shall be metallic, beige or white. All other types of signs shall have white lettering on a brown background, except signs pertaining to safety which are governed by national standards.



Base entry sign



Residential subdivision sign

III. DESIGN STANDARDS

E. Signage Standards

Major signs such as those at base entrances can be designed to be more decorative and can vary from the general recommendations. Specialty signs with message boards shall be as approved by the Base Architect.

Materials for signs shall be aluminum, galvanized steel, and non-ferrous materials. Wood posts shall not be used. Internally lighted signs are not permitted. If lighting is required, use external flood or spot lights.

The exterior sign types for use on the base are as outlined below:

a. Identification Signs

Unit name and secondary information provided shall be applied to the face of the sign. Street numbers and logo shall be provided as indicated in AFP 32-1097.

A landscape plan indicating all site signs showing locations and height of the signs above grade must be submitted for review and approval to the Base Architect.

Identification signs may be one or two sided. Two sided signs shall be installed perpendicular to the roadway.



Building Sign



E. Signage Standards

- (1) **Base Identification Signs:** These are located at Base entry points to identify the facility (Fig. 56). Three types of base identification signs are to be used - the Main Entrance Sign, Secondary Entrance Sign, and Entry Gate Sign. These signs are all one sided since they are viewed from one direction only.

- (2) **Military Identification Signs:** These identify military facilities and activities.

There are six types of military identification signs which vary in size and design elements to distinguish different levels of organization. (Refer to AFP 32-1097 for types and size requirements.)

One unit name and secondary information should be indicated on the sign. The use of motto's, names or titles of individuals is prohibited, unless authorized by the Commanding Officer.

- (3) **Community Identification Signs:** These identify facilities and activities used for non-military purposes. These signs have the same character as military signs but consist of a different background color, lack military emblems and building numbers. The use of community

and commercial related symbols is permitted.

- b. **Direction Signs:** These are used to direct vehicular traffic to specific locations. All signs shall be faced with brown reflective sheeting for the background and white reflective materials for the graphics.
- c. **Regulatory Signs:** These signs are used to direct vehicular traffic to specific locations. Highway Standards, Base Warning Signs and Parking Regulation Signs are considered Regulatory Signs.
- d. **Motivational Signs:** These signs serve to increase morale.

Motivational signs should be used to identify principal organizations, support safety campaigns, fund-raising drives, special events, display emblems and to express unit pride. Electronic messaging can be used for this sign type.

- e. **Information Signs:** These signs provide educational information and directional guidance for visitors.
- f. **Wall Mounted Signs:** The Base Architect will decide the appropriateness of wall mounted signs. If wall mounted signs are used they should be used throughout the Base.

III. DESIGN STANDARDS

E. Signage Standards

- g Temporary Signs: Temporary signs will not be permitted except as described below.

All temporary signs shall be fabricated to follow the style and guidelines as specified and illustrated.

Temporary construction signs shall be permitted during the construction of a facility and shall be removed no later than one week after issuance of the certificate of occupancy. One project sign shall be permitted and shall be parallel to the street with locations subject to approval of the Base Architect and should include only the following information:

- Building Name
Major Tenant(s)
- Architect
Consulting Engineer(s)
Landscape Architect
- Developer (when applicable)
- General Contractor

Subcontractor signs shall not be permitted. The temporary construction sign outlined above shall be located within a minimum of 5' of the property line and adjacent to the construction trailer. Construction signs will not be permitted off site

except as needed to direct construction traffic.

All temporary signs shall be free standing ground mounted and signs of this nature shall not be affixed to any building.

Tractor trailers used for materials storage displaying the name and/or logo of the contractor may not be parked in such a manner as to violate the intent of this section of the criteria.



F. Lighting Standards

1. General Recommendations

The design objective for all site lighting is to provide a uniform system of functional lighting in an aesthetically pleasing and visually unobtrusive manner.

Exterior accent lighting of plant materials, signs and buildings shall be achieved with hidden light sources. These include surface mounted fixtures, lamps recessed in building soffits, overhangs, walls, lamps recessed in the ground, and lamps hidden by plant material.

Roadway light fixtures should be uniform across the *Mixed Use Central Core, Flight Line, Flight Line Support, and Facilities*

Engineering districts. Consistent fixtures provide cohesiveness and help link the districts together. The *Residential Neighborhoods* should have fixtures for its streets which set it apart from the rest of the base and provide a greater sense of residential character. Within the *Wetlands/ Recreational Area* another type of fixture for walkways and jogging trails should be used. This fixture will identify the trail system which interconnects the different uses within the district.

All lighting shall be energy efficient high pressure sodium.



Typical Cobra-type roadway light



Typical parking light

III. DESIGN STANDARDS

F. Lighting Standards

Lighting levels will be determined as specified in the “Lighting Handbook of the Illuminating Engineering Society,” most recent edition. Lighting levels in parking lots shall average 1.0 foot candle at grade.

2. Approved Material and Treatments

The fixtures indicated below are for all districts unless noted later in this section.

Parking lot fixtures and poles shall be a shoe box type to match those found at the Rushmore Center, unless otherwise specified by the Base Architect.

Roadway light fixtures and poles shall be a Cobra head type to match those currently used on base, unless otherwise specified by the Base Architect.

Low bollard fixtures or landscape lighting for walks and building entries shall match those found at the Rushmore Center, unless otherwise specified by the Base Architect.

Building mounted lights shall be absolute cut-off type fixtures and shall be recessed and as manufactured by Kim Lighting, unless otherwise specified by the Base Architect. Style shall be “Wall Director.” Color shall be dark bronze. Wall mounted lights for lighting stairs and sidewalks shall



Building mounted lights



Landscape accent lighting

III. DESIGN STANDARDS



F. Lighting Standards

be manufactured by Kim Lighting, unless otherwise specified by the Base Architect. Color shall be dark bronze.

Building and sign flood lighting shall be as manufactured by Kim Lighting, unless otherwise specified by the Base Architect. Style shall be “Architectural Flood Light.” Color shall be dark bronze.

Landscape accent lighting shall be as manufactured by Kim Lighting, unless otherwise specified by the Base Architect. Style shall be Model CL-4. Color shall be dark bronze.

Residential District

Roadway light fixtures and poles shall match those currently used on base, unless otherwise specified by the Base Architect.

Wetlands/Recreational District

Jogging trail and walkway lighting shall match those currently used on base, unless otherwise specified by the Base Architect.

III. DESIGN STANDARDS

G. Engineering Standards

1. Civil

a. All civil work should indicate all calculation in design analysis and show design criteria on drawings and shall conform to the latest editions of the following:

- (1) State of South Dakota Department of Transportation) Standard Specifications;
- (2) The South Dakota Department of Transportation Standard Details;
- (3) The Clark County Public Works standard drawings for civil work.
- (4) The Uniform Building Code (UBC);
- (5) The UBC Standards;
- (6) The Uniform Plumbing code.

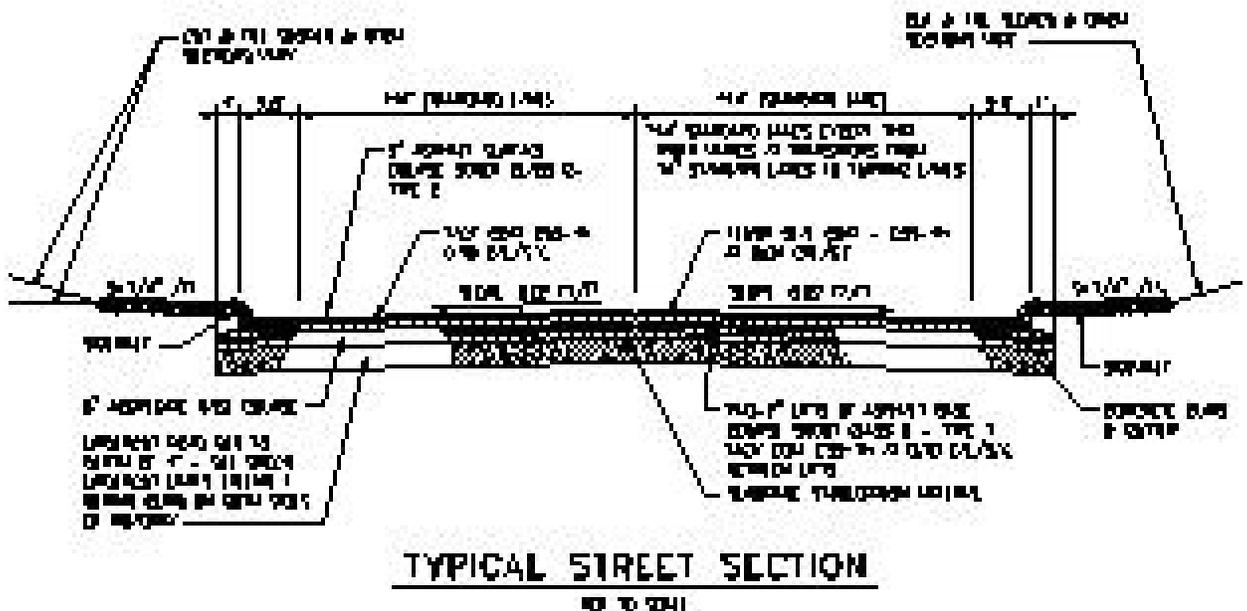
b. All civil work shall conform to the requirements of:

- (1) The Uniform Federal Accessibility Standards (UFAS);

- (2) The Americans with Disabilities Act (ADA);
- (3) The most stringent requirements shall apply.

c. Site Plans

- (1) General base plans and some more specific as-built plans for the existing buildings and utilities are available on request, however they may be incomplete and inaccurate.
- (2) Existing conditions will need to be surveyed and verified by the A/E.
- (3) A new site plan shall be developed on AutoCAD for project areas at 1" equals 40' or larger (1" equals 20') showing all existing utilities, sprinklers, facilities, features, trees, ponds, etc.





G. Engineering Standards

- (4) One foot contours shall be accurately shown, with bold five foot contours.
 - (5) Key spot elevations shall also be shown accurate to 0.1' for land features and accurate to 0.01' for structures, pavements, and slabs.
 - (6) Finish drawings must include horizontal and vertical control references to actual survey data control points.
 - (7) Benchmarks and key work/control points must be shown on site plans with coordinates (State plane). Both AutoCAD disk copies and mylar hard copies shall be furnished to the Government upon completion of the project.
- d. Gas Service
- (1) The design agent should expect to coordinate and arrange new facility connection to the natural gas line.
 - (2) Contract plans should clearly identify connections necessary and the party responsible for the work.
 - (3) Gas lines shall have maximum working pressure 50 PSIG.
 - (4) Underground gas piping shall be non-metallic.
 - (5) Refer to Mechanical/Plumbing Section for additional information.
- e. Sanitary Sewer Service
- The minimum service size for a new facility shall be 6". If required, a new 6" or 8" main shall be designed and constructed to serve the site from the closest manhole which can be reached via gravity flow.
- (1) The A/E shall study the most economical gravity sewer design option.
 - (2) Verify capacities of existing sewer to handle additional flows once they are determined
 - (3) Sewer lines shall be installed according to manufacturer's recommendations with not less than a 2.5 fps hydraulic velocity flow; minimum main from building shall be 4".
 - (4) Sewer manholes shall be precast reinforced concrete manhole sections with two exterior coats of heavy duty bituminous. Manholes shall conform to ASTM C478-72. Position manholes at every 45° and 90°, and a minimum of 300' apart.
- f. Manholes/Cleanouts
- (1) Use standard precast manholes with nominal 25" diameter cast iron cover.
 - (2) Maximum manhole spacing shall be 400'.
 - (3) A new manhole or cleanout shall be required if there is a significant change in direction for the new line.
 - (4) Minimum wastewater flow velocity is two feet per second.
- g. Water Supply
- (1) Verify that existing water mains are adequate to handle fresh water demands of the project, including fire protection and irrigation.
 - (2) Wet barrel fire hydrants shall be supplied to the building site off

III. DESIGN STANDARDS

G. Engineering Standards

- existing water mains in accordance with NFPA.
- (a) Fire hydrants shall be Kennedy or Muller only.
 - (b) Fire hydrants shall be provided with Hydrosield hose connection couplers.
- (3) A water demand analysis shall be made to determine flow and capacity requirements, line sizes, routing, as well as which line or lines are best to tie into.
 - (4) Cathodic protection is required on any metallic piping.
 - (5) Use PVC type C-900 for underground service, and galvanized steel for aboveground (outside).
 - (6) Install a water meter at each new facility.
 - (7) Disinfect the plumbing lines in accordance with AWWA and UPC standards and provide for bacteriological and pressure testing of the water after the building is complete.
 - (8) Water piping shall be designed for a maximum velocity of 3 fps, or manufacturer's recommendation, whichever is less. Plastic piping shall be pressure pipe capable of withstanding 165 psi. Trenching, backfilling, and pipe installation shall be done according to manufacturer's recommendations. Pipe shall have minimum cover of 3'.
 - (9) No pressure piping shall be allowed under slabs unless it is in a crawl space or pipe chase except for the service entrance. The service entrance shall be perpendicular to the slab edge and not extend more than 5' under the slab.
- (10) Provide reduced pressure backflow preventors at the service entrance. The mechanical make-up water system shall have a separate air gap type (10 gallon tank and float with pressure actuated gear driven pumps) backflow prevention device.
- h. Storm Drainage
 - (1) The building site shall be designed such that 100-year flood plain shall be at least one foot below finish floor elevation.
 - (2) Culverts, storm drains, and catch basins shall be sized to handle a 25-year storm.
 - i. Site Drainage
 - (1) Drainage shall generally be surface drainage away from building with paved areas sloping a minimum of 1%; earth areas a minimum of 2%; and pipes, gutters and swales a minimum of 0.5%.
 - (2) Use bituminous coated CSP or RSP for culverts.
 - (3) Use precast concrete catch basins with cast iron grates.
 - (4) Provide concrete splash blocks at outlets of downspouts.
 - (5) Where slope exceeds 20%, a system of erosion control should be provided.
 - j. Soil and Foundation Conditions



G. Engineering Standards

- (1) Site specific soil borings are required to determine soil bearing, pH and resistivity characteristics.
- k. Pavement/Parking Materials
 - (1) Asphalt road pavements: For parking lots and secondary housing roads, the minimum requirement is 2" thick asphalt concrete on 6" class 2 aggregate base. For asphalt roads, pavement shall be a minimum of 4" thick with a 6" aggregate base course (also for areas used by large trucks and tractor trailers).
 - (2) Parking lots shall be located at the back or sides of the facility.
 - (3) Parking spaces shall be 9' wide, 18' long and have a 26' drive lane. Parking spaces shall be constructed at 90°. Vast expanses of asphalt shall be divided by islands incorporating desert plan material.
 - (4) Concrete curb is required along driveways, around parking areas and around landscape islands in the parking lot. (Tack-on curbs are not allowed)
 - (5) Lane delineation shall be ceramic traffic buttons and reflectors.
 - (6) All joints between precast concrete and asphalt pavements shall be routed out and sealed.
 - (7) Control joints shall be provided in concrete pavement to minimize random cracks. "Too many" control joints is preferred to random cracks.
 - (8) Boring shall be used when possible to eliminate road cuts.
 - (9) Cuts in asphalt pavement shall be backfilled with a slurry cement backfill to prevent settlement. Asphalt patches should be a minimum of 25' and a maximum of 50'.
 - (10) Sidewalks shall be 5' wide along major streets and 4' wide along secondary and tertiary streets.
 - (11) Design the parking lot such that the total number of spaces is equal to the expected building population plus 10%.
 - (12) Handicap spaces shall be provided in accordance with the requirements of the American with Disabilities Act (ADA) and the Uniform Federal Accessibility Standards (UFAS).
 - (13) Site design should provide adequate separation between pedestrian and automobile traffic through sidewalks, curbs, landscaping, or other buffering elements.
 - (14) Specialized vehicles, such as delivery trucks, require separation from other vehicles.
- l. Construction Considerations
 - (1) Detailed construction phasing and an order of work schedule shall be provided in contract documents for all major projects to reduce negative impact on nearby facilities and traffic.
 - (2) Provide remote monitoring, including utility meters, HVAC, generators, etc.

III. DESIGN STANDARDS

G. Engineering Standards

- (3) Provide utility meters for all renovated and new facilities.

2. Structural

a. General Requirements

- (1) The structural system and materials shall be suitable for permanent type facilities, capable of carrying the required loads, and compatible with fire protection requirements and architectural and functional concepts.
- (2) Materials not already defined in these standards shall be selected for economy, general availability, desirability, resistance to fire and low maintenance costs over the design life of the facility.
- (3) In selecting the type of structural system, the total cost of the facility shall be considered in conjunction with utilities, HVAC, lighting, finish materials and other architectural features.
- (4) In choosing miscellaneous structural materials for this project, consideration shall be given to the site environment, climate, subsurface conditions, accessibility, wind velocity and seismic ratings, skill and experience of prospective contractors, the design life of the facility and maintenance cost over this period, availability of labor and materials and the feasibility of preassembling or precasting major structural elements.

- (5) Asbestos and lead paint shall be tested for prior to any demolition.

- (6) A preconstruction meeting is required prior to any asbestos or lead base paint work.

- (7) All nonresidential buildings shall be metal framing.

- (8) Soil treatment for termites shall be specified for any new building with wood framing.

b. Design Loads

- (1) Comply with the latest edition of the Uniform Building Code.

- (2) Consideration should be given to the use of bearing walls since past designs indicate their economic advantages.

- (3) Any design using a column and beam system must be analyzed to determine the most economical system.

- (4) Floor, ceiling and roof structures should be investigated to determine the most economical system consistent with the desired acoustical attenuation.

- (5) Walls and partitions should be held to a minimum thickness to obtain maximum livable areas within the gross area limitation.

- (6) The selection of walls and partition systems must take into consideration acoustical separation, fire protection, maintenance, structural requirements, and utility systems.

c. Design Notes

- (1) Include general structural notes on drawings such as roof, floor, wind and seismic loads (wind:90, snow:30);



G. Engineering Standards

material types and design stresses; unusual members sections properties; survey references; and other pertinent notes relating to conformance to codes or construction practices.

d. Compatibility with Finishes:

- (1) Structural systems that require the use of cast in place concrete in conjunction with concrete masonry units should be carefully designed and detailed to present an attractive and acceptable appearance allowing for expansion/contraction and not allowing any leakage.

3. Plumbing/Mechanical

a. General

- (1) The design of mechanical systems must take into consideration all factors that will ensure a quiet, comfortable and convenient environment for the occupants.
- (2) All mechanical equipment and systems must be selected on the basis of acoustical impact on the building occupants.

b. Reference Standards

- (1) Uniform Building Code;
- (2) Uniform Mechanical Code;
- (3) Uniform Plumbing Code;
- (4) NFPA Codes;
- (5) OSHA & AFOSHA regulations;
- (6) Americans with Disabilities Act
- (7) Uniform Federal Accessibility Standards;

- (8) Mil Handbook 1008 Fire Protection for Facilities;
- (9) ASHRAE standards.

c. Special System Criteria

- (1) Provide air conditioning and ventilation for proper operation of computers, machinery, etc.
- (2) Provide for the ventilation of mechanical rooms where refrigerant may be present.
- (3) Reference TRANE application engineering manual "Refrigeration Equipment Room Design" (REF-AM-2, Aug 1992).

d. Maintenance Consideration

- (1) Each piece of equipment must be installed so it can be properly maintained.
- (2) Clearances must be provided around all equipment to allow it to be serviced, removed, and replaced as required.
- (3) Plans and specifications should be examined to minimize large maintenance costs in the future.
- (4) Provide convenient access to all utilities, cleanouts, HVAC equipment and systems, and gas fittings, in the mechanical room, underground and in the building.
- (5) Additionally, any work performed in the overhead space must be done with the least disruptions to personnel utilizing the facility.
- (6) Provide direct vehicular access to mechanical rooms if possible.

III. DESIGN STANDARDS

G. Engineering Standards

- (7) Ensure adequate means of removing interior equipment.
- (8) Construction contract shall include training period for base maintenance personnel.
- (9) Training period shall range from four hours of on-site instruction for simple systems up to two days for complex systems.
- (10) Videotape of training sessions shall be included.
- e. Energy Conservation Measures
 - (1) Executive Order 12003, which requires a 30% energy reduction based on similar types of buildings in use in 1985, shall be followed.
 - (2) Reference the following Engineering Technical Letter (ETL) for current design guidance: "U" values, ETL 83-9; Energy Budget Figures, ETL 87-4; Meters, ETL 87-5 (Draft rev. 93-XX); Equipment Efficiency, ETL 82-2; HVAC control, ETL 83-1.
 - (3) A computer energy system analysis, under ETL 84-2 (Draft rev. 93-XX) shall be required
 - (4) Use a present value (discounting) technique using 10% mid-year values.
 - (5) Equipment economic life shall be equal to the building projected occupancy, but not more than a 25 year cost period.
 - (6) Designer shall conform to the Energy Budget Figures set forth in ETL 87-4 (Draft ref. 93-XX)
- (7) submit proposed EBF's corresponding to the different facility operating hours.
- f. Corrosion Control/Cathodic Protection
 - (1) Apply cathodic protection on all buried or submerged ferrous piping, tanks and related facilities.
 - (2) Under no circumstances will underground facilities be installed without cathodic protection.
 - (3) This requirement includes ferrous materials such as cast iron.
 - (4) All buried or submerged cast iron pipe joints will be bonded with number 2 AWG insulated wire.
 - (5) Thermit wire connections must be coated.
 - (6) All cathodic protection design must be performed by an engineer accredited by the National Association for Corrosion Engineers.
 - (7) All cathodic protection design must be based upon specific field tests made at the construction site. Tests will include soil resistivity and water conductivity.
 - (8) Cathodic protection systems shall be sacrificial anode and impressed systems and shall comply with corrosion protection criteria outlined in NACE Standard RP-01-69-9 (revised), ETL 87-3 and AFM 88-45.
 - (9) All dissimilar metals shall be separated by dielectric union.
- g. Potable Water Source

III. DESIGN STANDARDS



G. Engineering Standards

- (1) Coordinate with the Engineering and Site Development Sections at Ellsworth AFB for location of water mains and the operating pressure ranges in the area of connection.
- h. Piping Materials and Special Outlets System - Material
 - (1) Water (underground)-PVC type C-900
 - (2) Water (above ground, outside) - Galvanized steel
 - (3) Water (above ground, inside)- Hard copper Type l
 - (4) Sanitary Drain, Waste - (building, 3 stories and less) - ATSS - Vent, ABS - Vent Sanitary Sewer
 - (5) Sanitary Drain, Waste - (buildings taller than 3 stories) - cast iron
 - (6) Storm Drain- RCP or CMP
 - (7) Chilled Water- Schedule 40 galvanized steel or Schedule 80 - PVC or hard copper - Type L
 - (8) Heating Hot Water- Schedule 40 black steel or hard copper - Type L
 - (9) Natural Gas (underground)- Polyethylene with tracer wire
 - (10) Natural Gas (above ground)- black iron
 - (11) Provide dielectric union when connecting dissimilar metals
 - (12) Provide lead free plumbing components
 - (13) Provide identification labels for pipes in the Mechanical Rooms
- i. Piping System
 - (1) Provide valves to isolate portions of building to avoid shutdown of entire building.
 - (2) Drain, waste and vent piping as required by Uniform Plumbing Code for sanitary sewer system from each new facility.
 - (3) Fire protection systems are required for each facility per NFPA codes.
- j. Piping System
 - (1) Energy conservation washerless fixtures shall be all metal construction, no chrome-plated plastic. All techniques shall be considered, including 1 gpm flow restrictors for faucets, 3 gpm low-flow shower heads, single control mixing type faucets, low-volume flush water closets, and self-closing faucet valves. Showers shall have valves with pressure balance feature. Utilize freezeless wall hydrant. Provide interior wall access (self-draining) with hose attached. Wall mounted drinking fountains are preferred.
 2. In buildings normally occupied by more than 15 persons, provide separate toilet rooms for each sex; position them together and use a common wall for plumbing chase. In buildings occupied by 1-15 persons, a single toilet to serve both sexes may be provided. Furnish one water closet, one lavatory, and a room door that can be locked from the inside.
 3. All applications of plumbing fixtures shall be considered for handicapped usage as directed by Air Force Guidelines.

III. DESIGN STANDARDS

G. Engineering Standards

- (4) Plumbing fixture types
 - (a) *Water closets (Institutional)* - Flushometer valve, siphon-jet, elongated bowl, top supply spud, 3" trap way, floor or wall mounted, 1.6 gpm/flush. Seat: plastic, elongated, open front.
 - (b) *Water closets (Handicapped, Institutional)* - Top rim of bowl shall be 18 inches above the floor. (All others same as #1)
 - (c) *Water closet (Residential)* - Siphon-jet, elongated bowl, flush tank, 3" trap way, floor mounted, 1.6 gpm/flush. Seat: plastic, elongated, open front with seat cover
 - (d) *Lavatories (Institutional)* - Enameled cast iron or vitreous china, counter top. Facet: as required.
 - (e) *Wheelchair sinks (Residential)* - Vitreous china.
 - (f) *Urinal (Institutional)* - Wall hung. Siphon-jet or washout. 1 gpm/flush.
 - (g) *Kitchen sinks (Residential, Institutional)* - Single or double bowl. Ledge back with holes for faucet and spout. Enameled cast iron, porcelain enameled steel or stainless steel. Faucet - as required.
 - (h) *Service sinks (Institutional)* - Enameled cast iron. Trap standard, wall mounted or floor mounted. Faucet - as required.
 - (i) *Food service sinks (Institutional)* - Stainless steel with drain board. Faucet - as required.
 - (j) *Water coolers (Institutional)* - Self contained. Exposed surfaces shall be stainless steel. Wall mounted surface. Wall mounted semi-recessed. Wall mounted recessed. Handicapped. Free standing.
 - (k) *Showers (Institutional, Residential)* - Wall mounted for stall or bath tub. Valves as required.
 - (l) *Bathtubs (Institutional, Residential)* - Straight front recessed. Enameled cast iron.
- k. HVAC
 - (1) General
 - (a) Air conditioning units shall be Trane or Carrier; designed for an ambient temperature of 115°F.
 - (b) Provide VAV systems in all new projects and during major renovations where entire mechanical system is being removed.
 - (c) Provide Energy Management Control System for units greater than 10 tons.
 - (d) Provide water cooled chillers for units greater than 40 tons.
 - (e) Roof mounted mechanical equipment shall not be allowed for any new sloped roof facility. Where permitted on flat roofs, equipment should be screened with parapet walls or other devices.
 - (f) Provide gas heating where gas is available. This needs to be con-



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- firmed for each project. Do not use heat pumps if gas is available.
- (g) Provide screw type compressors for chillers greater than 40 tons.
 - (h) Provide economizer when appropriate.
 - (i) Provide water treatment for all water systems, heating or cooling. Large systems should have loops installed as part of the system.
 - (j) Provide washable pleated air filters.
 - (k) Provide phase protection for all HVAC equipment (i.e. pumps, chillers, air handling units)
 - (l) Refrigerant shall be HCFC type only.
 - (m) Provide recommended manufacturing clearance around boilers, chillers and air handlers for maintenance purposes.
- (2) Controls
- (a) Provide DDC or electronic controls. Pneumatic controls will not be accepted.
 - (b) DDC shall have direct communication with base existing EMCS system.
 - (c) Provide a fully labeled control schematic which details all set points, throttling ranges, actions, spances, proportional bands, and any other adjustment.
 - (d) Provide a fully labeled elementary diagram (ladder diagram).
 - (e) Provide a sequence of control on the drawings cross-referenced to the control schematic and elementary diagram.
- (f) Provide a generic, functional description of each control component shown on the drawings.
 - (g) Provide for remote monitoring, including utility meters, HVAC, generators, etc. Use remote sensors so that controllers can be centrally located in the mechanical room.
 - (h) Provide logical grouping of controllers, adapters, relays and power supplies in an easily accessible controls cabinet mounted away from vibrating machinery.
 - (i) Provide electronic system terminal strips cross-referenced to the control schematic to facilitate troubleshooting and calibration. Maximize “self-help” software as well.
 - (j) Provide control schematic, elementary diagram, control sequence, description of components, control panel details, legends and schedules in the design.
 - (k) All possible “clog” points shall have differential pressure checks on them.
 - (l) Systems shall be fully functional on their own case in case connection to main EMCS is lost.
- l. Heating
- (1) Designer will research and choose most appropriate heating system for the facility

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- (2) Use ASHRAE Standards for calculating heating loads.
- (3) The use of cast iron boilers is discouraged. Provide boiler water testing sample points on all hot water systems. Provide chemical feeding systems on all hot water heating systems. Provide automatic pilotless ignition systems on all gas fired equipment. Install thermostats on heating supply and return lines. Install pressure gauges with valves on suction and discharge lines to all pumps. Install gas pressure gauges with valves on all gas trains on boilers.
- (4) Access to equipment for servicing is the single most important item for designing of new systems. Coils, filters, valves, pumps or tube removal or servicing is to be considered when designing mechanical systems.
- (5) Sloped roofs shall not have any equipment located on them. All equipment located closer than 10'-0" from the edge of a flat roof shall have a safety railing.
- (6) Equipment located on the ground shall be hidden from view (See Landscape Architectural Standards.)
- (7) Where humidification is required, steam humidifiers shall be used.
- (8) The fuels available for use are gas for furnaces and boilers, electric for heat pumps.
- (9) The equipment selection should be based on the system selected to provide the most energy efficient combination.
- (10) Equipment types to be used
 - (a) Type-1
HVAC boiler shall be steel tube. Domestic hot water boiler shall be copper tube.
 - (b) Type-2
Heat exchanges shall be shell and tube type or plate type.
 - (c) Type-3
Heat pumps shall be air-to-air or water-to-air.
 - (d) Type-4
Circulating pumps shall be centrifugal base mounted, inline horizontal or vertical.
 - (e) Type-5
Unit heaters shall be horizontal or vertical.
 - (f) Type-6
Air handling units shall be blow thru or draw thru packaged type.
 - (g) Type-7
Fan coil units shall be horizontal, vertical or thru-the-wall type.
 - (h) Type-8
Radiant heaters shall be gas fired combination.
- (11) Distribution Piping and/or Ducting
 - (a) Piping and ducting shall be IAW the Uniform Mechanical Code, SMACNA, and applicable ASHRAE design criteria. Flexible duct runs should be limited to 6' lengths.
- (12) Insulation

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- (a) All piping installed to serve the building and within the building shall be thermally insulated IAW Table 5.1, ASHRAE Standard 90A-1980, Energy Conservation.
 - (b) New Building Design.
 - (c) No asbestos-containing materials will be used for insulation.
- (13) Heating Plant and Systems
- (a) Water Softeners/Water Treatment Equipment
 - (i) Make sure water softeners are properly sized to allow soft water to be introduced into the plant at all times, including emergency shutdown.
 - (ii) Provide soft/conditioned water for all large boiler systems.
 - (iii) Install adequate water treatment equipment on boilers/plant. Consideration should be given to pulse type boilers.
- m. Ventilation/Air Conditioning/Refrigeration System
- (1) The use of cooling towers should be avoided. Evaporative coolers shall be installed at the 2-3' level, not on the roof. All condensing units shall be air cooled. Select air cooled condensers based on 110°F ambient. Avoid the use of centrifugal chillers. A central mechanical system shall normally be provided unless specific engineering cost analysis indicate sub systems to be more economical. Locate equipment designed to operate outside behind architectural screening. Avoid locating outside equipment near the main entry of buildings.
 - (2) A life cycle cost analysis shall be done for air cooled and/or water cooled chillers. Larger air conditioning units work more efficiently with cooling towers. Use of a screw type compressor chiller is more efficient. Centrifugal chillers are long lasting. Based on the above, a life cycle cost analysis shall be done to compare initial costs, long-term costs and energy efficiency.
 - (3) Access to equipment for servicing is the single most important item for designing of new systems. Removal or servicing of coils, filters, valves, pumps, or tube is to be considered when designing mechanical systems.
 - (4) Sloped roofs shall not have any equipment located on them. All equipment located closer than 10'-0" from the edge of a flat roof shall have a safety railing.
 - (5) Equipment located on the ground shall be hidden from view. (See Landscape Architectural Standards)
 - (6) *Fuel:* Mechanical refrigeration shall be fueled by electricity.
 - (7) *Equipment:* Shall be suitable for the application.
 - (a) Type-1

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- Chillers shall be packaged air cooled type.
- (b) Type-2
Evaporative coolers shall be up-blast or vertical discharge closed circuit type or cellulose material impregnated with antirot salt and rigidifying saturants. Media efficiency shall be 76% at 600 FPM face velocity with no entrainment of pad water. Open evaporative coolers shall be designed to provide an indoor temperature of 80°F.
 - (c) Type-3
Heat pumps shall be air-to-air, water-to-air, or geothermal closed loop.
 - (d) Type-4
Circulating pumps shall be centrifugal base mounted, inline horizontal, or vertical.
 - (e) Type-5
Air handling units shall be flow thru or draw thru packaged type.
 - (f) Type-6
Fan coil units shall be horizontal, vertical or thru-the-wall type.
- (8) Office areas, dining rooms, and personnel living spaces shall have air conditioning.
 - (9) Air conditioning system shall be chosen on the basis of economy, efficiency, and ease of maintenance.
 - (10) When calculating cooling loads, use ASHRAE standards.
 - (11) The peak or maximum cooling load for selecting the room side cooling equipment will consist of:
 - (a) exterior heat gain through building construction;
 - (b) personnel occupancy;
 - (c) electrical lighting not to exceed one watt per square foot for rooms and 1½ watts per square foot for office and shop space;
 - (d) design occupancy ventilation air total heat (outside air design minimum room design condition);
 - (e) 10% safety factor.
 - (12) Window shading devices on the exterior and interior will be investigated in an effort to reduce the room solar heat energy.
 - (13) Minimum room supply air rate or fan-coil capacity will be 0.80 cfm/sq. ft.
 - (14) The building peak or block cooling load for central refrigeration capacity will be determined on the identical parameters outlined above with the following exceptions:
 - (a) Personnel occupancy will be 40% total occupancy;
 - (b) No interior electrical lighting;
 - (c) 10% minimum safety factor to include motor hp and heat gain to coolant distribution system.
 - (15) The chilled water supply temperature will normally vary between 40 and 50°F, which shall be determined from the designer's analysis of the optimum



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- balance for the cooling unit, water distribution, and water chiller.
- (16) Normal air infiltration should be evaluated in an effort to meet the requirement for range hood exhaust.
 - (17) The building peak heat gain analysis will include the personnel ventilation rate or continuous toilet exhaust where the air flows through the occupied space.
 - (18) Provision will be made for removal of equipment for maintenance. Tube bundles will have provision of easy removal for maintenance; i.e., A-frame or monorails structurally adequate to support the loads and provide proper distance between system components and walls to ensure ability to clean, repair, or replace tube bundles.
 - (19) Install bypasses on all strainers so that they may be cleaned without plant shutdown.
 - (20) Distribution Piping and/or Ducting: same as for heating.
 - (21) Design conditions shall be chosen from ASHRAE.
 - (22) Ventilation
 - (a) Ventilation shall be supplied in accordance with ASHRAE.
 - (23) Pipelines/Utilities
 - (a) Access Requirements:
 - (i) Sufficient clearance shall be provided for any conceivable service equipment which may be installed or temporarily operated in the future facility.
 - (24) Road Crossing Criteria
 - (a) All crossings must be made by boring or jacking unless a road cut is expressly approved.
 - (b) On approved road cuts, provide spare pipe sleeve for future use.
 - (25) Separation Requirements
 - (a) Design shall meet IAW the Uniform Plumbing Code.
 - (26) Maximum/Minimum Depths of Cover
 - (a) Eighteen inches minimum for all services at the 5' building line.
 - (b) 30" average depth is acceptable on piped utilities.
 - (c) Proper engineering design may allow less depth.
- n. Fire Protection
- (1) Design Development
 - (a) Provide description of fire alarm/suppression system to be utilized, fire water flow rates, connection point, and catalog cuts for proposed equipment.
 - (b) Provide preliminary design, water flow pipe calculations (if sprinkler system is proposed), cost estimates and specifications.
 - (2) Response Distance/Time (Mobile Fire Apparatus)
 - (a) Information regarding the base water distribution is available from the Base Civil Engineer.
 - (3) Existing Fire Protection System

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- (a) Provide a radio fire alarm transceiver compatible with base fire alarm system.
- (b) Research pressure and flow rate for hydrants in the building area.
- (4) Compliance with Life Safety Code (NFPA Standard 101)
 - (a) Design for structural, fire protection and occupancy features, including means of egress, roof ventilation, emergency lighting and illumination, and building service (heating, ventilation, and air conditioning systems) shall be IAW the latest edition of NFPA 101.
 - (b) Provide calculations and diagrams showing compliance.
 - (c) Ceiling light in corridors to be used as emergency lighting units with battery backup lights to be near each exit. Exit lights shall have a battery backup.
- (5) Fire Detection System Requirements
 - (a) Manual pull stations shall be provided throughout the facility, typically including one pull station at every personnel exit door.
 - (b) Actuation of a pull station shall sound local alarms and transmit an alarm to the Base Fire Department via the building central control panel.
 - (c) Actuation of a pull station of fire detection system shall indicate both audible and visual signals.
 - (d) This system shall be designed IAW NFPA Standard 72.
 - (e) Smoke/Heat Detectors: Install 135°F fixed temp heat detectors or photoelectric smoke detectors in all areas except dormitory sleeping areas. In dormitory and sleeping areas, install combination smoke/heat detectors.
 - (f) Only the heat detectors component shall be connected to the fire detection systems which transmits a coded signal to a central alarm location.
 - (g) Smoke detectors in sleeping areas shall only activate an audible room alarm. Battery operated units are not permitted.
 - (h) Areas protected by automatic fire detection systems will include occupied and unoccupied spaces and attics.
 - (i) Mechanical rooms, laundry room and attic must be 190°F waterproof where exposed to moisture.
 - (j) Design shall comply with applicable NFPA Standards.
 - (k) Systems should contain a fan shutdown to turn off all air handlers, exhaust fans, and ventilation motors upon activation. Follow UNC and NFPA requirements.
- (6) Fire Sprinkler Requirements



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- (a) Provide a fire sprinkler system IAW NFPA 13 for Automatic Systems.
- (7) Special Extinguishing Systems Requirements
 - (a) Provide recessed or semi-recessed cabinets for portable fire extinguisher. Distribution shall be IAW NFPA Standard 10.
- (8) Provisions
 - (a) Fire protection provisions shall be summarized and submitted as a separate analysis.
- (9) Testing
 - (a) Contracts and specifications shall include requirements for all testing and initial charging of systems as part of the construction in accordance with NFPA 13 to produce a complete and usable system.
- (10) Cooking Area Requirements
 - (a) Hood and dust systems for cooking equipment which produces smoke or grease-laden vapors shall comply with NFPA 96, "Installation of Equipment for Removal of Smoke and Grease-laden Vapors from Commercial Cooking Equipment."
 - (b) Activation of the hood and duct fire suppression systems shall automatically de-energize the unit.
 - (c) Activation of the hood and duct fire suppression systems shall sound a general building alarm and transmit a signal to the fire department.

- (11) Handicapped Requirements
 - (a) Designs shall comply with the Americans with Disabilities Act (ADA) and the Uniform Federal Accessibility Standards (UFAS). The most stringent requirements shall apply.

4. Electrical

Note: These standards utilize brand names for certain items so that the base can standardize and minimize spare parts.

- a. General
 - (1) The design of under ground distribution systems shall be based on the calculated demand with sufficient electrical capacity for expansion if allowed or if within the budget.
 - (2) The materials as indicated above shall be plastic conduit encased in concrete. Allowable plastic conduits include PVC, fiberglass, or similar nonmetallic electrical duct.
- b. High Voltage
 - (1) Padmounted Transformers
 - (a) No dry type transformers on high voltage.
 - (b) All oil filled transformers must have a certified oil sample on record with the BCE before installation.
 - (c) Rebuilt transformers are allowed as they are less expensive and can be delivered more quickly.

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- (d) Specify Copper windings OA/FA Deg C rise, 95KV BIL, with surge arrestors. Aluminum is not allowed.
- (2) Padmounted Switches
 - (a) Specify "RTE" RVAC's for inline switching. Joslyns will not be allowed.
 - (b) Specify "RTE" MOST Oil switches for taps.
 - (c) All taps off of a high voltage line shall be switched and fused.
- (3) Fused Cutouts
 - (a) Specify A-B Chance or S & C. All fused cutouts will be porcelain. No fiber types permitted.
 - (b) Always require an Alumina-Form or equal aluminum bracket installation for risers and fused cutouts.
- (4) Surge Arrestors
 - (a) Specify General Electric or Ohio Brass non porcelain type, 9KV.
- (5) Underground Cable
 - (a) Specify Copper, 15KV insulation, 95 KV, 133% BIL, XLP or EPR insulation.
- (6) Concentric Neutral
 - (a) Neutral to be stranded not banded.
- (7) Terminations
 - (a) Specify 3M-5601 shrink on Quick Term or equal.
- (8) Services
 - (a) By regulation all building services will be metered.
- c. Low Voltage
 - (1) Panelboards
 - (a) Specify breakers, no fuses.
 - (b) Square D or GE preferable.
 - (2) Contactors
 - (a) Specify magnetic contactors not manual for a load over ½ hp.
 - (b) Lighting contactor with photocell, locate photocell as high as possible.
 - (c) Motor Starters - always specify thermal protection. Specify with a Hand-Off-Auto switch so the shops can bypass if necessary.
 - (3) Wire
 - (a) All wire larger than #10's shall be stranded copper
 - (b) Indoor and general wiring specify THHN insulation.
 - (c) Outdoor underground wire specify either XHHW or XLP.
 - (4) Dry Type Transformers
 - (a) Specify Copper windings, 115 Deg C rise over a 40 Deg C ambient.
 - (5) Outdoor Lighting
 - (a) HPS required by regulation, 250W if possible for parking lights, security lighting, roadway lighting.
 - (6) Fluorescent
 - (a) Indoor office lighting shall be fluorescent except for very specific decorative situations. All lamps to be Type T-8 for new projects with energy efficient ballast.
 - (b) Fluorescent fixtures by regulation shall have solid state ballast. Lamps shall be 35W.
 - (c) Diffusers shall be highly reflective for maximum fixture efficiency.



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- (d) Industrial lighting shall be HPS except for instances where accurate color rendition is a requirement. Then specify metal halide (i.e. inside airplane hangars).
- (7) All communication connections will be in panel boxes. Do not use plywood on the walls. There shall be no exposed wires.
- c. Interior Lighting
 - (1) Provide wire guards for all open fluorescent lamps. Utilize energy saver 35 watt T-8 fluorescent lamps and electronic ballasts in administrative and similar areas. Use metal halide lights in bay areas. Provide seismic protection for all fixtures, especially ceiling grid mounted fluorescent fixtures. Provide Certified Ballast Manufacturer (CBM) listed ballasts. All ballasts shall have 0.90 power factor or greater.
 - (2) Wiring Devices: Provide new devices and plates whenever an area is renovated. All devices shall be recessed except in mechanical rooms and utility areas. Provide devices rated at 20 amps where heavy use or electrical load dictates the need for 20 amp devices. All wiring shall be copper. No aluminum allowed.
 - (3) Automatic controllers: Provide battery backup for lawn sprinkler system controllers and automatic setback thermostats.
 - (4) Overcurrent Protective Devices: The minimum sized overcurrent device for branch circuits is 20 amps. Ensure proper coordination and withstand ratings for all overcurrent protection devices. Demonstrate coordination with first upstream existing protective device. Replace old circuit breakers with new when remodeling facilities. If replacement breakers are unavailable, consider replacement of entire panel board. Main fusing is acceptable for limiting short circuit currents; however, place a box with one full set of spare fuses adjacent to main panel.
 - (5) Provide plastic panel board and disconnect labels. Labels shall be laminated (black with white core) engraved with ¼" high letters. Attach to front exterior of enclosures. Labels shall match plan designations. Provide non-ferrous phase and circuit identification labels in all enclosures for feeder circuit conductors. Provide underground marker tapes for all underground conductors. If underground conductors are not in metallic conduit, provide marker tape with foiled backing to facilitate detection.
 - (6) Add power factor (p.f.) capacitors to induction motors (10 HP or larger) to correct p.f. to 0.90 (+ .05, - .00). Switch p.f. capacitors in with the motor. Size capacitor IAW IEEE 141, NEMA MG2 and motor manufacturer recommendations.

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- (7) Power requirements for building shall be 208/120 except 480/277 may be used depending upon building function.
 - (8) Balance loads on phases within 10% at all panel boards. Conduit fault calculations to ensure proper withstand ratings for all protective devices. Ensure coordination for all protection devices, conductors, enclosures and equipment.
 - (9) Conduit run in concrete shall be PVC unless steel conduit is needed for a specific reason, i.e. to limit fault currents. Underground primary voltage feeders shall be in concrete encased conduit. All penetrations of fire resistance rated walls shall be fire stopped IAW NEC Article 300-21. Highlight compliance with NEC Articles 300-5 (g) and 300-7 (1) regarding moisture seals.
 - (10) Aluminum conductors smaller than No. 4 AWG may not be used. In mission critical facilities, housing, dormitories, and transient quarters, aluminum conductors may only be used for service entrances. The smallest branch circuit conductors acceptable are No. 12 AWG. Conductors No. 6 AWG and larger shall have heat resistant insulation.
 - (11) All new utility lines shall be run in underground conduit. Provide spare conduits from transformer to building.
 - (12) Meters shall be generally located in rear of building or near service entrance.
 - (13) All new building shall have lightning protection designed into the project.
- d. Security Systems
- (1) In order to maintain coordinated system growth, security panels shall be compatible with the base system.
 - (2) Install a ¾" conduit from the security panel to the building's main telephone backboard (home run panel). Install a 24 AWG fur wire Cat 5 telephone cable in this conduit.
 - (3) Security panels will have a minimum of sixteen programmable zones. Door contacts will be grouped together with a maximum of five door contacts per zone. Motion detectors will be grouped together with a maximum of five motion detectors per zone. Under the floor or above the ceiling motion detectors or other sensors will be zoned separately. Duress alarm sensors and duct detectors will also be zoned separately. Sensors on each zone are to be wired in series.
 - (4) Install a separate power supply in a junction box adjacent to the security panel to power all motion detectors or other non passive field security sensors. Install conduit between the power supply junction box and the security panel. Provide 115V AC to an AC handy box inside the power supply security panel. Install a 115V AC



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receptacle with an ON/OFF switch in the handy box. This receptacle will be used to plug in the stepdown transformer that powers the security panel.

- (5) Magnetic card readers with keypads shall be installed to permit entry into secure area. Mycraft Technologies card reader ASC/1150 is supported by the base's system. The keypad shall be mounted on the outside of the primary entrance into the classified area. If the keypad is mounted on an external wall exposed to the elements, a NEMA enclosure with hinged cover will be installed to protect the card reader. The enclosure will be of sufficient size to allow the user to swipe the card through the reader.

e. Telecommunications

- (1) New construction and remodeling projects should make provisions for conduit, outlets, lockable enclosures, power and building entrance. Locate telecommunication rooms close by electrical equipment rooms.
- (2) Telephone Systems: Provide general purpose electrical box. Provide 120V duplex receptacle adjacent to box with a #6 AWG bare copper wire from backboard to grounding bar in panel board. Provide conduit to exterior for telephone service drop - prefer below ground access.
- (3) Pay Phones: Ensure that electrical power is provided next to all pay phones.

- (4) Wiring and Conduit (General): Provide prewired outlets with covers for phones and computer. All cable and phone lines prewired back to central electrical space in the building. Provide empty underground conduit to exterior manhole for both cable and phone.
- (5) Electrical Room: All electrical rooms shall have environmentally controlled spaces.
- (6) Communication wiring shall be located in cable trays above ceilings.
- (7) All new buildings shall be pre-wired for telecommunication in conduit which includes fire alarm, telephone and EMCS Systems.

5. Environmental Engineering

- (1) National Environmental Policy Act
 - (a) The goal of the National Environmental Policy Act (NEPA) is to incorporate environmental values into Federal government planning as a practical contribution to informed decision making. The Law requires using a systematic interdisciplinary approach to planning, and ensuring appropriate involvement of internal, inter-agency, institutional, and public stakeholders early in the planning process to integrate pertinent analysis, values and perspectives

III. DESIGN STANDARDS

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- and expose and evaluate points of controversy.
- (b) The A/E shall take part in the process for analyzing the National Environmental Policy Act.
- (2) Pest Management
 - (a) Minimize bird nesting opportunities.
 - (b) Provide bat proof design.
 - (c) Provide cockroach preventive design.
 - (d) Provide rodent preventive design.
 - (e) Provide skunk and feral cat proofing design.
- (3) Bird Air Strike Hazard (BASH)
 - (a) Provide designs of building and landscape consistent with BASH program goals.
 - (b) Avoid designing landscapes which support animals that could provide a hazard to base operations.
- (6) Landscaping should be natural, consistent with the prairie and its ecological habitat.

6. Maintenance Engineering

- (1) All surfaces should be low maintenance.
- (2) Provide easier access for less intrusive maintenance of utilities.
- (3) Minimize obstacles in parking lots and provide curb design for easy snow plow operations.
- (4) Provide landscape trees, bushes and plants consistent with low water, high wind environment.
- (5) Layout of landscaping should consider ease of mowing.

APPENDIX 1



Plant List

LARGE TREES

Botanical Name <i>Common Name</i>	Description
Acer Platanoides <i>Norway Maple</i>	Deciduous, 55' height x 45' spread. Adaptable, tolerates many soil and climates. Invasive roots can be a problem.
Acer Saccharinum <i>Silver Maple</i>	Deciduous, 40' - 100' height and spread, fast growing. Good fall color, open form.
Celtis Occidentalis <i>Common Hackberry</i>	Deciduous, rounded crown, 55' height x 45' spread, deep rooted, dark green leaves.
Picea Abies "karst" <i>Norway Spine</i>	Evergreen, 60' height x 30' spread. Extremely hardy and wind resistant.
Pinus Nigra <i>Austrian Black Pine</i>	Evergreen, 35' height x 20' spread. Very hardy, adaptable to winter cold and wind.
Populus Tremuloides <i>Quaking Aspen</i>	Deciduous, upright 45' height x 30' spread. Golden yellow fall color.

APPENDIX 1

Plant List

MEDIUM AND SMALL TREES

Botanical Name <i>Common Name</i>	Description
Aesculus glabra <i>Ohio Buckeye</i>	Deciduous, 20' height x 20' spread. Flowers and fruit messy and are not for use in pedestrian areas.
Betula Nigra <i>River Birch</i>	Deciduous, 30' height x 20' spread. Very fast growth, needs ample moisture.
Crataegus Ambigua <i>Russian Hawthorne</i>	Deciduous, 25' height x 25' spread, vase form. Extremely winter hardy.
Elgeagnus Angustitolia <i>Russian Olive</i>	Deciduous, 25' height x 20' spread. Good background plant, barrier.
Pinus Edulis <i>Pinon Pine</i>	Evergreen 20' height x 15' spread. Hardy and drought resistant.
Prunus Virginia <i>Choke Cherry</i>	Deciduous, 15' height x 12' spread. Good fall color.
Quercus Gambelii <i>Gambel Oak</i>	Deciduous, 25' height x 20' spread. Dark green leaves turning yellow, orange and red in the fall.



Plant List

SHRUBS

Botanical Name <i>Common Name</i>	Description
Atriplex Canescens <i>Four Wing Salt Bush</i>	Evergreen, 3 - 6' height x 4 - 8' spread. Gray leaves, drought tolerant.
Berberis Mentorensis <i>Mentor Barberry</i>	Evergreen, 5' - 6' height and spread. Dark green foliage, hardy.
Cercocarpus Ledifolius <i>Curl Leaf Mahogany</i>	Evergreen, 10' height x 10' spread. Dark green leathery leaves.
Cornus Florida <i>Flowering Dogwood</i>	Deciduous, 7 - 10' height and spread. Flowers in spring.
Euonymus alata "Compacta" <i>Wing Euonymus</i>	Deciduous 4 - 6' height and spread. Dark green leaves turn rose red in fall.
Forsythia Intermedia <i>Forsythia</i>	Deciduous, 7 - 10' height and spread. Use "Lynwood Gold" or "Arnold Dwarf."
Potentilla Fruticosa <i>Brush Cinquefoil</i>	Deciduous, 3' height x 3' spread. Gold Drop and Jackman provide yellow flowers.

See Nellis AFB Master Plan Criteria for complete Plant List.

APPENDIX 1

Plant List

GROUND COVER

Botanical Name <i>Common Name</i>	Description
Euonymous fortunei “coloratus” <i>Purple leaf winter creeper</i>	Good ground cover, leaves turn dark purple in fall.
Mahonia Repens <i>Creeping Mahonia</i>	Spreading habit to 18" fall. Will control erosion.

See Ellsworth Landscape Assistance for complete plant list.



ACC Design Standards

1. Base Design Policy

The special character of defense installations dictates compatibility over personal style. The limited size and function of Air Combat Command (ACC) bases cannot accept the diverse opinions of the many design professionals without becoming cluttered and unsettled. In this context, “good design” is defined as design that contributes to the overall harmony of the base rather than design that attracts individual attention. Good examples of where ACC goals should lead are college campuses and corporate office parks. Because we do not want monotony, every building does not have to be the same, but some repetitive common architectural element or theme should tie all buildings together. Responsible design will achieve this goal.

Use a simple approach to locate facilities. Facilities having similar function should be located in the same vicinity on uncongested sites, but do not permit parking to dominate. Use indigenous, low maintenance materials. Relate building forms to each other and use low maintenance landscape material. Do not paint new buildings. Use materials that do not require painting during their life cycle. Use neutral colors such as beige and brown.

The Architectural Policy has a set of goals that guide the development of the policy.

- *Site Conditions:* Provide site conditions and building forms appropriate to any new, future or existing buildings.
- *Low Maintenance:* Use permanent low maintenance exteriors that are compatible with ACC bases and their natural and man-made environments.
- *Environmental:* Design facilities in ways to enhance environmental quality and minimize consumption of natural resources.
- *Layouts:* Provide functional layouts that completely satisfy users needs.
- *Costs:* Reduce life cycle costs.
- *Labor:* Reduce labor intensive maintenance procedures.
- *Approval:* Obtain user approval of design concept layout prior to predesign conferences in order to prevent costly changes during final design, contracting and construction. This is normally done through a Customer Concept Document prior to preparation of programming documents.

2. Site Design Policy

Site selection and design are important to achieve compatibility with the Base Comprehensive Plan (BCP). The following guidelines for site location, site size, parking and landscaping will help contribute to this compatibility.

APPENDIX 2

ACC Design Standards

2a. Location

Situate new buildings within compatible functional groups as determined by base master plan.

- *Congestion:* Do not create congestion. Functional separation is better than congesting a functional neighborhood.
- *Complexes:* Site buildings supporting a common function such as civil engineering complexes in order to share a common infrastructure of roads, parking, utilities and security. These tight clusters should read as one idea with similar details and materials that link them aesthetically as well as functionally. Provide enough space around a complex for expansion. Assume 10% expansion whenever other supporting data is not available.
- *Traffic:* When existing traffic patterns are changed by new construction proposals, provide adequate traffic alternatives to coincide with the construction of the new project. Locate buildings so that you can walk between buildings in a functional group. Only encourage driving when walking cannot be accommodated.

2b. Site

Avoid small sites that cause problems for neighboring buildings and unnecessarily increase costs.

- *Site Influence:* Do not use sites that force building functions into basements, third floors or uneconomical shapes as curves, diagonals or long rectangles.
- *Open area:* Use sites that permit open landscape space around buildings to separate the building from required pavement. Prevent an overcrowded appearance.
- *Existing site contours:* After positive drainage away from buildings is developed, use existing or natural grades and contours to avoid excessive cut and fill operations.
- *Setbacks:* Sites need to allow minimum setbacks from other structures such as buildings, roads, and parking. Minimum setbacks are 25' for the front and rear, and 10' for the side.

2c. Parking

Use size, location and screening to prevent parking from becoming a dominate feature. Do not locate parking directly in front of a building or entrance. Do not locate parking between the main viewing street and the building.

- *Buildings:* Locate parking behind buildings; when a building is located between a street and a parking lot the building appearance is improved and the parking is screened with minimum cost. Consider building shape and relationship to other buildings to provide as much screening as possible. Ensure the



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principle or main view of the building presents a pleasing and uncluttered appearance. Parking arrangement is a major factor in providing an orderly appearance.

- *Size:* Use separate smaller parking lots of 50 cars or less rather than one large lot of 200.
- Reduce apparent size: Where large parking lots exist or are required by functional layout, landscape approximately 10% of the area within the lot.
- *Walking distance:* Design parking lots to limit walking distance. Use a maximum of 200 feet for most buildings, for transient and bachelor housing limit luggage carrying and walking distance to 100 feet.
- *Curbs:* Provide curbs around parking, access roads and streets.
- *Drainage:* Design paved areas to minimize drainage into natural water courses.

3. Architectural Design Policy

Exterior treatment requires careful management to achieve the desired overall compatibility. Each base has to define a context and direction based on existing built and natural environment. Use of the following guidelines will achieve the desired ACC standard.

3a. Form

Use simple plans and building forms as well as conventional sloping roofs. Eave heights may vary as required by interior functional relationships, but do not use more than one pitch angle on a building. Do not combine two kinds of roof such as flat and sloping roofs on the same building unless it is clearly justified by the influence of adjacent architecture, building function or layout. Minimize corners, offsets and curves on horizontal and vertical surfaces. Use only as clearly justified by the adjacent architecture, building function or layout.

- *New Versus Old:* Imitate and improve on existing base building forms to provide harmony between new and old; the new emphasis on sloping roofs makes this more difficult than in the past. When new sloping roofed buildings are sited among existing flat profiled building, steps must be taken to develop some secondary flat forms to relate the new to the old.
- *Height:* Except for dormitories, which are limited to three stories, limit buildings to two stories above ground. Do not use basements.
- *Mechanical:* Do not let mechanical systems become form-givers. Locate mechanical units to the rear or side of buildings. Design these features to blend in and to integrate with the building architecture in such a way that they are not prominent or detectable. Match ma-

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materials for mechanical enclosures to the building they serve, i.e., masonry with masonry. Use roof mounted equipment only when absolutely necessary. If required, match the equipment enclosure to the roof or wall material, as much as possible. Equipment wells are also acceptable. As a minimum, screen any equipment at ground level with landscape. When screening mechanical equipment, ensure adequate clearance as recommended by the equipment manufacturer is provided to allow for proper air circulation.

3b. Walls

Minimize use of curves, cants or angles other than 90 degree corners. Use only as clearly justified by the adjacent architecture, building function or layout.

- *Material:* Use low maintenance durable materials that are integrally colored and textured such as brick, split-face concrete masonry units (CMU), split ribbed CMU, prominently exposed aggregate on precast concrete or other substrates, and integrally colored concrete that is textured by use of form liners. Brushed, honed or sandblasted concrete is not acceptable.

Use of bricks, blocks or grout containing fly ash or other by-products is preferred. Use concrete containing fly ash or other recycled materials. Autoclaved

cellular cement should be used where appropriate.

- *Doors and Windows:* Use energy-efficient doors, windows, and door/window frames. Consider if doors or windows from previous facility modifications can be reused/recycled. Use of doors, windows and door/window framing containing recycled materials is preferred.
- *Painting:* Do not paint new buildings and do not use materials that are typically restored by painting such as stucco, metal fascia and various kinds of siding. Secondary doors may be painted as described in the next paragraph. On metal buildings, select a factory prefinished material.
- *Anodized Aluminum:* Color anodized aluminum in neutral colors (suggest dark to light bronze) is recommended for exterior metals normally associated with walls such as fascia, gutters, downspouts, windows, and building entrances. Fire exit doors and other secondary doors and frames may be painted for economy. When painting secondary doors and fire exits, they may be painted to match the primary color anodized entrances or painted to match adjacent walls; this is a designer option. The objective is to produce a simple appearance which is uncluttered by many colored shapes.



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3c. Roofs

Use sloped roofs greater than 3:12 on ACC buildings with corresponding roof coverings such as factory finished standing seam metal or shingle roofs. These low maintenance alternatives are required because of the poor maintenance history of flat multi-ply built-up roofs. Generally use a symmetrical double slope roof type. For improved maintenance, do not combine a multi-ply flat roof with exposed metal, shingles, etc. Make all of the building parts compatible with each other. Roofing made from recycled materials is preferred.

- *Alternatives:* Do not use low slope roofing if 3:12 or steeper pitch is feasible. Lower slopes and other materials may occasionally be required by building form and size (extremely large buildings such as supply facilities or commissaries). Slopes as low as 1:12 are generally accepted for metal roofs (consult with manufacturers for particulars). When a multi-ply built-up roof is used, slope the roof at ¼:12 minimum. The slope is to be accomplished with structural members for new built up roofs, not by tapering the insulation.
- *Drainage:* Provide continuous roof slope to the perimeter of the building. Do not design interior valleys or depressions that will form ponds if a roof drain becomes obstructed. Ensure overflow scuppers are provided in ac-

cordance with applicable codes for parapets.

- *Skylights and Clerestories:* These features may be used where strong functional and economic justification dictates; fully document economic justification and submit with proposed design to include life cycle cost of special ballast and control devices. Be sure to consider heat load and occupant comfort as part of the proposed design. General area lighting for warehouses is not considered strong enough functional justification to compensate for the generally high maintenance associated with large numbers of skylights on a flat roof.
- *Metal fascia:* Do not use wide metal fascias with flat roofed buildings. If a band is desired around the top of a building, provide it with masonry detailing such as projections, soldier courses, or stack bonds. Masonry detailing provides a more durable maintenance free fascia that does not require painting.

3d. Additions

When building additions are proposed, careful coordination is required to determine if the addition should match the old building or if the old building should be changed and brought up to ACC standards at the same time as the addition.

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- *Small Addition:* When less than 25% of the existing building's floor area, design additions to match the original construction.
 - *Large Additions:* When additions exceed 25% of the original building area, the addition and the original construction are required to comply with ACC standards. For example, a flat roofed building of 10,000 square feet needs an addition of 3,000 square feet. In this example 3,000 is more than 25%. The addition would have a sloped roof, and the original building would be renovated to have a sloped roof. If the original building were plain CMU, then a new exterior wall finish of textured CMU would be considered either in the form of a complete veneer or as a minimum, use textured CMU at important visual points such as entrances, planters, sign, corner protection, etc.
 - *Compatibility:* In either case (large or small), when additions are complete, they should be architecturally compatible rather than obvious add-ons.
- *vegetation.* When designing a new metal building, consider using a textured, integrally colored masonry base for durability.
 - *Finish:* Use factory applied finishes with more than 15-year warranties.
 - *Submit site justification:* At the programming stage, submit siting criteria. Indicate adjacent building construction. If the building is isolated, describe how visible it is from major, minor, or service roads. State reason for selection of metal over masonry in addition to cost consideration.
 - *Protective masonry:* Provide protection on the exterior of buildings where impact to metal panels is probable. For example, integrally colored and textured masonry should be used at entrances, at corners, exterior wainscot to four feet high where vehicles are parked next to buildings, around forklift operations, and at loading docks.

3e. Metal Buildings

- *Location:* Use metal buildings where they are compatible with adjacent structures. Do not use metal buildings in highly visible locations unless they are surrounded by other metal buildings. Metal buildings not used in highly visible locations should be well screened with walls or

3f. Colors

Use neutral anodized colors such as brown tone or gray tone neutral. Judgment has to be exercised in selection of colors for isolated miscellaneous features such as exit doors, downspouts, etc. In some cases, a building benefits from having isolated features painted to match adjacent light colored walls. This is very important on older buildings with many windows and doors.



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Painting trim a contrasting color can produce a cluttered appearance.

- *Wall Materials:* Select neutral colors such as beige and brown.
- *Exterior metals:* Use neutral anodized colors such as bronze. When aluminum, hollow metal, and wood are mixed on one building, hollow metal and wood may be painted to match the bronze aluminum color or adjacent walls. In any case, do not use a third color that does not match the bronze metals. Use one trim color to the greatest extent possible.
- *New Work:* Do not paint new masonry.
- *Color Use:* Usually two colors on a building produce the best appearance - one wall color and one trim color. Do not use more than three colors - one wall color, one metal color and one accent color such as exposed aggregate fascia, columns, beams, etc.

3g. Utility and Dumpster Enclosures

Provide an enclosed yard to conceal miscellaneous support items such as generators, transformers, trash, lawn equipment, flammable storage, HVAC, meters, and aboveground tanks.

- *Enclosures:* Match enclosing walls to the building wall material. When this is not possible, metal slats and planting may be used. In some cases, plant material by itself may be used to conceal the service area, but it must functionally con-

ceal at the time of planting. All enclosures need to be at least six feet tall. If the items being concealed are taller than six feet then the enclosure should be as tall as the tallest item in the enclosures.

- *Gates:* Provide gates for trash enclosures.
- *Subdivide:* Organize and layout the service yard by responsibility. For instance, HVAC equipment should not be in the trash enclosure. Many of the functions may require separation and separate access such as tools, lawn mowers, fuel, etc.
- *Pavement:* Provide vehicular access and surfacing such as pavement or gravel to reduce maintenance. Use concrete curbs or edging.

4. Interior Design Policy

Air Combat Command standards differentiate based on whether a finish will be permanent or non-permanent. The differentiation is necessary due to the color palette changes each year. Generally permanent finishes last longer and consequently need to be a color that will not become dated after a few years. Non-permanent finishes do not last as long and can be updated to the new colors as they change.

4a. Permanent Finishes

Command Standards require that all permanent finishes be in either brown-tone or gray-tone neutrals. These neutral shades can

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be from very light (such as off-white relating to the particular color tone) to a mid-range neutral of this same shade.

- *Special Note:* Neutrals can be tricky! It is important to choose true neutrals. A true neutral is one that can work in combination with almost any other color in the spectrum. A brown-tone neutral with a pink or yellow base will not work this way nor will a gray-tone neutral with a blue or green base.

4b. Non-Permanent Finishes

Command Standards allow non-permanent finishes to be any coloration appropriate to the facility. Most often these finishes will be in mid-range colorations. Very seldom would there be a use for pastel or very bright colors in our facilities. However, primary colors of red, yellow, blue and green may be used in youth centers, child care centers or bowling centers!

While non-permanent finishes are allowed in various colors, it is highly recommended that in office and other work areas, the vinyl wall covering or painted wall surfaces also be kept in a neutral coloration. Light reflective surfaces are important to a productive work environment. Dark colors absorb light. In other words, for work areas, develop a neutral shell for the interior space with only the carpet, upholstery, and artwork providing the color accent. This is the way most large corporations develop

their interior plans. Remember, all the people who occupy these spaces bring color into them each day.

4c. Finishes and Treatments

- *Vinyl wall covering:* Should be Type II in most applications. Type I has very limited use in most of our facilities. A vertical texture will help hide seaming.
- *Paint:* Use a low sheen enamel for all painted surfaces. Flat paint is impossible to maintain in our facilities.
- *Laminates:* Laminate surfaces are much more maintainable if the laminate has a flecked, speckled, mottled, texture or granite-look. Soiling and water spotting is not nearly so visible on these surfaces.
- *Ceilings:* In almost all facilities, ceilings (whether painted or ceiling tile), are to be off-white to coordinate with the color tone of the walls. Textured ceiling tiles in two foot squares with a regular edge are recommended.
- *Wainscot and Chair Rail:* Wainscot is not recommended in most areas. Dark paneling wainscot has the effect of visually reducing the size of small office spaces. In long hallways wood panel wainscot has a railroading effect. A Type II heavy duty vinyl wallcovering will have a better effect. If paneling is required, cover one accent wall floor to ceiling. The purpose of chair rail is to protect wall surfaces from being marred by chair



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backs. Therefore, the chair back height must be considered to properly locate the chair rail. It may be stained or painted to coordinate with the other woodwork or doors. Wainscot and chair rail should be no more than 36" high in rooms and no more than 42" high in corridors. Heavy vinyl bumper guards may also be used to protect walls in corridors where needed. They, too, should be in coordinating neutrals.

- *Vinyl/Rubber Base and Carpet Base:* Use vinyl/rubber base in areas where the floor surface is vinyl composition tile (VCT) or rubber tile. Base is to be in a coordinating neutral to the floor surface, as near the same shade as possible. Do not use a dark color or accent color for the base. Use a four inch carpet base capped with a dark neutral vinyl/rubber carpet cap in carpeted areas. Use the same carpet for the base as meets the wall in the case of borders. When carpet tile is used it will be necessary to use a vinyl/rubber base. Choose a neutral that will most closely relate to the carpet coloration or wall coloration. With carpet tile, a straight base must be used (one without a cove foot) and installed first with the carpet tile butted up to it. In ceramic tile areas, if a base is used it will be a coordinating ceramic tile base.
- *Ceramic Tile:* Use a mottled, flecked or specked floor tile, if at all possible. Also, be sure to use a dark tone grout which coordinates with the floor tile to avoid a stained or soiled appearance. Tile banding accents or patterns are approved for walls and floors provided the accent is another neutral shade which coordinates with the dominant tile color.
- *Doors and Door Frames:* Depending on the quality of the doors, they may be either stained or painted. If painted, they may be painted either a color close to the wall color or an accent color of mid-range hue. Hollow metal door frames are best painted a color close to the wall color or only a shade or two darker.
- *Window Blinds:* Metal or vinyl blinds may be horizontal or vertical and are best in off-white or light neutrals. Dust is not as visible on the light colors as on the dark colors, and vertical blinds collect less dust than horizontal ones. Dark blinds that match the anodized finish of the window frames are acceptable, provided the windows are of reflective glass. If the windows are not of reflective glass, dark blinds will radiate a great deal of heat into the building rather than reflecting it as light or off-white blinds do.
- *Carpet:* (See ETL 94-3: Air Force Carpet Standard and revised ACC Carpet Guidance - dated 12 Oct 1993). In general, use mainly bold tweed, nylon, level-loop carpet of a least 28 oz. face weight. Bold tweed means yarns of several different colors, not various shades of the

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same color. Level-loop is the most hard-wearing type of carpet, and bold tweed allows for several upholstery color coordinations in a facility using only one carpet color-way. Again, use a 4" carpet base capped with a vinyl/rubber, dark neutral carpet cap.

- *Dormitory Carpet:* Carpet dormitories by using one carpet pattern per building with a different color-way per floor. Take care to ensure that carpet used in living areas is not the same carpet used in the work areas on base. Do not use drab, dull colors in living areas. Bedspreads and chair upholstery can be coordinated per floor to the carpet color-way. Draperies in these small living areas are best kept in neutral colorations to blend in with the walls. This provides a neutral background for personal items of the occupants.
- *Carpet Borders:* Carpet borders may be solid in color. They may be used with either carpet tile or roll goods. Be careful not to over-do borders. In corridors, a border width of 9" is about right. Install field carpet in rectangular shapes and allow border to fill in indentation such as doorways, drinking fountains, etc. Do not use borders in rooms where the furniture will cover the border.
- *Systems/Prewired Workstations/Modular Furniture:* All panel fabrics, work surfaces, flipper doors, etc., are to be in either brown-tone or gray-tone neutrals. Only one type of systems furniture

should be used per building in order to allow greater flexibility in reconfiguration as occupants, needs and requirements change and to provide continuity throughout the space. Systems furniture should be installed over carpet tiles. Removal and installation of new carpet in 12 foot widths becomes a major undertaking. A professional team must be hired to dismantle, store, then re-install the systems furniture. This is not efficient or cost effective. Carpet tile will allow for self-help replacement and ease of maneuvering under the systems furniture. Carpet tile will also accommodate flat-wiring for electrical and communications under the carpet.

5. Landscape Design Policy

All landscape planting should comply with the base land management plan. Develop functional rather than purely visual landscapes and preplan to reduce maintenance. Provide a landscaped space uncluttered by vehicles in front, at the entrance, and between the main viewing street and the building.

- *Mowing strips:* Provide planting beds with wide mowing strips such as 4-inch thick by 12-inch wide concrete; mowing strips should eliminate hand trimming and edging caused by turf creeping into bedding plants.
- *Plant Material:* Use indigenous, low maintenance, adapted trees and shrubs



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locally recommended for urban or street use that can survive without irrigation after the first season (one year) warranty maintenance period. Do not use plant material that drops large amounts of fruit or seed pods. Select deciduous trees that drop all their leaves early in the fall season rather than those that retain brown leaves most of the winter and continue to be a maintenance problem for many months; some trees to avoid are Sycamore, Beech, and some Oaks.

- *Surface Runoff:* Use trees, shrubs, grass and landscaping to reduce stormwater runoff. Terrace steep slopes.
- *Berms:* Use berms to screen and restrict views. Limit berm slope to one foot in 10 feet. Do not use earth berms against building walls.
- *Function:* Use landscape to reduce energy cost: shade to prevent heat and glare, and wind breaks to lessen air infiltration. Use landscape to screen unsightly views, control pedestrian circulation and define entries.

6. Sign Design Policy

Provide signs that comply with base architectural compatibility. Comply with sign standards provided in ACCR 88-1, Exterior Signs.

- *Moving Signs:* Do not use moving or revolving signs.

- *Monument:* Use of pole mounted or AAFES concession monument signs is a local base decision that has to consider suitability in terms of base architectural compatibility issues. Base personnel should decide this issue.
- *Lettering Size:* For signs other than those covered by ACCR 88-1, size lettering according to the functional viewing distance. Keep sign size to a minimum. The rule to follow for readability is one inch of letter height for each 25 feet of view distance. Example: If a sign is intended to be read from a passing car using a road 100 feet away, the largest sign lettering would be four inches (100 divided by 25 equal 4). Do not over-size.

AAFES/DeCA/Commercial Signs

- Logo and lettering supplied by AAFES/DeCA/or the parent organization are required to be light to dark bronze. It must also be in compliance with the standards that follow.
- Format shall be the AAFES logo followed by the facility name; i.e., AAFES BASE EXCHANGE. This format shall be used for all AAFES facilities including shoppettes, laundry and dry cleaners, military clothing sales, class six stores.
- Logo and facility name shall be the same height and positioned on one continuous horizontal line wherever possible.

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- Facility name shall be spelled out completely with individual letters.
- Logo and letters shall be mounted directly to the building fascia or exterior wall adjacent to the facility's main entrance. The back edge of logo and letters shall be ¼ inch from the face of the wall or fascia.
- Logo and letters shall be light or dark bronze anodized aluminum or other noncorrosive material in a light or dark bronze color. Select finish color for maximum contrast and readability.
- Logo and letters shall be available in even height increments from 2 inches to 16 inches. Choose the appropriate size and color for each facility and location.
- The ratio of height to depth of logo and letters shall be approximately 8 to 1.

Lighted Signs

Internally lighted signs create a commercial impression that is not compatible with ACC goals. When night visibility is functionally required, use external flood or spot lights that illuminate both the sign and adjacent landscape or building. Illumination of the sign with its surroundings makes a better impression and improves orientation.

Lettering

All lettering on all base signs should be of the same style. Upper case Helvetica medium type style is recommended.

6a. Exterior Graphics, Striping and Banding

- *Super Graphics:* Painted stripes and letters may be used to rehabilitate large, plain, existing buildings. Design graphics to function: define entrances, identify building numbers, conceal clutter. Proportion graphics to the building size; do not exceed three feet in height of letters or banding for the largest buildings.
- *Use:* Use graphics to relate buildings to each other instead of making a building prominent.
- *Limits:* Graphics are not required on every building. Too much graphic work reduces a building to a billboard. Except for painted masonry and metal buildings, identification signage should be located in adjacent landscaped space at eye level rather than being attached to walls or fascia. This will provide a better impression of the total base. A building's order of importance should be established by factors such as quality of architecture and landscape, not size and location of signage.
- *New Buildings:* Do not use high-color-contrasting bands and strips on new buildings. Use masonry detailing, or texture changes to provide interest. This does not apply to exposed aggregate panels when used as a fascia.



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- *Structural Elements:* Do not paint structural columns and beams. This approach generally creates clutter. Instead, design a banding scheme that relates the building to other buildings on the base.

